2021 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference

Advance Programme

Virtual Meeting

CEST time zone

21 - 25 June 2021

www.cleoeurope.org

Sponsored by

- European Physical Society / Quantum Electronics and Optics Division
- IEEE Photonics Society
- The Optical Society

WORLD OF PHOTONICS CONGRESS

25th International Congress on Photonics in Europe

Collocated with Laser World of Photonics Industry Days

https://world-of-photonics.com/en/

Messe München International

10th EPS-QEOD Europhoton Conference

EUROPHOTON

SOLID-STATE, FIBRE, AND WAVEGUIDE COHERENT LIGHT SOURCES

28 August – 02 September 2022
Hannover, Germany

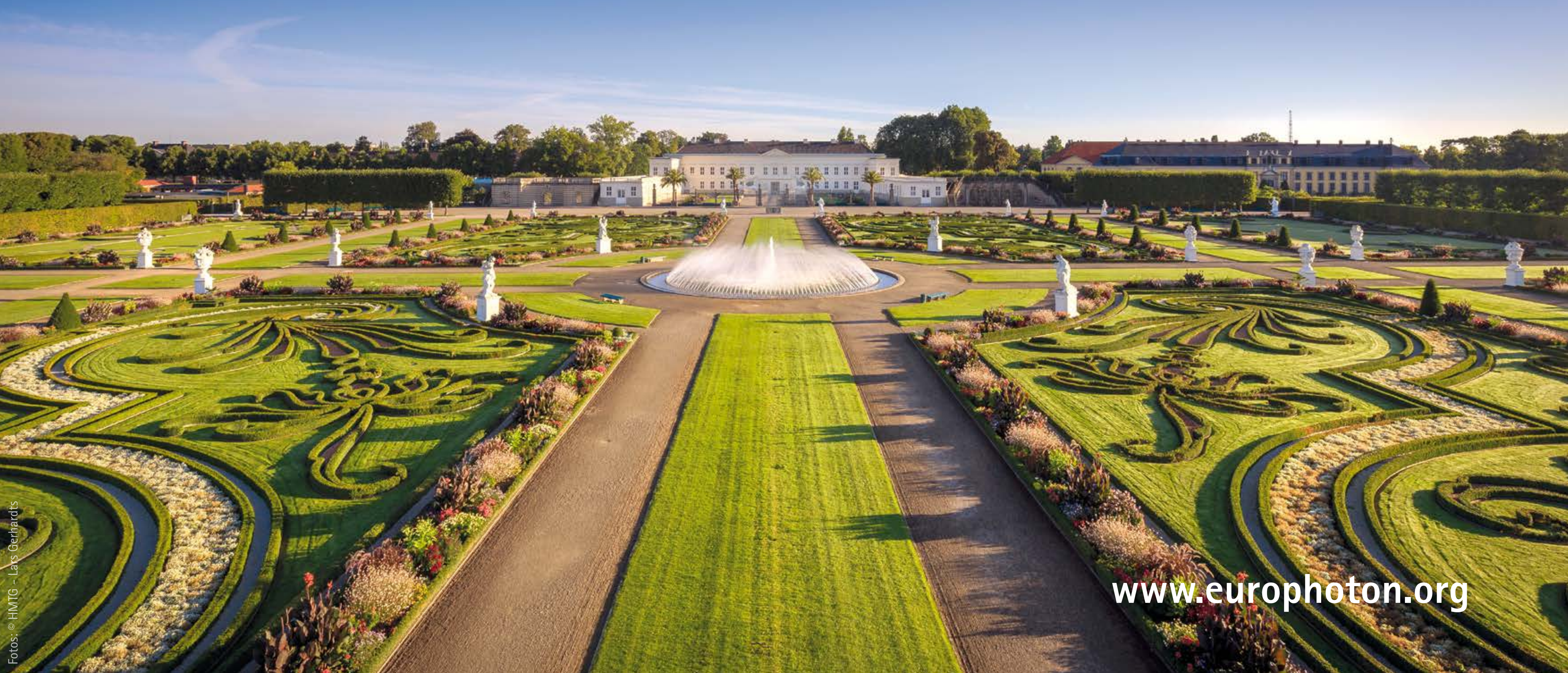

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TABLE OF CONTENTS

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CLEO®/Europe - EQEC 2021

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- IEEE Photonics Society
- The Optical Society

Also sponsored by

- World of Photonics Congress

- EPS Young Minds

Welcome to the 2021 Conference on Lasers and Electro-Optics Europe & European Quantum Electronics Conference (hereafter CLEO®/Europe-EQEC) at the World of Photonics Congress 2021

Following on from the very successful previous conferences held in Amsterdam (1994), Hamburg (1996), Glasgow (1998), Nice (2000) and Munich (2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019), the General and Programme Chairs warmly welcome you to the 2021 CLEO®/Europe-EQEC conference, which will take place virtually from June 21 – 25, 2021. CLEO®/Europe-EQEC targets university and industry scientists and researchers as well as students and graduates. We extend a special welcome to attending young researchers, postgraduate and PhD students, and we wish them every success, especially if this is their first participation in a major scientific conference.

The CLEO®/Europe-EQEC conference series has established a strong tradition as the largest, most comprehensive and prestigious gathering of optics and photonics researchers and engineers in Europe. With technical co-sponsorship provided by the European Physical Society (EPS), the Institute of Electrical and Electronics Engineers (IEEE) Photonics Society, and the Optical Society (OSA), CLEO®/Europe and EQEC have a strong international presence in the complementary research areas of laser science, photonics and quantum electronics.

More specifically, CLEO®/Europe emphasizes applied physics, optical engineering and applications of photonics and laser technology, whereas EQEC addresses more basic research in laser physics, nonlinear optics and quantum optics.

CLEO®/Europe will showcase the latest developments in a wide range of laser and photonics areas including solid-state lasers, semiconductor lasers, terahertz sources and applications, applications of nonlinear optics, optical materials, optical fabrication and characterization, ultrafast optical technologies, high-field laser and attosecond science, optical sensing and microscopy, optical technologies for communications and data storage, fibre and guided wave lasers and amplifiers, micro- and nanophotonics, photonic applications in biology and medicine, and material processing.

EQEC will feature the fundamentals of quantum optics and ultracold quantum matter, quantum information, quantum communication and sensing, topological states of light, precision metrology, ultrafast optical science, nonlinear phenomena, solitons, and self-organization, plasmonics and metamaterials, two-dimensional and novel materials, and theoretical and computational photonics modelling.

CLEO®/Europe-EQEC creates a unique forum where participants can obtain informative over-views and discuss recent advances on a wide range of topics, from fundamental light-matter interaction and new sources of coherent light to technology development, system engineering and various applications of photonics.

Over five days CLEO®/Europe-EQEC 2021 will virtually showcase around 1400 technical contributions in the form of oral presentations in parallel sessions and posters from university, research organisations and industry, drawn from all countries around the world, and will provide an unparalleled opportunity to bring together scientists, engineers and users of laser and photonics technologies under the same roof.

Particular highlights of the 2021 programme will be a series of symposia:

Nanophononics, High-Field THz Generation and Applications, Attochemistry, Deep learning in Photonics and Flexible Photonics.

Additionally, two joint sessions (ECBO-CLEO®/Europe and LiM-CLEO®/Europe) will be held.

As usual a series of prestigious EPS-QEOD Prizes and Awards will be remitted during a special Plenary and Award Ceremony to take place on Tuesday 22 June 2021 from 09:00 to 10:30.

This year, the meeting will not be complemented by the **LASER World of Photonics**, the world's largest tradeshow of laser and optical technology, which is rescheduled to take place in person in Munich, Germany, April 26–29, 2022. However, from June 21 to 24, 2021, Messe Munich will present the **"LASER World of PHOTONICS Industry Days"** on the World of Photonics Stage. This will take place in parallel to the digital **World of Photonics Congress** and offer the photonics community a platform for information exchange and networking. You can expect exciting presentations on market figures and the photonics applications of tomorrow, as well as quantum optics and many interesting showrooms. See https://www.world-of-photonics.com/en/

Conference Structure and Technical Sessions

CLEO®/Europe-EQEC consists of a large number of technical presentations in a number of different formats:

Plenary talks are broad-scope, 60-minute long talks given by these world-leading scientists, and are accessible to a general technical audience including conference attendees, exhibitors, and exhibit visitors. Plenary talks are not held in parallel with other sessions, allowing maximum possible attendance. The 2021 Plenary Talks will be presented by **Reinhard Genzel**, 2020 Nobel Prize Co-Laureate (World of Photonics), Monday, 11:00–12:30, Robert W. Boyd (CLEO®/Europe), Monday, 16:30–17:30 and Nirit Dudovich (EQEC), Tuesday, 9:00–10:30.

Tutorials (60-minute talks) and **Keynote presentations** (45-minute talks) are also given by the world leaders in particular technical areas. They are generally directed at a more specific audience, and are thus delivered in parallel with other sessions. Keynotes provide a survey of exciting recent developments, and Tutorials are particularly valuable for those unfamiliar with a particular field.

In addition to these talks the conference will feature invited talks, orals and poster presentations.

Other very much appreciated CLEO®/Europe-EQEC meetings are the special Symposia settled to anticipate and capture emerging fields in optics by giving emphasis to fast developing, well defined topics. Five symposia have been identified for CLEO®/Europe-EQEC 2021:

- JSI – Nanophononics
- JSII – High-Field THz Generation and Applications
- JSIII – Attochemistry
- JSIV – Deep Learning in Photonics
- JSV – Flexible Photonics

CLEO®/Europe-EQEC 2021 will also present **twelve short courses**. All courses at additional cost will take place in parallel on Wednesday 23 June 2021 (16:30 to 20:00) in the exception of one course which will take place the same day in the morning (08:30 to 12:00) due to time zone constraints of the instructor.

The conference will also feature two post-deadline sessions on Thursday evening, 24 June 2021 (18:30 to 20:00). Their purpose is to give the audience the chance to listen to the latest breaking news in optics, and these are usually one of the most attractive events that certainly contribute to the great atmosphere that makes the CLEO®/Europe-EQEC conference a unique meeting.

In addition to the technical sessions involving oral presentations, all scientific areas of both CLEO®/Europe and EQEC will be covered in **poster sessions**, which will provide an interactive and less formal way for researchers to discuss their work, interact and exchange ideas.

CLEO®/Europe-EQEC is now established as the largest and most comprehensive gathering of optics and photonics researchers and engineers in Europe, spanning classical and quantum optical science, laser technology and photonics applications.

The conference programme could not have been elaborated without the vital support and effort of **275 scientists, forming 13 CLEO®/Europe, 10 EQEC, 5 Joint Symposia and 2 Joint Sessions sub-committees**, who have assembled an excellent series of talks and posters covering a wide range of fields in optics and quantum electronics. The technical programme featuring more than 1400 presentations will consist of **3 Plenary talks** (CLEO®/Europe, EQEC, WoP Congress), **5 Tutorial talks, 9 Keynote talks, 72 invited talks, 20 talks upgraded to invited, 914 oral presentations and 408 poster presentations**. Additionally, **18 oral presentations** will be featured in the two post-deadline sessions to take place on Thursday evening.

During the conference week, **199 oral sessions and 9 poster sessions** will be featured.

The Conference Chairs would like to extend their sincere thanks to the technical programme committee members for all their hard and fruitful work. A conference as large as CLEO®/Europe-EQEC requires two years of planning and organisation. Here, we also thank the staff of the European Physical Society, and the local conference chair in Munich for invaluable professional assistance during this period. We thank Messe München GmbH, the World of Photonics Congress steering committee, the CLEO/Europe-EQEC steering committee and all the Sponsoring Societies for their guidance, support, and their invaluable advice, which ensures that this event not only remains at the core of optics and photonics research for many nations, but will also be a major event in Europe.

Let us finally thank our attendees. The real success of CLEO®/Europe-EQEC 2021 indeed rests on the efforts and commitments of these researchers and students, who all contribute to the tremendous evolution of our research field and to the high quality of the papers that will be presented.

We wish you all a lively, fruitful, and enjoyable 2021 virtual conference, and we are looking forward to seeing you in-person in Munich in 2023!

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Austrian Physical Society
Belarusian Physical Society
Belgian Physical Society
Union of Physicists in Bulgaria
Croatian Physical Society
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Icelandic Physical Society
Israel Physical Society
Italian Physical Society
Latvian Physical Society
Liechtenstein Scientific Society (Physical Section)
Lithuanian Physical Society
Association Luxembourgeoise des Physiciens
Moldovan Physical Society
Physical Society of Montenegro
Netherlands Physical Society
Norwegian Physical Society
Polish Physical Society
Portuguese Physical Society
Society of Physicists of Macedonia
Romanian Physical Society
United Physical Society of the Russian Federation
Serbian Physical Society
Slovak Physical Society
Society of Mathematicians Physicists and Astronomers of Slovenia
Spanish Royal Physics Society
Swedish Physical Society
Swiss Physical Society
Turkish Physical Society
Ukrainian Physical Society
The Institute of Physics (IOP)

	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
08:30	CA-1 Visible Lasers	CB-1 Photonic Crystal and Membrane Lasers	CE-1 Photonic Structures	CF-1 Ultrashort Pulse Generation	CG-1 Ultrafast Dynamics in Solids	CK-1 Periodic Components
09:00						
09:30						
10:00	CA-P CA Poster Session	CB-P CB Poster Session	CI-P CI Poster Session	JSV-P JSV Poster Session		
10:30						
11:00	PL-1 Welcome Words and World of Photonics Congress Plenary Talk by 2020 Nobel Prize Co-Laureate					
11:30						
12:00						
12:30						
13:00						
13:30	EA-P EA Poster Session	EB-P EB Poster Session	EJ-P EJ Poster Session			
14:00						
14:30	CE-2 Semiconductor for Photonic Devices	CD-1 Nonlinear Metasurfaces	CA-2 2-µm Lasers	CH-1 Gas Sensing	CJ-1 Coherent Beam Combining	CK-2 Novel Integrated Components
15:00						
15:30						
16:00	PL-2 CLEO/Europe Plenary Talk					
16:30						
17:00						
17:30						
18:00	CC-1 THz Strong Field Applications	CL-1 Laser-Tissue Interactions and Surgery	EJ-1 Optical Computing and Artificial Intelligence	JSV-2 Flexible Photonic Devices	JSII-2 Applications of Strong THz Fields	ED-2 Optical Computing and Artificial Intelligence
18:30						
19:00						
19:30						
20:00						

Monday at a glance

🕒	ROOM 7	ROOM 8	ROOM 9	ROOM 10	ROOM 11	ROOM 12
08:30	EB-1 Quantum Networks	EC-1 Band Topology I	JSI-1 Theory and Numerical Modeling for Nanophononics	JSII-1 Strong-field THz Generation	ED-1 Precision Spectroscopy and Fundamental Metrology I	JSV-1 Flexible Photonic Materials and Integration
09:00						
09:30						
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12:00						
12:30						
13:00						
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14:00						
14:30	CM1 Laser Induced Periodic Surface Structures	JSIII-1 Theoretical Perspectives in Attochemistry	EF-1 Mode-Locking Phenomena	EG-1 Emission Control at the Nanoscale	EH-1 Extreme and Ultrafast Phenomena in Plasmonics and Metamaterials	CG-2 Controlled and Intense XUV Light
15:00						
15:30						
16:00						
16:30						
17:00						
17:30						
18:00	EB-2 Integrated Devices and Memories	CD-2 Solitons	EI-1 Towards Applications and Perovskites	JSIII-2 Experimental Progress in Attochemistry	EF-2 Turbulence and Nonlinear Effects	CH-2 Raman Spectroscopy
18:30						
19:00						
19:30						
20:00						

Tuesday at a glance

	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
08:30						
09:00	PL-3 EQEC Plenary Talk and Award Ceremony					
09:30						
10:00						
10:30						
11:00	EA-1 Waveguide-QED and Atom-light Interfaces	EB-3 Photonic Quantum Computation	CC-2 Nonlinear THz Spectroscopy and Techniques	CL-2 Biological and Clinical Applications	EE-1 Ultrafast Phenomena in Waveguides	CK-3 Integrated Photonics Devices
11:30						
12:00						
12:30						
13:00						
13:30	CD-P CD Poster Session	ED-P ED Poster Session				
14:00						
14:30	SP-1 Herbert Walter Award & Wolfgang Peter Schleich Talk					
15:00						
15:30						
16:00						
16:30	ED-3 Precision Spectroscopy and Fundamental Metrology II	CD-4 Microresonators	CG-3 Ultrafast Spectroscopy	CA-3 High-intensity and Nonlinear Systems	EC-2 Nonlinear Topology	EI-2 From Single Photons to Engineered Photonic Environments
17:00						
17:30						
18:00						
18:30	ED-4 Frequency Standards and Miniaturized Comb Platforms	EA-2 Cold Molecules	CG-4 Chemical Reactions and Molecular Dynamics	CJ-2 Mode-locked Fiber Lasers above 2 Micron	CA-4 Novel Laser Concepts	CD-5 Supercontinuum Generation
19:00						
19:30						
20:00						

Tuesday at a glance

	ROOM 7	ROOM 8	ROOM 9	ROOM 10	ROOM 11	ROOM 12
08:30						
09:00						
09:30						
10:00						
10:30						
11:00	EH-2 New Perspectives in Metamaterials and Nanophotonics	CI-1 Broadband Systems	EJ-2 Nonlinear Optics Modeling	CD-3 Microresonators and Waveguides	CH-3 Advanced Optical Sensing Techniques	CF-2 Ultrafast UV Sources
11:30						
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15:30						
16:00						
16:30	EH-3 Advanced Control of Light with Metasurfaces	CB-2 High Power Semiconductor Lasers	CE-3 Fabrication and Characterization Techniques	CH-4 Fiber-based Sensors II	EB-4 Nonclassical Light Sources	
17:00						
17:30						
18:00						
18:30	CE-4 Luminescent Materials	EB-5 Long-Range Distribution of Entanglement I	EC-3 Bound States and High-order Topology	CF-3 Nonlinear Pulse Propagation	CH-5 Imaging in Scattering Media	CC-3 High Power THz Sources
19:00						
19:30						
20:00						

Wednesday at a glance

	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
08:30	JSI-2 Phononic Crystals and Acoustic Metamaterials	CA-5 Mid-infrared Lasers	CB-3 Technologies for LIDAR Applications	CC-4 Novel Approach THz Sources	CE-5 Micro and Nanostructures	CF-4 Ultrafast Lasers
10:00	CC-P CC Poster Session	CF-P CF Poster Session	CE-P CE Poster Session	JSII-P JSII Poster SessionMetamaterials		
11:00	CJ-4 Mode-locked Fiber Lasers	CH-6 On-chip Solutions for Optical Sensing	CF-5 Ultrashort Pulses in the mid-IR	CM-2 Semiconductor Processing	CB-4 Quantum Cascade Lasers	EG-3 Coupling at the Nanoscale II
12:30						
13:30	EC-P EC Poster Session	EH-P EH Poster Session	EI-P EI Poster Session	JSI-P JSI Poster SessionMetamaterials	SP-2 Hot Topics: What's Next in Integrated Frequency Combs	
14:30	CH-7 Microscopy and Imaging Sensors	CF-6 Ultrafast Mid-IR Sources	CM-3 Temporal and Spatial Beam Shaping for Laser Processing I	CB-5 Mid-infrared Semiconductor Lasers	EG-4 Nonlinear and Ultrafast Nano-optics	CE-7 Integrated Optoelectronic Devices
16:00						
16:30	SH-1 Short Course 1: Ultrashort Pulse Characterization	SH-2 Short Course 2: High-power Fiber Lasers	SH-3 Short Course 3: Optical Parametric Oscillators	SH-4 Short Course 4: Laser Beam Analysis, Propagation, and Spatial Shaping	SH-5 Short Course 5: Practical Quantum Optics	SH-6 Short Course 6: Mid-infrared Semiconductor Lasers
20:00						

Wednesday at a glance

	ROOM 7	ROOM 8	ROOM 9	ROOM 10	ROOM 11	ROOM 12
08:30	EG-2 Coupling at the Nanoscale I	EC-4 Band Topology II	CI-2 Digital Signal Processing	CJ-3 Multimode Nonlinear Fiber Optics and SC Generation	CD-6 Guided Wave Devices	SH-12 Short Course 12: Finite Element Modelling Methods for Photonics
09:00						
09:30						
10:00						
10:30						
11:00	CE-6 Materials for Waveguides and Resonators	EA-3 Quantum Optomechanics and Detectors	EF-3 2D Transverse Dynamics and Quantum Effects	CA-6 High-Power Yb-lasers	EB-6 Long-Range Distribution of Entanglement II	
11:30						
12:00						
12:30						
13:00						
13:30						
14:00						
14:30	EA-4 Cavity-QED and Cold Gases	EF-4 Nonlinear Regimes in Optical Fibers	CA-7 Ultrafast Lasers	EB-7 Quantum Imaging and Interference	EI-3 Graphene Heterolayers	EJ-3 Tailored Light
15:00						
15:30						
16:00						
16:30	SH-7 Short Course 7: THz Measurements and their Applications	SH-8 Short Course 8: Nonlinear Crystal Optics	SH-9 Short Course 9: Frequency Combs Principles and Applications	SH-10 Short Course 10: Silicon Photonics	SH-11 Short Course 11: Optics in Graphene and other 2D Materials	
17:00						
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18:30						
19:00						
19:30						
20:00						

	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
08:30	JSI-3 Nanophononic and Optomechanical Systems. Radiative Heat Transfer Thermal Rectification	CG-5 Symmetries in Ultrafast Science	CH-8 Spectroscopy at the Molecular Level	CB-6 Integration on Silicon	CA-8 Laser Beam Control	CM-4 Surface Engineering and Functionalisation
09:00						
09:30						
10:00	CG-P CG Poster Session	EE-P EE Poster Session	EF-P EF Poster Session			
10:30						
11:00	CA-9 Laser Materials	CB-7 Short Wavelength Sources and Applications	CC-5 THz Imaging	CD-7 Tunable Light Sources	CF-7 Nonlinear Spectral Broadening	CI-3 Microwave Photonics
11:30						
12:00						
12:30						
13:00						
13:30	CJ-P CJ Poster Session	CK-P CK Poster Session	CL-P CL Poster Session			
14:00						
14:30	CL + ECBO JS Advances in Deep Tissue Imaging	CH-9 Hyperspectral Imaging	CF-8 Ultrashort Pulse Characterization	CM-5 Temporal and Spatial Beam Shaping for Laser Processing II	EG-6 Resonant Dielectric Nanostructures	CE-10 Crystals, Glasses and Ceramics
15:00						
15:30						
16:00						
16:30	CM-6 Joint Session CM with LiM	CD-9 Nonlinear Applications at Extreme Wavelengths	CJ-6 Fiber Laser Components	CK-6 3D Fabrication Techniques and Components	EC-6 Topology in Driven-dissipative Systems	CH-10 Optical Metrology
17:00						
17:30						
18:00						
18:30	PD-1 CLEO/Europe Postdeadline Session	PD-2 CLEO/Europe Postdeadline Session				
19:00						
19:30						
20:00						

	ROOM 7	ROOM 8	ROOM 9	ROOM 10	ROOM 11	ROOM 12
08:30	CK-4 Silicon Photonics	EE-2 HHG in Condensed Matter	EF-5 Micro-combs in Microresonators	EH-4 Plasmonics for Enhanced Light-Matter Interaction	CE-8 Materials and Fabrication of Specialty Optical Fibers	EG-5 Light-driven Phenomena at the Nanoscale
09:00						
09:30						
10:00						
10:30						
11:00	CK-5 Beam Manipulation	EA-5 Quantum Light Sources	EB-8 Quantum Computation and Error Correction	EC-5 Emerging Trends in Topology	EF-6 Dissipative Solitons I	CE-9 Nonlinear and Meta-materials
11:30						
12:00						
12:30						
13:00						
13:30						
14:00						
14:30	CJ-5 Pulsed Fiber Laser	EF-7 Symmetry Breaking, Geometrical and Topological Effects	CB-8 Semiconductor-based Frequency Combs	CD-8 Quantum Technologies	JSIV-1 Optical Computing I	EE-3 Ultrafast Molecular Dynamics
15:00						
15:30						
16:00						
16:30	EA-6 Polaritons and Quantum Fluids of Light	CL-3 Advanced Biological Microscopy	EE-4 Ultrafast Characterisation and Manipulation at Nanoscale	JSIV-2 Learning in Imaging and Metrology I	CB-9 Dynamics and Novel Concepts in Semiconductor Lasers	
17:00						
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18:00						
18:30						
19:00						
19:30						
20:00						

	ROOM 1	ROOM 2	ROOM 3	ROOM 4	ROOM 5	ROOM 6
08:30	JSI-4 Optophononic and Optothermal Characterization and Techniques	CC-6 THz Devices and Communications	CG-6 Lasers and High-Order Harmonic Generation	CJ-7 Mid-IR Fiber Laser Sources and Components	EA-7 Quantum Interferences	EB-9 Quantum Tomography and State Estimation
09:00						
09:30						
10:00	CH-P CH Poster Session	EG-P EG Poster Session	JSIV-P JSIV Poster session			
10:30						
11:00	CH-11 Quantum Sensing and Imaging	CI-4 Emerging Technologies for Telecommunications	CF-9 Sources for Dual Comb Spectroscopy	CM-8 Modelling and In-situ Diagnostics	CD-10 Nonlinear Spectroscopy and Microscopy	CL-4 Spectroscopy, Label-Free Imaging and Sensing
11:30						
12:00						
12:30						
13:00						
13:30	CM-P CM Poster Session					
14:00						
14:30	CD-11 All-optical Control and Wavelength Conversion	CL-5 Dynamic and Advanced Light Shaping	EH-6 Applications of Metamaterials and Metasurfaces	CJ-9 Speciality Fiber Lasers	CK-9 Novel Technologies and Materials for Micro-photonics	CC-8 THz QCL-combs and Imaging
15:00						
15:30						
16:00						
16:30	CD-12 Raman Amplification and Nonlinear Media	CJ-10 Fiber Optical Techniques and Applications	CK-10 Micro and Nano Resonators	CH-13 Temporally and Spatially Structured Beams and Microscopy	CI-5 Transmission Devices	JSIV-5 Learning Metasurfaces - Nanostructures – Spectroscopy
17:00						
17:30						
18:00						
18:30						
19:00						
19:30						
20:00						

	ROOM 7	ROOM 8	ROOM 9	ROOM 10	ROOM 11	ROOM 12
08:30	EF-8 Dissipative Solitons II	CK-7 Photonic Crystals	EG-7 Electron-light Interactions	EI-4 Many Body States and Non-linear Dynamics	CM-7 Surface and Volume Processing	
09:00						
09:30						
10:00						
10:30						
11:00	CJ-8 Power Fiber Lasers	CK-8 Non-Linear Integrated Photonics	EE-5 Novel Ultrafast Sources	EH-5 Hybrid, Tunable and Nonlinear Metasurfaces	CC-7 THz QCL	JSIV-3 Optical Computing II
11:30						
12:00						
12:30						
13:00						
13:30						
14:00						
14:30	JSIV-4 Learning in Imaging and Metrology II	CH-12 Fiber-based Sensors I	CG-7 High-Repetition XUV and X-ray Sources			
15:00						
15:30						
16:00						
16:30	CM-9 3D Laser Structuring of Transparent Materials	CF-10 Strong Field and Ultrafast Phenomena				
17:00						
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18:30						
19:00						
19:30						
20:00						

PLENARY SESSIONS

PL-1 Welcome Words and World of Photonics Congress Plenary Talk by 2020 Nobel Prize Co-Laureate
Monday, 11:00 - 12:30, ROOM 1

PL-2 CLEO/Europe Plenary Talk
Monday, 16:30 - 17:30, ROOM 1

PL-3 EQEC Plenary Talk and Award Ceremony
Tuesday, 09:00 - 10:30, ROOM 1

SPECIAL EVENTS

SP-1 Herbert Walter Award & Wolfgang Peter Schleich Talk
Tuesday, 14:30 - 15:30, ROOM 1

SP-2 Hot Topics: What's Next in Integrated Frequency Combs
Wednesday, 13:30 - 14:30, ROOM 5

CLEO®/EUROPE 2021 SESSIONS

CA – SOLID-STATE LASERS

CA-1 Visible Lasers
Monday, 08:30 -10:00, ROOM 1

CA-P CA Poster Session
Monday, 10:00 - 11:00, ROOM 1

CA-2 2-µm Lasers
Monday, 14:30 - 16:00, ROOM 3

CA-3 High-intensity and Nonlinear Systems
Tuesday, 16:30 - 18:00, ROOM 4

CA-4 Novel Laser Concepts
Tuesday, 18:30 - 20:00, ROOM 5

CA-5 Mid-infrared Lasers
Wednesday, 08:30 - 10:00, ROOM 2

CA-6 High-Power Yb-lasers
Wednesday, 11:00 - 12:30, ROOM 10

CA-7 Ultrafast Lasers
Wednesday, 14:30 - 16:00, ROOM 9

CA-8 Laser Beam Control
Thursday, 08:30 - 10:00, ROOM 5

CA-9 Laser Materials
Thursday, 11:00 - 12:30, ROOM 1

CB – SEMICONDUCTOR LASERS

CB-1 Photonic Crystal and Membrane Lasers
Monday, 08:30 - 10:00, ROOM 2

CB-P CB Poster Session
Monday, 10:00 - 11:00, ROOM 2

CB-2 High Power Semiconductor Lasers
Tuesday, 16:30 - 18:00, ROOM 8

CB-3 Technologies for LIDAR Applications
Wednesday, 08:30 - 10:00, ROOM 3

CB-4 Quantum Cascade Lasers
Wednesday, 11:00 - 12:30, ROOM 5

CB-5 Mid-infrared Semiconductor Lasers
Wednesday, 14:30 - 16:00, ROOM 4

CB-6 Integration on Silicon
Thursday, 08:30 - 10:00, ROOM 4

CB-7 Short Wavelength Sources and Applications
Thursday, 11:00 - 12:30, ROOM 2

CB-8 Semiconductor-based Frequency Combs
Thursday, 14:30 - 16:00, ROOM 9

CB-9 Dynamics and Novel Concepts in Semiconductor Lasers
Thursday, 16:30 - 18:00, ROOM 11

CC – TERAHERTZ SOURCES AND APPLICATIONS

CC-1 THz Strong Field Applications
Monday, 18:00 - 19:30, ROOM 1

CC-2 Nonlinear THz Spectroscopy and Techniques
Tuesday, 11:00 - 12:30, ROOM 3

CC-3 High Power THz Sources
Tuesday, 18:30 - 20:00, ROOM 12

CC-4 Novel Approach THz Sources
Wednesday, 08:30 - 10:00, ROOM 4

CC-P CC Poster Session
Wednesday, 10:00 - 11:00, ROOM 1

CC-5 THz Imaging
Thursday, 11:00 - 12:30, ROOM 3

CC-6 THz Devices and Communications
Friday, 08:30 - 10:00, ROOM 2

CC-7 THz QCL
Friday, 11:00 - 12:30, ROOM 11

CC-8 THz QCL-combs and Imaging
Friday, 14:30 - 16:00, ROOM 6

CD – APPLICATIONS OF NONLINEAR OPTICS

CD-1 Nonlinear Metasurfaces
Monday, 14:30 - 16:00, ROOM 2

CD-2 Solitons
Monday, 18:00 - 19:30, ROOM 8

CD-3 Microresonators and Waveguides
Tuesday, 11:00 - 12:30, ROOM 10

CD-P CD Poster Session
Tuesday, 13:30 - 14:30, ROOM 1

CD-4 Microresonators
Tuesday, 16:30 - 18:00, ROOM 2

CD-5 Supercontinuum Generation
Tuesday, 18:30 - 20:00, ROOM 6

CD-6 Guided Wave Devices
Wednesday, 08:30 - 10:00, ROOM 11

CD-7 Tunable Light Sources
Thursday, 11:00 - 12:30, ROOM 4

CD-8 Quantum Technologies
Thursday, 14:30 - 16:00, ROOM 10

CD-9 Nonlinear Applications at Extreme Wavelengths
Thursday, 16:30 - 18:00, ROOM 2

CD-10 Nonlinear Spectroscopy and Microscopy
Friday, 11:00 - 12:30, ROOM 5

CD-11 All-optical Control and Wavelength Conversion
Friday, 14:30 - 16:00, ROOM 1

CD-12 **Raman Amplification and Nonlinear Media**
Friday, 16:30 - 18:00, ROOM 1

CE – OPTICAL MATERIALS, FABRICATION AND CHARACTERISATION

CE-1 **Photonic Structures**
Monday, 08:30 - 10:00, ROOM 3

CE-10 **Crystals, Glasses and Ceramics**
Thursday, 14:30 - 16:00, ROOM 6

CE-2 **Semiconductor for Photonic Devices**
Monday, 14:30 - 16:00, ROOM 1

CE-3 **Fabrication and Characterization Techniques**
Tuesday, 16:30 - 18:00, ROOM 9

CE-4 **Luminescent Materials**
Tuesday, 18:30 - 20:00, ROOM 7

CE-5 **Micro and Nanostructures**
Wednesday, 08:30 - 10:00, ROOM 5

CE-P **CE Poster Session**
Wednesday, 10:00 - 11:00, ROOM 3

CE-6 **Materials for Waveguides and Resonators**
Wednesday, 11:00 - 12:30, ROOM 7

CE-7 **Integrated Optoelectronic Devices**
Wednesday, 14:30 - 16:00, ROOM 6

CE-8 **Materials and Fabrication of Specialty Optical Fibers**
Thursday, 08:30 - 10:00, ROOM 11

CE-9 **Nonlinear and Meta-materials**
Thursday, 11:00 - 12:30, ROOM 12

CF – ULTRAFAST OPTICAL TECHNOLOGIES

CF-1 **Ultrashort Pulse Generation**
Monday, 08:30 - 10:00, ROOM 4

CF-2 **Ultrafast UV Sources**
Tuesday, 11:00 - 12:30, ROOM 12

CF-3 **Nonlinear Pulse Propagation**
Tuesday, 18:30 - 20:00, ROOM 10

CF-4 **Ultrafast Lasers**
Wednesday, 08:30 - 10:00, ROOM 6

CF-P **CF Poster Session**
Wednesday, 10:00 - 11:00, ROOM 2

CF-5 **Ultrashort Pulses in the mid-IR**
Wednesday, 11:00 - 12:30, ROOM 3

CF-6 **Ultrafast Mid-IR Sources**
Wednesday, 14:30 - 16:00, ROOM 2

CF-7 **Nonlinear Spectral Broadening**
Thursday, 11:00 - 12:30, ROOM 5

CF-8 **Ultrashort Pulse Characterization**
Thursday, 14:30 - 16:00, ROOM 3

CF-9 **Sources for Dual Comb Spectroscopy**
Friday, 11:00 - 12:30, ROOM 3

CF-10 **Strong Field and Ultrafast Phenomena**
Friday, 16:30 - 18:00, ROOM 8

CG – HIGH-FIELD LASER AND ATTOSECOND SCIENCE

CG-1 **Ultrafast Dynamics in Solids**
Monday, 08:30 - 10:00, ROOM 5

How to read the session codes?

The following pages contain the abstracts of the papers presented at the 2021 CLEO®/Europe-EQEC.

All CLEO®/Europe sessions are on a white background and have a code beginning with a **C**.

All EQEC sessions are on a shaded background and have a code that begins with an **E**.

Both post-deadline sessions including CLEO®/Europe and EQEC presentations are on a white background and have a code beginning with **PD**.

Exceptions mentioned below are on a dark background:

- Short courses referenced with **SH**
- Plenary talks referenced with **PL**
- CLEO®/Europe-EQEC joint symposia referenced with **JS**.
- The ECBO-CLEO®/Europe joint session referenced with **CL + ECBO JS**
- The joint session LiM-CLEO®/Europe referenced with **CM-6, Joint Session CM with LiM**.

Oral Presentations

Oral presentations have a code made up of two parts, *e.g.*

CM-1.1 MON (Invited) 14:30

The first part (CM-1.1) indicates the Conference, the topic title, the session title and the placement of the presentation within the session, *e.g.*

CM-1.1 = CLEO®/Europe
CM-1.1 = Materials processing with lasers
CM-1.1 = Beam shaping for laser processing
CM-1.1 = First paper presented in the "Beam shaping for laser processing" session of the CM topic

The second part indicates the day when the presentation takes place.

SUN = Sunday
MON = Monday
TUE = Tuesday
WED = Wednesday
THU = Thursday

The figures on the right specify at what time the talk begins (10:30 am).

Plenary, Tutorial, Keynote and Invited Talks are marked between brackets.

Posters

Poster presentations have a code made up of two parts, *e.g.*

EG-P.2 FRI

The first part indicates the Conference, the topic title, the poster destination, and the order of presentation within the topic, *e.g.*

EG-P.2 = EQEC
EG-P.2 = Light-matter interactions at the nanoscale
EG-P.2 = Poster
EG-P.2 = Second poster in the "Light-matter interactions at the nanoscale" topic of the EQEC conference.

The second part indicates the day when the assigned poster session of the poster takes place. The same abbreviations as for the oral presentations apply. Posters from the same topic are all assigned in the same virtual poster session. Each poster presenter is requested to join his/her assigned virtual break-out room at the given day and time.

CG-2 **Controlled and Intense XUV Light**
Monday, 14:30 - 16:00, ROOM 12

CG-3 **Ultrafast Spectroscopy**
Tuesday, 16:30 - 18:00, ROOM 3

CG-4 **Chemical Reactions and Molecular Dynamics**
Tuesday, 18:30 - 20:00, ROOM 3

CG-5 **Symmetries in Ultrafast Science**
Thursday, 08:30 - 10:00, ROOM 2

CG-P **CG Poster Session**
Thursday, 10:00 - 11:00, ROOM 1

CG-6 **Lasers and High-Order Harmonic Generation**
Friday, 08:30 - 10:00, ROOM 3

CG-7 **High-Repetition XUV and X-ray Sources**
Friday, 14:30 - 16:00, ROOM 9

CH – OPTICAL SENSING AND MICROSCOPY

CH-1 **Gas Sensing**
Monday, 14:30 - 16:00, ROOM 4

CH-2 **Raman Spectroscopy**
Monday, 18:00 - 19:30, ROOM 12

CH-3 **Advanced Optical Sensing Techniques**
Tuesday, 11:00 - 12:30, ROOM 11

CH-4 **Fiber-based Sensors II**
Tuesday, 16:30 - 18:00, ROOM 10

CH-5 **Imaging in Scattering Media**
Tuesday, 18:30 - 20:00, ROOM 11

CH-6 **On-chip Solutions for Optical Sensing**
Wednesday, 11:00 - 12:30, ROOM 2

CH-7 **Microscopy and Imaging Sensors**
Wednesday, 14:30 - 16:00, ROOM 1

CH-8 **Spectroscopy at the Molecular Level**
Thursday, 08:30 - 10:00, ROOM 3

CH-9 **Hyperspectral Imaging**
Thursday, 14:30 - 16:00, ROOM 2

CH-10 **Optical Metrology**
Thursday, 16:30 - 18:00, ROOM 6

CH-P **CH Poster Session**
Friday, 10:00 - 11:00, ROOM 1

CH-11 **Quantum Sensing and Imaging**
Friday, 11:00 - 12:30, ROOM 1

CH-12 **Fiber-based Sensors I**
Friday, 14:30 - 16:00, ROOM 8

CH-13 **Temporally and Spatially Structured Beams and Microscopy**
Friday, 16:30 - 18:00, ROOM 4

CI – OPTICAL TECHNOLOGIES FOR COMMUNICATIONS AND DATA STORAGE

CI-P **CI Poster Session**
Monday, 10:00 - 11:00, ROOM 3

CI-1 **Broadband Systems**
Tuesday, 11:00 - 12:30, ROOM 8

CI-2 **Digital Signal Processing**
Wednesday, 08:30 - 10:00, ROOM 9

CI-3 **Microwave Photonics**
Thursday, 11:00 - 12:30, ROOM 6

CI-4 **Emerging Technologies for Telecommunications**
Friday, 11:00 - 12:30, ROOM 2

CI-5 **Transmission Devices**
Friday, 16:30 - 18:00, ROOM 5

CJ – FIBRE AND GUIDED WAVE LASERS AND AMPLIFIERS

CJ-1 **Coherent Beam Combining**
Monday, 14:30 - 16:00, ROOM 5

CJ-2 **Mode-locked Fiber Lasers above 2 Micron**
Tuesday, 18:30 - 20:00, ROOM 4

CJ-3 **Multimode Nonlinear Fiber Optics and SC Generation**
Wednesday, 08:30 - 10:00, ROOM 10

CJ-4 **Mode-locked Fiber Lasers**
Wednesday, 11:00 - 12:30, ROOM 1

CJ-P **CJ Poster Session**
Thursday, 13:30 - 14:30, ROOM 1

CJ-5 **Pulsed Fiber Laser**
Thursday, 14:30 - 16:00, ROOM 7

CJ-6 **Fiber Laser Components**
Thursday, 16:30 - 18:00, ROOM 3

CJ-7 **Mid-IR Fiber Laser Sources and Components**
Friday, 08:30 - 10:00, ROOM 4

CJ-8 **High Power Fiber Lasers**
Friday, 11:00 - 12:30, ROOM 7

CJ-9 **Speciality Fiber Lasers**
Friday, 14:30 - 16:00, ROOM 4

CJ-10 **Fiber Optical Techniques and Applications**
Friday, 16:30 - 18:00, ROOM 2

CK – MICRO- AND NANO-PHOTONICS

CK-1 **Periodic Components**
Monday, 08:30 - 10:00, ROOM 6

CK-2 **Novel Integrated Components**
Monday, 14:30 - 16:00, ROOM 6

CK-3 **Integrated Photonics Devices**
Tuesday, 11:00 - 12:30, ROOM 6

CK-4 **Silicon Photonics**
Thursday, 08:30 - 10:00, ROOM 7

CK-5 **Beam Manipulation**
Thursday, 11:00 - 12:30, ROOM 7

CK-P **CK Poster Session**
Thursday, 13:30 - 14:30, ROOM 2

CK-6 **3D Fabrication Techniques and Components**
Thursday, 16:30 - 18:00, ROOM 4

CK-7 **Photonic Crystals**
Friday, 08:30 - 10:00, ROOM 8

CK-8 **Non-Linear Integrated Photonics**
Friday, 11:00 - 12:30, ROOM 8

CK-9 **Novel Technologies and Materials for Micro-photonics**
Friday, 14:30 - 16:00, ROOM 5

CK-10 **Micro and Nano Resonators**
Friday, 16:30 - 18:00, ROOM 3

CL – PHOTONIC APPLICATIONS IN BIOLOGY AND MEDICINE

CL-1 Laser-Tissue Interactions and Surgery
Monday, 18:00 - 19:30, ROOM 2

CL-2 Biological and Clinical Applications
Tuesday, 11:00 - 12:30, ROOM 4

CL-P CL Poster Session
Thursday, 13:30 - 14:30 ROOM 3

CL + ECBO JS Advances in Deep Tissue Imaging
Thursday, 14:30 - 15:45, ROOM 1

CL-3 Advanced Biological Microscopy
Thursday, 16:30 - 18:00, ROOM 8

CL-4 Spectroscopy, Label-Free Imaging and Sensing
Friday, 11:00 - 12:15, ROOM 6

CL-5 Dynamic and Advanced Light Shaping
Friday, 14:30 - 15:45, ROOM 2

CM – MATERIALS PROCESSING WITH LASERS

CM-1 Laser Induced Periodic Surface Structures
Monday, 14:30 - 16:00, ROOM 7

CM-2 Semiconductor Processing
Wednesday, 11:00 - 12:30, ROOM 4

CM-3 Temporal and Spatial Beam Shaping for Laser Processing I
Wednesday, 14:30 - 16:00, ROOM 3

CM-4 Surface Engineering and Functionalisation
Thursday, 08:30 - 10:00, ROOM 6

CM-5 Temporal and Spatial Beam Shaping for Laser Processing II
Thursday, 14:30 - 16:00, ROOM 4

CM-6 Joint Session CM with LiM
Thursday, 16:30 - 18:00, ROOM 1

CM-7 Surface and Volume Processing
Friday, 08:30 - 10:00, ROOM 11

CM-8 Modelling and In-situ Diagnostics
Friday, 11:00 - 12:30, ROOM 4

CM-P CM Poster Session
Friday, 13:30 - 14:30, ROOM 1

CM-9 3D Laser Structuring of Transparent Materials
Friday, 16:30 - 18:00, ROOM 7

POSTDEADLINE SESSION

PD-1 CLEO/Europe Postdeadline Session
Thursday, 18:30 - 20:00, ROOM 1

EQEC 2021 SESSIONS

EA – QUANTUM OPTICS AND ULTRACOLD QUANTUM MATTER

EA-P EA Poster Session
Monday, 13:30 - 14:30, ROOM 1

EA-1 Waveguide-QED and Atom-light Interfaces
Tuesday, 11:00 - 12:30, ROOM 1

EA-2 Cold Molecules
Tuesday, 18:30 - 20:00, ROOM 2

EA-3 Quantum Optomechanics and Detectors
Wednesday, 11:00 - 12:30, ROOM 8

EA-4 Cavity-QED and Cold Gases
Wednesday, 14:30 - 16:00, ROOM 7

EA-5 Quantum Light Sources
Thursday, 11:00 - 12:30, ROOM 8

EA-6 Polaritons and Quantum Fluids of Light
Thursday, 16:30 - 18:00, ROOM 7

EA-7 Quantum Interferences
Friday, 08:30 - 10:00, ROOM 5

EB – QUANTUM INFORMATION, COMMUNICATION, AND SENSING

EB-1 Quantum Networks
Monday, 08:30 - 10:00, ROOM 7

EB-P EB Poster Session
Monday, 13:30 - 14:30, ROOM 2

EB-2 Integrated Devices and Memories
Monday, 18:00 - 19:30, ROOM 7

EB-3 Photonic Quantum Computation
Tuesday, 11:00 - 12:30, ROOM 2

EB-4 Nonclassical Light Sources
Tuesday, 16:30 - 18:00, ROOM 11

EB-5 Long-Range Distribution of Entanglement I
Tuesday, 18:30 - 20:00, ROOM 8

EB-6 Long-Range Distribution of Entanglement II
Wednesday, 11:00 - 12:30, ROOM 11

EB-7 Quantum Imaging and Interference
Wednesday, 14:30 - 16:00, ROOM 10

EB-8 Quantum Computation and Error Correction
Thursday - 11:00 - 12:30, ROOM 9

EB-9 Quantum Tomography and State Estimation
Friday, 08:30 - 10:00, ROOM 6

How to find the room?

The conference running virtually, each indicated room of this programme is only a virtual space allocated to allow the build-up of the parallel sessions and check for overlaps.
When on the platform, within each day, just go through the session titles and you will find your way.

Note: The "Welcome Words and World of Photonics Congress Plenary by 2020 Nobel Prize Co-Laureate Reinhard Genzel, Max-Planck-Institut für extraterrestrische Physik, Garching, Germany entitled "A 40-year journey" to take place Monday 21 June 11:00 - 12:30 am CEST time zone, will be directly broadcasted from Messe Munich's platform. Instructions on how to join in will be sent via email just prior the session. For all other CLEO/Europe-EQEC sessions join in via the CLEO/Europe-EQEC platform.

EC – TOPOLOGICAL STATES OF LIGHT

EC-1 **Band Topology – I**
Monday, 08:30 - 10:00, ROOM 8

EC-2 **Nonlinear Topology**
Tuesday, 16:30 - 18:00, ROOM 5

EC-3 **Bound States and High-order Topology**
Tuesday, 18:30 - 20:00, ROOM 9

EC-4 **Band Topology – II**
Wednesday, 08:30 - 10:00, ROOM 8

EC-P **EC Poster Session**
Wednesday, 13:30 - 14:30, ROOM 1

EC-5 **Emerging Trends in Topology**
Thursday, 11:00 - 12:15, ROOM 10

EC-6 **Topology in Driven-dissipative Systems**
Thursday, 16:30 - 18:00, ROOM 5

ED – PRECISION METROLOGY AND FREQUENCY COMBS

ED-1 **Precision Spectroscopy and Fundamental Metrology I**
Monday, 08:30 - 10:00, ROOM 11

ED-2 **Comb Sources and Applications**
Monday, 18:00 - 19:30, ROOM 6

ED-P **ED Poster Session**
Tuesday, 13:30 - 14:30, ROOM 2

ED-3 **Precision Spectroscopy and Fundamental Metrology II**
Tuesday, 16:30 - 18:00, ROOM 1

ED-4 **Frequency Standards and Miniaturized Comb Platforms**
Tuesday, 18:30 - 20:00, ROOM 1

EE – ULTRAFAST OPTICAL SCIENCE

EE-1 **Ultrafast Phenomena in Waveguides**
Tuesday, 11:00 - 12:30, ROOM 5

EE-2 **HHG in Condensed Matter**
Thursday, 08:30 - 10:00, ROOM 8

EE-P **EE Poster Session**
Thursday, 10:00 - 11:00, ROOM 2

EE-3 **Ultrafast Molecular Dynamics**
Thursday, 14:30 - 16:00, ROOM 12

EE-4 **Ultrafast Characterisation and Manipulation at Nanoscale**
Thursday, 16:30 - 18:00, ROOM 9

EE-5 **Novel Ultrafast Sources**
Friday, 11:00 - 12:30, ROOM 9

EF – NONLINEAR PHENOMENA, SOLITONS AND SELF-ORGANIZATION

EF-1 **Mode-Locking Phenomena**
Monday, 14:30 - 16:00, ROOM 9

EF-2 **Turbulence and Nonlinear Effects**
Monday, 18:00 - 19:30, ROOM 11

EF-3 **2D Transverse Dynamics and Quantum Effects**
Wednesday, 11:00 - 12:30, ROOM 9

EF-4 **Nonlinear Regimes in Optical Fibers**
Wednesday, 14:30 - 16:00, ROOM 8

EF-5 **Micro-combs in Microresonators**
Thursday, 08:30 - 10:00, ROOM 9

EF-P **EF Poster Session**
Thursday, 10:00 - 11:00, ROOM 3

EF-6 **Dissipative Solitons I**
Thursday, 11:00 - 12:30, ROOM 11

EF-7 **Symmetry Breaking, Geometrical and Topological Effects**
Thursday, 14:30 - 16:00, ROOM 8

EF-8 **Dissipative Solitons II**
Friday, 08:30 - 10:00, ROOM 7

EG – LIGHT-MATTER INTERACTIONS AT THE NANOSCALE

EG-1 **Emission Control at the Nanoscale**
Monday, 14:30 - 16:00, ROOM 10

EG-2 **Coupling at the Nanoscale I**
Wednesday, 08:30 - 10:00, ROOM 7

EG-3 **Coupling at the Nanoscale II**
Wednesday, 11:00 - 12:30, ROOM 6

EG-4 **Nonlinear and Ultrafast Nano-optics**
Wednesday, 14:30 - 16:00, ROOM 5

EG-5 **Light-driven Phenomena at the Nanoscale**
Thursday, 08:30 - 10:00, ROOM 12

EG-6 **Resonant Dielectric Nanostructures**
Thursday, 14:30 - 16:00, ROOM 5

EG-7 **Electron-light Interactions**
Friday, 08:30 - 10:00, ROOM 9

EG-P **EG Poster Session**
Friday, 10:00 - 11:00, ROOM 2

EH – PLASMONICS AND METAMATERIALS

EH-1 **Extreme and Ultrafast Phenomena in Plasmonics and Metamaterials**
Monday, 14:30 - 16:00, ROOM 11

EH-2 **New Perspectives in Metamaterials and Nanophotonics**
Tuesday, 11:00 - 12:30, ROOM 7

EH-3 **Advanced Control of Light with Metasurfaces**
Tuesday, 16:30 - 18:00, ROOM 7

EH-P **EH Poster Session**
Wednesday 13:30 - 14:30, ROOM 2

EH-4 **Plasmonics for Enhanced Light-Matter Interaction**
Thursday, 08:30 - 10:00, ROOM 10

EH-5 **Hybrid, Tunable and Nonlinear Metasurfaces**
Friday, 11:00 - 12:30, ROOM 10

EH-6 **Applications of Metamaterials and Metasurfaces**
Friday, 14:30 - 16:00, ROOM 3

EI – TWO-DIMENSIONAL AND NOVEL MATERIALS

EI-1 **Towards Applications and Perovskites**
Monday, 18:00 - 19:30, ROOM 9

EI-2 **From Single Photons to Engineered Photonic Environments**
Tuesday, 16:30 - 18:00, ROOM 6

EI-P **EI Poster Session**
Wednesday, 13:30 - 14:30, ROOM 3

EI-3 **Graphene Heterolayers**
Wednesday, 14:30 - 16:00, ROOM 11

EI-4 **Many Body States and Non-linear Dynamics**
Friday, 08:30 - 10:00, ROOM 10

EJ – THEORETICAL AND COMPUTATIONAL PHOTONICS MODELLING

EJ-P **EJ Poster Session**
Monday, 13:30 - 14:30, ROOM 3

EJ-1 **Optical Computing and Artificial Intelligence**
Monday, 18:00 - 19:30, ROOM 3

EJ-2 **Nonlinear Optics Modeling**
Tuesday, 11:00 - 12:30, ROOM 9

EJ-3 **Tailored Light**
Wednesday, 14:30 - 16:00, ROOM 12

POSTDEADLINE SESSION

PD-2 **EQEC Postdeadline Session**
Thursday, 18:30 - 20:00, ROOM 2

CLEO®/EUROPE-EQEC 2021 JOINT SYMPOSIA SESSIONS

JSI – NANOPHONONICS

JSI-1 **Theory and Numerical Modeling for Nanophononics**
Monday, 08:30 - 10:00, ROOM 9

JSI-2 **Phononic Crystals and Acoustic Metamaterials**
Wednesday, 08:30 - 10:00, ROOM 1

JSI-P **JSI Poster Session**
Wednesday, 13:30 - 14:30, ROOM 4

JSI-3 **Nanophononic and Optomechanical Systems. Radiative Heat Transfer Thermal Rectification.**
Thursday, 08:30 - 10:00, ROOM 1

JSI-4 **Optophononic and Optothermal Characterization and Techniques**
Friday, 08:30 - 10:00, ROOM 1

JSII – HIGH-FIELD THZ GENERATION AND APPLICATIONS

JSII-1 **Strong-field THz Generation**
Monday, 08:30 - 10:00, ROOM 10

JSII-2 **Applications of Strong THz Fields**
Monday, 18:00 - 19:30, ROOM 5

JSII-P **JSII Poster Session**
Wednesday, 10:00 - 11:00, ROOM 4

JSIII – ATTOCHEMISTRY

JSIII-1 **Theoretical Perspectives in Attochemistry**
Monday, 14:30 - 16:00, ROOM 8

JSIII-2 **Experimental Progress in Attochemistry**
Monday, 18:00 - 19:30, ROOM 10

JSIV – DEEP LEARNING IN PHOTONICS

JSIV-1 **Optical Computing I**
Thursday, 14:30 - 16:00, ROOM 11

JSIV-2 **Learning in Imaging and Metrology I**
Thursday, 16:30 - 18:00, ROOM 10

JSIV-P **JSIV Poster session**
Friday 10:00 - 11:00, ROOM 3

JSIV-3 **Optical Computing II**
Friday, 11:00 - 12:15, ROOM 12

JSIV-4 **Learning in Imaging and Metrology II**
Friday, 14:30 - 16:00, ROOM 7

JSIV-5 **Learning Metasurfaces - Nanostructures – Spectroscopy**
Friday, 16:30 - 18:00, ROOM 6

JSV – FLEXIBLE PHOTONICS

JSV-1 **Flexible Photonic Materials and Integration**
Monday, 08:30 - 10:00, ROOM 12

JSV-P **JSV Poster Session**
Monday, 10:00 - 11:00, ROOM 4

JSV-2 **Flexible Photonic Devices**
Monday, 18:00 - 19:30, ROOM 4

JOINT SESSION ECBO (EUROPEAN CONFERENCES ON BIOMEDICAL OPTICS (RUN BY OSA, SPIE) -CLEO®/EUROPE 2021

CL + ECBO JS **Advances in Deep Tissue Imaging**
Thursday, 14:30 - 15:45, ROOM 1

JOINT SESSION LIM-CLEO®/EUROPE 2021

CM-6 **Joint Session CM with LiM**
Thursday, 16:30 - 18:00, ROOM 1

SHORT COURSES

SH-12 **Short Course 12: Finite Element Modelling Methods for Photonics**
Wednesday, 08:30 - 12:00, ROOM 12

SH-1 **Short Course 1: Ultrashort Pulse Characterization**
Wednesday, 16:30 - 20:00, ROOM 1

SH-2 **Short Course 2: High-power Fiber Lasers**
Wednesday, 16:30 - 20:00, ROOM 2

SH-3 **Short Course 3: Optical Parametric Oscillators**
Wednesday, 16:30 - 20:00, ROOM 3

SH-4 **Short Course 4: Laser Beam Analysis, Propagation, and Spatial Shaping Techniques**
Wednesday, 16:30 - 20:00, ROOM 4

SH-5 **Short Course 5: Practical Quantum Optics**
Wednesday, 16:30 - 20:00, ROOM 5

SH-6 **Short Course 6: Mid-infrared Semiconductor Lasers**
Wednesday, 16:30 - 20:00, ROOM 6

SH-7 **Short Course 7: THz Measurements and their Applications**
Wednesday, 16:30 - 20:00, ROOM 7

SH-8 **Short Course 8: Nonlinear Crystal Optics**
Wednesday, 16:30 - 20:00, ROOM 8

SH-9 **Short Course 9: Frequency Combs Principles and Applications**
Wednesday, 16:30 - 20:00, ROOM 9

SH-10 **Short Course 10: Silicon Photonics,**
Wednesday, 16:30 - 20:00, ROOM 10

SH-11 **Short Course 11: Optics in Graphene and other 2D Materials**
Wednesday, 16:30 - 20:00, ROOM 11

CLEO®/Europe 2021 Topics

CA – Solid-state Lasers

Advances in solid-state lasers: novel solid-state lasers and amplifiers; high-power and high-energy lasers; power-scalable laser architectures; lasers for large-scale facilities; solid-state micro-chip lasers; crystalline waveguide lasers; short-wavelength lasers; up-conversion lasers; mid-infrared lasers; wavelength tuning techniques and tunable lasers; intracavity wavelength conversion; laser resonator design; techniques for thermal management and beam quality control; novel pump sources and pumping configurations; ns-pulse generation; amplitude and frequency stability; advanced laser crystals and ceramics, and glasses; spectroscopic characterization of solid-state gain media; laser characterization and modeling.

CHAIR: Nicolaie Pavel, *National Institute for Laser, Plasma and Radiation Physics, Romania*

CB – Semiconductor Lasers

New technology, devices and applications; UV lasers, visible lasers, near-infrared lasers; mid to far-infrared semiconductor lasers including W-lasers, quantum cascade and inter-subband lasers; quantum well, wire, dot and dash lasers; high power and high brightness lasers; vertical (extended) cavity surface emitting lasers; optically-pumped semiconductor lasers; photonic crystal semiconductor lasers, micro-cavity lasers, nanolasers, plasmonic lasers, polariton lasers; semiconductor ring lasers; short-pulse generation, mode locking; semiconductor optical amplifiers; new semiconductor laser materials, silicon-based lasers, novel characterization techniques; functional applications, including but not limited to: switching, clock recovery, signal processing; semiconductor lasers in integrated photonic circuits; laser dynamics, synchronization, chaos.

CHAIR: Stephen Sweeney, *University of Surrey, UK*

CC – Terahertz Sources and Applications

Sources for generating terahertz (far-infrared) radiation in the range from 200 GHz to 100 THz, based on various physical principles including ultrafast time-domain systems, direct generation using terahertz lasers, and sources based on nonlinear optical mixing and laser-created plasmas; applications using terahertz radiation for spectroscopy, nonlinear THz phenomena, sensing, and imaging; advances in terahertz communications; new terahertz measurement techniques and instrumentation, including advances in terahertz imaging, detector technologies, near-field microscopy, terahertz devices and environmental monitoring.

CHAIR: Juliette Mangeney, *Ecole Normale Supérieure, Laboratoire Pierre Aigrain, Paris, France*

CD – Applications of Nonlinear Optics

Novel applications of nonlinear optical phenomena and new devices; nonlinear frequency conversion for the UV, visible and IR; telecommunications applications and all-optical switching; all-optical delay lines and slow light; optical parametric devices such as optical parametric amplifiers and oscillators; nonlinear optics in waveguides and fibres, including photonic crystal structures and microstructured optical fibres; quasi-phasematched materials and devices; novel nonlinear materials; metamaterials and nanostructures; stimulated scattering processes and devices; applications of optical solitons and photorefractives; electro-optic and Kerr devices in crystals and semiconductors; Raman based devices including amplifiers and lasers; nonlinear probing of surfaces; multi-photon imaging and coherent Raman microscopy; quantum oriented applications.

CHAIR: Mikko J. Huttunen, *Tampere University, Finland*

CE – Optical Materials, Fabrication and Characterisation

Fabrication of optical materials; new crystalline and glass laser materials in bulk, fiber and waveguide geometry; micro- and nano-fabrication and -engineering techniques; heterogeneous integration techniques; optical characterisation of laser and nonlinear materials, micro-structured fibre and photonic crystal waveguides, micro- and nano-crystalline materials, single defect centres, quantum wells, quantum wires and quantum dots, nano-tubes and nano-needles, innovative organic materials.

CHAIR: Daniel Milanese, *University of Parma, Italy*

CF – Ultrafast Optical Technologies

Femtosecond and picosecond pulse generation from solid state, fiber and waveguide sources; mode-locked lasers; few-cycle optical pulses; pulse compression, carrier-envelope phase stabilization and pulse characterization; light waveform synthesis metrology; ultrashort-pulse semiconductor lasers and devices; ultrafast parametric amplifiers and parametric chirped pulse amplifiers; ultrashort-pulse mid-IR generation; supercontinuum generation; dispersion management; ultrafast electro-optics; pulse-shaping; carrier-envelope effects; ultrafast characterization methods and measurement techniques, ultrafast optoelectronic systems and devices; applications of ultrafast technology, technological aspects of ultrafast spectroscopy; ultrafast microscopic techniques; electro-optic sampling.

CHAIR: Daniele Brida, *University of Luxembourg, Luxembourg*

CG – High-Field Laser and Attosecond Science

Strong-field and attosecond phenomena; attosecond pulse generation; strong-field ionization and ionization dynamics; novel technologies for high-field physics and attosecond science; probing of ultrafast dynamics with intense free-electron laser pulses; control of high-field and attosecond phenomena; laser-driven rescattering and recollision phenomena; high-harmonic generation; time-resolved XUV/soft x-ray spectroscopy, interferometry and microscopy; attosecond and femtosecond diffraction imaging with electrons or photons; molecular dynamics driven by strong fields or probed by high-field/attosecond methods; attosecond or strong-field driven electron dynamics in the condensed phase, bulk media, nanostructures, quantum-confined structures or at surfaces/interfaces; ultra-high-intensity laser physics and technology; laser-plasma interaction and particle acceleration; relativistic nonlinear optical phenomena.

CHAIR: Adrian Pfeiffer, *Friedrich-Schiller-Universität, Jena, Germany*

CH – Optical Sensing and Microscopy

Inspection of a wide range of objects, from the macroscopic to the nanometric scale; recent progress in all aspects of optical sensing and metrology, particularly in new photonic sensor technologies and applications ; plasmonic sensors; metamaterial sensors; biosensors; terahertz sensors; new trends in optical remote sensing; fibre sensors using conventional and photonic crystal fibres; active multispectral and

hyperspectral imaging; sensor multiplexing; novel spectroscopic techniques, nanospectroscopy; applications and systems; novel measurement methods and devices based on interferometry; holography; diffractometry or scatterometry; critical dimension metrology; multiscale surface metrology; UV and DUV microscopy; resolution enhancement technologies in microscopy; inverse problems; adaptive optics; phase retrieval.
CHAIR: Crina Cojocaru, *Universitat Politecnica de Catalunya, Spain*

CI – Optical Technologies for Communications and Data Storage

Fibre devices including nonlinear fibre, propagation and polarization effects, fibre gratings. Semiconductor devices for generation, processing and detection of optical signals. Digital signal processing, forward error correction, nonlinear Fourier transform. Submarine, core and metropolitan transport networks, communication and access networks. Multi-core, multi-mode fibre for transmission, optical amplification and functions; multi-band optical amplification and transmission. Optical sub-systems including clock recovery, packet/burst switching, advanced modulation formats, radio-over-fiber and microwave photonic technologies, optical regeneration and buffering; holographic and 3D optical data storage, near-field recording and super-resolution.
CHAIR: Alessandro Tonello, *XLIM, Limoges, France*

CJ – Fibre and Guided Wave Lasers and Amplifiers

Waveguide and fibre laser oscillators and amplifiers including novel waveguide and fibre geometries; power and energy scaling of waveguide and fibre lasers – including beam combination techniques (for both pump and signal beams) and new waveguide coupling approaches; up-conversion lasers; nonlinear frequency conversion and pulse generation and compression; spatio-temporal pulse evolution; advances in fibre waveguide materials; fabrication techniques for doped waveguide and fibre devices; active microstructured fibre and waveguide laser devices; novel waveguide and fibre sources for industrial applications; nanomaterials and their applications in fibre and guided wave lasers.
CHAIR: Bülend Ortaç, *UNAM-Bilkent University, Turkey*

CK – Micro- and Nano-Photonics

Nanostructured materials and fabrication techniques for photonic applications; novel phenomena occurring when light is created, transported and detected in environments where either dimensionality or size are reduced and, in particular, when light-matter interaction occurs in regions smaller than or similar to the wavelength of light (nanophotonics). Periodic or quasi-periodic nanostructures (photonic crystals); issues related to order/disorder in nanostructured materials; photonic integrated circuits and applications advancing the integration of photonic devices for biology, lighting, communication, sensing and energy efficiency; optical MEMS; hybrid and 2D nanomaterials including in-/organic nano-layers/wires, nanocrystals and single molecules.
CHAIR: Olivier Gauthier-Lafaye, *LAAS CNRS, Toulouse, France*

CL – Photonic Applications in Biology and Medicine

Emerging concepts in biophotonics: single particle/molecule detection and tracking; spatio-temporal manipulation of light fields for biomedicine; enhanced linear and nonlinear excitation and detection; micro-fluidics, optofluidics and micro-optics; new optical probes for local measurements including organic and inorganic nanoparticles, electric fields and temperature measurements; New routes and modalities for optical detection in biophotonics : spectroscopy; holography, adaptive optics, phase conjugation time reversal; optics in biological media: scattering; coherence; polarization; symmetry and invariance. Advanced light sources and geometries for microscopy, phototherapy, surgery, biomedicine.
CHAIR: Alexander Jesacher, *Medizinische Universität Innsbruck, Austria*

CM – Materials Processing with Lasers

Fundamentals of laser-materials interactions: phase transformation, chemical reactions, diffusion processes, ablation; high-power laser-materials processing: welding, cutting, surface treatment; laser ablation; thin-film growth: PLD, LCVD; direct write techniques: MAPLE, LIFT, near-field techniques; 2D and 3D micro/nano structuring; plasma related processes; laser assisted nanosynthesis; femtosecond micromachining; ultrafast laser processing: volume modification, index engineering; laser-assisted manufacturing; additive manufacturing: two-photon polymerization and 3D laser printing.
CHAIR: Emmanuel Stratakis, *IESL-FORTH, Greece*

EQEC 2021 Topics

EA – Quantum Optics and Quantum Matter

Quantum light sources and applications; nonlocality and quantum interference; squeezing and entanglement; quantum correlations, coherence, and measurement; quantum fluid of light; multimode and mesoscopic quantum optics; single photon emission and absorption; quantum optics in cavities; slow light and quantum memories; quantum imaging and quantum lithography; quantum coherent effects in biology; Developments in few- and many-body phenomena with ultracold quantum gases of atoms and molecules; quantum simulation; superfluidity and thermodynamics in Bose and Fermi systems; dipolar physics with atoms and molecules; Efimov physics; atom interferometry; hybrid systems such as cold and trapped ion/atom setups, optomechanical devices.
CHAIR: Julien Laurat, *Laboratoire Kastler Brossel Université P. et M. Curie, ENS, CNRS, France*

EB – Quantum Information, Communication, and Sensing

Quantum computers and quantum communication systems ; quantum algorithms and communication protocols, quantum simulations, quantum key distribution, quantum logic gates, entanglement distribution and distillation, interfaces between static and flying qubits, quantum memories; integrated quantum devices, quantum nano-mechanics, ion-trap arrays, superconducting structures, quantum dots, cavity QED systems.
CHAIR: Harald Weinfurter, *Ludwig-Maximilians-Universität, München, Germany*

EC – Topological States of Light

Advances in topological photonic lattices, topological edge states, topological pumps, synthetic dimensions, Dirac and Weyl points, topological lasers, topology and disorder, topology in non-Hermitian systems, probes of topological invariants, topological aspects of photonic quasicrystals, nonlinear topological effects, Floquet-topological photonics, spin-orbit coupling in photonic materials, non-reciprocity.
CHAIR: Alberto Amo, *Laboratoire PhLAM, Université de Lille-CNRS, Lille, France*

ED – Precision Metrology and Frequency Combs

Precision interferometry and spectroscopy including frequency combs; quantum metrology; ultimate limitations of measurement precision as imposed by the nature of quanta; tests of fundamental symmetries; definition of basic units; measurement of fundamental constants; applications in different spectral ranges, including mid-infrared.

CHAIR: Aleksandra Foltynowicz, *Umeå University, Sweden*

EE – Ultrafast Optical Science

Fundamental aspects of ultrafast science in all spectral regimes; propagation and instabilities of ultrashort pulses in linear and nonlinear media, supercontinuum generation, ultrafast filamentation and applications, extreme events, rogue waves and turbulence dynamics; ultrafast spectroscopy of molecules, solids and low dimensional structures; ultrafast phenomena in physics, chemistry and biology; propagation media: gas, liquid, and solid materials; free-space and waveguided geometries; coherent control using femtosecond pulses.

CHAIR: Daniele Faccio, *University of Glasgow, UK*

EF – Nonlinear Phenomena, Solitons and Self-organization

Nonlinear optical phenomena including dynamics and self-organization; frequency conversion, wave mixing, parametric processes, conservative and dissipative solitons, pattern formation, interaction between disorder and nonlinearities, complex behaviours and statistically heavy-tailed phenomena. Applications of nonlinear phenomena; nonlinear imaging and manipulation, novel optical materials, devices and systems. Fundamental aspects of nonlinear dynamics in single or coupled photonic devices, polariton condensates, micro and nano lasers, photonic crystals, optomechanical systems.

CHAIR: Julien Javaloyes, *Universitat de les Illes Ballears, Palma, Spain*

EG – Light-matter Interactions at the Nanoscale

Fundamental aspects of light-matter interactions at the nanoscale: nanoantennas and nanophotonic architectures, classical and quantum models, detection, emission and manipulation of light and/or matter; quantum nano-optics: coherent, quantum and nonlinear optical effects; ultrafast and strong-field phenomena at the nanoscale: interactions with electrons/plasma and their applications, ultrafast dynamics; optical imaging and spectroscopy: nanoscopy, nano-optical forces and tweezers; nano-energy: radiative transfer, photovoltaics and catalysis.

CO-CHAIRS: Niek van Hulst, *ICFO, Castelldefelds, Barcelona, Spain*
Paolo Biagioni, *Politecnico di Milano, Italy*

EH – Plasmonics and Metamaterials

Metal nanophotonics from fundamentals towards applications and including all spectral regimes: plasmonic nanostructures, antennas, cavities and waveguides; metamaterials; hybrid materials; nonlinear structures and effects; active systems, systems with gain.

CHAIR: Vassili Fedotov, *University of Southampton, UK*

EI – Two-dimensional and Novel Materials

Fundamental aspects and applications of graphene and other two-dimensional materials in optics and optoelectronics; light-matter interactions in 2D materials; ultrafast dynamics and nonlinear phenomena in 2D and novel materials, and mode-locked lasers; light sources, modulators, detectors, and other optoelectronic devices; photovoltaics; smart windows and flexible displays; terahertz devices; tunable plasmonics and metamaterials; integration with cavities and waveguides; multi-layered 2D heterostructures; perovskites and perovskite optoelectronics; NV centres; phase change materials.

CHAIR: Alexander Holleitner, *Technische Universität München, Germany*

EJ – Theoretical and Computational Photonics Modelling

Predictive theoretical and computational approaches for all fields of optics and photonics: full and semi-analytical treatments; applied mathematics and numerical analysis of partial differential equations; high-performance computing, massively parallel codes, including utilization of hardware accelerators. Modelling of singular nonlinear processes, shocks, wave collapse, material processing; first principle calculations of optical properties in dielectrics, plasmas, semiconductors and plasmonic structures; modelling of artificial optical materials.

CHAIR: Evangelos Siminos, *University of Gothenburg, Sweden*

CLEO®/Europe-EQEC 2021 Joint Symposia Topics

JSI – Nanophononics

Extreme-near-field heat transport. Heat transport in 2D materials and metamaterials. Heat transport in molecular junctions. Micro/Nanoscale Energy Devices and Systems (including bolometers, calorimeters, energy components). Nanoscale/microscale thermal metrology. Near-field radiative heat transfer. Nonequilibrium effects, thermodynamics and devices. Quantum effects in heat transport and quantum thermodynamics. Thermal interface resistance. Thermal rectification. Thermoelectricity and thermophotovoltaics. Ultrafast heat transfer. Phononic Crystal Design and Fabrication. Acoustic Metamaterial Design and Fabrication. Applications of Phononic Crystals and Acoustic Metamaterials. Temporally modulated Phononic Crystals and Acoustic Metamaterials. Topological Acoustics and Phononics. Nonlinear Phononic Crystals and Acoustic Metamaterials. Optomechanics and Phonon Coupling.

CO-CHAIRS:
Sebastian Volz, *Laboratory for Integrated Micro-Mechatronic Systems, LIMMS/CNRS-IIS(UMI2820), University of Tokyo, Japan*
Roberto Li Voti, *Sapienza Università di Roma, Italy*

JSII – High-Field THz Generation and Applications

The symposium will highlight the most recent developments in exploration of strong-field interactions between light and matter in the THz range (loosely defined as 0.1 – 30 THz). The high interest and worldwide activity within this field is spurred by the possibility to generate ultrashort, tailored THz fields with strengths approaching that of the interatomic fields in matter, and probe the interaction on a timescale much shorter than the oscillation period of the fields. The understanding of the physics involved in such interactions is challenging, but the rewards for unlocking the potential of applications of such interactions are enormous: Computing at the clock frequency of a THz field without energy dissipation, quantum information processing, miniature accelerators, control of the behavior of complex molecules at the elementary level.

Possible topics:

- Strong-field THz generation and detection
- Local enhancement of strong THz fields
- Propagation in guided structures
- High-repetition-rate strong-field THz sources
- Nonlinear spectroscopy techniques
- Single-pulse experiments
- Pump-probe experiments
- N-dimensional nonlinear spectroscopy
- THz pump – x-ray probe
- Strong-field THz physics:
- Nonperturbative effects
- Relativistic strong-field interactions
- Interactions in the ballistic regime
- 2D materials
- lightwave electronics
- high-harmonic generation
- Ultrafast tunneling phenomena
- THz-driven electrons
- Generation
- Acceleration
- Applications

CO-CHAIRS:
Franz Kaertner, *DESY, University of Hamburg, Germany*
Peter Uhd Jepsen, *Danish Technical University, Denmark*

JSIII – Attochemistry

Attosecond imaging and control of charge dynamics in molecules; attosecond pump-probe spectroscopy and high-harmonic spectroscopy of charge dynamics; photo-induced charge migration and charge transfer in molecules and liquids; imaging of few-fs structural changes in molecules; imaging of ultrafast electron and nuclear dynamics with XUV and X-ray FELs; control of coupled electron-nuclear dynamics in molecules; survival of electronic coherences in molecular systems; attosecond charge dynamics in solids and nanoparticles: clusters, organic optoelectronic systems, two-dimensional materials, topological systems; ultrafast processes in bio-relevant systems; proton migration; ultrafast dynamics of XUV radiation damage; attosecond dynamics of chiral systems; laser technology for attochemistry; theoretical methods for attochemistry.

CO-CHAIRS: Mauro Nisoli, *Politechnico di Milano, Italy*
Fernando Martin, *Universidad Autónoma de Madrid, Spain*

JSIV – Deep learning in Photonics

Deep neural network techniques have been used recently in a variety of ways in optics, including the processing of information from optical systems, design of optical devices, control of their functionality and also in the optical implementation of neural networks. This session will focus on recent progress in this exciting new field.

CO-CHAIRS:
Demetri Psaltis, *EPFL, Lausanne, Switzerland*
Chris Moser, *EPFL, Lausanne, Switzerland*

JSV – Flexible Photonics

Conventional photonic devices are planar and rigid because of the substrates on which they are fabricated. However, the world is not flat and stiff: There are many applications that would benefit from soft devices and nonplanar geometries, such as interfacing with the soft, curvilinear, and dynamic surfaces of living organisms. This mismatch demands flexible and stretchable photonic devices that can be mechanically deformed without damage to their useful properties. This session will focus on latest advances in the field of flexible and stretchable photonic devices, address the scientific and technical challenges associated with their material choice, device engineering, as well as system integration, and highlight key applications enabled by the technology.

CO-CHAIRS:
Giancarlo Righini, *IFAC, Centro Fermi, Italy*
Juejun Hu, *Massachusetts Institute of Technology, USA*

Joint Session ECBO (European Conferences on Biomedical Optics (run by OSA, SPIE) - CLEO®/Europe 2021

JS ECBO-CLEO®/Europe

CO-CHAIRS:
Alexander Jesacher, *Medizinische Universität Innsbruck, Austria (CL chair CLEO®/Europe)*
Peter So, *Massachusetts Institute of Technology, US (ECBO chair)*

Joint Session LiM-CLEO®/Europe 2021

CO-CHAIRS:
Benjamin Graf, *Fraunhofer Institute for Production Systems and Design Technology IPK, Berlin, Germany (LiM)*
Michael Rethmeier, *Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany (LiM)*
Emmanuel Stratakis, *IESL- FORTH, Heraklion, Greece (CM chair CLEO®/Europe)*

NOTES

GENERAL INFORMATION

Short abstracts of the papers to be presented at CLEO®/Europe-EQEC 2021 appear in this advance programme.

The CLEO®/Europe-EQEC 2021 technical programme will feature more than 1400 presentations including **3 Plenary talks** (CLEO®/Europe, EQEC, WoP Congress), **5 Tutorial talks, 9 Keynote talks, 72 invited talks, 20 talks upgraded to invited, 914 oral presentations and 408 poster presentations**. Additionally, 18 oral talks will be presented in the two post-deadline sessions to take place on Thursday evening. Additionally, **12 short courses** will be proposed.

During the conference week, 199 oral sessions and 9 poster sessions will be featured. Up to 12 parallel sessions will virtually take place daily during the conference.

Conference Dates

CLEO®/Europe-EQEC 2021 will be running from **Monday 21 June, 08:30 to Friday 25 June, 18:00**, CEST time zone.

Welcome Words and World of Photonics Congress Plenary Talk by 2020 Nobel Prize Co-Laureate

The official World of Photonics congress opening will take place on Monday 21 June, from 11:00 to 12:30 CEST time zone. The event will be broadcasted from Messe Munich's platform. Instructions on how to join in was sent to each participant. For all other CLEO/Europe-EQEC sessions join in via the CLEO/Europe-EQEC platform.

TIME SCHEDULE:

11:00 – 11:15

- **OPENING - WORDS OF WELCOME BY:**
  Dr. Reinhard Pfeiffer, *deputy CEO, Messe München GmbH.*
  Dr. Luc Bergé, *President European Physical Society*
  Prof. Constance J. Chang-Hasnain, *2021 OSA President*
  Prof. Carmen Menoni, *2021, IEEE Photonics Society President*
  Prof. David L Andrews, *SPIE President 2021*
  Prof. Dr.-Ing. Ludger Overmeyer, *President WLT e. V.*
  Prof. Dr. Peter Loosen, *Fraunhofer Institute for Laser Technology, ILT and President of the World of Photonics congress steering committee.*

11:15 - 12:15

- **PLENARY TALK "A 40-YEAR JOURNEY"**
  Reinhard Genzel, *Max-Planck-Institute for Extraterrestrial Physics, Garching, Germany*

12:15 – 12:30

- Presentation of the Winners of the **Bernard J. Couillaud Prize**
- Prize and the **Herbert Walther Award** Presented by OSA.

NOTE: Wolfgang Peter Schleich, *Universität Ulm, Institut für Quantenphysik, Ulm, Germany,* 2021 recipient of the Herbert Walther Award will present a Keynote Talk **"Cavity QED, Cold Atoms and the Riemann Zeta Function"** during a special session to take place on Tuesday afternoon, 22 June 2021, from 14:30 to 15:30.

Prizes and Awards

A series of Prize and Award ceremonies will take place during the EQEC Plenary session scheduled **Tuesday 22 June from 09:00 to 10:30, room 1.** During this session **Nirit Dudovich**, *Weizmann Institute of Science, Rehovot, Israel,* will present a plenary talk on **"Attosecond Interferometry"**

The following Prizes and Awards will be presented by the European Physical Society (EPS), the Optical Society (OSA), the European Optical Society (EOS).

- **EPS-QEOD and EPS Young Minds 2021 Best Student Presentation Awards.**

- **2021 Awards of the EPS-QEOD (Quantum Electronics and Optics Division**):
  - (1) **Quantum Electronics Prize.**
  - (2) **Fresnel Prizes.**
  - (4) **PhD Thesis Prizes.**

- **2021 EPS-QEOD/AMOPD (Atomic, Molecular and Optical Physics Division) Vladilen Letokhov Medal**

- **2020 EPS-QEOD Prize for 'Research in Laser Science and Applications'**

- **The Optical Society (OSA) Awards and Honours:**
  - **OSA Foundation Student Prizes**
  - **OSA Fellow Members**

- **EOS Early Career Women in Photonics Award**

Consult www.cleoeurope.org/awards-prizes/ for further information on the Prizes and Awards and lists of recipients.

Speakers' Information

Speakers are recommended to speak live with screen sharing of their presentations. Prerecording of the video is optional.

LENGTH OF THE ORAL PRESENTATIONS:

- Oral presentations are 15 minutes long (12 minutes live or pre-recorded presentation + 3 minutes for discussion).
- Post-deadline presentations are 10 minutes long (7 minutes live or pre-recorded presentation + 3 minutes for discussion).
- Invited presentations are 30 minutes long (25 minutes live presentation + 5 minutes for discussion).
- Tutorial presentations are 60 minutes long (50 minutes live presentation + 10 minutes for discussion)
- Keynote presentations are 45 minutes long (38 minutes live presentation + 7 minutes for discussion)
- Plenary presentations are 60 minutes long (50 minutes live presentation + 10 minutes for discussion).
- Short Course presentations are 2 x 1.5 hour and half an hour break in-between long (live presentation with screen sharing).

Speakers are requested to strictly stick to these time lengths, no extra time can be given.

Speakers are asked to check-in with the session chair in the virtual room of their relevant session ten minutes before the beginning of the session.

Poster Information

Each poster presenter had the possibility to post a A4 size poster in png format and a short 3-minute video presentation to be visible to participants during the conference.

Each poster author is also assigned in a one-hour topical poster session. Each author is required to attend his/her assigned poster break-out room to be able to meet with participants and explain/

discuss his/her poster presentation. During the session, the poster author can share his/her screen with a presentation (document, PowerPoint, …). She/he will able to mute/unmute his/her microphone.

Poster time schedules (all times given in CET time zone):

- ▸ Monday: 10:00 – 11:00
  (CA, CB, CI and JSV topics)
- ▸ Monday: 13:30 – 14:30
  (EA, EB and EJ topics)
- ▸ Tuesday: 13:30 – 14:30
  (CD and ED topics)
- ▸ Wednesday: 10:00 – 11:00
  (CC, CF, CE and JSII topics)
- ▸ Wednesday: 13:30 – 14:30
  (EC, EH, EI an JSI topics)
- ▸ Thursday: 10:00 – 11:00
  (CG, EE and EF topics)
- ▸ Thursday: 13:30 – 14:30
  (CJ, CK and CL topics).
- ▸ Friday: 10:00 – 11:00
  (CH, EG and JSIV topics)
- ▸ Friday: 13:30 – 14:30
  (CM topic)

Session chairs

For each oral session a nominated session chair will act to introduce the speakers, make sure the speakers stay within the appropriate time limits, help generate discussion.

The Session Chair main functions will consist in:

1) Connecting to his/her session 10 minutes prior the session begins.
2) Checking if all speakers of the session are present.
3) Identifying who will go for a live or a pre-recorded talk.
4) When the session runs, introducing each speaker.
5) Informing the audience that questions can be written down via the chat box.
6) Making sure the speakers stay within the appropriate time limits.
7) Reading the questions for the speaker to answer them, helping generate discussion.
8) Reporting any problems to the technical staff.
9) Post conference reporting of no-shows, reporting of any other matter.

Short Courses

Twelve short courses at an extra cost will be presented in parallel on Wednesday afternoon 23 June 2021 in the exception of one course to take place on Wednesday morning from 08:30 due to time zone constraints of the instructor.

Each course is scheduled in two parts: Course Part I (1 hour ½), break (30 minutes), Course Part II (1 hour ½). The short courses will not be recorded.

Conference Publication

The accepted one-page summaries (oral or posters) will be available online during the conference for those who have registered for the full week.

Post Conference Publications

After the conference, if approval given during the online submission, the one-page summaries will be published online by OSA Publishing (https://www.osa.org/en-us/publications/) and IEEE Photonics Society's IEEE Xplore Digital Library (https://ieeexplore.ieee.org/xpl/conhome/1000412/all-proceedings).

Only papers (either oral or poster) for which the author(s) physically made the presentation at the conference will be eligible for the publications.

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Code of Conduct

For the success of the meeting, it is important that every participant is treated with respect and consideration. Registering to the meeting implies acceptance of our code of conduct policy to be found at www.cleoeurope.org/wp-content/uploads/2020/11/Code_of_Conduct.pdf

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Persons not wishing to be photographed or videotaped from the management staff or its supplier need to send their request by email to conferences@eps.org including their picture to allow their identification.

Exhibition information

This year, the meeting will not be complemented by the LASER World of Photonics, the world's largest tradeshow of laser and optical technology, which is rescheduled to take place in person in Munich, Germany, April 26–29, 2022. However, from June 21 to 24, 2021, Messe Munich will present the "LASER World of PHOTONICS Industry Days" on the World of Photonics Stage. This will take place in parallel to the digital World of Photonics Congress and offer the photonics community a platform for information exchange and networking. You can expect exciting presentations on market figures and the photonics applications of tomorrow, as well as quantum optics and many interesting showrooms.
See https://www.world-of-photonics.com/en/

Conference registration

CONFERENCE REGISTRATION FEES

CONFERENCE REGISTRATION FEES	
EPS/OSA/IEEE Member *with the online digest*	€ 390
Non-Member *with the on line digest*	€ 470
EPS/OSA/IEEE Student Member (*) *with the online digest*	€ 200
Student Non-Member (*) *with the online digest*	€ 220
Student (*) extra fee for Short Course	€ 80
Regular extra fee for Short Course	€ 160
As an association without profit, the European Physical Society is not liable to VAT, all registration fees are exempt from Value Added Tax. (*) Applications for the student rates must include a copy of an official student identity card.	

Registration for the meeting includes:
- Admission to all virtual technical sessions of the 2021 Conference on Lasers and Electro-Optics/Europe – European Quantum Electronics Conference (CLEO®/Europe-EQEC) to take place from 21 to 25 June 2021, CEST time zone.
- Access to the networking features.
- Online technical digest (1-page summaries) with login and password.
- On-demand access of the recorded oral sessions during a 6 months period after the conference.

Additionally, each registered person will receive a voucher to attend:
- The digital World of Photonics Stage including selected sessions from the other Laser World of Photonics conferences.
- LASER World of PHOTONICS Industry Days presentations and panel discussions, network.

Cancellation policy

The deadline is passed, no refund can be requested.

Conference management

European Physical Society
6 rue des Frères Lumière
68200 Mulhouse, France

This programme is edited by Patricia Helfenstein and André Wobst.

Language

English is the official language of the conferences.

NOTES

ROOM 1

8:30 – 10:00

CA-1: Visible Lasers

Chair: Richard Paul Mildren, Macquarie University, Sydney, Australia

CA-1.1 MON (Invited) 8:30

Tb-doped Materials for Visible Lasers

•*R. Yasuhara, H. Chen, and H. Uehara*; *National Institute for Fusion Science, Toki, Japan*

Tb3+ activated visible lasers pumped by blue semiconductor lasers are investigated for the efficient high energy and high peak power.

ROOM 2

8:30 – 10:00

CB-1: Photonic Crystal and Membrane Lasers

Chair: Stephen Sweeney, University of Surrey, Guildford, United Kingdom

CB-1.1 MON (Invited) 8:30

Heterogeneously integrated membrane lasers and photonic crystal lasers

•*S. Matsuo, K. Takeda, T. Fujii, and H. Nishi*; *NTT Device Technology Labs, NTT Corporation, Atsugi, Japan*

We will describe our recent results on membrane DFB laser array and photonic crystal lasers. We have succesfully demonstrated heterogeneous integration of III-V photonic devices on Si substrate.

ROOM 3

8:30 – 10:00

CE-1: Photonic Structures

Chair: Stavros Pissadakis, Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology - Hellas (FORTH), Heraklion, Greece

CE-1.1 MON (Keynote) 8:30

Interplay between order and disorder in natural photonic structures

L. Schertel, G. Jacucci, G.T. van der Kerhof, and •*S. Vignolini*; *University of Cambridge, Cambridge, United Kingdom*

Colours in living organisms are often created by scattering of nanostructured materials, rather than absorption. Here we revise how the interplay between order and disorder in natural photonic structures affect their optical appearance.

ROOM 4

8:30 – 10:00

CF-1: Ultrashort Pulse Generation

Chair: Hanieh Fattahi, MPI for the Science of Light, Erlangen, Germany

CF-1.1 MON 8:30

Kerr-lens mode locked, synchronously pumped, ultra-broadband breathing pulse optical parametric oscillator

•*J. Fan[1,2], D. Zuber[1,2], R. Mevert[1,2], T. Lang[3], T. Binhammer[4], and U. Morgner[1,2,5]*; *[1]Leibniz Universität Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering-Innovation Across Disciplines), Hannover, Germany; [3]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [4]neoLASE GmbH, Hannover, Germany; [5]Laser Zentrum Hannover e.V., Hannover, Germany*

Beneficial from a breathing pulse design, we demonstrate a Kerr-lens mode locked non-collinear optical parametric oscillator, which is capable of delivering stable ultrabroadband signal spanning from 628 nm to 890 nm at -10 dB level.

CF-1.2 MON 8:45

Ultra-broadband, high power, femtosecond non-collinear optical parametric oscillator in the visible

•*R. Mevert[1,2], Y. Binhammer[1,2], C.M. Dietrich[1,2], J.R. Cardoso de Andrade[1,2], L. Beichert[1,2], T. Binhammer[3], J. Fan[1,2], and U. Morgner[1,2]*; *[1]Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany; [3]neoLASE GmbH, Hannover, Germany*

Optical parametric oscillators are novel laser sources for the creation of tunable ultrashort laser pulses. We present a fast-tunable, high power non-collinear optical parametric oscillator which covers nearly the complete visible spectral range (VIS-NOPO).

ROOM 5

8:30 – 10:00

CG-1: Ultrafast Dynamics in Solids

Chair: Hiroki Mashiko, The University of Tokyo, Center for Ultrafast Intense Laser Science, Japan

CG-1.1 MON (Invited) 8:30

Ab Initio Description of Ultrafast Dynamics in Solids

•*K. Yabana*; *University of Tsukuba, Tsukuba, Japan*

We have developed an ab initio theoretical and computational description of light matter interaction solving coupled dynamics of light propagation, electronic, and ionic motions. We show several applications in ultrafast nano-optics.

ROOM 6

8:30 – 10:00

CK-1: Periodic Components

Chair: Olivier Gauthier-Lafaye, LAAS-CNRS, Toulouse, France

CK-1.1 MON (Invited) 8:30

Stacked Photonic Systems Composed of Resonant Metasurfaces and Other Functional Layers

•*I. Staude*; *Friedrich Schiller University, Jena, Germany*

Stacking of Mie-resonant all-dielectric metasurfaces and other functional layers offers interesting new opportunities for tailoring the response of the metasurface system. This talk will discuss several examples of such stacked systems, which we experimentally realized.

ROOM 7

8:30 – 10:00

EB-1: Quantum Networks

Chair: Andreas Reiserer, MPQ, Garching, Germany

EB-1.1 MON (Keynote) 8:30

Quantum Multiplexing

•*W. Munro*; *1. NTT Basic Research Laboratories and Research Center for Theoretical Quantum Physics. NTT Corporation, Atsugi, Japan*

Quantum networking will enable information transmission in ways unavailable in the classical world. Here we introduce the concept of quantum multiplexing which encodes multiple qubits of information onto a photon to overcome scarce resource issues.

ROOM 8

8:30 – 10:00

EC-1: Band Topology I

Chair: Sebastian Klembt, Wuerzburg University, Germany

EC-1.1 MON (Invited) 8:30

Photonic topological Z2 Insulators

•*A. Szameit*; *Institute for Physics, University of Rostock, Rostock, Germany*

We introduce a photonic topological Floquet Z2-insulator with fermionic time reversal symmetry (TRS). Our experiments demonstrate the characteristic protected counter-propagating edge modes and unequivocally prove the presence of fermionic TRS in this bosonic system.

ROOM 9

8:30 – 10:00

JSI-1: Theory and Numerical Modeling for Nanophononics

Chair: Marc Bescond, The University of Tokyo, Tokyo, Japan

JSI-1.1 MON (Invited) 8:30

Ab initio modeling of thermal effects in 2D van der Waals materials

•*M. Luisier, S. Fiore, T. Bunjaku, J. Backman, C. Klinkert, and A. Szabo*; *Integrated Systems Laboratory, ETH Zurich, Zurich, Switzerland*

In this presentation, the thermal transport properties of two-dimensional van der Waals materials composed of layered transition metal dichalcogenides will be discussed based on ab initio quantum transport simulations. The influence of disorder will be highlighted.

ROOM 10

8:30 – 10:00

JSII-1: Strong-field THz Generation

Chair: Peter Uhd Jepsen, DTU Fotonik, Kgs. Lyngby, Denmark

JSII-1.1 MON (Invited) 8:30

High harmonic generation from low dimensional materials

•*K. Tanaka*; *Department of Physics, Kyoto University, Kyoto, Japan*

We show recent progress of high harmonic generation in solids, especially focusing low dimensional materials such as graphene, transition metal dichalcogenides, and carbon nanotubes.

ROOM 11

8:30 – 10:00

ED-1: Precision Spectroscopy and Fundamental Metrology I

Chair: Piotr Wcislo, Nicolaus Copernicus University, Torun, Poland

ED-1.1 MON (Invited) 8:30

Improved Determination of Fundamental Constants and Test of Fundamental Physics with Doppler-Free THz Spectroscopy of HD^+

S. Alighanbari[1], *G. Giri*[1], •*F.L. Constantin*[2], *V. Korobov*[3], *and S. Schiller*[1]; [1]*Institut für Experimentalphysik, Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany*; [2]*Laboratoire PhLAM, CNRS UMR 8523, University of Lille, Villeneuve d'Ascq, France*; [3]*Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, Dubna, Russia*

Improved precision of Doppler-free rotational spectroscopy of trapped and laser-cooled HD^+ ions allows to confirm accurately high-precision ab-initio molecular ion quantum theory calculations and to determine fundamental constants more precisely than the CODATA2018 values.

ROOM 12

8:30 – 10:00

JSV-1: Flexible Photonic Materials and Integration

Chair: Giancarlo C. Righini, Nello Carrara Institute of Applied Physics, Florence, Italy

JSV-1.1 MON (Invited) 8:30

A universal approach for photonic integration on flexible substrates

Z. Chen[1,2], *Y. Luo*[1,2], *H. Ma*[3], *M. Wei*[3], *J. Jian*[1,2], *Y. Ye*[1,2], *L. Wang*[3], *Y. Shi*[1,2], *R. Tang*[1,2], *C. Sun*[1,2], *J. Li*[3], *C. Zhong*[3], *J. Wu*[1,2], *H. Lin*[3], *and* •*L. Li*[1,2]; [1]*Key Laboratory of 3D Micro/Nano Fabrication and Characterization of Zhejiang Province, School of Engineering, Westlake University, Hangzhou, China*; [2]*Institute of Advanced Technology, Westlake Institute for Advanced Study,, Hangzhou, China*; [3]*College of Information Science & Electronic Engineering, Zhejiang University, Hangzhou, China*

We demonstrate a universal approach for the fabrication of flexible photonics. The developed approach shows few limitations on the selection of optical materials and enables novel 3D photonic integrations for sensing and biological applications.

ROOM 1

CA-1.2 MON 9:00

Enhanced absorption efficiency in UV-pumped Tb^{3+}:LLF

•*S. Kalusniak, H. Tanaka, E. Castellano-Hernández, and C. Kränkel*; *Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany*

We investigate UV pumping of Tb-based lasers and demonstrate significantly higher optical-to-optical efficiencies compared to conventional cyan-blue pumping. Spectroscopy reveals higher UV absorption cross sections and efficient population of the upper laser level by cross-relaxation.

CA-1.3 MON 9:15

The contribution has been withdrawn.

ROOM 2

CB-1.2 MON 9:00

Comparison of electrically and optically pumped buried-heterostructure photonic crystal lasers

•*E. Dimopoulos, Y. Yu, A. Sakanas, A. Marchevsky, M. Xiong, K.S. Mathiesen, E. Semenova, K. Yvind, and J. Mørk*; *DTU Fotonik, Technical University of Denmark, Kongens Lyngby, Denmark*

The properties of buried-heterostructure photonic crystal nanolasers are studied by employing electrical and optical pumping. Using the rate equations and the spectral evolution of the laser the thermal properties and injection efficiency are being investigated.

CB-1.3 MON 9:15

Rate equation analysis of slow-light photonic crystal lasers

M. Saldutti and •*M. Gioannini*; *Politecnico di Torino, Torino, Italy*

We derive laser rate equations including slow-light effect and coupling, induced by gain, between photonic crystal waveguide Bloch modes. We apply it to the calculation of the laser modulation bandwidth and energy cost per bit.

ROOM 3

CE-1.2 MON 9:15

First Observation of Phonon-induced Ballistic Motion in Photonic Nanostructures

•*T. Liu*[1], *J.-Y. Ou*[1], *K. MacDonald*[1], *and N. Zheludev*[1,2]; [1]*University of Southampton, Southampton, Hampshire , United Kingdom*; [2]*Nanyang Technological University, Singapore, Singapore*

The components of photonic and opto/electro-mechanical nanostructures are subject to picometre-scale thermal movements, which affect their optical properties. We present the first observation of short-timescale ballistic (non-Brownian) phonon-driven motion in a microcantilever.

ROOM 4

CF-1.3 MON 9:00

Towards Sub-10-fs Visible μJ Pulses at 1 MHz Repetition Rate From an Optical Parametric Amplifier

•*S. Kleinert*[1,2], *A. Tajalli*[3], *D. Zuber*[1,2], *J.R.C. Andrade*[4], *and U. Morgner*[1,2,5]; [1]*Institute of Quantum Optics, Leibniz Universität Hannover, 30167 Hannover, Germany*; [2]*Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering - Innovation AcrossDisciplines), 30167 Hannover, Germany*; [3]*Deutsches Elektronen-Synchrotron DESY, 22607 Hamburg, Germany*; [4]*Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, 12489 Berlin, Germany*; [5]*Laser Zentrum Hannover e.V., 30419 Hannover, Germany*

We present a compact visible optical-parametric amplifier delivering pulses with an energy of 2μJ and a Fourier-transform-limited pulse duration below 7fs at 1MHz repetition rate. The system is pumped by a CPA-free solid-state amplifier.

CF-1.4 MON 9:15

Soliton-effect self-compression: limits and high repetition rate scaling

•*D. Schade*[1,2], *J.R. Koehler*[1], *F. Köttig*[1], *P.S.J. Russell*[1,2], *and F. Tani*[1]; [1]*Max Planck Institute for the Science of Light, Erlangen, Germany*; [2]*Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany*

We identify the boundaries of multi-parameter space within which soliton-effect self-compression is optimal in gas-filled hollow-core fibres, taking account of modulational instability, self-focusing, third-order dispersion, photoionisation, and the effects of scaling to MHz-level repetition rates.

ROOM 5

CG-1.2 MON 9:00

Observation of Dynamical Bloch Oscillations in Dielectrics

J. Reislöhner, D. Kim, and •*A. Pfeiffer*; *Friedrich-Schiller-Universität Jena, Jena, Germany*

The effect that the current alternates direction when the electrons leave the first Brillouin zone is observed with noncollinear spectroscopy. The onset of Bloch oscillations is mapped into an interference trace.

CG-1.3 MON 9:15

Reconstruction of Ultrafast Exciton Dynamics with a Phase-retrieval Algorithm

•*B. Moio*[1,2], *G.L. Dolso*[1], *G. Inzani*[1], *N. Di Palo*[1], *R. Borrego-Varillas*[2], *M. Nisoli*[1,2], *and M. Lucchini*[1,2]; [1]*Department of Physics, Politecnico di Milano, Milan, Italy*; [2]*Institute for Photonics and Nanotechnologies, IFN-CNR, Milan, Italy*

We present ePIX, a novel iterative algorithm for the reconstruction of ultrafast exciton dynamics from attosecond transient reflectivity traces. Based on ptychographic techniques, our method guarantees high accuracy and robustness with respect to experimental noise.

ROOM 6

CK-1.2 MON 9:00

Uniformly-Distributed Energy Losses in Photonic Gratings Enabled by Exceptional Points in Band Diagrams

•*A. Yulaev*[1,2], *S. Kim*[3], *Q. Li*[4], *D.A. Westly*[1], *B.J. Roxworthy*[1], *K. Srinivasan*[1], *and V. Aksyuk*[1]; [1]*Physical Measurement Laboratory, National Institute of Standards and Technology, Gaithersburg, MD 20899, USA*; [2]*Department of Chemistry and Biochemistry, University of Maryland, College Park, MD 20742, USA*; [3]*Department of Electrical and Computer Engineering, Texas Tech University, Lubbock, TX 79409, USA*; [4]*Department of Electrical and Computer Engineering, Carnegie Mellon University, Pittsburgh, PA 15213, USA*

Wave penetration in uniform lossy materials is typically accompanied by an exponential decay. We demonstrate spatially uniform energy losses across hundred-micrometer long photonic gratings carefully tuned to operate between exceptional points in their band diagram.

CK-1.3 MON 9:15

Designing Out-of-Plane Tilted Bragg Gratings for Arbitrary Beam Shaping

•*D.-W. Ko, J.C. Gates, and P. Horak*; *Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*

We investigate grating-based couplers theoretically to deliver light from integrated waveguides into free space above the chip. Analytical and numerical models determine nonuniform grating periods and index contrasts required to generate arbitrary beam shapes.

ROOM 7

EB-1.2 MON 9:15

Entanglement Based Quantum Networks: Protocols, AI control plane & coexistence with classical communication.

•*S.K. Joshi[1], Z. Huang[2], A. Fletcher[3], N. Solomons[1], I.V. Puthoor[4], Y. Pelet[1], D. Aktas[1], C. Lupo[2], A.O. Quintavalle[2], S. Wengerowsky[5], R. Stange Tessinari[1], O. Alia[1], R. Wang[1], M. Clark[1], N. Venkatachalam[1], E. Hugues-Salas[1], G. Kanellos[1], M. Lončarić[6], S. Neumann[5], B. Liu[7], T. Scheidl[5], Ž. Samec[6], L. Kling[1], A. Qiu[1], R. Nejabati[1], D. Simeonidou[1], E. Andersson[4], S. Pirandola[3], R. Ursin[5], M. Stipčević[7], and J. Rarity[1]; [1]University of Bristol, Bristol, United Kingdom; [2]The University of Sheffield, Sheffield, United Kingdom; [3]University of York, York, United Kingdom; [4]Heriot-Watt University, Edinburgh, United Kingdom; [5]Institute for Quantum Optics and Quantum Information - Vienna (IQOQI), Vienna, Austria; [6]Ruder Bošković Institute, Zagreb, Croatia; [7]College of Advanced Interdisciplinary Studies, NUDT, Changsha, China*

We present a multi-user quantum network and experimental implementations of unconditionally secure digital signatures, 5 different anonymity protocols, authentication transfer protocol, network flooding, Artificial Intelligence network control plane and coexistence between classical and quantum signals.

ROOM 8

EC-1.2 MON 9:00

Topological Photonics with Embedded Quantum Dots

•*A. Foster[1], M. Jalalimehrabad[1], R. Dost[1], E. Clarke[2], P. Patil[2], M. Skolnick[1], and L. Wilson[1]; [1]Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom; [2]EPSRC National Epitaxy Facility, University of Sheffield, Sheffield, United Kingdom*

We demonstrate a chiral interface using semiconductor quantum dots (QDs) coupled to topological photonic waveguides. Chiral coupling is shown to extend to QDs in ring resonator structures, providing a route to Purcell-enhanced chiral light-matter interactions.

EC-1.3 MON 9:15

Measuring topological invariants in polaritonic graphene

•*P. St-Jean[1], A. Dauphin[2], P. Massignan[2,3], B. Real[4], O. Jamadi[4], M. Milicevic[1], A. Lemaître[1], A. Harouri[1], L. Le Gratiet[1], I. Sagnes[1], S. Ravets[1], J. Bloch[1], and A. Amo[1]; [1]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]ICFO, Barcelona, Spain; [3]Universitat Politecnica de Catalunya, Barcelona, Spain; [4]PHLAM - Université de Lille, Lille, France*

Using a honeycomb polaritonic lattice, we elaborate and demonstrate a scheme for measuring topological invariants of 2D chiral Hamiltonians directly from the bulk. We also extend our scheme to critically compressed honeycomb lattices, where Dirac cones have merged.

ROOM 9

JSI-1.2 MON 9:00

Thermal boundary conductance of Si/Ge interface by anharmonic phonon non-equilibrium Green function formalism

•*Y. Guo, Z. Zhang, M. Bescond, M. Nomura, and S. Volz; Institute of Industrial Science, The University of Tokyo, Tokyo, Japan*

This work presents a study of heat transport at Si/Ge interface by anharmonic phonon non-equilibrium Green's function formalism, and quantify the contribution of anharmonicity to thermal boundary conductance.

JSI-1.3 MON 9:15

"Hot" electron generation in plasmonic nanostructures – thermal vs. non-thermal effects

Y. Dubi[1], S. Sarkar[1], •I.W. Un[2], and Y. Sivan[2]; [1]Department of Chemistry, Ben Gurion University, Beer Sheva, Israel; [2]School of Electrical and Computer Engineering, Ben-Gurion University of the Negev, Beer Sheva, Israel

We have developed a self-consistent theory for determining the electron distribution in plasmonic nanostructures under continuous-wave illumination, allowing, for the first time, a comparison of heating and non-thermal effects in the steady-state electron distributions.

ROOM 10

JSII-1.2 MON 9:00

Terahertz pulse generation by laser-created, magnetized plasmas

•*C. Tailliez[1,2], X. Davoine[1,2], L. Gremillet[1,2], A. Debayle[1,2], and L. Bergé[1,2]; [1]CEA, DAM, DIF, Arpajon, France; [2]Université Paris-Saclay, CEA, LMCE, Bruyères-le-Châtel, France*

Relativistic interactions between a laser and strongly magnetized, underdense plasmas are able to produce high-intensity, few-cycle Cerenkov wake radiation in the Terahertz domain. 1D and 2D Particle-in-Cell simulations highlight the influence of various cyclotron/plasma frequencies.

JSII-1.3 MON 9:15

Multi-mW-level, air-plasma induced ultra-broadband THz pulses for nonlinear THz spectroscopy

•*B. Zhou, M. Rasmussen, and P.U. Jepsen; DTU Fotonik, Technical University of Denmark, Kongens Lyngby, Denmark*

We demonstrated multi-mW-level, ultra-broadband THz pulse generation from 2-color air-plasma driven by a standard 1 kHz commercial OPA. Such extremely short and energetic THz pulses are uniquely useful for nonlinear THz spectroscopy investigations.

ROOM 11

ED-1.2 MON 9:00

Bending modes metrology beyond 12 μm

•*R. Gotti[1], M. Lamperti[1], D. Gatti[1], M.K. Shakfa[2], E. Canè[3], F. Tamassia[3], P. Schunemann[4], P. Laporta[1], A. Farooq[2], and M. Marangoni[1]; [1]Dipartimento di Fisica - Politecnico di Milano and IFN-CNR, Lecco, Italy; [2]King Abdullah University for Science and Technology, Clean Combustion Research Center, Thuwal, Saudi Arabia; [3]Università di Bologna, Dipartimento di Chimica Industriale, Bologna, Italy; [4]BAE Systems, Inc., Nashua, USA*

Bending modes metrology through a comb-referenced widely tunable nonlinear laser source is demonstrated. We report 30 kHz uncertainty in the CO2 line center frequency determination and an extensive study of the ν11 band of benzene.

ED-1.3 MON 9:15

High-Resolution Measurements of Halogenated Volatile Organic Compounds Using Frequency Comb Fourier Transform Spectroscopy

•*A. Hjältén[1], I. Sadiek[2], C. Lu[1], F. Senna Vieira[1], M. Stuhr[3], M. Germann[1], and A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Leibniz Institute for Plasma Science and Technology (INP), Greifswald, Germany; [3]Institute of Physical Chemistry, University of Kiel, Kiel, Germany*

We use mid-infrared optical frequency comb Fourier transform spectroscopy to measure and assign high-resolution absorption spectra of methyl iodide, CH_3I, and dibromomethane, CH_2Br_2, around 3.3 μm. We also provide the first assessment of linestrengths of the ν_4 band of CH_3I.

ROOM 12

JSV-1.2 MON 9:00

Ultra-high numerical aperture meta-fiber for flexible optical trapping

•*M. Plidschun[1,2], H. Ren[3], J. Kim[1,2], R. Förster[1], S.A. Maier[3,4], and M.A. Schmidt[1,2,5]; [1]Leibniz Institute of Photonic Technology, Jena, Germany; [2]Abbe Center of Photonic and Faculty of Physics, FSU Jena, Jena, Germany; [3]Chair in Hybrid Nanosystems, Nanoinstitute Munich, LMU München, München, Germany; [4]Department of Physics, Imperial College London, London, United Kingdom; [5]Otto Schott Institute of Material Research, FSU Jena, Jena, Germany*

We demonstrate the concept, design and application of a meta-lens enhanced single-mode fiber for trapping of single silica microbeads and E. coli bacteria, reaching an unprecedented ultra-high numerical aperture of 0.88 with only one fiber.

JSV-1.3 MON 9:15

Tunable Coupling of Photonic Molecules on Flexible Elastomer Substrates

•*S. Woska, P. Rietz, O. Karayel, and H. Kalt; Institute of Applied Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany*

Photonic molecules of whispering gallery mode cavities are structured on liquid crystal elastomer substrates. Using temperature as external stimulus, the photonic molecule's inter-cavity gap is controlled, and its coupling strength is precisely and reversibly tuned.

ROOM 1

CA-1.4 MON 9:30

Miniaturized passively Q-switched Pr:YLF Laser

•M. Badtke, H. Tanaka, L. Ollenburg, S. Kalusniak, and C. Kränkel; Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

We demonstrate a Pr:YLF laser at 640 nm passively Q-switched by a Co:MgAl2O4 spinel saturable absorber. A miniaturized linear cavity as short as 8 mm enables to achieve sub-10 ns pulse durations.

CA-1.5 MON 9:45

8.5W Linear and 3.6W Ring TEM_{00} Diode-Pumped Alexandrite Lasers

•G. Tawy[1], A. Minassian[2], and M.J. Damzen[1]; [1]Photonics Group, Imperial College London, London, United Kingdom; [2]Unilase Ltd, London, United Kingdom

We present record power levels for red-diode-pumped Alexandrite lasers in TEM_{00} operation. 8.5W is obtained with $M^2 < 1.1$ in a linear cavity and a 3.6W from a ring laser with $M^2 = 1.2$.

ROOM 2

CB-1.4 MON 9:30

Design strategy for broadband MECSELs

•H. Kahle, H.-M. Phung, P. Tatar-Mathes, P. Rajala, and M. Guina; Optoelectronics Research Centre (ORC), Physics Unit / Photonics, Faculty of Engineering and Natural Sciences, Tampere University, Tampere, Finland

First results of MECSELs with semiconductor gain membranes, designed to possess a broad tuning range are presented. The MECSEL operates at room temperature around 1 μm and the membrane contains two different kinds of quantum wells.

CB-1.5 MON 9:45

Quantum dot membrane external-cavity surface-emitting laser (MECSEL) at 1.5 μm

•H.-M. Phung[1], P. Tatar-Mathes[1], C. Paranthoen[2], C. Levallois[2], N. Chevalier[2], H. Kahle[1], M. Alouini[2], and M. Guina[1]; [1]Optoelectronics Research Centre (ORC), Physics Unit / Photonics, Faculty of Engineering and Natural Sciences, Tampere University, Tampere, Finland; [2]Institut FOTON, UMR-CNRS 6082, Institut National des Sciences Appliquées de Rennes, University of Rennes, Rennes, France

We report an InAs quantum dot MECSEL, which provides an output power of 320 mW around 1.5 μm with 86 nm tunability at room temperature operation and silicon carbide heat spreaders.

ROOM 3

CE-1.3 MON 9:30

Switchable optical strong PUFs via polymer dispersed liquid crystals

•S. Nocentini[1,2], U. Ruehrmair[3], M. Barni[4], D.S. Wiersma[1,2,5], and F. Riboli[2,6]; [1]National Institute of Metrological Research (INRiM), 10135 Turin, Italy; [2]Europeran Laboratory of Nonlinear Spectroscopy (LENS), 50019 Sesto Fiorentino, Italy; [3]LMU München Faculty of Physics, D-80799 München, Germany; [4]University of Siena, Department of Information Engineering and Mathematical Sciences, 53100 Siena, Italy; [5]University of Florence, Department of Physics, 50019 Sesto Fiorentino, Italy; [6]National Research Center - National Optical Institute (CNR-INO), 50019 Sesto Fiorentino, Italy

Physical unclonable functions (PUFs) have been proposed for secure authentication processes in open networks. We demonstrate reconfigurable and switchable all-optical strong PUFs based on polymer dispersed liquid crystals characterized by an enhanced complexity thanks to material reconfigurability.

CE-1.4 MON 9:45

Lensless and Optical Physically Unclonable Function with Fibrous Media

•M.S. Kim[1], G.J. Lee[1], S.H. Choi[2], J.W. Leem[3], Y.L. Kim[3], and Y.M. Song[1]; [1]Gwangju Institute of Science and Technology, Gwangju, South Korea; [2]Yonsei University, Wonju, South Korea; [3]Purdue University, West Lafayette, USA

Combination of Physically unclonable functions (PUF) and fibrous medium can potentially increase hardware and information security. Here, we propose a strong lensless, optical, portable PUF device with fibrous medium having inherent stochastic pinholes.

ROOM 4

CF-1.5 MON 9:30

Gas Mixtures to Suppress Thermal Buildup Effects Caused by High-Repetition-Rate Photoionization of Confined Gases

J.R. Koehler[1], D. Schade[1,2], P.S.J. Russell[1,2], and •F. Tani[1]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany

The buildup of ionisation-related thermal density depressions affects pulse compression at high repetition rates in heavier noble gases. Adding lighter gases with high thermal conductivity accelerates heat dissipation, significantly reducing buildup effects.

CF-1.6 MON 9:45

Nonlinear pulse compression in double-pass multiple plate compression

•B.-H. Chen[1], J.-X. Su[1], J.-Y. Guo[1], K. Chen[2,3], S.-D. Yang[1], and C.-H. Lu[1]; [1]Institute of Photonics Technologies, National Tsing Hua University, Hsinchu 30013, Taiwan; [2]Robinson Research Institute, Faculty of Engineering, Victoria University of Wellington, Wellington 6012, New Zealand; [3]The Dodd-Walls Centre for Photonic and Quantum Technologies, Dunedin 9016, New Zealand

A new double-pass multiple plate compression (DPMPC) scheme is first demonstrated, compressing the pulse from 190 fs to 17.8 fs with 57 % throughput and good beam quality.

ROOM 5

CG-1.4 MON 9:30

Light field-driven electron dynamics in 2D-materials

•T. Boolakee[1], C. Heide[1,2], H.B. Weber[1], and P. Hommelhoff[1]; [1]Department of Physics, Friedrich-Alexander Universität Erlangen-Nürnberg, 91058 Erlangen, Germany; [2]now at PULSE Institute, Departments of Photon Science and Applied Physics SLAC/ Stanford University, Menlo Park, CA, 94025, USA

We demonstrate sub-femtosecond coherent control on electrons in 2D-materials using carrier-envelope phase-controlled femtosecond laser pulses. Ultrafast currents reveal the intricately coupled inter- and intra-band carrier dynamics imprinted by the shape of the optical field.

CG-1.5 MON 9:45

Contribution of free carriers to light absorption upon intense light-semiconductor interaction

•R. Hollinger[1,2], E. Haddad[3], M. Zapf[4], V. Shumakova[5], P. Herrmann[1], R. Röder[4], I. Uschmann[1], U. Reislöhner[1], A. Pugžlys[5], A. Baltuška[5], F. Légaré[3], M. Zürch[1,6,7,8], C. Ronning[4,9], C. Spielmann[1,2,9], and D. Kartashov[1,9]; [1]Institute of Optics and Quantum Electronics, Friedrich-Schiller-University Jena, Jena, Germany; [2]Helmholtz Institute Jena, Jena, Germany; [3]Centre Énergie Matériaux et Télécommunications, Institut National de la Recherche Scientifique, Varennes, Canada; [4]Institute for Solid State Physics, Friedrich-Schiller-University Jena, Jena, Germany; [5]Institute for Photonics, Technical University Vienna, Vienna, Austria; [6]Fritz Haber Institute, Berlin, Germany; [7]Department of Chemistry, University of California Berkeley, Berkeley,

ROOM 6

CK-1.4 MON 9:30

Fiber System with Nanostructured Components for Generation of Optical Vortex Beam

•H.T. Nguyen[1,2], A. Filipkowski[1,2], K. Switkowski[3], D. Pysz[2], W. Krolikowski[4,5], and R. Buczynski[1,2]; [1]University of Warsaw, Pasteura 5, 02-093 Warsaw, Poland; [2]Łukasiewicz Institute of Microelectronics and Photonics, Al. Lotników 32/46, 02-668 Warsaw, Poland; [3]Warsaw University of Technology, Koszykowa 75, 00-662 Warsaw, Poland; [4]Australian National University, Canberra, ACT 0200, Australia; [5]Texas A&M University , Qatar, Qatar

We report on optical performance of a compact nano-structured gradient index micro-lenses. These two-component systems which are rigidly integrated at fiber end and used for generation of high-quality vortices with low numerical aperture.

CK-1.5 MON 9:45

Multiple vibro-polaritons formation from a polyethylene film embedded in a resonant mid-infrared cavity

M. Malerba, M. Jeannin, A. Bousseksou, R. Colombelli, and •J.-M. Manceau; Centre de Nanosciences et Nanotechnologies, Palaiseau, France

We resolve the dispersion of multiple vibro-polariton modes issued from the coupling of several vibrational bands of the methylene group with a resonant modes of a mid-infrared micro-cavity. The experimental results are in excellent agreement with numerical simulations.

ROOM 7

EB-1.3 MON 9:30

Flexible entanglement distribution with an AlGaAs chip for quantum networks

•F. Appas[1], F. Baboux[1], M.I. Amanti[1], A. Lemaître[2], F. Boitier[3], E. Diamanti[4], and S. Ducci[1]; [1]Laboratoire Matériaux et Phénomènes Quantiques, Université de Paris, CNRS-UMR 7162, Paris, France; [2]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [3]Nokia Bell Labs, Nozay, France; [4]Sorbonne Université, CNRS, LIP6, Paris, France

We combine an on-chip, telecom, broadband entangled photon source with industry-grade flexible wavelength management techniques to demonstrate reconfigurable entanglement distribution over up to 75 km between up to 8 users in a resource-optimized quantum network.

EB-1.4 MON 9:45

OpenQKD Use-case for Securing Sensitive Medical Data at Rest and in Transit

B. Zatoukal[1], F. Kutschera[2], •A. Poppe[2], W. Strasser[1], B. Stockinger[3], L. Brcic[4], L. Setaffy[5], K. Zatloukal[4], H. Müller[4], M. Plass[4], B. Kipperer[4], and S.F. Lax[5]; [1]fragmentiX, Klosterneuburg, Austria; [2]AIT Austrian Institute of Technology GmbH, Vienna, Austria; [3]Citycom Telekommunikation GmbH, Graz, Austria; [4]Medical University Graz, Graz, Austria; [5]Hospital (LKH)-Graz II, Graz, Austria

Secure keys from QKD systems have been used by AES-encryptors to distribute large images and sensitive genome data and store them using secret sharing methods under real-world conditions in Graz

ROOM 8

EC-1.4 MON 9:30

Measuring Non-Hermitian Topological Invariants with Exciton Polaritons

•E. Estrecho[1], R. Su[2], D. Biegańska[3], Y. Huang[2], M. Wurdack[1], M. Pieczarka[1,3], A.G. Truscott[1], T.C.H. Liew[2], E. Ostrovskaya[1], and Q. Xiong[2,4]; [1]The Australian National University, Canberra, Australia; [2]Nanyang Technological University, Singapore, Singapore; [3]Wrocław University of Science and Technology, Wrocław, Poland; [4]Tsinghua University, Beijing, China

We present the measurement of the novel non-Hermitian topological invariant in the dispersion of exciton polaritons, hybrid particles of light and matter, based on lead halide perovskites.

EC-1.5 MON 9:45

Optical Analogue of Dresselhaus Spin-Orbit Interaction in Photonic Graphene

•D. Krizhanovskii; University of Sheffield, Sheffield, United Kingdom

We report on the experimental realization of a synthetic non-Abelian gauge field for photons in a honeycomb microcavity lattice. The effective magnetic field associated with TE-TM splitting has the symmetry of Dresselhaus spin-orbit interaction around Dirac points.

ROOM 9

JSI-1.4 MON 9:30

Temperonic Crystal: A Superlattice for Temperature Waves in Graphene

M. Gandolfi[1], C. Giannetti[2], and •F. Banfi[3]; [1]CNR-INO and Department of Information Engineering, University of Brescia, Brescia, Italy; [2]Department of Physics and I-LAMP, Università Cattolica del Sacro Cuore, Brescia, Italy; [3]FemtoNanoOptics group, Université de Lyon, Institut Lumière Matière, Université Lyon 1 and CNRS, Villeurbanne, France

The temperonic crystal, a periodic structure with a unit cell made of two slabs sustaining temperature wavelike oscillations on short timescales, is introduced. Results are shown for the paradigmatic case of a graphene-based temperonic crystal.

JSI-1.5 MON 9:45

Terahertz Full-polarization-state Detection by Nanowires

•K. Peng[1], D. Jevtics[2], F. Zhang[3], S. Sterzl[1], D.A. Damry[1], M.U. Rothmann[1], B. Guilhabert[2], M.J. Strain[2], H.H. Tan[3,4], L.M. Herz[1], L. Fu[3,4], M.D. Dawson[2], A. Hurtado[2], C. Jagadish[3,4], and M.B. Johnston[1]; [1]Department of Physics, University of Oxford, Oxford, United Kingdom; [2]Institute of Photonics, SUPA Department of Physics, University of Strathclyde, Glasgow, United Kingdom; [3]Department of Electronic Materials Engineering, Research School of Physics, The Australian National University,, Canberra, Australia; [4]ARC Centre of Excellence on Transformative Meta Optical Systems, Research School of Physics, The Australian National University, Canberra, Australia

We present a polarization-sensitive cross-nanowire detector that can measure the full polarization state of a terahertz pulse over a single scan

ROOM 10

JSII-1.4 MON 9:30

Mechanisms of Terahertz Generation under Femtosecond Pulses propagation in Nanocomposites

•O. Fedotova[1], A. Husakou[2], G. Rusetsky[1], A. Fedotov[3], O. Khasanov[1], T. Smirnova[4], U. Sapaev[5], and I. Babushkin[6,7,2]; [1]Scientific-Practical Materials Research Centre NAS Belarus, Minsk, Belarus; [2]Max Born Institute, Berlin, Germany; [3]Belarusian State University, Minsk, Belarus; [4]International Sakharov Environmental Institute BSU, Minsk, Belarus; [5]Tashkent State Technical University, Tashkent , Uzbekistan; [6]Institute of Quantum Optics, Leibnitz Hannover University, Hannover , Germany; [7]Cluster of Excellence PhoenixD, Hannover , Germany

Intensive femtosecond pulse propagating through nanocomposite consisted of the semiconductor quantum dots incorporated into a dielectric matrix may yield terahertz pulse due to the contribution of large permanent dipole moments as well as transition dipole moments between the excitonic states

JSII-1.5 MON 9:45

Quantum Interference Terahertz Generation from ZnTe

•L. Peters, J.S. Totero Gongora, V. Cecconi, J. Tunesi, L. Olivieri, A. Pasquazi, and M. Peccianti; Emergent Photonics Lab, University of Sussex, Brighton, United Kingdom

We demonstrate a novel scheme based on two-color quantum interference to augment the THz emission from ZnTe in transmission. The generation mechanism is phase-matching free due to confinement of the interactions at the crystal surface.

ROOM 11

ED-1.4 MON 9:30

Frequency Comb Fourier Transform Spectroscopy at 8 μm Using a Compact Difference Frequency Generation Source

•M. Germann[1], A. Hjältén[1], K. Krzempek[2], A. Hudzikowski[2], A. Głuszek[2], D. Tomaszewska[2], G. Soboń[2], and A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Laser and Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland

Using a compact fiber-based difference frequency generation comb and a Fourier transform spectrometer we record Doppler-limited spectra of the ν_1 band of N_2O at 1285 cm^{-1} and obtain line positions with an average precision below 200 kHz.

ED-1.5 MON 9:45

Gapless high-resolution QCL dual-comb spectroscopy with real-time data processing for dynamic gas-phase measurements

•M. Gianella[1], S. Vogel[1], K. Komagata[2], J. Hillbrand[3], F. Kapsalidis[3], B. Tuzson[1], A. Nataraj[1], M. Beck[3], A. Hugi[4], M. Mangold[4], P. Jouy[4], T. Südmeyer[2], J. Faist[3], and L. Emmenegger[1]; [1]Laboratory for Air Pollution / Environmental Technology, Empa, Dübendorf, Switzerland; [2]Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtelâtel, , Neuchâtel, Switzerland; [3]Institute for Quantum Electronics, ETH Zurich, Zürich, Switzerland; [4]IRsweep AG, Stäfa, Switzerland

We demonstrate gapless, high resolution absorption measurements with QCL dual-comb spectroscopy and fast parallel data processing enabling near real-time observations of dynamic processes.

ROOM 12

JSV-1.4 MON 9:30

Flexible Photonics Embedded into Advanced Composites

•C. Holmes[1], M. Godfrey[2], P. Mennea[1], S. Jantzen[1], D. Bull[2], and J. Dulieu-Barton[3]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]School of Engineering, University of Southampton, Southampton, United Kingdom; [3]Bristol Composite Institute, University of Bristol, Bristol, United Kingdom

We embed flexible (50 μm thick) planar silica glass into advanced composites, namely carbon fibre and glass reinforced polymer. We demonstrate unique triaxial strain sensing capability and switching of optical signals within composite structure.

JSV-1.5 MON 9:45

Second-Harmonic Generation Tuning by Stretching Arrays of GaAs Nanowires

•G. Saerens[1], E. Bloch[1], K. Frizyuk[2], V. Vogler-Neuling[1], E. Semenova[3,4], E. Lebedkina[3], M. Petrov[2], R. Grange[1], and M. Timofeeva[1]; [1]ETH Zürich, Optical Nanomaterial Group, Institute for Quantenelectronics, Dep. of Physics, Zürich, Switzerland; [2]ITMO University, Kronverkskiy prospect 49, St. Petersburg, Russia; [3]DTU Fotonik, Technical University of Denmark, Kongens Lyngby, Denmark; [4]NanoPhoton-Centor for Nanophotonics, Technical University of Denmark, Kongens Lyngby, Denmark

We study optical performances of ordered arrays of GaAs nanowires and present experimental enhancement of the second-harmonic signal by 2.2 times under 25% stretching. After considering the NWs' size distribution, simulations deliver 1.8 times enhancement.

ROOM 5

USA; [8]Lawrence Berkeley National Laboratory, Materials Sciences Division,, Berkeley, USA; [9]Abbe Center of Photonics, Friedrich Schiller University, Jena, Germany

We investigated the absorption of intense, long wavelength light by using the onset of stimulated emission in ZnO thin films. The wavelength dependence of the lasing threshold intensity reveals the important role of free carriers.

ROOM 1

11:00 – 12:30

PL-1: Welcome Words and World of Photonics Congress Plenary Talk by 2020 Nobel Prize Co-Laureate

Chair: Peter Loosen, Fraunhofer Institute for Laser Technology ILT, Aachen, Germany

Welcome note by Dr. Pfeiffer

Welcome and Introduction of the Keynote Talk of Prof. Genzel by Prof. Loosen

PL-1.1 MON (Plenary)

A 40-Year Journey

•R. Genzel; Max Planck Institute for Extraterrestrial Physics, Garching, Germany

I discuss our 40-year journey to study the mass distribution in the Center of our Milky Way and the existence of a four million solar mass object, which must be a single massive black hole.

Q&A and time to switch to the other conferences

ROOM 1

14:30 – 16:00

CE-2: Semiconductor for Photonic Devices

Chair: Sergey Mirov, University of Alabama at Birmingham, USA

CE-2.1 MON 14:30

Mid-infrared type-I InGaSb/GaSb quantum well SESAM

B.O. Alaydin, J. Heidrich, M. Gaulke, M. Golling, •A. Barh, and U. Keller; Institute of Quantum Electronics, Zürich, Switzerland

We present a type-I InGaSb/GaSb quantum well mid-infrared SESAM operating at 2.35 μm with Fsat of 10.59 μJ/cm2, ΔR of 1.69%, ΔRns of 0.81%, and ideally suited fast recovery time (τ2 = 1.9 ps).

ROOM 2

14:30 – 16:00

CD-1: Nonlinear Metasurfaces

Chair: Mikko Huttunen, Tampere University, Tampere, Finland

CD-1.1 MON (Invited) 14:30

Ultrafast and Nonlinear Semiconductor Metasurfaces

•I. Brener; Sandia National Labs, Albuquerque, USA

In this talk, I will describe some of our recent work on harmonic generation from nonlinear metasurfaces, ultrafast switching and diffraction, transient frequency conversion and perfect absorbing metasurfaces for THz emission and detection.

ROOM 3

14:30 – 16:00

CA-2: 2-μm Lasers

Chair: Pavel Loiko, CNRS, CIMAP, University of Caen, France

CA-2.1 MON (Invited) 14:30

GaSb-based SESAM technology for mid-IR ultrafast lasers

•M. Guina; Tampere University, Tampere, Finland

The key features of GaSb-based semiconductor saturable absorber mirrors are reviewed in connection with performance they enable when used for mode-locking a large variety of ultrafast solid-state lasers emitting at 2μm window and beyond.

ROOM 4

14:30 – 16:00

CH-1: Gas Sensing

Chair: Cristian Focsa, Université de Lille, Lille, France

CH-1.1 MON 14:30

Up in the air! Trace-gas sensing aboard flying platforms

•B. Tuzson, M. Graf, P. Scheidegger, H. Looser, A. Kupferschmid, and L. Emmenegger; Laboratory for Air Pollution / Environmental Technology, Empa, Dübendorf, Switzerland

Our fundamental reconsideration of the main components of QCL based spectrometers led to rugged and lightweight instruments that opened up remarkable options in environmental sciences. We highlight their potential using field application results.

ROOM 5

14:30 – 16:00

CJ-1: Coherent Beam Combining

Chair: Mikhail Likhachev, Dianov Fiber Optics Research Center, Moscow, Russia

CJ-1.1 MON 14:30

Four-channel coherently combined Tm-doped fiber chirped-pulse amplification system delivering 1 mJ-pulses at 98 kHz repetition rate

•T. Heuermann[1,2], Z. Wang[1], M. Lenski[1], M. Gebhardt[1,2], C. Gaida[3], A. Klenke[1,2], M. Müller[1], C. Grebing[1,4], and J. Limpert[1,2,4]; [1]Institute of Applied Physics, Friedrich Schiller University Jena, Jena, Germany; [2]Helmholtz Institute Jena, Jena, Germany; [3]Active Fiber Systems GmbH, Jena, Germany; [4]Fraunhofer Institute for optics and fine mechanics, Jena, Germany

We report our first results on the

ROOM 6

14:30 – 16:00

CK-2: Novel Integrated Components

Chair: Béatrice Dagens, C2N CNRS - Université Paris-Saclay, Palaiseau, France

CK-2.1 MON (Invited) 14:30

Receiver-less silicon-germanium avalanche p-i-n photodetectors

•D. Benedikovic[1,2], L. Virot[3], G. Aubin[1], J.-M. Hartmann[3], F. Amar[1], X. Le Roux[1], C. Alonso-Ramos[1], E. Cassan[1], D. Marris-Morini[1], F. Boeuf[4], J.-M. Fedeli[3], C. Kopp[3], B. Szelag[3], and L. Vivien[1]; [1]Universite Paris-Saclay, CNRS, Centre de Nanosciences et Nanotechnologies, Palaiseau, France; [2]University of Žilina, Dept. Multimedia and Information-Communication Technologies, Žilina, Slovakia; [3]University Grenoble Alpes and CEA, LETI, Grenoble, France; [4]STMicroelectronics, Crolles, France

ROOM 7

ROOM 8

ROOM 9

without crosstalk, which promise to expand terahertz time-domain spectroscopy and imaging into new applications.

ROOM 10

ROOM 11

ROOM 12

NOTES

ROOM 7

14:30 – 16:00

CM-1: Laser Induced Periodic Surface Structures

Chair: Joern Bonse, BAM, Berlin, Germany

CM-1.1 MON (Invited) 14:30

Controlling Surface Properties by Fabricating Single and Multi-Scaled Periodic Surface Structures using Laser Based Microfabrication Methods

•*A.F. Lasagni*[1,2], *S. Milles*[1], *F. Bouchard*[1], *R. Baumann*[1], *B. Voisiat*[1], *and M. Soldera*[1,3]; [1]*Technische Universität Dresden, Dresden, Germany*; [2]*Fraunhofer-Institut für Werkstoff- und Strahltechnik (IWS), Dresden, Germany*; [3]*Universidad Nacional del Comahue, Neuquen, Argentina*

In this work, we report on the fabrication of multi-functional surfaces by combining deterministic peri-

ROOM 8

14:30 – 16:00

JSIII-1: Theoretical Perspectives in Attochemistry

Chair: Fernando Martin, Universidad Autonoma de Madrid, Madrid, Spain

JSIII-1.1 MON (Invited) 14:30

Steering Nuclear Motion by Ultrafast Multistate Non Equilibrium Electronic Quantum Dynamics in Atto Excited Molecules

•*F. Remacle*; *University of Liege, Liege, Belgium*

Coherence driven ultrafast femtosecond non equilibrium multistate quantum dynamics in atto excited molecules : bond making in norbornadiene and isotope effect and structural rearrangements in the methane cation

ROOM 9

14:30 – 16:00

EF-1: Mode-Locking Phenomena

Chair: Kathy Lüdge, Technical University, Berlin, Germany

EF-1.1 MON (Invited) 14:30

Quantum Coherence and Fast-Gain Effects in Laser Modelocking: The Coherent Master Equation

A.M. Perego[1], *S. Barland*[2], *F. Prati*[3], *and* •*G.J. de Valcárcel*[4]; [1]*Aston University, Birmingham, United Kingdom*; [2]*Université Côte d'Azur, CNRS, Valbonne, France*; [3]*Università dell'Insubria, Como, Italy*; [4]*Universitat de València, Burjassot, Spain*

We present a master equation for modelocking that incorporates fast-gain dynamics and quantum coherence. Its divergent predictions from Haus master equation for AM mod-

ROOM 10

14:30 – 16:00

EG-1: Emission Control at the Nanoscale

Chair: Niek van Hulst, ICFO - The Institute of Photonic Sciences, Castelldefels, Spain

EG-1.1 MON (Invited) 14:30

Entanglement generation in semiconductor nanostructures

L. Ginés[1], *J.R. Gonzales Ureta*[1], *M. Moczala-Dusanowska*[2], *J. Jurkat*[2], *S. Höfling*[2], *C. Schneider*[3], *and* •*A. Predojević*[1]; [1]*Department of Physics, Stockholm University, 10691 Stockholm, Sweden*; [2]*Technische Physik, Physikalisches Institut and Würzburg-Dresden Cluster of Excellence ct.qmat, Universität Würzburg, Am Hubland, D-97074 Würzburg, Germany*; [3]*Institute of Physics, University of Oldenburg, D-26129 Oldenburg, Germany*

We present several devices capable of enhanced and broadband collec-

ROOM 11

14:30 – 16:00

EH-1: Extreme and Ultrafast Phenomena in Plasmonics and Metamaterials

Chair: Paloma Huidobro, Instituto de Telecomunicações, University of Lisbon, Lisbon, Portugal

EH-1.1 MON (Invited) 14:30

Light-matter interaction control with multilayer epsilon -near-zero metamaterials

•*H. Caglayan*; *Tampere University, Tampere, Finland*

In this study, we obtained epsilon-near-zero metamaterial at visible range by designing and fabricating a metal-dielectric multilayer hyperbolic metamaterial. We have used the ENZ feature of these metamaterials to control linear and nonlinear properties.

ROOM 12

14:30 – 16:00

CG-2: Controlled and Intense XUV Light

Chair: Thomas Pfeifer, Max-Planck Institute for Nuclear Physics, Heidelberg, Germany

CG-2.1 MON (Invited) 14:30

Attosecond metrology at Free Electron Lasers

•*G. Sansone*; *Albert-Ludwigs-University, Freiburg, Germany*

I will present experimental data and simulations on the correlation analysis technique recently used at the seeded FEL FERMI for the temporal characterization and shaping of attosecond pulse trains.

ROOM 1

CE-2.2 MON 14:45

Ge-on-Si Single-Photon Avalanche Diode Detectors with Low Noise Equivalent Power in the Short-Wave Infrared

•*R. Millar[1], J. Kirdoda[1], F. Thorburn[2], L. Huddleston[2], D. Dumas[1], Z. Greener[2], K. Kuzmenko[2], P. Vines[2], L. Ferre-Llin[1], X. Yi[2], S. Watson[1], B. Benakaprasad[1], A. Bruce[1], G. Buller[2], and D. Paul[1]; [1]University of Glasgow, Glasgow, United Kingdom; [2]Heriot Watt University, Edinburgh, United Kingdom*

Ge-on-Si Single-Photon Avalanche Diode (SPAD) detectors are demonstrated at 1310 nm with record low noise-equivalent powers (7.7×10^{-17}WHz$^{-1/2}$), using a 26 μm diameter pixel fabricated with a Si foundry compatible pseudo-planar process.

CE-2.3 MON (Invited) 15:00

Novel concepts for III-N-based vertical cavity surface emitting lasers

•*A. Dadgar; Institut für Physik, Fakultät für Naturwissenschaften, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany*

We discuss and demonstrate highly conductive epitaxial AlInN/GaN Bragg mirrors promoting better current spreading and enabling short cavity VCSEL design. Hole injection concepts including ITO but also highly conducting GaN:Ge tunneling contacts are demonstrated.

ROOM 2

CD-1.2 MON 15:00

Nonlinear Circular Dichroism in the Second-Harmonic Generation from AlGaAs Nanoparticle Dimers

•*E. Melik-Gaykazyan[1], K. Frizyuk[2], J.-H. Choi[3,4], M. Petrov[2], H.-G. Park[3,5], and Y. Kivshar[1]; [1]Research School of Physics, Australian National University, Canberra, Australia; [2]Department of Physics and Engineering, ITMO University, St. Petersburg, Russia; [3]Department of Physics, Korea University, Seoul, Republic of Korea; [4]University of Southern California, Los Angeles, USA; [5]KU-KIST Graduate School of Converging Science and Technology, Korea University, Seoul, Republic of Korea*

We experimentally demonstrate the effect of nonlinear circular dichroism in a dimer of Mie-resonant AlGaAs nanoparticles originated by the multipolar nature of their op-

ROOM 3

CA-2.2 MON 15:00

Diode-pumped Femtosecond Modelocked Tm,Ho:CLNGG laser at 2093 nm

•*M. Hamdan[1], S. Tomilov[1], Z. Pan[2], Y. Wang[1], and C.J. Saraceno[1]; [1]Ruhr-Universität Bochum, Bochum, Germany; [2]Institute of Chemical Materials, Mianyang, China*

We demonstrated a 2-μm diode-pumped modelocked Tm,Ho:CLNGG laser with 213-fs pulse duration and 200-mW output power at 102-MHz. To the best to our knowledge, this is the shortest pulse duration from a Tm,Ho-codoped diode-pumped laser.

ROOM 4

CH-1.2 MON 14:45

Fourier transform spectrometer developed for high repetition rate mid-infrared supercontinuum sources

•*A. Khodabakhsh, M. Nematollahi, K. Eslami Jahromi , R. Krebbers, M.A. Abbas, and F.J.M. Harren ; Trace Gas Research Group, Department of Molecular and Laser Physics, Institute for Molecules and Materials, Radboud University, Nijmegen, Netherlands*

We developed a compact and fast-scanning Fourier transform spectrometer based on a mid-infrared supercontinuum source capable of baseband balanced detection as well as synchronous demodulation referenced to the repetition rate of the supercontinuum source.

CH-1.3 MON 15:00

Post signal processing for CO gas spectroscopy using chip-based supercontinuum source

•*J. Hwang[1], D.-Y. Choi[2], F. Rotermund[1], K.-h. Ko[3], and H. Lee[1,4]; [1]department of physics, korea advanced institute of science and technology (kaist), daejeon, South Korea; [2]laser physics centre, research school of physics, australian national university, canberra, Australia; [3]quantum optics division, korea atomic energy research institute, daejeon, South Korea; [4]graduate school of nanoscience and technology, korea advanced institute of science and technology, daejeon, South Korea*

We propose post-processing method to extract molecular ro-vibrational absorption lines. Distinct transition bands of CO gas are achieved by transmitting a chip-based supercontinuum

ROOM 5

coherent combination of four Tm-doped fiber amplifiers delivering 1 mJ pulse energy and 98 W average power at a repetition rate of 98 kHz.

CJ-1.2 MON 14:45

4-channel Coherently Combined Long-term-stable Ultrafast Thulium-doped Fiber CPA

•*C. Gaida[1], F. Stutzki[1], M. Gebhardt[2,3], T. Heuermann[2,3], S. Breitkopf[1], T. Eidam[1], J. Rothhardt[2,3,4], and J. Limpert[1,2,3,4]; [1]Active Fiber Systems GmbH, Jena, Germany; [2]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [3]Helmholtz-Institute Jena, Jena, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We demonstrate the coherent combination of four thulium-doped fiber amplifiers. The system delivers pulses with <120 fs FWHM duration with up to 228 μJ of pulse energy at a center wavelength of 1940 nm.

CJ-1.3 MON 15:00

Beam Pointing Estimation in Target-in-the-loop Coherent Beam Combination through 300m Atmospheric Turbulence

•*L. Lombard, B. Rouzé, H. Jacqmin, A. Liméry, A. Durécu, and P. Bourdon; Onera, the French aerospace lab, Palaiseau, France*

Beam pointing in target-in-the-loop coherent-beam-combination of seven fiber amplifiers at 300m is simultaneously estimated in far-and near-fields. Both measurements agree and support the idea of an access to tip/tilt from the emitter side.

ROOM 6

We report on compact and high-performing silicon-germanium avalanche photodetectors with double p-i-n heterojunctions. We succeeded in having credible 40 Gbps on-chip detection at mainstream telecom waveband, leaving out additional electronic amplification stages.

CK-2.2 MON 15:00

RF Frequency locking of electrically driven III-V Optomechanical resonator

•*I. Ghorbel[1,2], S. Combrié[1], R. Horvarth[2], A. Martin[1], R. Braive[2,3], and A. De Rossi[1]; [1]Thales Research and Technology, Palaiseau, France; [2]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [3]Université Paris Diderot, Paris, France*

A piezoelectric electro-optomechanical crystal made of Indium Gallium Phoshpide is demonstrated. The electromechanical actuation results in a coupling rate equal to 1μHz and is used for injection locking by an external generator

ROOM 7

odic structures with feature sizes in the micrometer, submicrometer and nanometer range-scales. This is achieved by combining different laser-based microfabrication techniques.

CM-1.2 MON 15:00

Femtosecond laser-induced oxidation in the formation of periodic surface structures

•*C. Florian Baron[1,2], J.-L. Déziel[3], S.V. Kirner[1], J. Siegel[4], and J. Bonse[1]; [1]Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin, Germany; [2]Princeton Institute for the Science and Technology of Materials, Princeton, USA; [3]Département de Physique, Université Laval, Québec, Canada; [4]Laser Processing Group, Instituto de Óptica IO-CSIC, Madrid, Spain*

Laser-induced oxide graded layers may contribute to the formation of a new type of embedded low-spatial frequency LIPSS with an anomalous orientation parallel to the laser polarization. In this contribution, we explore this effect experimentally with femtosecond laser pulses.

ROOM 8

JSIII-1.2 MON 15:00

Novel Isotope Effect in Coherent Non-adiabatic Dynamics Induced by an Attosecond Pulse

•*K. Komarova[1], F. Remacle[1,2], and R. Levine[1]; [1]Fritz Haber Research Center, The Hebrew University of Jerusalem, Jerusalem, Israel; [2]Theoretical Physical Chemistry, RU MOLSYS, University of Liège, Liege, Belgium*

Non-adiabatic dynamics in the case of attosecond coherent pumping to multiple electronic states is shown to lead to a quantal isotope effect governed by coherence between the coupled wave packets

ROOM 9

elocking are validated by experiment. Passive modelocking via saturable absorption is addressed.

EF-1.2 MON 15:00

Time-Localized Fourier Patterns

•*A. Bartolo[1], N. Vigne[2], M. Marconi[1], G. Huyet[1], G. Beaudoin[3], K. Pantzas[3], I. Sagnes[3], J. Javaloyes[4], S. Gurevich[5], A. Garnache[2], and M. Giudici[1]; [1]Université Côte d'Azur, Centre National de La Recherche Scientifique, Valbonne, France; [2]Institut d'Electronique et des Systèmes, Centre National de la Recherche Scientifique, University of Montpellier, Montpellier, France; [3]Centre for Nanosciences and Nanotechnology, CNRS, Université Paris-Saclay, Paris, France; [4]Departament de Física and IAC-3, Universitat de les Illes Balears, Palma de Mallorca, Spain; [5]Institute for Theoretical Physics, University of Münster, Münster, Germany*

We show that self-imaging VECSEL can host temporally-localized pulses spatially organized as Fourier patterns.

ROOM 10

tion of pairs of entangled photons emitted by a single semiconductor quantum dot.

EG-1.2 MON 15:00

Using a Plasmonic Nanolens To Observe Quantum Emitters

•*O. Ojambati; Cavendish Laboratory, Department of Physics, JJ Thompson Avenue, University of Cambridge, Cambridge, United Kingdom*

Positional information inside a plasmonic hotspot is usually inaccessible. We reconstruct the positions of emitters inside a nanogap with a plasmonic nanolens, which confines fields that interact with single molecules to yield quantum effects.

ROOM 11

EH-1.2 MON 15:00

Time Diffraction in an Epsilon-Near-Zero Metasurface

•*R. Tirole[1], T. Attavar[1], J. Dranczewski[1], E. Galiffi[1], J. Pendry[1], S. Maier[1,2], S. Vezzoli[1], and R. Sapienza[1]; [1]Imperial College London, London, United Kingdom; [2]Ludwig-Maximilians-Universitat Munchen, Munich, Germany*

A deeply subwavelength film of Indium-Tin-Oxide exhibits strong and efficient all-optical modulation at its Berreman mode, with time diffraction leading to the redshift and broadening of a probe beam.

ROOM 12

CG-2.2 MON 15:00

Extreme Ultraviolet Second Harmonic Generation using a seeded soft X-ray laser

•*T. Helk[1,2], E. Berger[3,4], L. Hoffmann[3,6], A. Kabacinski[5], J. Gautier[5], F. Tissandier[5], J.P. Goddet[5], S. Sebban[5], C. Spielmann[1,2], and M. Zürch[3,4,6]; [1]Institute of Optics and Quantum Electronics, Abbe Center of Photonics, Friedrich-Schiller University, Jena, Germany; [2]Helmholtz Institute Jena, Jena, Germany; [3]Department of Chemistry, University of California, Berkeley, USA; [4]Materials Science Division, Lawrence Berkeley National Laboratory, Berkeley, USA; [5]Laboratoire d'Optique Appliqué, ENSTA Paris, Ecole Polytechnique, CNRS, Institut Polytechnique de Paris, Palaiseau, France; [6]Fritz Haber Institute of the Max Planck Society, Berlin, Germany*

Lab-scale sources accelerate the un-

ROOM 1

CE-2.4 MON 15:30

Impact of high temperature post-treatment on photoluminescence performance of passivated InP/In0.53Ga0.47As/InP nanopillars

•*E. Malysheva, D. Pellegrino, A. Fiore, K. Williams, and V. Calzadilla; Eindhoven University of Technology, Eindhoven, Netherlands*

The effect of high temperature post treatment was investigated on InP/InGaAs/InP pillars, passivated with ammonium sulfide and SiOx coating. Passivation efficiency was shown to increase for treatment temperature up to 500 ˚C.

ROOM 2

tical response and depending on a material's crystalline axis orientation.

CD-1.3 MON 15:15

Intersubband Polaritonic Metasurfaces for Second Harmonic Generation with High Conversion Efficiency

•*J. Krakofsky[1], G. Böhm[1], M. Belkin[1], A. Mekawy[2], S. Mann[2], and A. Alú[2]; [1] Walter Schottky Institute, Munich, Germany; [2] CUNY, New York, USA*

In this work we present a new attempt to overcome saturation effects of nonlinear intersubband polaritonic metasurfaces using GaAsSb as a small linewidthmaterial and new nano resonator designs.

CD-1.4 MON 15:30

All-dielectric metasurface with enhanced third-harmonic dichroism driven by quasi-BIC

•*M. Gandolfi, A. Tognazzi, D. Rocco, L. Carletti, and C. De Angelis; CNR-INO and Department of Information Engineering, University of Brescia, Brescia, Italy*

We design chiral Si metasurfaces supporting quasi-BIC for enhanced nonlinear circular dichroism (up to 99.9%) and high TH conversion efficiency (0.01 W^{-2}). Tuning mode interference allows selective linear and nonlinear circular dichroism.

ROOM 3

CA-2.3 MON 15:15

Sub-50-fs SESAM mode-locked Tm,Ho:Ca(Gd,Lu)AlO4 laser

•*L. Wang[1], W. Chen[2], Y. Zhao[1], Z. Pan[1], M. Mero[1], X. Mateo[3], P. Loiko[4], M. Guina[5], U. Griebner[1], and V. Petrov[1]; [1] Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [2] Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, China; [3] Universitat Rovira i Virgili (URV), Tarragona, Spain; [4] Université de Caen, Caen, France; [5] Reflektron Ltd., Tampere, Finland*

We report on the first sub-50-fs mode-locked 2-μm solid-state laser using Tm,Ho:Ca(Gd,Lu)AlO4 as a gain medium, to generate pulses as short as 47 fs at 2033 nm with a repetition rate of ~78.3 MHz.

CA-2.4 MON 15:30

40 W SESAM-modelocked Ho:YAG thin-disk laser at 2090 nm

•*S. Tomilov[1], M. Hoffmann[1], J. Heidrich[2], B.Ö. Alaydin[2], M. Golling[2], Y. Wang[1], U. Keller[2], and C.J. Saraceno[1]; [1] Photonics and Ultrafast Laser Science, Ruhr-Universität Bochum, Bochum, Germany; [2] Department of Physics, Institute for Quantum Electronics, ETH Zürich, Zürich, Switzerland*

We demonstrate high-power SESAM, soliton-modelocking of a Ho:YAG thin-disk oscillator, delivering an output power of 40.5 W with pulse duration of 1.66 ps

ROOM 4

into gas cell, along with high-pass filtering of the signal.

CH-1.4 MON 15:15

Sensitive multi-species gas sensing with supercontinuum-based photoacoustic spectroscopy

•*T. Mikkonen[1], T. Hieta[2], G. Genty[1], and J. Toivonen[1]; [1] Photonics Laboratory, Physics Unit, Tampere University, Tampere, Finland; [2] Gasera Ltd, Turku, Finland*

We improved the sensitivity of supercontinuum-based broadband photoacoustic spectroscopy in the mid-infrared by employing a miniature multipass cell. We demonstrated the system's ability to separate spectrally overlapping hydrocarbons from a gas mixture.

CH-1.5 MON 15:30

Part-per-billion optical sensing of carbon monoxide based on QEPAS and PTS detection modules

•*D. Pinto[1], H. Moser[1], J.P. Waclawek[1], S. Dello Russo[2], P. Patimisco[2], V. Spagnolo[2], and B. Lendl[1]; [1] Institute of Chemical Technologies and Analytics, Technische Universität Wien, Vienna, Austria; [2] PolySense Lab - Dipartimento Interateneo di Fisica, University and Politecnico of Bari, Bari, Italy*

A mid-IR laser-based gas sensor system for part-per-billion detection of carbon monoxide in nitrogen is presented. The sensing scheme relies on

ROOM 5

CJ-1.4 MON 15:15

Optimizing rod-type multicore fiber amplifiers in coherently-combined laser systems

•*A. Steinkopff[1], C. Aleshire[1], C. Jauregui[1], A. Klenke[1,2], and J. Limpert[1,2,3]; [1] Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University, Jena, Germany; [2] Helmholtz-Institute Jena, Jena, Germany; [3] Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We will present theoretical investigations on the power and energy scaling potential of coherently-combined multicore fiber amplifiers, including thermal considerations and the limitations stemming thereof. Furthermore, we will show strategies to counteract these effects.

CJ-1.5 MON 15:30

PISTIL interferometry diagnosis on a 61 channels coherent beam combining digital laser

•*B. Rouzé[1], S. Bellanger[2], I. Fsaifes[2], C. Bellanger[1], M. Veinhard[2], J.-C. Chanteloup[2], and J. Primot[1]; [1] DOTA, ONERA, Université Paris-Saclay, Palaiseau, France; [2] LULI, CNRS, Ecole Polytechnique, CEA, Sorbonne Université, Institut Polytechnique de Paris, Palaiseau, France*

A PISton and TILt (PISTIL) interferometry is applied on 61 channels coherent beam combining femtosecond digital laser. Extraction of piston, tip and tilt per sub-pupils and segmented wavefront analysis

ROOM 6

CK-2.3 MON 15:15

Optical Gyrator and Microwave-to-Optical Converter using HBAR modes

•*A. Siddharth[1], T. Blésin[1], H. Tian[2], W. Weng[1], R.N. Wang[1], J. Liu[1], S.A. Bhave[2], and T.J. Kippenberg[1]; [1] Laboratory of Photonics and Quantum Measurements, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2] OxideMEMS lab, Purdue University, West Lafayette, USA*

We demonstrate efficient modulation of optical resonators by partially releasing the substrate of an integrated MEMS-photonic stack. The increased interaction between the microwave and optical signals enables to realize gyrators as well as MW-optical converters.

CK-2.4 MON 15:30

High-Overtone Bulk Acoustic Resonators (HBAR) as cryogenic high-frequency Acousto-optic Modulators

•*S. Valle and K.C. Balram; University of Bristol, Bristol, United Kingdom*

We report the first micromechanical acousto-optic modulator operating at 10 K in the range between 1 GHz and 3 GHz configured as double resonant configuration, to explore alternative route to efficient quantum optomechanic transduction.

ROOM 7

CM-1.3 MON 15:15

Anisotropic Resistivity ITO Surfaces produced by Laser-induced Self-organization at the Nanoscale

M. Macias-Montero[1], C. Lopez-Santos[2,3], D. Puerto[1], J. Siegel[1], C. Florian[1], J. Gil-Rostra[2], V. López-Flores[2], A. Borrás[2], A.R. González-Elipe[2], and •J. Solis[1]; [1]Laser Processing Group, Instituto de Óptica (IO-CSIC), Madrid, Spain; [2]Nanotechnology on Surfaces Group, Instituto de Ciencia de Materiales de Sevilla (US-CSIC), Sevilla, Spain; [3]Departamento de Física Atómica, Molecular y Nuclear, Facultad de Física, Universidad de Sevilla, Sevilla, Spain

Highly anisotropic resistivity surfaces are produced in indium tin oxide (ITO) films by fs-laser induced self–organization at the nanoscale. Anisotropy is caused by the formation of laser–induced periodic surface structures (LIPSS) extended over cm–sized regions.

CM-1.4 MON 15:30

The contribution has been withdrawn.

ROOM 8

JSIII-1.3 MON 15:15

Attosecond Pulse Trains with Time-Dependent Spin Angular Momentum

•L. Rego, J. San Román, L. Plaja, and C. Hernández-García; Grupo de Investigación en Aplicaciones del Láser y Fotónica, Salamanca University, Salamanca, Spain

We present a technique to generate attosecond pulse trains whose polarization varies sequentially from pulse to pulse. This is accomplished by driving high-order harmonic generation with two time-delayed bichromatic counter-rotating fields carrying orbital angular momentum.

JSIII-1.4 MON 15:30

Ultrafast Optical Rotation for Extremely Sensitive Enantio-Discrimination

•D. Ayuso[1,2], A. Ordonez[2], M. Ivanov[1,2,3], and O. Smirnova[2,4]; [1]Department of Physics, Imperial College London, London, United Kingdom; [2]Max-Born-Institut, Berlin, Germany; [3]Institute für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [4]Technische Universität Berlin, Berlin, Germany

We introduce ultrafast optical rotation: a highly efficient method for chiral discrimination using few-cycle pulses. Sub-cycle optical con-

ROOM 9

EF-1.3 MON 15:15

Self-Starting Temporal Cavity Solitons in a Laser-based Microcomb

•A. Cutrona[1], P.-H. Hanzard[1], M. Rowley[1], B. Malomed[2,3], G.-L. Oppo[4], J.S. Totero-Gongora[1], M. Peccianti[1], and A. Pasquazi[1]; [1]Emergent Photonics Lab (Epic), Department of Physics and Astronomy, University of Sussex, Brighton, United Kingdom; [2]Department of Physical Electronics, School of Electrical Engineering, Faculty of Engineering and the Center for Light-Matter Interaction, Tel Aviv University, Tel Aviv, Israel; [3]Instituto de Alta Investigación, Universidad de Tarapacá, Arica, Chile; [4]SUPA, Department of Physics, University of Strathclyde, Glasgow, United Kingdom

Self-starting of stable temporal laser-cavity solitons in a micro-ring cavity nested into an amplifying fiber loop is demonstrated. Group velocity mismatch and gain dispersion are used to control the soliton multiplicity at the output.

EF-1.4 MON 15:30

Wiggling Temporal Localized States in Passively Mode-Locked Vertical External Cavity Surface Emitting Lasers

•D. Hessel[1,2], J. Javaloyes[1], and S. Gurevich[2]; [1]Departament de Física, Universitat de les Illes Balears & Institute of Applied Computing and Community Code (IAC-3), Cra. de Valldemossa, km 7.5, E-07122 Palma de Mallorca, Spain; [2]Institute for Theoretical Physics, University of Münster, Wilhelm-Klemm-Str. 9, D-48149 Münster, Germany

We analyze the dynamics of temporal localized states in a system composed of coupled optical micro-

ROOM 10

EG-1.3 MON 15:15

uW Pumping for MHz Photon Pair Generation Rates Enabled by $\chi^{(2)}$ Organic Chromophores

•K. Keller[1], M. Doderer[1], M. Davis[1], K. Srinivasan[2], J. Leuthold[1], and C. Haffner[1,2]; [1]Institute of Electromagnetic Fields, Zurich, Switzerland; [2]Physical Measurement Laboratory, Gaithersburg, USA

Simulation of photon-pair sources in a photonic-organic platform are presented. Using mode-matching and programmable quasi-phase-matching, peak efficiencies of 0.75 GHz/mW are reached, featuring a minimum of 100 MHz/mW with a fabrication tolerance of 57.6 nm.

EG-1.4 MON 15:30

Single-molecule imaging of LDOS modification by an array of plasmonic nanochimneys

•R.M. Córdova-Castro[1], D. Jonker[2], B. van Dam[1], G. Blanquer[1], Y. De Wilde[1], I. Izeddin[1], A. Susarrey-Arce[2], and V. Krachmalnicoff[1]; [1]1. Institut Langevin, ESPCI Paris, Université PSL, CNRS., Paris, France; [2]Mesoscale Chemical Systems, MESA+ Institute, University of Twente., Enschede, Netherlands

We perform nanometer-resolved imaging of the modification of the LDOS by simultaneously mapping the position and decay rate of photoactivatable single-molecules

ROOM 11

EH-1.3 MON 15:15

Temporal Dynamics of Strongly Coupled Epsilon Near-Zero Plasmonic Systems

•M. Haji Ebrahim[1], A. Marini[2], V. Bruno[3], D. Faccio[3], and M. Clerici[1]; [1]James Watt School of Engineering, University of Glasgow, G12 8QQ, Glasgow, United Kingdom; [2]Department of Physical and Chemical Sciences, University of L'Aquila, Via Vetoio, 67100, L'Aquila, Italy; [3]School of Physics and Astronomy, University of Glasgow, G12 8QQ, Glasgow, United Kingdom

We demonstrate a significant slow-light effect in a deeply subwavelength epsilon near-zero plasmonic system, particularly pronounced near the system excitation frequencies. This effect yields a group index as high as 1600 for Silicon Carbide.

EH-1.4 MON 15:30

Photoinduced symmetry-breaking for all-optical ultrafast dichroism in plasmonic metasurfaces

•A. Schirato[1,3], M. Maiuri[1,2], A. Toma[3], S. Fugattini[3], R. Proietti Zaccaria[3,4], P. Laporta[1,2], P. Nordlander[5,6], G. Cerullo[1,2], A. Alabastri[5], and G. Della Valle[1,2]; [1]Dipartimento di Fisica, Politecnico di Milano, Milan, Italy; [2]Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche, Milan, Italy; [3]Istituto Italiano di Tecnologia, Genoa, Italy; [4]Cixi Institute of Biomedical Engineering, Chinese Academy of Sciences, Ningbo, China;

ROOM 12

derstanding of nonlinear processes on the surface and inside the material. For the first time a second harmonic process in the soft X-ray regime with a table-top setup was realized.

CG-2.3 MON 15:15

FLASH2020+: The New High Repetition Rate Coherent Soft X-Ray Facility

•E. Allaria, M. Beye, I. Hartl, M. Kazemi, T. Lang, L. Scharper, S. Schreiber, and t. FLASH2020+ team; Deutsches Elektronen-Synchrotron DESY, Notkestraße 85, 22607 Hamburg, Germany, Hamburg, Germany

With the ongoing upgrades FLASH2020+ will extend capabilities of existing Free-Electron-Lasers. Combining a superconducting electron-beam accelerator with a new external seeding scheme, FLASH2020+ will provide up to 1 MHz repetition rate highly coherent pulses.

CG-2.4 MON 15:30

Attosecond control of multi-photon multiple ionization dynamics

M. Kretschmar, J. Tümmler, I. Will, T. Nagy, M.J.J. Vrakking, and •B. Schütte; Max-Born-Institut, Berlin, Germany

We demonstrate attosecond control of the multi-photon multiple ionization dynamics of argon. While the Ar^{2+} ion yield is weakly modulated in an autocorrelation measurement, the Ar^{3+} autocorrelation trace shows strong oscillations attributed to direct two-photon absorption.

ROOM 1

CE-2.5 MON 15:45

Growth of site-controlled InAs/GaAs quantum dot arrays for integration into photonic devices

•*C. Ovenden*[1], *A. Trapalis*[1], *D.J. Hallett*[2], *P.K. Patil*[3], *E. Clarke*[3], *M.S. Skolnick*[2], *I. Farrer*[1], *and J. Heffernan*[1]; [1]*Department of Electronic and Electrical Engineering, University of Sheffield, Sheffield, United Kingdom*; [2]*Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom*; [3]*EPSRC National Epitaxy Facility, University of Sheffield, Sheffield, United Kingdom*

We demonstrate the growth of low linewidth, site-controlled quantum dot arrays, where the use of a scalable fabrication process and thin regrowth buffer makes them suitable for incorporation into single mode nano-photonic devices.

ROOM 2

CD-1.5 MON 15:45

Resonantly Enhanced Third Harmonic Up-conversion of 2.4 micron Excitation using Amorphous Germanium Zero Contrast Gratings

•*L.K. A.S., R. Biswas, J. KM, S. Menon, and V. Raghunathan*; *Indian Institute of Science, Bengaluru, India*

We experimentally demonstrate resonant one-dimensional amorphous-Germanium zero contrast grating structures for frequency up-conversion. For ~2.4 um fundamental excitation, the structures achieve 900 times resonant enhancement of the third-harmonic signal at ~800 nm wavelength.

ROOM 3

at a repetition rate of 52.2 MHz, corresponding to a pulse energy of 0.78 μJ.

CA-2.5 MON 15:45

High Energy Cryogenically Cooled Ho:YAG Oscillator

•*M. Ganija*[1,2], *K. Boyd*[1,2], *A. Hemming*[2], *N. Carmody*[2], *N. Simakov*[2], *P. Veitch*[1], *and J. Munch*[1]; [1]*Department of Physics and IPAS, Adelaide, Australia*; [2]*Directed Energy Technologies and Effects Defence Science and Technology Group, Edinburgh, Australia*

We report efficient, cryogenically cooled, continuous wave and pulsed Ho:YAG lasing with excellent beam quality. We demonstrate average powers of 60 W and pulse energies 310 mJ with a 100 Hz PRF without thermal degradation.

ROOM 4

two interchangeable compact modules capable of probing either pressure or thermal waves.

CH-1.6 MON 15:45

Monitoring of peroxy radicals by chemical amplification enhanced photoacoustic spectroscopy

•*G. Wang*[1], *A. Lahib*[2], *M. Duncianu*[2], *Q. Gou*[3], *P.S. Stevens*[4], *S. Dusanter*[2], *A. Tomas*[2], *M.W. Sigrist*[5], *and W. Chen*[1]; [1]*Laboratoire de Physicochimie de l'Atmosphère, Université du Littoral Côte d'Opale, 59140 Dunkerque, France*; [2]*IMT Lille Douai, Université de Lille, 59000 Lille, France*; [3]*School of Chemistry and Chemical Engineering, Chongqing University, 401331 Chongqing, China*; [4]*Paul H. O'Neill School of Public and Environmental Affairs, Indiana University, Bloomington, IN 47405, USA*; [5]*Institute for Quantum Electronics, ETH Zurich, Zurich, Switzerland*

Measurements of peroxy radicals using photoacoustic spectroscopy enhanced by chemical amplification was demonstrated. 1-σ limit of detection of about 12 pptv was achieved in 90 s integration time at a relative humidity of 9.8%.

ROOM 5

are conducted/presented.

CJ-1.6 MON 15:45

1 kW average power emission from an in-house 4x4 multicore rod-type fiber

•*A. Klenke*[1,2], *A. Steinkopff*[1], *C. Aleshire*[1], *C. Jauregui*[1], *S. Kuhn*[3], *J. Nold*[3], *N. Haarlammert*[3], *T. Schreiber*[3], *A. Tünnermann*[1,2,3], *and J. Limpert*[1,2,3]; [1]*Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität, Jena, Germany*; [2]*Helmholtz-Institute Jena, Jena, Germany*; [3]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We present a rod-type multicore fiber delivering up to 1kW of average power. The in-house manufactured fiber contains 4x4 cores and a shared pump cladding in an all-glass structure and is suitable for coherent combination.

ROOM 6

CK-2.5 MON 15:45

Highly-efficient GaAs/AlGaAs Nanopillars and NanoLEDs via SiNx Surface Passivation

B. Jacob, F. Camarneiro, J. Borme, J. Nieder, and •*B. Romeira*; *INL - International Iberian Nanotechnology Laboratory, Braga, Portugal*

We report an extremely low surface recombination velocity value of 3400cm/s in passivated GaAs/AlGaAs nanopillars. The remarkable suppression of surface recombination is crucial for the development of highly-efficient nanoLEDs and nanolasers for nanophotonic integrated circuits.

NOTES

ROOM 7

CM-1.5 MON 15:45

Ultrafast laser processing of nanostructured patterns for the control of cell adhesion and migration on titanium alloy

•*A. Abou Khalil[1], X. Sedao[1,2], S. Papa[3], P. Claudel[2], A. Klos[3], T. Itina[1], N. Attik[4], A. Guignandon[3], and V. Dumas[5]; [1]University of Lyon, Jean Monnet University, UMR 5516 CNRS, Laboratory Hubert Curien, Saint-Etienne, France; [2]GIE Manutech-USD, Saint-Etienne, France; [3]University of Lyon, Jean Monnet University, INSERM U1059-SAINBIOSE, Saint Priest en Jarez, France; [4]University of Lyon, Claude Bernard Lyon 1 University, UMR 5615 CNRS, Laboratoire des Matériaux et Interfaces, Lyon, France; [5]University of Lyon, National School of Engineers of Saint-Etienne, Laboratory of Tribology and Systems Dynamics, UMR 5513 CNRS, Saint-Etienne, France*

The ultrafast laser induced nanoscale structures influence surface wettability and protein adsorption and thus influence focal adhesions formation and finally induce shape-based mechanical constraint on cells, known to promote osteogenic differentiation.

ROOM 8

trol enables full control over the enantio-sensitive response of matter in a molecule-specific manner and on ultrafast timescales.

JSIII-1.5 MON 15:45

Enantio-sensitive unidirectional light bending

•*A. Ordonez[1,2], D. Ayuso[1,3], P. Decleva[4], M. Ivanov[1,3,5], and O. Smirnova[1,2]; [1]Max-Born-Institut, Berlin, Germany; [2]Technische Universität Berlin, Berlin, Germany; [3]Imperial College London, London, United Kingdom; [4]Università degli Studi di Trieste, Trieste, Italy; [5]Humboldt-Universität zu Berlin, Berlin, Germany*

We introduce structured light with zero net chirality displaying a charge-polarized-like pattern of chirality, allowing perfect enantiomeric discrimination within the dipole approximation on ultrafast time scales, opposite enantiomers emitting harmonics in opposite directions.

ROOM 9

cavities. We show that third order dispersion and the detuning between two micro-cavities lead to wiggling pulse oscillations.

EF-1.5 MON 15:45

Symmetry-broken pulse-timing sequences in micropillar lasers with optical delayed feedback

V.A. Pammi[1], S. Terrien[2], N.G. Broderick[2], R. Braive[1], G. Beaudoin[1], I. Sagnes[1], B. Krauskopf[2], and •S. Barbay[1]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]The Dodd-Walls Centre for Photonic and Quantum Technologies, The University of Auckland, Auckland, New Zealand

Micropillar lasers can sustain temporal dissipative solitons when subjected to delayed optical feedback. These systems can converge from a variety of initial conditions to a handful of equidistant and symmetry-broken pulsing patterns.

ROOM 10

on a nanoarray of plasmonic nanochimneys with a field of view of ~10 μm2.

EG-1.5 MON 15:45

Strain tuning of single-molecule-based single photon sources

•*A. Fasoulakis[1,2], K.D. Major[1], R.A. Hoggarth[1], and A.S. Clark[1]; [1]Centre for Cold Matter, Blackett Laboratory, Imperial College London, London, United Kingdom; [2]Quantum Engineering Technology Labs, H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom*

We will present experiments that demonstrate strain tuning of the frequency of the zero phonon line resonances of single dibenzoterrylene molecules at cryogenic temperature, and support our measurements with molecular dynamics calculations.

ROOM 11

[5]Department of Electrical and Computer Engineering, Rice University, Houston, USA; [6]Department of Physics and Astronomy, Laboratory for Nanophotonics, Houston, USA

We theoretically predict and demonstrate via polarisation-resolved ultrafast pump-probe spectroscopy a sub-picosecond broadband dichroism driven by the transient spatial inhomogeneities at the nanoscale of photoexcited hot carriers in a highly symmetric plasmonic metasurface.

EH-1.5 MON 15:45

Hot Electrons Remote Excitation and their Ultrafast Dynamics

•*R. Hernandez[1], R. Juliano-Martins[1], M. Lodari[3,4], M. Celebrano[2], M. Finazzi[2], L. Duo[2], G. Isella[3,4], M. Petit[1], A. Agreda[1], J.-C. Weeber[1], A. Bouhelier[1], M. Bollani[3,4], O. Demichel[1], P. Biagioni[2,4], and B. Cluzel[1]; [1]Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France; [2]Politecnico di Milano, Milano, Italy; [3]L-NESS, Como, Italy; [4]IFN-CNR, Milano, Italy*

The hot-electrons generation and dynamics are studied within plasmonic devices by : a) their remote production with propagative Surface Plasmons (SPs) and b) localized SPs within Schottky barrier device

ROOM 12

CG-2.5 MON 15:45

Spectrally Tunable Attosecond Pulse Generation

•*L. Gulyás Oldal[1,2], P. Ye[1], Z. Filus[1], T. Csizmadia[1], T. Grósz[1], M. De Marco[1], and B. Major[1]; [1]ELI-ALPS, ELI-HU Non-Profit Ltd., Wolfgang Sandner utca 3., H-6728 Szeged, Hungary; [2]Institute of Physics, University of Szeged, Dóm tér 9., H-6720 Szeged, Hungary*

We propose and demonstrate a method to generate high-order harmonics in rare-gas atoms with tunable photon energy and spectral width in a way that can be easily adopted to already implemented beamlines worldwide

ROOM 1

16:30 – 17:30

PL-2: CLEO/Europe Plenary Talk

Chair: Valdas Pasiskevicius, KTH, Stockholm, SE and Concita Sibilia, Sapienza Università di Roma, IT

PL-2.1 MON (Plenary) 16:30

How Light Behaves when the Refractive Index Vanishes

•*R. Boyd; University of Ottawa, Ottawa, Canada; University of Rochester, Rochester, USA*

We explore the properties of light within a medium for which the refractive index vanishes. The fundamental radiative processes of spontaneous and stimulated emission are predicted to be profoundly modified. Moreover, the nonlinear optical response is extremely large.

ROOM 1

18:00 – 19:30

CC-1: THz Strong Field Applications

Chair: Fülöp József András, ELI-ALPS, Szeged, Hungary

CC-1.1 MON (Invited) 18:00

Ultrafast structural dynamics of strongly-THz-driven materials

•*M. Hoffmann*; *SLAC National Accelerator Laboratory, Menlo Park, USA*

Intense THz pulses efficiently couple to low-energy degrees of freedom in complex materials such as optical phonons or magnons. Simultaneously, ultrafast x-ray or electron diffraction can be used to track structural changes with femtosecond resolution.

ROOM 2

18:00 – 19:30

CL-1: Laser-Tissue Interactions and Surgery

Chair: Molly May, Division of Biomedical Physics, Medical University Innsbruck, Innsbruck, Austria

CL-1.1 MON (Tutorial) 18:00

Picosecond Infrared Laser (PIRL)-Ohmics: Fundamental Single Cell Limit to Minimally Invasive Surgery and Biodiagnostics

•*R.J.D. Miller*; *University of Toronto, Toronto, Canada*

An atomic level understanding of strongly driven phase transitions has led to the achievement of scar free surgery with intact molecular fingerprints for surgical guidance and new abilities to correlate molecular structure to cell/tissue function.

ROOM 3

18:00 – 19:30

EJ-1: Optical Computing and Artificial Intelligence

Chair: Kestutis Staliunas, Unitversitat Politecnica de Catalunya, Spain

EJ-1.1 MON (Invited) 18:00

Scalable photonics: an optimized approach

•*J. Vuckovic*; *Stanford University, Stanford, USA*

Classical and quantum photonics with superior properties can be implemented in a variety of photonic materials by combining state of the art optimization and machine learning techniques (photonics inverse design) with new fabrication approaches.

ROOM 4

18:00 – 19:30

JSV-2: Flexible Photonic Devices

Chair: Juejun Hu, Massachusetts Institute of Technology, Cambridge, USA

JSV-2.1 MON (Invited) 18:00

Flexible Hybrid Semiconductor Membrane Photonic Devices Based on Micro Transfer Printing Process

•*W. Zhou*; *University of Texas at Arlington, Arlington, USA*

We report here progresses on hybrid semiconductor membrane photonic devices for 3D integrated chips, from earlier work on flexible LEDs arrays and flexible detector arrays to recent work on large area multi-wavelength 2D laser arrays and on-chip spectrometers.

ROOM 5

18:00 – 19:30

JSII-2: Applications of Strong THz Fields

Chair: Franz Kärtner, DESY, Hamburg, Germany

JSII-2.1 MON (Invited) 18:00

Generating THz fields and Delivering Them to Samples for Maximum Effect

•*K.A. Nelson*; *Massachusetts Institute of Technology, Cambridge, USA*

THz spectroscopy may be conducted with fields delivered to samples through free space or through direct coupling between the THz generation medium and the sample with no free-space THz propagation.

ROOM 6

18:00 – 19:30

ED-2: Comb Sources and Applications

Chair: Aleksandra Foltynowicz, Umeå University, Umeå, Sweden

ED-2.1 MON 18:00

Coherent mid-infrared dual-comb spectroscopy enabled by optical injection locking of quantum cascade laser frequency combs

•*J. Hillbrand, M. Bertrand, F. Kapsalidis, M. Beck, and J. Faist*; *Institute of Quantum Electronics, ETH Zurich, Zurich, Switzerland*

We investigate optical injection locking of the offset frequency of QCL frequency combs to a single-mode QCL. When both combs are locked, the dual-comb beating consists of a harmonic series of lines with resolution-limited linewidth.

ED-2.2 MON 18:15

Near-Infrared 10-GHz Astrocomb With Mode Identification

•*Y.S. Cheng[1], D. Xiao[2], R.A. McCracken[1], and D.T. Reid[1]*; *[1]Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]CAS Key Laboratory of Astronomical Optics & Technology and National Astronomical Observatories, Nanjing Institute of Astronomical Optics & Technology, Nanjing, China*

We present a 10-GHz astrocomb spanning 1.15–1.8 μm and based on a spectrally broadened degenerate optical parametric oscillator. Absolute mode identification is provided by a Fourier-transform spectrometer cross-calibrated to the comb-mode spacing.

ROOM 7

18:00 – 19:30

EB-2: Integrated Devices and Memories

Chair: Eleni Diamanti, CNRS Paris, France

EB-2.1 MON (Invited) 18:00

Quantum Networks with Artificial Atoms in Scalable Photonic Circuits: Architecture Designs to Proof of Concept Systems

•D. Englund; MIT, Cambridge, USA; Brookhaven National Laboratory, Upton, NY, USA

This talk discusses quantum memory-integrated photonic circuits for applications in modular quantum computers and in distributed quantum communication networks. It considers system architecture designs, protocols, experiments, and coherent interfaces to superconducting quantum computing machines.

ROOM 8

18:00 – 19:30

CD-2: Solitons

Chair: Kartik Srinivasan, National Institute of Standards and Technology, USA

CD-2.1 MON 18:00

Generation of Dispersive Waves via Intermodal Cross-phase Modulation

•M. Timmerkamp[1], N.M. Lüpken[1], R. Scheibinger[2], K. Schaarschmidt[2], M.A. Schmidt[2,3], K.-J. Boller[4,1], and C. Fallnich[1,4]; [1]Institute of Applied Physics, University of Münster, Münster, Germany; [2]Leibniz Institute of Photonic Technology, Jena, Germany; [3]Otto Schott Institute of Material Research, University of Jena, Jena, Germany; [4]MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands

We present the generation of dispersive waves via intermodal cross-phase modulation. A low-intensity transverse mode radiates a dispersive wave on account of the interaction with a higher-order soliton in a different orthogonal mode.

CD-2.2 MON 18:15

Emergence of Laser Cavity-Solitons in a Microresonator-Filtered Fiber Laser

•M. Rowley[1], P.-H. Hanzard[1], A. Cutrona[1], S.T. Chu[2], B.E. Little[3], R. Morandotti[4,5], D.J. Moss[6], J.S. Totero Gongora[1], M. Peccianti[1], and A. Pasquazi[1]; [1]University of Sussex, Brighton, United Kingdom; [2]City University Hong Kong, Hong Kong, China; [3]Xi'an Institute of Optics and Precision Mechanics, Xi'an, China; [4]INRS-EMT, Montreal, Canada; [5]Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology, Chengdu, China; [6]Optical Sciences Centre, Swinburne University of Technology, Swinburne, Australia

The parameter space, defined by simple global controls, is probed in a microresonator-filtered fiber laser.

ROOM 9

18:00 – 19:30

EI-1: Towards Applications and Perovskites

Chair: Alexander Holleitner, Technische Universität München, Munich, Germany

EI-1.1 MON (Invited) 18:00

Ultrafast machine vision with 2D semiconductor photodiode arrays

L. Mennel, J. Symonowicz, M. Paur, A. Molina-Mendoza, D. Polyushkin, and •T. Mueller; Vienna University of Technology, Vienna, Austria

We demonstrate that a 2D semiconductor photodiode array can itself constitute an artificial neural network that can simultaneously sense and process optical images without latency.

ROOM 10

18:00 – 19:30

JSIII-2: Experimental Progress in Attochemistry

Chair: Mauro Nisoli, Politecnico di Milano, Milan, Italy

JSIII-2.1 MON (Invited) 18:00

Attosecond Noncollinear Four Wave Mixing

•S. Leone; University of California, Berkeley, USA

The background-free method of attosecond extreme ultraviolet plus optical pulse four-wave mixing allows a new level of time-dynamic analysis, and multidimensional methods with near infrared pulse shaping can be used to isolate individual states.

ROOM 11

18:00 – 19:30

EF-2: Turbulence and Nonlinear Effects

Chair: Julien Javaloyes, University of Balearic Islands, Palma, Spain

EF-2.1 MON 18:00

Ultra-Broadband Stochastic Resonance of Light Enabled by Memory Effects in the Nonlinear Response

•K.J.H. Peters[1], Z. Geng[1], K. Malmir[2], J.M. Smith[2], and S.R.K. Rodriguez[1]; [1]Center for Nanophotonics, AMOLF, Amsterdam, Netherlands; [2]Department of Materials, University of Oxford, Oxford, United Kingdom

We report the first observation of non-Markovian stochastic resonance, using a thermo-optical nonlinear cavity. Memory effects attributed to a non-instantaneous nonlinear response dramatically enhance the stochastic resonance bandwidth.

EF-2.2 MON 18:15

Turbulence control by non-Hermitian potentials

•S. Benadouda Ivars[1], M. Botey[1], R. Herrero[1], and K. Staliunas[1,2]; [1]Universitat Politècnica de Catalunya (UPC), Barcelona, Spain; [2]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

We propose a new method to actively influence the energy cascade through wavenumbers which is responsible of the appearance of turbulent flows. The method is based on the asymmetric properties of non-Hermitian potentials.

ROOM 12

18:00 – 19:30

CH-2: Raman Spectroscopy

Chair: Anderson Gomes, Federal University of Pernambuco, Recife, Brazil

CH-2.1 MON (Invited) 18:00

Quantitative coherent Raman scattering microscopy for bioimaging

•P. Borri; Cardiff University, Cardiff, United Kingdom

Our laboratory has developed a range of label-free chemically-specific coherent Raman scattering microscopes featuring innovative excitation/detection schemes including hyperspectral acquisition, quantitative volumetric imaging, and interferometric detection. Their application to bioimaging will be showcased.

ROOM 1

CC-1.2 MON 18:30

High-harmonic generation from doped Si pumped with intense THz pulses

•F. Meng[1], F. Walla[1], Q. ul-Islam[1], M.D. Thomson[1], S. Kovalev[2], J.-C. Deinert[2], I. Ilyakov[2], M. Chen[2], A. Ponomaryov[2], S.G. Pavlov[3], H.-W. Hübers[3,4], N.V. Abrosimov[5], and H.G. Roskos[1]; [1]Physikalisches Institut, Goethe-Universität Frankfurt, Frankfurt am Main, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany; [3]Institute of Optical Sensor Systems, German Aerospace Center (DLR), Berlin, Germany; [4]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [5]Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

We report the high harmonic generation (HHG) up to ninth order from a boron-doped Si at room temperature, pumped with intense terahertz pulses. The HHG is modeled by assuming nonparabolicity of the valance band.

CC-1.3 MON 18:45

Ultrafast electron diffraction powered with a Terahertz-driven pulse compressor

•D. Zhang[1], T. Kroh[1,2], F. Ritzkowsky[1,2], T. Rohwer[1], M. Fakhari[1], H. Cankaya[1,2], A.-L. Calendron[1], N.H. Matlis[1], and F.X. Kärtner[1,2]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen Synchrotron, Hamburg, Germany; [2]Department of Physics and The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Hamburg, Germany

We built an ultrafast electron diffractometer with a Terahertz-driven pulse compressor to probe the ultrafast dynamics of single-

ROOM 2

ROOM 3

EJ-1.2 MON (Invited) 18:30

Predicting Supercontinuum Generation Dynamics Using a Neural Network

•L. Salmela[1], M. Hary[1,2], J.M. Dudley[2], and G. Genty[1]; [1]Photonics Laboratory, Tampere University, Tampere, Finland; [2]Institut FEMTO-ST, Université Bourgogne Franche-Comté CNRS UMR 6174, Besançon, France

We show that machine learning models using two different architectures can learn a wide range of ultrafast nonlinear dynamics scenarios ranging from pulse compression to supercontinuum generation from only the input pulse and fibre characteristics.

ROOM 4

JSV-2.2 MON (Invited) 18:30

Photonic glass systems fabricated by RF sputtering on flexible substrates

•A. Chiasera[1], O. Sayginer[2,1], E. Iacob[3], A. Szczurek[1,4], K. Startek[5,6], L. Thi Ngoc Tran[1], S. Varas[1], J. Krzak[4], O. Bursi[2,1], D. Zonta[2,1,7], A. Lukowiak[6], G. Righini[8], and M. Ferrari[1]; [1]IFN-CNR CSMFO Laboratory and FBK Photonics Unit, Trento, Italy; [2]Department of Civil, Environmental and Mechanical Engineering, University of Trento, Trento, Italy; [3]Fondazione Bruno Kessler, Sensors and Devices, Micro Nano Facility, Trento, Italy; [4]Department of Mechanics, Materials and Biomedical Engineering, Wroclaw University of Science and Technology, Wroclaw, Poland; [5]Lukasiewicz Research Network - PORT, Polish Center for Technology Development, Wroclaw, Poland; [6]Institute of Low Temperature and Structure Research, Wroclaw, Poland; [7]Department of Civil and Environmental Engineering, University of Strathclyde, Glasgow, United Kingdom; [8]Istituto di Fisica Applicata Nello Carrara IFAC-CNR, MipLab, Sesto Fiorentino, Italy

Glass-based 1D photonic crystals and planar waveguides are fabricated by the rf-sputtering technique on different substrates such as PMMA, PEEK, and SiO2. The features of the samples are measured and compared before and after deformation.

ROOM 5

JSII-2.2 MON 18:30

THz-driven Electron Deflection for Streaking and Undulators

•D. Rohrbach[1], Z. Ollmann[1], M. Hayati[1], C.B. Schroeder[2], H.W. Kim[3], I.H. Baek[3], K.Y. Oang[3], M.H. Kim[3], Y.C. Kim[3], K.-H. Jang[3], Y.U. Jeong[3], W.P. Leemans[4], and T. Feurer[1]; [1]Institute of Applied Physics, University of Bern, Bern, Switzerland; [2]Lawrence Berkeley National Laboratory, Berkeley, USA; [3]Quantum-beam based Radiation Research Center, KAERI, Daejeon, South Korea; [4]Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany

We introduce THz-driven split-ring-resonators for electron bunch manipulation with applications in electron streaking and short-period undulators. While a single resonator facilitates bunch length measurements with 10fs resolution, an array can serve as 1mm period undulator.

JSII-2.3 MON 18:45

Enantioselective Orientation of Chiral Molecules Induced by Terahertz Pulses with Twisted Polarization

•I. Tutunnikov[1], L. Xu[1], R.W. Field[2], K.A. Nelson[2], Y. Prior[1], and I.S. Averbukh[1]; [1]Weizmann Institute of Science, Rehovot, Israel; [2]Massachusetts Institute of Technology, Cambridge, USA

We theoretically demonstrate enantioselective control of molecular orientation using strong THz pulses with twisted polarization. We show that the induced orientation persists on the nanosecond time scale after the field is over.

ROOM 6

ED-2.3 MON (Invited) 18:30

Single-pixel massively parallel coherent LiDAR using on dual soliton microcombs

•J. Riemensberger, A. Lukashchuk, M. Karpov , J. Liu, and T.J. Kippenberg; Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland

We show a novel architecture for massively parallel FMCW LiDAR based on dispersive spreading and multiheterodyne mixing of two chirped photonic chip-based soliton microcombs using a single laser source and a single coherent receiver.

ROOM 7

EB-2.2 MON 18:30

Entanglement Between a Telecom Photon and a Spin-Wave Solid-State Multimode Quantum Memory

•*J.V. Rakonjac[1], D. Lago-Rivera[1], A. Seri[1], M. Mazzera[1,2], S. Grandi[1], and H. de Riedmatten[1,3]; [1] ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain; [2] Institute of photonics and quantum sciences, SUPA, Heriot-Watt University, Edinburgh, United Kingdom; [3] ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We demonstrate entanglement between a telecom photon and a solid-state multimode quantum memory. The entanglement is maintained for an optical excitation (with a fidelity high enough to violate a Bell inequality) and a spin-wave excitation.

EB-2.3 MON 18:45

Towards satellite-suited noise-free quantum memories

•*L. Esguerra[1,2], L. Meßner[1,2], E. Robertson[1,2], M. Gündoğan[1,3], and J. Wolters[1,2]; [1] German Aerospace Center (DLR), Institute of Optical Sensor Systems, Berlin, Germany; [2] TU Berlin, Institute for Optics and Atomic Physics, Berlin, Germany; [3] Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany*

Transmission losses in long-distance quantum communication may be compensated by quantum memories on satellites. We demonstrate a warm EIT-based Cesium vapour memory with a

ROOM 8

We identify a distinct region that clearly admits solitons and we investigate the role of slow nonlinearities in their emergence

CD-2.3 MON 18:30

High Efficiency Raman Soliton Generation in Passive Silica Fiber

•*M.H.M. Shamim, I. Alamgir, and M. Rochette; Department of Electrical and Computer Engineering, McGill University, Montreal, Canada*

We report the highest energy conversion efficiency for soliton self-frequency shift based on a passive silica fiber. The soliton is tunable over 310 nm above the thulium band with a conversion efficiency up to 84.6%.

CD-2.4 MON 18:45

Temporal Cavity Soliton in a Coherently Driven Active Fiber Resonator

•*N. Englebert, C. Mas Arabí, P. Parra-Rivas, S.-P. Gorza, and F. Leo; Université libre de Bruxelles, Bruxelles, Belgium*

We theoretically describe and experimentally demonstrate the existence of temporal solitons in a coherently driven laser, pumped below its lasing threshold. These new pulses share the properties of mode-locked lasers and passive resonators solitons.

ROOM 9

EI-1.2 MON 18:30

Broadband Optical Parametric Amplification by 2D Semiconductors

•*C. Trovatello[1,2], A. Marini[3], X. Xu[1], C. Lee[1], F. Liu[1], N. Curreli[4], C. Manzoni[5], S. Dal Conte[2], K. Yao[1], A. Ciattoni[6], J. Hone[1], X. Zhu[1], P.J. Schuck[1], and G. Cerullo[2,5]; [1] Columbia University, New York , USA; [2] Politecnico di Milano, Milan, Italy; [3] Università dell'Aquila, L'Aquila, Italy; [4] IIT, Genova, Italy; [5] IFN-CNR, Milano, Italy; [6] CNR-SPIN, L'Aquila, Italy*

We demonstrate single-pass optical parametric amplification (OPA) in monolayer semiconducting transition-metal dichalcogenides. Our experimental findings of OPA efficiency and polarization dependence are fully supported by first-principle calculations of the nonlinear response within a tight-binding model.

EI-1.3 MON 18:45

High-Speed Graphene Photodetection: 300 GHz is not the Limit.

•*S.M. Koepfli[1], M. Baumann[1], S. Giger[1], K. Keller[1], Y. Horst[1], Y. Salamin[2], Y. Fedoryshyn[1], and J. Leuthold[1]; [1] ETH Zurich, Institute of Electromagnetic Fields (IEF), 8092 Zurich, Switzerland; [2] Now in Massachusetts Institute of Technology, Research Laboratory of Electronics, MA02139 Cambridge, USA*

We demonstrate the fastest measurement of a graphene photodetector up to 330GHz. We investigate the behaviour of three different operation mechanisms – photovoltaic, photoconductive and bolo-

ROOM 10

JSIII-2.2 MON 18:30

Real-Time Probing of Atmospheric Photochemical Reaction by Ultrashort Eextreme Ultraviolet Pulses: Nitrous Acid Release from o-Nitrophenol

•*T. Sekikawa[1], Y. Nitta[1], O. Schalk[2], H. Igarashi[2], S. Wada[3], T. Tsutsumi[3], K. Saita[4], and T. Takatsugu[4,5]; [1] Department of Applied Physics, Hokkaido university, Sapporo, Japan; [2] University of Copenhagen, Copenhagen, Denmark; [3] Graduate School of Chemical Sciences and Engineering, Hokkaido University, Sapporo, Japan; [4] Department of Chemistry, Hokkaido University, Sapporo, Japan; [5] Institute for Chemical Reaction Design and Discovery, Hokkaido University, Sapporo, Japan*

Photolysis of o-nitrophenol, contained in brown carbon in the atmosphere, was investigated by time-resolved photoelectron spectroscopy with EUV light and by theoretical calculations to disentangle all reaction steps from the excitation to the dissociation.

JSIII-2.3 MON 18:45

Delayed Ring-Opening in 1,3-Cyclohexadiene upon Photoexcitation to a Higher State Probed by Time-Resolved Soft X-Ray Absorption

Y. Kurimoto[1], N. Saito[2], Y. Ishii[3], T. Kanai[2], J. Itatani[2], K. Saita[3], T. Taketsugu[3,4], and •T. Sekikawa[1]; [1] Department. of Applied Physics. Hokkaido University, Sapporo, Japan; [2] Institute for Solid State Physics, University of Tokyo, Kashiwa, Japan; [3] Department of Chemistry, Hokkaido University, Sapporo, Japan; [4] Institute for Chemical Reaction Design and Discovery, Hokkaido University,, Sapporo, Japan

ROOM 11

EF-2.3 MON 18:30

Dynamics of Photon Statistics and Coherent Structures during the Turn on Transient of a Long Laser

•*A. Roche[1,2,3], S. Slepneva[1,2,3], U. Gowda[2,3], A. Kovalev[4], E. Viktorov[4], A. Pimenov[4], A. Vladimirov[5,6], M. Marconi[1], M. Giudici[1], and G. Huyet[1]; [1] Université Côte d'Azur, CNRS, INPHYNI, Nice, France; [2] Centre for Advanced Photonics and Process Analysis and Department of Physical Sciences, Munster Technological University, Cork, Ireland; [3] Tyndall National Institute, University College Cork, Cork, Ireland; [4] ITMO University, Saint Petersburg, Russia; [5] Weierstrass Institute, Berlin, Germany; [6] Lobachevsky State University of Nizhny Novgorod, 603950, Russia*

We analyse the turn-on transient of a long laser and show that the evolution of the intensity and of the field coherence occur on two significantly different time scales.

EF-2.4 MON 18:45

Testing Critical Slowing Down as a Bifurcation Indicator in a Low-dissipation Laser System

M. Marconi[1], C. Métayer[2], A. Acquaviva[2], J.M. Boyer[2], A. Gomel[3], T. Quiniou[3], C. Masoller[4], •M. Giudici[1], and J.R. Tredicce[2]; [1] Université Côte d'Azur, CNRS-UMR 7010, Institut de Physique de Nice, Valbonne, France; [2] Université de la Nouvelle Calédonie, ISEA, Nouméa, Nouvelle Calédonie, France; [3] Universidad de Buenos Aires, Departamento de Física, Buenos Aires, Argentina; [4] Departamento de Física, Universitat Politecnica de Catalunya, Barcelona, Spain

ROOM 12

CH-2.2 MON 18:30

Sub-Optical-Cycle Light-Matter Energy Transfer Dynamics in Molecular Vibrational Spectroscopy

•*T. Buberl[1], M. Peschel[2], M. Högner[1], R. de Vivie-Riedle[2], and I. Pupeza[1,3]; [1] Max-Planck-Institut für Quantenoptik, Garching, Germany; [2] Ludwig-Maximilians-Universität München, Munich, Germany; [3] Ludwig-Maximilians-Universität München, Garching, Germany*

The complete energy transfer dynamics between field-controlled mid-infrared optical waveforms and vibrating molecules in aqueous solution is recorded with field-resolved spectroscopy on a sub-optical-cycle timescale for the first time, and is reproduced by ab-initio calculations.

CH-2.3 MON 18:45

Targeted single-beam CARS using phase-and-polarization shaping

•*R. Viljoen[1], D. Spangenberg[2], P. Neethling[1], A. Heidt[2], T. Feurer[2], and E. Rohwer[1]; [1] Laser Research Institute, Stellenbosch, South Africa; [2] Institute for Applied Physics, Bern, Switzerland*

I^2PIE compressed supercontinuum pulses from a femtosecond oscillator pumped ANDi-PCF are phase shaped, using an SLM in a 4f-shaper geometry, with quadratic phase functions. Specific Raman transitions in single-beam CARS measurements are successfully targeted.

ROOM 1

crystal silicon. We demonstrate high-quality diffraction with improved time resolution.

CC-1.4 MON 19:00

Ion evaporation by single-cycle terahertz pulses

•M. Tang[1], J. Houard[1], L. Arnoldi[1], M. Boudant[1], A. Ayoub[1], A. Normand[1], G. Da Costa[1], A. Hideur[2,3], and A. Vella[1,3]; [1]GPM UMR CNRS 6634, Normandie Université, Université-INSA de Rouen, Saint Etienne du Rouvray, France; [2]CORIA UMR CNRS 6614, Normandie Université,Université-INSA de Rouen, Saint Etienne du Rouvray, France; [3]Institut Universitaire de France, (IUT), France

Coupling picosecond duration terahertz pulses to metallic nanostructures allows the generation of extremely localized and intense electric fields. Here, using single-cycle terahertz pulses, we demonstrate the control over field ion emission from metallic nano-tips.

CC-1.5 MON 19:15

Emission of Terahertz Waves from Curved Two-Color Filaments Produced by 2D Airy Wave Packets

•A.D. Koulouklidis[1], D. Mansour[1,2], D.G. Papazoglou[1,2], and S. Tzortzakis[1,2,3]; [1]Institute of Electronic Structure and Laser, FORTH, Heraklion, Greece; [2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [3]Science Program, Texas A\&M University at Qatar, Doha, Qatar

We report on THz generation from

ROOM 2

CL-1.2 MON 19:00

Bone tissue ablation by industrial fs laser systems

•L. Gemini, S. Al Bourgol, G. Machinet, M. Faucon, and R. Kling; ALPhANOV, Talence, France

Carbonization-free fs-laser ablation of porcine femur was achieved with ablation rates up to 0.7 mm3/s, thus becoming a competitive approach in the frame of bone surgery. The possibility of upscaling the process was also demonstrated.

CL-1.3 MON 19:15

Printing of living cells by using ultra-short laser pulses

•J. Zhang[1,2,3,4], P. Byers[1], Y. Geiger[1,2], D. Docheva[4], H. Clausen-Schaumann[2,3], S. Sudhop[2,3], and H.P. Huber[1]; [1]Lasercenter, Munich University of Applied Sciences, Lothstrasse 34, 80335 , Munich, Germany; [2]Center for Applied Tissue Engineering and Regenerative Medicine CANTER, Munich University of Applied Sciences, Lothstrasse 34, 80335 , Munich, Germany; [3]Center for NanoScience, University of Munich, 80799 , Munich,

ROOM 3

EJ-1.3 MON 19:00

Optically-addressed spatial light modulator for the Ising machine implementation

•V. Semenov[1], X. Porte[1], C. Conti[2,3], I. Abdulhalim[4], L. Larger[1], and D. Brunner[1]; [1]FEMTO-ST Institute/Optics Department, CNRS & University Bourgogne Franche-Comté, Besançon, France; [2]Dipartimento di Fisica, Università di Roma ”La Sapienza”, Rome, Italy; [3]Institute for Complex Systems, National Research Council (ISC-CNR), Rome, Italy; [4]Department of Electrooptics and Photonics Engineering, Ben Gurion University, Beer Sheva, Israel

Ising machines are powerful concepts to solve combinatorial problems. Emulations in classical hardware are very inefficient, and we show that this challenge can be alleviated by realizing Ising models in optically-addressed spatial light modulators.

EJ-1.4 MON 19:15

Computing Continuous Nonlinear Fourier Spectrum of Optical Signal with Artificial Neural Networks

•E. Sedov[1,2], J. Prilepsky[1], I. Chekhovskoy[2], and S. Turitsyn[1,2]; [1]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom; [2]Novosibirsk State University, Novosibirsk, Russia

We propose the artificial neural network architecture that can efficiently perform the nonlinear Fourier optical signal processing. The per-

ROOM 4

JSV-2.3 MON 19:00

A flexible polymer waveguide platform with low-loss optical interfaces

S. Yu, H. Zuo, T. Gu, and •J. Hu; MIT, Cambridge, USA

We demonstrated a flexible polymer waveguide platform with low propagation loss and excellent mechanical ruggedness. We also realized ultra-compact waveguide bends and broadband, low-loss optical interface with fibers based on microfabricated quadratic reflectors.

JSV-2.4 MON 19:15

3D Integrated Photonics Platform with Deterministic Geometry Control

•J. Michon[1], S. Geiger[1,2], L. Li[3,4], C. Gonçalves[5], H. Lin[6], K. Richardson[5], X. Jia[2], and J. Hu[1]; [1]Massachusetts Institute of Technology, Cambridge, USA; [2]University of Delaware, Newark, USA; [3]Westlake University, Hangzhou, China; [4]Westlake Institute for Advanced Studies, Hangzhou, China; [5]University of Central Florida, Orlando, USA; [6]Zhejiang University, Hangzhou, China

ROOM 5

JSII-2.4 MON 19:00

Ultrafast Mode Switching of Metamaterials Driven by Intense THz Field-Induced Impact Ionization

•B.J. Kang[1], D. Rohrbach[1], F. Brunner[1], S. Bagiante[1,2], H. Sigg[2], and T. Feurer[1]; [1]Institute of Applied Physics, University of Bern, 3012 Bern, Switzerland; [2]Laboratory for Micro- and Nanotechnology, Paul Scherrer Institute, 5232 Villigen, Switzerland

We report ultrafast THz-field induced mode switching of metamaterials on semiconductor substrates with different band gaps. We establish the dominant carrier generation mechanism and present detailed system dynamics.

JSII-2.5 MON 19:15

Semi-classical calculations of nonlinear terahertz conductivity in semiconductor nanoparticles

•H. Nemec and J. Kucharik; Institute of Physics, Czech Academy of Sciences, Prague, Czech Republic

Nonlinear terahertz conductivity of free-electron gas enclosed in semiconductor nanoparticles is calculated by semi-classical Monte-Carlo method. The result show that confinement-induced nonlinearities may be much stronger than the intrinsic nonlinear response of bulk semiconductors.

ROOM 6

ED-2.4 MON 19:00

Carrier-Free Dual-Comb Distance Metrology Using Two-Photon Detection

•H. Wright[1], J. Sun[2], D. McKendrick[3], N. Weston[3], and D. Reid[1]; [1]Scottish Universities Physics Alliance (SUPA), Institute of Photonics and Quantum Sciences, School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom; [2]School of Electronic Engineering and Intelligentization, Dongguan University of Technology, Dongguan, China; [3]Renishaw Plc, Edinburgh, United Kingdom

By using cross-polarized dual combs and two-photon detection we demonstrate carrier-phase-insensitive time-of-flight distance measurement at 1555 nm with 93 nm precision and sampling rates exceeding by 2.4 the conventional dual-comb metrology aliasing limit.

ED-2.5 MON 19:15

Electro-Optic Frequency Combs for Rapid Sensing of Optomechanical Sensors

•D. Long, B. Reschovsky, F. Zhou, Y. Bao, R. Madugani, R. Allen, T. LeBrun, and J. Gorman; National Institute of Standards and Technology, Gaithersburg, USA

Electro-optic frequency combs were employed to interrogate cavity optomechanical accelerometers. This approach allows for rapid sensing with high dynamic range. We describe approaches for comb generation as well as measurements in

ROOM 7

signal-to-noise level of unity for input signal pulses containing $\bar{\mu}_1 = 0.013$ photons.

EB-2.4 MON 19:00

Erbium Dopants in a Cryogenic High-Q resonator

B. Merkel[1,2], A. Ulanowski[1,2], P. Cova Farina[1,2], and •A. Reiserer[1,2]; [1]Max-Planck-Institute of Quantum Optics, Garching, Germany; [2]Munich Center for Quantum Science and Technology (MCQST), München, Germany

A high-finesse optical resonator enables coherent interactions between individual erbium dopants and photons at telecommunication wavelength. This establishes a novel hardware platform with unique properties towards the implementation of global quantum networks and repeaters.

EB-2.5 MON 19:15

Optical readout of a superconducting single photon detector with a cryogenic modulator

•F. Thiele[1], T. Hummel[1], F. vom Bruch[2], V. Quiring[2], R. Ricken[2], H. Herrmann[2], C. Eigner[2], C. Silberhorn[2], and T.J. Bartley[1]; [1]Mesoscopic Quantum Optics, Paderborn, Germany; [2]Integrated Quantum Optics, Paderborn, Germany

We report on the readout of a SNSPD using a lithium niobate waveguide polarisation modulator

ROOM 8

CD-2.5 MON 19:00

Mid-infrared soliton self-frequency shift using ultra-low pump pulse energy

•I. Alamgir[1], M.H.M. Shamim[1], W. Correr[2], Y. Messaddeq[2], and M. Rochette[1]; [1]McGill University, Montréal, Canada; [2]Université Laval, Québec City, Canada

We generate Raman solitons tunable within the spectral range of 2.0-2.6 μm from an ultralow pump pulse energy of 64 pJ. This is the lowest pump energy ever used to obtain wideband soliton shift.

CD-2.6 MON 19:15

Tunable Topological Phase Transition in Interacting Soliton Lattices

D. Bongiovanni[1,2], D. Jukić[3], •Z. Hu[1], F. Lunić [4], Y. Hu[1], D. Song[1], R. Morandotti[2,5], Z. Chen[1,6], and H. Buljan[1,4]; [1]TEDA Applied Physics Institute and School of Physics, Nankai University, Tianjin 300457, China; [2]INRS-EMT, 1650 Blvd. Lionel-Boulet, Varennes, QC J3X 1S2, Canada; [3]Faculty of Civil Engineering, University of Zagreb, Zagreb 10000, Croatia; [4]Department of Physics, Faculty

ROOM 9

metric by measuring gate and bias voltage sweeps at high frequencies.

EI-1.4 MON 19:00

Ultrafast spin relaxation mechanisms in layered hybrid perovskites

•F.V.A. Camargo[1], S. Ghosh[1], S.A. Bourelle[2], T. Neumann[3], R. Shivanna[2], R.H. Friend[2], G. Cerullo[1], and F. Deschler[3]; [1]IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milan, Italy; [2]Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom; [3]Walter-Schottky-Institute, Physics Department, Technical University Munich, Munich, Germany

We combine ultrafast Faraday rotation and transient absorption to study spin relaxation in layered perovskites, revealing different mechanisms following different excitation wavelengths.

EI-1.5 MON 19:15

Synchronized Injection of Charge Carriers in Perovskite Light Emitting Transistors

•M. Klein[1,3], B. Cheng[1], J. Li[3], A. Bruno[3], and C. Soci[1,2,3]; [1]Division of Physics and Applied Physics, Nanyang Technological University, Singapore, Singapore; [2]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, Singapore, Singapore; [3]Energy Research Institute @ NTU (ERI@N), Research Techno Plaza, Nanyang Technological University, Singapore, Singapore

ROOM 10

Time-resolved soft x-ray absorption spectroscopy based on high harmonic generation confirms that the ring of 1,3-cyclohexadiene is opened about 400 fs later upon photoexcitation to a higher excited state.

JSIII-2.4 MON (Invited) 19:00

Ultrafast Exciton Dynamics in Poly(3-hexylthiophene) Probed with Time Resolved X-ray Absorption Spectroscopy at the Carbon K-edge

•D. Garratt[1], L. Misiekis[1], D. Wood[1], E. Witting-Larsen[1], M. Matthews[1], O. Alexander[1], P. Ye[1], S. Jarosch[1], A. Bakulin[2], T. Penfold[3], and J. Marangos[1]; [1]The Blackett Laboratory Laser Consortium, Department of Physics, Imperial College London, London, United Kingdom; [2]Department of Chemistry and Centre for Processable Electronics, Imperial College London, London, United Kingdom; [3]Chemistry—School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne, United Kingdom

We apply transient X-ray absorption spectroscopy at the carbon K-edge to study exciton dynamics in poly(3-hexylthiophene). We observe a direct, spectroscopic signature of rapid exciton localisation in the material on a sub 50 fs timescale.

ROOM 11

Critical Slowing Down is commonly perceived as an indicator of an incoming bifurcation. Here we show that, in a solid-state laser where pump is linearly swept in time, it takes place well beyond the bifurcation point.

EF-2.5 MON (Invited) 19:00

Nonlinear Dynamics in Semiconductor Ring Lasers: From Phase Turbulence to Solitons

•M. Piccardo[1], B. Schwarz[2], L. Columbo[3], F. Prati[4], L. Lugiato[4], M. Brambilla[5], A. Gatti[6], C. Silvestri[3], M. Gioannini[3], D. Kazakov[1], N. Opacak[2], M. Beiser[2], J. Hillbrand[2], Y. Wang[7], A. Belyanin[7], and F. Capasso[2]; [1]Harvard University, Cambridge, USA; [2]TU Wien, Vienna, Austria; [3]Politecnico di Torino, Torino, Italy; [4]Universitá dell'Insubria, Como, Italy; [5]Universitá e Politecnico di Bari, Bari, Italy; [6]CNR, Milano, Italy; [7]Texas A&M University, College Station, USA

We introduce a framework capturing at the same time the physics of two distinct classes of frequency comb generators based on active and passive nonlinear optical media: ring quantum cascade lasers and Kerr microresonators.

ROOM 12

CH-2.4 MON 19:00

Advancing Stimulated Raman Scattering spectroscopy using Squeezed Light

•R. Bruzaca de Andrade[1], K. Berg-Sørensen[2], T. Gehring[1], and U. Lund Andersen[1]; [1]Center for Macroscopic Quantum States bigQ, Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]Department of Health Technology, Technical University of Denmark, Kgs. Lyngby, Denmark

Quantum technology can improve state-of-the-art microscopes. Here we present squeezed light enhanced stimulated Raman spectroscopy imaging.

CH-2.5 MON 19:15

Spectral Vector Beams for High-Speed Spectroscopic Measurements

•L. Kopf[1], J. Deop Ruano[1], T. Stolt[1], M.J. Huttunen[1], F. Bouchard[2], and R. Fickler[1]; [1]Photonics Laboratory, Physics Unit, Tampere University, FI-33720 Tampere, Finland; [2]National Research Council of Canada, 100 Sussex Drive, Ottawa, Ontario K1A 0R6, Canada

We introduce a novel method to generate beams with frequency-dependent polarization, i.e. spectral vector beams. They allow determin-

ROOM 1

curved filaments produced by 2D Airy wave packets. Due to the curvature of the plasma channel, non-concentric THz beams with different polarizations are generated.

ROOM 2

Germany; [4]*Experimentelle Unfallchirurgie, Klinik und Poliklinik für Unfallchirurgie, Am Biopark 9, 93053 , Regensburg, Germany*
We present a new ultra-short laser pulse-based method for the efficient and precise single cell printing which avoids the use of non-biological inorganic absorption layers.

ROOM 3

formance of the new method is analysed considering the error between the precomputed and predicted nonlinear spectra.

ROOM 4

We report a fully-packaged 3D integrated photonics platform with devices placed at arbitrary pre-defined locations in 3D. We further demonstrated the application of the platform to mechanical strain sensing.

ROOM 5

ROOM 6

comparison with acceleration standards.

ROOM 1

10:00 – 11:00

CA-P: CA Poster Session

CA-P.1 MON

Highly-efficient Resonantly Diode-pumped 2 μm Thulium Lasers
•*J. Sulc, M. Nemec, J. Kratochvil, K. Veselsky, and H. Jelinkova*; *Czech Technical University in Prague, FNSPE, Prague, Czech Republic*
Thulium-based lasers (Tm:YAP, Tm:YAG, Tm:YLF) were tested under CW 1.7 μm diode excitation. In a longitudinal pumping arrangement, efficiencies reaching quantum limit were obtained for all samples with multi-watt level output.

CA-P.2 MON

Photothermal-controlled relative frequency stabilization of Nd:YVO4-based monolithic microchip single mode laser with SHG
•*G. Dudzik*; *Wroclaw University of Science and Technology, Wroclaw, Poland*
Microchip resonator Nd:YVO4/YVO4/KTP/Er:Glass with second-harmonic generation and relative frequency stabilization to 127I2 iodine vapor atomic transition is presented. Auxiliary 976nm beam is absorbed in Er:Glass leading to the laser frequency control induced by photothermal effect.

CA-P.3 MON

2 μm MOPA Laser Based on Cryogenically Cooled Tm:Y2O3 Transparent Ceramic
•*F. Yue*[1,2,3], *V. Jambunathan*[1], *S. Paul David*[1], *X. Mateos*[2], *J. Sulc*[3], *M. Smrz*[1], *and T. Mocek*[1]; [1]*HiLASE Center, Institute of Physics Czech Academy of Sciences, Za Radnicí 828, 252 41 Dolní Břežany, Czech Republic*; [2]*Física i Cristal·lografia de Materials i Nanomaterials (FiCMA-FiCNA), Universitat Rovira i Virgili, Campus Sescelades, c/Marcel·lí Domingo, s/n., E-43007 Tarragona, Spain*; [3]*Faculty of Nuclear Sciences and Phys. Eng., Czech Technical University in Prague, Brehova 7, 115 19 Prague, Czech Republic*
We demonstrated a MOPA laser based on cryogenically cooled Tm:Y2O3 transparent ceramics emitting around 1932 nm. A maximum output energy of 2.94 mJ at 10 Hz with a pulse width of 32 ns was achieved.

CA-P.4 MON

Er:YAP laser and gain-switching generation of 186 ns pulses at 2.92 μm
•*R. Švejkar, J. Šulc, M. Němec, and H. Jelínková*; *Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Prague, Czech Republic*
Compact gain-switched Er:YAP laser emitting at 2920 nm was tested for the first time. Using short (11 mm long) laser resonator the pulse duration 186±1 ns with repetition rate 200 Hz were achieved.

CA-P.5 MON

Widely tunable Tm^{3+}:LuF$_3$-CaF$_2$ diode pumped laser
•*K. Veselský*[1], *J. Šulc*[1], *H. Jelínková*[1], *M.E. Doroshenko*[2], *K.A. Pierpoint*[2], *V.A. Konyushkin*[2], *and A.N. Nakladov*[2]; [1]*FNSPE, Czech Technical University in Prague, Prague, Czech Republic*; [2]*A. M. Prokhorov General Physics institute, Russian Academy of Sciences, Moscow, Russia*
One of the largest tunability of 250 nm (1785-2035 nm) from thulium-doped fluoride crystal was achieved with a new Tm^{3+}:LuF$_3$-CaF$_2$ crystal. The laser performance of the diode-pumped laser was investigated.

CA-P.6 MON

4.7–5.1 μm Lasing in Cr^{2+},Fe^{2+}:Zn$_{1-x}$Mn$_x$Se ($x \approx 0.4$) Single Crystal under 1.73 μm and 2.94 μm Pumping
•*A. Riha*[1], *M. Doroshenko*[2], *H. Jelinkova*[1], *M. Nemec*[1], *M. Jelinek*[1], *M. Cech*[1], *N. Kovalenko*[3], *and I. Terzin*[3]; [1]*Czech Technical University in Prague, FNSPE, Prague, Czech Republic*; [2]*Prokhorov General Physics Institute, Moscow, Russia*; [3]*Institute for Single Crystals, NAS of Ukraine, Kharkiv, Ukraine*
Two different Q-switched lasers pumping at ~1.73 μm through the Cr$^{2+} \rightarrow$ Fe^{2+} ions energy transfer and at ~2.94 μm via direct excitation of Fe^{2+} ions of the Cr^{2+},Fe^{2+}:Zn$_{1-x}$Mn$_x$Se ($x \approx 0.4$) single crystal are reported.

CA-P.7 MON

RE-doped LGSB (RE = Nd, Yb) as New High Performance Near-Infrared Laser Crystals
•*M. Greculeasa*[1,2], *A. Broasca*[1,2], *F. Voicu*[1], *S. Hau*[1], *G. Croitoru*[1], *C. Brandus*[1], *G. Stanciu*[1], *C. Gheorghe*[1], *and L. Gheorghe*[1]; [1]*National Institute for Laser, Plasma and Radiation Physics, Solid-State Quantum Electronics Laboratory, Magurele, Romania*; [2]*Doctoral School of Physics, University of Bucharest, Faculty of Physics, Magurele, Romania*
Near-infrared laser emission performances yielded by 4.6-at.% Nd:LGSB and 12.9-at.% Yb:LGSB laser crystals are presented. The obtained results prove the favorable intrinsic properties of these laser media to generate laser emission with high efficiencies.

CA-P.8 MON

Transient Frequency Dynamics in Single-Longitudinal-Mode Diamond Raman Lasers
•*S. Abedi, D. Little, O. Kitzler, D. Spence, and R. Mildren*; *Macquarie University, Sydney, Australia*
We report a long-pulse diamond Raman laser exhibiting thermally-induced chirp at rates up to 0.2~MHz per microsecond . Prospects for a "fast" thermo-optical actuator leveraging diamond's high thermal conductivity are discussed.

CA-P.9 MON

High-Efficiency CW and Passively-Q-Switched Operation of a 2050 nm Tm3+:Y2O3 Ceramic Laser In-Band Fiber-Laser Pumped at 1670 nm
•*O. Antipov*[1,2], *Y. Getmanovskiy*[1,3], *A. Dobrynin*[2], *H. Huang*[4], *D. Shen*[4], *J. Wang*[4], *and S. Balabanov*[5]; [1]*Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia*; [2]*Nizhny Novgorod State University, Nizhny Novgorod, Russia*; [3]*Nizhny Novgorod State Technical University, Nizhny Novgorod, Russia*; [4]*Jiangsu Normal University, Xuzhou, China*; [5]*Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences, Nizhny Novgorod, Russia*
A Tm3+:Y2O3 ceramic laser at 2050 nm with the L-shaped cavity in-band pumped by a fiber laser at 1670 nm was studied in the CW and passively Q-switched regimes. Kilohertz Q-switched operation was achieved by an intracavity Cr2+:ZnSe saturable absorber.

ROOM 7

at cryogenic temperature. This is an important step towards the development of feedforward modulation based on single photon events.

ROOM 8

of Science, University of Zagreb, Zagreb 10000, Croatia; [5]*Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, Chengdu 610054, China*; [6]*Department of Physics & Astronomy, San Francisco State University, San Francisco, CA 94132, USA*

We demonstrate dynamical topological phase transitions entirely driven by nonlinearity, which constitute an example of emergent nonlinear topological phenomena. These transitions in our system occur due to soliton interactions forming Su-Schrieffer-Heeger lattices.

ROOM 9

We report enhancement of the brightness of hybrid perovskite light emitting transistors operated with independent pulsing of drain and gate bias voltages, attributed to compensation of space-charge effects and improved timing of carrier injection.

ROOM 10

ROOM 11

ROOM 12

ing changes in the spectrum by only using polarization measurements, thus enabling GHz read-out rates.

ROOM 1

CA-P.10 MON

Development of a Yellow Laser Source at 577 nm for Ophthalmology Applications

•*V. Jambunathan*[1], *S. Paul David*[1], *F. Yue*[1], *X. Mateos*[2], *O. Novak*[1], *M. Smrz*[1], *and T. Mocek*[1]; [1]*HiLASE Center, Institute of Physics of the Czech Academy of Sciences, Za Radnicí 828, 25241, Dolní Břežany, Czech Republic*; [2]*Física i Cristal·lografia de Materials i Nanomaterials (FiCMA-FiCNA), Universitat Rovira i Virgili, Campus Sescelades, c/Marcel·lí Domingo, s/n., E-43007 , Tarragona, Spain*

We demonstrated a compact yellow laser source emitting at 577 nm that has potential in ophthalmology applications. This is achieved by constructing a laser setup with proper combination of gain, Raman and frequency doubling media.

CA-P.11 MON

Multiwavelength Ultrafast SRS Oscillation in Pb(MoO4)0.5(WO4)0.5 Mixed Crystal with Combined Frequency Shifts on Stretching and Bending Vibrations of Molybdate and Tungstate Anionic Groups

•*M. Frank*[1], *S. Smetanin*[2], *M. Jelínek*[1], *D. Vyhlídal*[1], *K. Gubina*[2], *V. Shukshin*[2], *P. Zverev*[2], *and V. Kubeček*[1]; [1]*Czech Technical University in Prague, FNSPE, Prague, Czech Republic*; [2]*Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia*

We present multiwavelength ultrafast oscillation in synchronously pumped Raman laser based on a Pb(MoO4)0.5(WO4)0.5 crystal. The output radiation with slope efficiency of 1.5% and 9.5% was achieved at wavelengths of 1171/1176 and 1217/1222 nm, respectively.

CA-P.12 MON

Design of intra-cavity phase masks for high power flat-top Yb:YAG thin-disk cavities

•*V. Fortin, M.-C. Nadeau, and S. Petit*; *Université Bordeaux- CNRS- CEA, CELIA, UMR 5107, Talence, France*

We report on simulations to design and implement graded-phase mirrors in Yb:YAG thin-disk cavities with a flat-top fundamental mode on the disk. Compared to fundamental Gaussian cavities, it could enable more efficient thin-disk laser systems.

CA-P.13 MON

Picosecond and Femtosecond Mode-Locked Lasers Based on Yb:LuAP Crystal

•*A. Rudenkov*[1], *V. Kisel*[1], *A. Yasukevich*[1], *K. Hovhannesyan*[2], *A. Petrosyan*[2], *and N. Kuleshov*[1]; [1]*Center for Optical Materials and Technologies, Belarusian National Technical University, Minsk, Belarus*; [2]*Institute for Physical Research, National Academy of Sciences, Ashtarak-2, Armenia*

Average output power of 7W with 28.1% optical efficiency and 130fs pulse duration obtained at 1016.9nm central wavelength. 2ps pulses with 12W average power and 38% optical efficiency obtained at 999.2nm central wavelength.

CA-P.14 MON

Performance of mid-IR high-power ZGP OPO compared in linear and non-planar ring resonators

•*M.A. Medina*[1,2], *M. Piotrowski*[1], *M. Schellhorn*[1], *C. Mueller*[1], *G. Spindler*[3], *F. Wagner*[2], *A. Berrou*[1], *and A. Hildenbrand-Dhollande*[1]; [1]*French-German Research Institute of Saint-Louis (ISL), Saint-Louis, France*; [2]*Aix Marseille Univ.,CNRS,Cetntrale Marseille,Institut Fresnel, Marseille, France*; [3]*Untere Gaisackerstrs.,10,79761, Waldshut-Tiengen, Germany*

We compare the performance in terms of output power, efficiency and beam quality of three types of mid-IR ZGP OPOs at high repetition rate: linear, RISTRA and FIRE cavities.

CA-P.15 MON

Exploring the Topological Charge and Shape of an Optical Vortex Generated with Wavelength-Detuned Spiral Phase Plates

•*O.-V. Grigore*[1], *A. Craciun*[1,2], *N. Pavel*[1], *and T. Dascalu*[1]; [1]*National Institute for Laser, Plasma and Radiation Physics, Solid-State Quantum Electronics Laboratory, Magurele, Romania*; [2]*Doctoral School of Physics, University of Bucharest, Faculty of Physics, Magurele, Romania*

A procedure to determine topological charge and sign of vortex beams generated by a spiral phase plate illuminated at a wavelength different than the designed one is proposed, showing good agreement between experiments and simulations.

CA-P.16 MON

Luminescent and laser properties of rare earth doped selenide glasses in the mid-infrared

M. Churbanov[2], *B. Denker*[1], *B. Galagan*[1], •*V. Koltashev*[3], *V. Plotnichenko*[3], *M. Sukhanov*[2], *S. Sverchkov*[1], *and A. Velmushov*[2]; [1]*Prokhorov General Physics Institute of RAS, Moscow, Russia*; [2]*Devyatykh Institute of Chemistry of High-Purity Substances of RAS, Nizhny Novgorod, Russia*; [3]*Prokhorov General Physics Institute of RAS, Dianov Fiber Optics Research Center, Moscow, Russia*

5-6 μm laser action was demonstrated in Tb-doped and Pr-doped ultrapure selenide glasses. Sensitization of Ce3+ by Dy3+ enabled to uncover the 7.5 ms long Ce3+ luminescence at 3.5-6 μm, also promising for lasing.

CA-P.17 MON

Low-Quantum-Defect CW and Q-Switched Operation of a Tm3+:YAP Laser with the In-Band Fiber-Laser Pumping

•*O. Antipov*[1,2,3], *Y. Getmanovskiy*[1,3,4], *A. Dobrynin*[2], *I. Shestakova*[5], *A. Shestakov*[5], *S. Balabanov*[6], *and S. Larin*[7]; [1]*Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod , Russia*; [2]*Nizhny Novgorod State University, Nizhny Novgorod , Russia*; [3]*Novosibirsk State University, Novosibirsk, Russia*; [4]*Nizhny Novgorod State Technical University, Nizhny Novgorod , Russia*; [5]*Research Institute "Polus", Moscow, Russia*; [6]*Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences, Nizhny Novgorod , Russia*; [7]*"NTO IRE-Polys", , Fryazino Moscow region, Russia*

In-band fiber laser pumped Tm3+:YAP laser at 1896 nm, 1935 nm or 1985 nm was studied in the CW, actively and passively Q-switched regimes. The Q-switched operation was achieved using an intracavity acousto-optical modulator or a Cr2+:ZnSe saturable absorber.

CA-P.18 MON

Diode Bar Pumping of Single Mode Solid State Lasers

L.S. Petrov[1], *K. Georgiev*[1], *A. Trifonov*[2], *and* •*I. Buchvarov*[1,3]; [1]*Physics Department, Sofia University, Sofia, Bulgaria*; [2]*IBPhotonics Ltd, Sofia, Bulgaria*; [3]*John*

ROOM 1

Atanasoff Center for Bio and Nano Photonics (JAC BNP), Sofia, Bulgaria
A method for optimization of a diode beam-shaping device for diode bar longitudinally pumping of solid-state-lasers is presented. Efficient diode-bar-pumped single mode operation of Yb-KGW fs-regenerative amplifier and Nd:YAP laser oscillators are demonstrated.

CA-P.19 MON

Evaluating Thermal Interface Materials for Mounting Slab Laser Crystals
•*J. Sanwell, H. Turner, D. Morris, and M.J.D. Esser; Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom*
We present a method for comparatively evaluating solid thermal interface materials for mounting slab and disk solid-state laser geometries. Indium foil and soft PGS are found to be the most practical materials for this application.

ROOM 2

10:00 – 11:00

CB-P: CB Poster Session

CB-P.1 MON

The contribution has been withdrawn.

CB-P.2 MON

Externally Wavelength-Stabilized Single Mode Lasers with 65% Conversion Efficiency and 50 pm Spectral Width at 1 W Output
•*M. Wilkens, G. Erbert, H. Wenzel, A. Maaßdorf, J. Fricke, A. Knigge, and P. Crump; Ferdinand-Braun-Institut gGmbH, Berlin, Germany*
Low loss, narrow spectrum, wide tuning range external wavelength stabilization of advanced waveguide (highly vertically asymmetric, lateral mode-filtered) single mode diode lasers is demonstrated, showing their suitability for use in dense wavelength beam combining systems.

CB-P.3 MON

Miniaturized Master-Oscillator Power-Amplifier emitting at 626 nm
•*G. Blume, M. Drees, J. Pohl, D. Feise, A. Sahm, and K. Paschke; Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany*
An all-semiconductor single longitudinal mode laser source at 626 nm in a small sized, sealed package was developed. It uses a DBR-RWL as master-oscillator and a tapered amplifier at low internal temperature to achieve approximately 200 mW.

CB-P.4 MON

Manipulation of Temporal Localized Structures in a VECSEL With Optical Feedback
•*T. Seidel[1,2], A. Bartolo[3], N. Vigne[4], A. Garnache[4], G. Beaudoin[5], I. Sagnes[5], M. Giudici[3], J. Javaloyes[1], S.V. Gurevich[1,2], and M. Marconi[3]; [1]Dpt. de Física, Universitat de les Illes Balears & IAC-3, Campus UIB, E-07122 Palma de Mallorca, Spain; [2]Institute for Theoretical Physics & Center for Nonlinear Science (CeNoS), University of Münster, Schlossplatz 2, 48149 Münster, Germany; [3]Université Côte d'Azur, Centre National de La Recherche Scientifique, Institut de Physique de Nice, F-06560 Valbonne, France; [4]Institut d'Electronique et des Systèmes, UMR5214, University of Montpellier, 34000 Montpellier, France; [5]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, UMR 9001, 91120 Palaiseau, France*
We analyze the effect of optical feedback on the dynamics of mode-locked semiconductor lasers operated in the regime of temporal localized structures. Depending on the feedback delay harmonic solutions can be either reinforced or hindered.

CB-P.5 MON

Optical Injection Dynamics of VCSEL Frequency Combs
•*Y. Doumbia[1,2], D. Wolfersberger[1,2], K. Panajotov[3,4], and M. Sciamanna[1,2]; [1]Chaire Photonique, CentraleSupélec, 2 Rue Edouard Belin 57070 , Metz, France; [2]Université de Lorraine, CentraleSupélec, LMOPS, 2 Rue Edouard Belin 57070 , Metz, France; [3]Brussels Photonics Group (B-PHOT), Vrije Universiteit Brussel, Brussels, Belgium; [4]Institute of Solid-State Physics, Bulgarian Academy of Sciences, Sofia, Bulgaria*
We analyze theoretically and experimentally the dynamics of a VCSEL with frequency comb injection. The VCSEL shows two tunable combs with orthogonal polarization and a bandwidth up to 13 times that of the injected comb.

CB-P.6 MON

The contribution has been withdrawn.

CB-P.7 MON

Dual Wavelength Laser Designed for Locking to Cs-133 Atomic Transitions
W. Qi[1], •B. Yuan[1], J. Shi[1], Y. Zhang[1], X. Chen[2], J.H. Marsh[3], and L. Hou[3]; [1]Nanjing University of Posts and Telecommunications, Nanjing, China; [2]National Laboratory of Solid State Microstructures, Nanjing University, Nanjing, China; [3]James Watt School of Engineering, University of Glasgow, Glasgow, United Kingdom
A laterally coupled dual-wavelength laser operating at 894 nm with a frequency separation at 9.19 GHz is designed for miniature atomic clocks and room temperature magnetometers.

CB-P.8 MON

Observation of the Turn-on Delay in InAs- and InP-based Quantum Cascade Lasers under Pulsed Pumping with Non-zero Rise-time
•*E. Cherotchenko[1], V. Dudelev[1], D. Mikhailov[1], S. Losev[1], A. Babichev[2,3], A. Gladyshev[2], I. Novikov[1,2,3], A. Lutetskiy[1], D. Veselov[1], S. Slipchenko[1], N. Pikhtin[1], L. Karachinsky[1,2,3], D. Denisov[2], V. Kuchinskii[1], E. Kognovitskaya[1], A. Egorov[3], R. Tessier[4], A. Baranov[4], and G. Sokolovskii[1]; [1]Ioffe Institute, Saint Petersburg, Russia; [2]Connector Optics LLC, Saint Petersburg, Russia; [3]ITMO University, Saint Petersburg, Russia; [4]IES, University of Montpellier, Montpellier, France*
We observe unexpectedly long turn-on delay reaching ~10ns and its non-monotonous dependence on pumping amplitude in InAs- and InP-based quantum-cascade lasers under non-zero rise-time pulse-pumping. Our numerical simulations qualitatively agree with these measurements.

CB-P.9 MON

Investigation of Scattering Losses in a Buried Tunnel Junction 4 um GaSb VCSEL
•*A. Simaz[1], P. Debernardi[2], M. Beshara[1], and M.A. Belkin[1]; [1]Walter Schottky Institute c/o Technical University of Munich, D-85748 Garching bei München, Germany; [2]CNR-IEIIT c/o Politecnico di Torino, 10129 Torino, Italy*
Scattering losses in a 4 mu GaSb VCSEL are analyzed using a 3D vectorial optical solver by parametrically varying transverse and longitudinal dimension of the buried tunnel junction and an optimized structure is proposed.

CB-P.10 MON

Phase-incoherent photonic molecules in V-shaped mode-locked VECSELs
•*J. Hausen[1], J. Javaloyes[2], S. Gurevich[2,3], and K. Lüdge[1]; [1]Institute of Theoretical Physics, Technische Univ. Berlin, Berlin, Germany; [2]Departament de Fisica, Universitat de les Illes Balears & Institute of Applied Computing and Community Code, Palma de Mallorca, Spain; [3]Institute for Theoretical Physics, University of Münster, Münster, Germany*
We find clusters of globally-bound but locally-independent pulses in mode-locked VECSELs in the long-cavity regime below threshold. Our analytics predicts the pulse distance while a bifurcation analysis yields regions of stability of the phase-incoherent clusters.

CB-P.11 MON

Ultra-short pulse non-classical light emitters utilizing multiple wide quantum wells
N. Torcheboeuf[1], V. Mitev[1], L. Balet[1], P. Renevey[1], M. Krakowski[2], P. Resneau[2], A. Larrue[2], J.-P. Legoec[2], Y. Robert[2], E. Vinet[2], M. Garcia[2], O. Parillaud[2], B. Gerard[2], and •D. Boiko[1]; [1]Centre Suisse d'Electronique et de Microtechnique SA (CSEM), Neuchâtel, Switzerland; [2]III-V Lab, Palaiseau, France
We report superradiance pulse emitters utilizing quantum-confined Stark effect in multiple wide-quantum-well heterostructure. The light pulses of duration is 1.2 ps and energy 80 pJ is a mixed photon state with non-classical correlations g(3)g(3)*>g(2)g(4).

CB-P.12 MON

2 Gbit/s QPSK Wireless Transmission System with Injection-locked Quantum-dash Laser 28 GHz MMW Source at 1610 nm
•*Q. Tareq[1], A.M. Ragheb[2], M.A. Esmail[3], S. Alshebeili[2], and M.Z.M. Khan[1]; [1]Electrical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia; [2]Electrical Engineering Department, King Saud University, Riyadh, Saudi Arabia; [3]Communications and Networks Engineering Department, Prince Sultan University, Riyadh, Saudi Arabia*
First demonstration of 28-GHz wireless transmission of 2-Gbit/s QPSK signal over 4-m channel link is reported that utilizes an L-band ~1610-nm InAs/InP quantum-dash laser based MMW source with ~19-kHz linewidth and ~-122-dBc/Hz phase noise.

CB-P.13 MON

Effects of Two-photon Absorption and Non-linear Index in InP-based Passive Waveguides on Integrated Extended Cavity Semiconductor Lasers
•*E. Bente, S. Andreou, Y. Jiao, and K. Williams; Eindhoven University of Technology, Eindhoven, Netherlands*

ROOM 2

Effects of two-photon absorption and the non-linear refractive index in InP rib waveguides and InGaAsP/InP ridge waveguides on picosecond pulses as well as the effects on integrated extended cavity modelocked lasers are studied theoretically.

CB-P.14 MON

Spatially Modeless Laser Cavity based on III-V Semiconductor technology: Non linear localized light

•N. Vigne[1], A. Bartolo[2], G. Beaudoin[5], K. Pantzas[5], M. Marconi[2], J. Javayoles[3], S. Gurevich[4], I. Sagnes[5], M. Giudici[2], and A. Garnache[1]; [1]Institut d'Electronique et des Systèmes, Centre National de la Recherche Scientifique, Université de Montpellier, Montpellier, France; [2]Institut de Physique de Nice, Centre National de la Recherche Scientifique, Université Côte d'Azur, Nice, France; [3]Departament de Física , Universitat de les Illes Balears & IAC-3, Mallorca, Spain; [4]Institute for Theoretical Physics & Center for Nonlinear Science, University of Münster, Münster, Germany; [5]Center for Nanosciences and Nanotechnologiy, Centre National de la Recherche Scientifique, Université Paris-Saclay, Palaiseau, France

A Spatially Modeless surface emitting Laser Cavity based on III-V Semiconductor technology has been designed and studied. Localized light structures have been observed and study. On and Off axis light wave emission have been observed.

CB-P.15 MON

The contribution has been withdrawn.

CB-P.16 MON

Gain-Switched Laser Self-Injection Locked to a WGM Microresonator

•A. Shitikov[1], V. Lobanov[1], N. Kondratiev[1], I. Gorelov[2], and I. Bilenko[1,2]; [1]Russian Quantum Center, Moscow, Russia; [2]M.V. Lomonosov Moscow State University, Moscow, Russia

We demonstrated experimentally that gain-switched operation is possible in the self-injection locking regime. It allowed to generate optical frequency combs with line spacing equal to modulation frequency from kHz up to GHz.

CB-P.17 MON

Hybrid integration of InAs/GaAs quantum dot microdisk lasers on silicon

•N. Kryzhanovskaya[1], E. Moiseev[1], A. Dragunova[1], F. Zubov[1,2], M. Maximov[1,2], N. Kalyuzhnyy[3], S. Mintairov[3], M. Kulagina[3], A. Nadtochiy[1], and A. Zhukov[1]; [1]HSE University, St.Petersburg, Russia; [2]Alferov University, St.Petersburg, Russia; [3]Ioffe Institute, St.Petersburg, Russia

We demonstrated cw lasing of injection-pumped microdisk quantum dot lasers transferred to silicon. The hybrid integration method allows individual addressing to a microdisk. The electrical, threshold, spectral, and thermal characteristics of a microlaser transferred to silicon remains unchanged.

CB-P.18 MON

High-power pulsed semiconductor lasers (905 nm) with an ultra-wide aperture (800 μm) based on epitaxially integrated triple heterostructures

S. Slipchenko[1], •A. Podoskin[1], P. Gavrina[1], N. Pikhtin[1], P. Kop'ev[1], T. Bagaev[2], M. Ladugin[2], A. Padalitsa[2], and A. Marmalyuk[2]; [1]Ioffe Institute, Saint-Petersburg, Russia; [2]Stel'makh Research and Development Institute "Polyus", Moscow, Russia

High-power pulsed ultra-wide-aperture (800 μm) semiconductor lasers (905 nm) based on epitaxially integrated triple heterostructures are developed. A slope of 2.2-2.9 W/A and a peak power of 216 W are observed at 90 A/100 ns.

CB-P.19 MON

Spatiotemporal stabilization and field localization in Edge-Emitting laser bars by PT-symmetric potentials

•J. Medina[1], R. Herrero[1], M. Botey[1], and K. Staliunas[1,2]; [1]Departament de Física, Universitat Politècnica de Catalunya (UPC), Barcelona, Spain; [2]. Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

We propose to control the intrinsic spatiotemporal turbulent dynamics of an array of edge-emitting semiconductor lasers by a PT-symmetric coupling between neighbouring lasers. Numerical simulations show temporal stabilization and spatial concentration of the output emission.

CB-P.20 MON

Generation of fast physical periodic patterns with high intra-pattern diversity using semiconductor lasers with optical feedback

•A. Argyris[1], J. Schwind[1,2], and I. Fischer[1]; [1]Instituto de Física Interdisciplinar y Sistemas Complejos IFISC (CSIC-UIB), Palma de Mallorca, Spain; [2]Institute of Applied Physics, University of Münster, Münster, Germany

We show that semiconductor lasers with short optical feedback can emit periodic signals that consist of equidistant frequency tones. By tuning the tones' relative power, we generate sub-nanosecond, clock-free, repetitive patterns with high intra-pattern diversity.

CB-P.21 MON

Simultanious generation of pulse trains with different periods in a class C quantum-dot heterolaser

•V. Kocharovsky[1], A. Mishin[1], V. Kocharovsky[1,2], E. Kocharovskaya[1], and A. Seleznev[1]; [1]Institute of Applied Physics, Russian Academy of Science, Nizhny Novgorod, Russia; [2]Department of Physics and Astronomy, Texas A\& M University, College Station, USA

We find an intriguing regime of simultaneous emission of different quasiperiodic pulse trains in a class C heterolaser that supports two or more superradiant or automodulated modes as well as many quasi-stationary, partially self-locked modes.

ROOM 3

10:00 – 11:00

CI-P: CI Poster Session

CI-P.1 MON

Interferometric Coupling-based Modulator for Large-Scale Integrated Photonic Systems

E. Luan, S. Saha, B. Semnani, M. Salmani, and •A. Eshaghi; Huawei Canada, Toronto, Canada

In this design, two symmetic interferometric-couplers, containing active index modulation elements inside, are introduced to the add-drop microring modulator for an intensity tuning purpose at a fixed wavelength, which eliminates the optical crosstalk issue.

CI-P.2 MON

Fast eigenvalue evaluation of the direct Zakharov-Shabat problem in telecommunication signals using adaptive phase jump tracking

I. Chekhovskoy[1], S. Medvedev[2,1], I. Vaseva[2,1], •E. Sedov[1,3], and M. Fedoruk[1,2]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia; [3]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom

We propose a new fast method with adaptive step size (phase jump tracking) for determining the discrete spectrum of the Zakharov-Shabat problem. This method is based on moving on a complex plane along special trajectories.

CI-P.3 MON

Low-power sub-diffraction optical data storage using lanthanide-doped upconversion nanoparticles

•S. Lamon[1,2], Y. Wu[3], Q. Zhang[1], X. Liu[3,4], and M. Gu[1,2]; [1]Centre for Artificial-Intelligence Nanophotonics, School of Optical-Electrical and Computer Engineering, University of Shanghai for Science and Technology, Shanghai 200093, China, Shanghai, China; [2]Laboratory of Artificial-Intelligence Nanophotonics, School of Science, RMIT University, Melbourne 3001, Australia, Melbourne, Australia; [3]Department of Chemistry, National University of Singapore, Singapore, 117543, Singapore, Singapore; [4]The N.1 Institute for Health, National University of Singapore, Singapore, 117456, Singapore, Singapore, Singapore

Far-field super-resolution optical techniques show the potential for sub-diffraction three-dimensional optical data storage towards petabyte-level single-disk capacity. We present low-power sub-diffraction optical data storage using lanthanide-doped upconversion nanoparticles in a polymer matrix based nanocomposite.

CI-P.4 MON

Multicolor Tunable Photonic Reservoir Computing

B. Semnani, •M. Salmani, E. Luan, S. Saha, and A. Eshaghi; Huawei Technologies , Toronto, Canada

This paper proposes a new on-chip photonic reservoir computing platform which employs frequency parallelization combined with on-chip photonic matrix multiplication arrangements to significantly boost the computational power of the reservoir.

CI-P.5 MON

Noise properties of cascaded optical majority gates

•E. Volkova, S. Kontorov, V. Lyubopytov, T. von Lerber, F. Küppers, and A. Shipulin; Skolkovo Institute of Science and Technology, Moscow, Russia

Noise development in a chain of optical majority gates is investigated numerically. Dynamics of semiconductor lasers is studied in the frame of Lang-Kobayashi equations with noise. A maximum possible number of cascaded optical gates is determined.

CI-P.6 MON

Convolutional Neural Networks with Multiple Layers per Span for Nonlinearity Mitigation in Long-Haul WDM Transmission Systems

•O. Sidelnikov[1], A. Redyuk[1,2], S. Sygletos[3], M. Fedoruk[1,2], and S. Turitsyn[1,3]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia; [3]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom

ROOM 3

In this work, we study the effect of the number of deep convolutional neural network layers on the efficiency of nonlinear distortion compensation in long-haul WDM transmission systems.

CI-P.7 MON

Complex fully connected neural networks for nonlinearity compensation in long-haul transmission systems

•S. Bogdanov and O. Sidelnikov; Novosibirsk State University, Novosibirsk, Russia

The complex-valued fully connected neural networks are applied for nonlinearity compensation in fiber optic communication systems. The superiority of a such approach over the real-valued neural networks and linear compensation schemes is demonstrated.

CI-P.8 MON

Ultra-Broadband Beam Splitting in Three-Waveguide System with Dissipation

•R. Alrifai[1], V. Coda[1], J. Peltier[1], A. Rangelov[2], and G. Montemezzani[1]; [1]Université de Lorraine, Centrale-Supélec, LMOPS, Metz, France; [2]Department of Physics, Sofia University, Sofia, Bulgaria

Light dissipation in the central of three parallel waveguides permits to achieve ultra-broadband beam splitting with an overall 3 dB loss. Analogy to quantum population transfer through a decaying intermediate state is addressed.

ROOM 4

10:00 – 11:00

JSV-P: JSV Poster Session

JSV-P.1 MON

Focusing light through a free-form scattering medium

•A. Rates[1], A.J.L. Adam[2], W.L. IJzerman[3,4], A. Lagendijk[1], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Optics Research Group, Department of Imaging Physics, Delft University of Technology, Delft, Netherlands; [3]CASA, Department of Mathematics and Computer Science, Eindhoven University of Technology, Eindhoven, Netherlands; [4]Signify Research, Eindhoven, Netherlands

We use wavefront shaping to enhance the intensity in a free-form sample, comparing the efficiency when the sample is flat and when the sample is curved.

JSV-P.2 MON

Highly emissive point-like source of white light based on graphene excited by a CW laser

•M. Oleszko, T. Hanulia, P. Wiewiorski, R. Tomala, and W. Strek; Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wroclaw, Poland

Point-source emitting broad spectrum of visible light was developed. Our study shows that the emissivity of a laser-induced light source is strongly dependent on morphology of the excited material.

ROOM 1

13:30 – 14:30

EA-P: EA Poster Session

EA-P.1 MON

Echoes in a Single Quantum Kerr-nonlinear Oscillator

•I. Tutunnikov, R. Viswambharan, and I.S. Averbukh; Weizmann Institute of Science, Rehovot, Israel

We theoretically study the echo phenomenon in a single impulsively excited ("kicked") Kerr-nonlinear oscillator. These echoes may be useful for studying decoherence processes in a number of systems related to quantum information processing.

EA-P.2 MON

Mixing of Multi-Spectral Quantum States Generated in a Single Pulse with a Dispersion-Engineered Nonlinear Waveguide Crystal

•Y. Yamagishi[1], A. Hosaka[1], K. Tanji[1], S. Kurimura[2], and F. Kannari[1]; [1]Keio University, Yokohama, Japan; [2]National Institute for Materials Science, Tsukuba, Japan

As a method of quantum pulse gating in a quantum simulator, an arbitrary mixing method of multimode quantum states prepared in the frequency domain is experimentally demonstrated.

EA-P.3 MON

Dynamics of ultrafast twin beam generation in gas-filled hollow-core photonic crystal fibres

•M. Lippl[1,2], M.V. Chekhova[1,2], and N.Y. Joly[1,2,3]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany; [3]Interdisciplinary Centre for Nanostructured Films, Erlangen, Germany

We study the dynamics of twin-beam generation by 300 fs pulses at 808 nm in Xe-filled hollow-core photonic crystal fibre, focusing on the evolution of the time-frequency Schmidt modes an the joint spectral intensity.

EA-P.4 MON

The contribution has been withdrawn.

EA-P.5 MON

Fiber Source of Biphotons with Ultrabroad Frequency Tuneability

•S. Lopez-Huidobro[1,2], M. Lippl[1,2], N. Joly[2,1,3], and M.V. Chekhova[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]University of Erlangen-Nuremberg, Erlangen, Germany; [3]Interdisciplinary Centre for Nanostructured Films, Erlangen, Germany

We report a correlated photon-pair source with an ultrabroad frequency tuneability produced in a gas-filled hollow-core photonic crystal fiber based on a four-wave mixing process, where the phase matching strongly depends on the gas pressure.

EA-P.6 MON

Coherence of a dynamically decoupled single neutral atom

C.H. Chow[1], •B.L. Ng[1], and C. Kurtsiefer[1,2]; [1]Center for Quantum Technologies, 3 Science Drive 2, Singapore; [2]Department of Physics, National University of Singapore, 2 Science Drive 3, Singapore

We apply dynamical-decoupling on magnetic-sensitive ground states of ^{87}Rb atom, motivated by the availability of closed optical transition with the excited state. Coherence time of 7ms is achieved, indicating improvement over two orders of magnitude.

EA-P.7 MON

The contribution has been withdrawn.

EA-P.8 MON

Broadband Mid-IR Spectroscopy with Near-IR Grating Spectrometers

•P. Kaufmann[1], H. Chrzanowski[1], A. Vanselow[1,2], and S. Ramelow[1,3]; [1]Humboldt-Universität zu Berlin, Berlin, Germany; [2]Inria Paris, Paris, France; [3]IRIS Adlershof, Berlin, Germany

We demonstrate fast, mid-infrared (3.2-4.3 µm) spectroscopy with high resolution (1.5 cm–1) based on nonlinear interferometry with undetected photons using a commercial, Si-CCD based grating spectrometer.

EA-P.9 MON

Engineered Correlated Loss For an Integrated Source of Photon Pairs with ~ 100 dB Pump Self-Rejection

•P. de la Hoz[1], A. Sakovich[2], A. Mikhalychev[2], M. Thornton[1], N. Korolkova[1], and D. Mogilevtsev[2]; [1]School of Physics and Astronomy, University of St Andrews, North Haugh KY16 9SS, St Andrews , United Kingdom; [2]B. I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Nezavisimosti Ave. 68-2, 220072, Minsk, Belarus

We present a theoretical proposal for the design of an integrated source of entangled photon pairs which feature an in-built mechanism for an on-chip pump suppression level exceeding 100dB

EA-P.10 MON

Spectral density and non Markovianity in optical quantum complex network

•P. Renault[1], J. Nokkala[2], F. Arzani[1], T. Michel[1,4], G. Roeland[1], A. Davis[1], R. Zambrini[3], S. Maniscalco[2], N. Treps[1], J. Piilo[2], and V. Parigi[1]; [1]Laboratoire Kastler Brossel, Sorbonne University, Paris, France; [2]Turku Centre for Quantum Physics, Turku, Finland; [3]IFISC (UIB-CSIC), Instituto de Fisica Interdisciplinar y Sistemas Complejos, Palma de Mallorca, Spain; [4]Department of Quantum Science, ANU, Canberra, Australia

Multimode optical parametric processes can be tailored and arranged as complex quantum networks. Here we show experimental results for the simulation of structured environments and the probing of their spectral density and non-Markovianity

EA-P.11 MON

Towards waveshape-insensitive flying qubit gates

•I. Babushkin, U. Morgner, and A. Demircan; Institute of Quantum Optics, Leibniz University, Welfengarten 1,

ROOM 1

30167, Hannover, Germany

We show that so-called coherent photon conversion, together with a network of linear optical elements allow for gates processing photons correctly independently on the temporal/spatial waveshape of photons or correlations between them.

EA-P.12 MON

Direct measurement of the photon exchange phase

•K. Tschernig[1,2], C. Müller[2,3], M. Smoor[3], T. Kroh[2,3], J. Wolters[4,5], O. Benson[2,3], K. Busch[1,2], and A. Pèrez-Leija[1,2]; [1]Max-Born-Institut für Nichtlineare Optik und Kurzzeitspektroskopie, Berlin, Germany; [2]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [3]IRIS Adlershof, Humboldt-Universität zu Berlin, Berlin, Germany; [4]Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Berlin, Germany; [5]Technische Universität Berlin, Berlin, Germany

We report the measurement of the particle exchange phase of photons, providing direct evidence for the bosonic symmetry of two-photon wavefunctions and revealing the geometric phase $\phi_g = \pi$ associated with the physical exchange of two particles.

EA-P.13 MON

Ultra-Wide Photon-Pair Source in the Mid-Infrared on a Silicon Chip

•L.M. Rosenfeld, S. Wollmann, J.C.F. Matthews, and J.G. Rarity; Quantum Engineering Technology Labs, University of Bristol, Bristol, United Kingdom

Photon-pair sources are fundamental to integrated quantum photonics. We demonstrate a silicon intermodal photon source pumped at 2.09 um generating photons at 1.53 um realising ultra-wide spectral detuning. This work enables new sensing technologies on-chip.

EA-P.14 MON

Position-controlled quantum emitters with reproducible emission wavelength in hBN

•C. Fournier, A. Plaud, S. Roux, S. Buil, X. Quélin, J. Barjon, J.-P. Hermier, and A. Delteil; Université Paris-Saclay, UVSQ, CNRS, GEMaC, Versailles, France

We demonstrate deterministic activation of quantum emitters in the bidimensional material hBN (hexagonal boron nitride) using an electron beam. The single photon sources exhibit narrow and reproducible emission that persists up to room temperature.

ROOM 2

13:30 – 14:30

EB-P: EB Poster Session

EB-P.1 MON

Advances on Chip-Based QKD in Bristol Quantum Network

•D. Aktas[1], L. Rosenfeld[1], F. Jöhlinger[2], E. Hastings[2], and J.G. Rarity[1]; [1]Quantum Engineering Technology Labs, H. H. Wills Physics Laboratory & Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Technology Labs & Quantum Engineering Centre for Doctoral Training, Centre for Nanoscience and Quantum Information, Bristol, United Kingdom

Integrated Photonics provide compact platform to implement photonic circuits amenable to manufacture thus providing a compelling technology to implement QKD. We are developing devices for QKD systems allowing for a scalable approach in Quantum Networks.

EB-P.2 MON

The Multi-Output Quantum Pulse Gate: a Novel High-Dimensional QKD Decoder

J. Gil-Lopez, •L. Serino, M. Santandrea, W. Ridder, V. Ansari, B. Brecht, and C. Silberhorn; Integrated Quantum Optics Group, Institute for Photonic Systems (PhoQS), Paderborn University, Paderborn, Germany

We present an integrated engineered sum-frequency generation process that enables to decode information encoded in temporal modes of photons. This provides a reading device for high-dimensional, temporal-mode-based quantum key distribution compatible with standard telecom systems.

EB-P.3 MON

A portable and compact decoy-state QKD sender

•M. Auer[1,2,3], P. Freiwang[1,2], A. Baliuka[1,2], M. Schattauer[1], L. Knips[1,2,4], and H. Weinfurter[1,2,4]; [1]Ludwig-Maximilians-Universität, 80797 München, Germany; [2]Munich Center for Quantum Science and Technology, 80799 München, Germany; [3]Universität der Bundeswehr München, 85577 Neubiberg, Germany; [4]Max-Planck-Institut für Quantenoptik, 85748 Garching, Germany

We present a small-size, low-power QKD sender capable of running the decoy protocol by electrically modulating the intensity of four VCSELs, fully preserving timing accuracy as well as pulse-shape even for a 100MHz repetition rate.

EB-P.4 MON

On the Impact of Center Frequency Drifts on QKD Performance in WDM-based Nodes

•D. Zavitsanos[1], A. Ntanos[1], P. Toumasis[1], A. Raptakis[1], K. Tokas[1], K. Kanta[1], C. Kouloumentas[1,2], G. Giannoulis[1], and H. Avramopoulos[1]; [1]School of Electrical and Computer Engineering, National Technical University of Athens, Athens, Greece; [2]Optagon Photonics, Ag. Paraskevi 15341, Athens, Greece

We study on the frequency shift impact on the performance of a BB84 QKD link by experimentally addressing the total photon count rate associated with the spectral leakage factor in a WSS-based node.

EB-P.5 MON

Optical Ranging using a Subthreshold Laser Diode

•P.K. Tan[1] and C. Kurtsiefer[1,2]; [1]Centre for Quantum Technologies, Singapore, Singapore; [2]National University of Singapore, Singapore, Singapore

Thermal light exhibits photon bunching behaviour, which can be used for timing correlation despite being a stationary source. This property is demonstrated in an optical ranging experiment using a laser diode operating below lasing threshold.

EB-P.6 MON

Distributed Coherent Absorption in Quantum Networks for Deterministic Entanglement Generation

•A.N. Vetlugin[1], R. Guo[1], C. Soci[1], and N.I. Zheludev[1,2]; [1]Nanyang Technological University, Singapore, Singapore; [2]University of Southampton, Southampton, United Kingdom

We demonstrate that distributed coherent absorption offers a robust and efficient way to generate quantum entanglement in multi-nodal quantum networks. Proof-of principle experiment in a bi-nodal network is reported.

EB-P.7 MON

Sub-diffraction near-field imaging with undetected photons using thin sources of photon pairs

•E.A. Santos[1], S. Saravi[1], A. Vega[1], T. Pertsch[1,2], and F. Setzpfandt[1]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We propose an imaging scheme with undetected photons that goes beyond the diffraction limit by transferring near-field information at one wavelength to a far-field information at its paired wavelength in an ultrathin photon-pair source.

EB-P.8 MON

SPAD array with high spatial resolution for quantum imaging

•A. Stefanov[1], B. Bessire[1], M. Unternährer[1], B. Eckmann[1], L. Gasparini[2], and M. Perenzoni[2]; [1]Institute of Applied Physics, Bern, Switzerland; [2]Fondazione Bruno Kessler FBK,, Trento, Italy

We present a new SPAD array sensor capable of detecting high order correlations between photons with high temporal (sub-nanosecond) and spatial (224 x 272 pixels) resolution.

EB-P.9 MON

Information Analysis for Quantum Imaging Optimization

•A. Mikhalychev[1], I. Karuseichyk[1], S. Vlasenko[1], B. Bessire[2], D. Lyakhov[3], D. Michels[3], A. Stefanov[2], and D. Mogilevtsev[1]; [1]B.I. Stepanov Institute of Physics of NAS of Belarus, Minsk, Belarus; [2]King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; [3]Institute of Applied Physics, University of Bern, Bern, Switzerland

We apply an information-based approach to optimization of several imaging schemes (SOFI and quantum imaging with biphotons and pseudo-thermal light) and show that maximal resolution corresponds to finite correlations order and correlation length of photons.

EB-P.10 MON

A General Framework for Multimode Gaussian Quantum Optics and Photo-detection

•O.F. Thomas[1,2], W. McCutcheon[1,3], and D.P.S. McCutcheon[1]; [1]H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Centre for Doctoral Training, H. H. Wills Physics Laboratory and Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom; [3] BBQLabs, Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, United Kingdom

We develop a broadly applicable framework of multimode Gaussian optics and photon detection to uncover previously unknown trade-offs and limitations of single photon sources based on non-linear parametric processes including interference visibilities and generation rates.

ROOM 2

EB-P.11 MON

Optimization of a cavity-QED system for fast two-qubit gates

•*R. Asaoka*[1], *T. Utsugi*[2], *Y. Tokunaga*[1], *R. Kanamoto*[3], *and T. Aoki*[2]; [1]*NTT Secure Platform Laboratories, NTT Corporation, Tokyo, Japan;* [2]*Department of Applied Physics, Waseda University, Tokyo, Japan;* [3]*Department of physics, Meiji University, Kanagawa, Japan*

We model and analyze the error due to the distortion of photon pulse in a controlled phase flip gate using cavity quantum electrodynamics. From this analysis, we found that cavity length has an optimal value.

EB-P.12 MON

Towards Conditional Quantum Phase Gates Based on Strongly-Coupled Charged Quantum Dot-Micropillar Cavities

•*M. Haider*[1], *M. Koleva*[2], *O. Maier*[3], *K. Müller*[1], *C. Jirauschek*[1], *and G. Slavcheva*[2,3]; [1]*Technical University of Munich, Munich, Germany;* [2]*Quantopticon Ltd., London, United Kingdom;* [3]*Johannes Kepler University Linz, Linz, Austria*

We investigate polarization rotation of light transmitted through a single negatively charged quantum dot inside a high-Q micropillar cavity, operating in the strong coupling regime. The rotation angle is approximately 127 degrees.

EB-P.13 MON

Efficient and stable fiber-to-chip coupling enabling the injection of telecom quantum dot photons into a silicon photonic chip

•*S. Bauer*[1], *D. Wang*[1], *N. Hoppe*[2], *C. Nawrath*[1], *J. Fischer*[1], *S.L. Portalupi*[1], *M. Jetter*[1], *M. Berroth*[2], *and P. Michler*[1]; [1]*Institut für Halbleiteroptik und Funktionelle Grenzflächen (IHFG), Center for Integrated Quantum Science and Technology (IQst) and SCoPE, University of Stuttgart, Stuttgart, Germany;* [2]*Institute of Electrical and Optical Communications Engineering, University of Stuttgart, stuttgart, Germany*

Here, we present an efficient and stable fiber-to-chip coupling, which enables the injection of single photons from telecom quantum dots into an SOI photonic chip. A proof-of-principle Hanbury-Brown and Twiss measurement was performed to demonstrate single-photon behavior.

EB-P.14 MON

Green laser threshold magnetometry based on absorption by nitrogen-vacancy centers in a diamond within an external cavity laser

J. Webb[1], •*A. Poulsen*[1], *R. Staacke*[2], *J. Meijer*[2], *K. Berg-Sørensen*[3], *U. Andersen*[1], *and A. Huck*[1]; [1]*Center for Macroscopic Quantum States (BigQ), Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark;* [2]*Division of Applied Quantum System, Felix Bloch Institute for Solid State Physics, Leipzig University, Leipzig, Germany;* [3]*Department of Health Technology, Technical University of Denmark, Kgs. Lyngby, Denmark*

We investigate the use of green pump absorption by nitrogen-vacancy centers in an external cavity for laser threshold magnetometry. Sensitivities in the pT/Hz$^{0.5}$ range are predicted using realistic cavity and material parameters.

EB-P.15 MON

Coupling Erbium Dopants to Nanophotonic Silicon Structures

•*A. Gritsch*[1,2], *L. Weiss*[1,2], *J. Früh*[1,2], *F. Burger*[1,2], *S. Rinner*[1,2], *and A. Reiserer*[1,2]; [1]*Max-Planck-Institut für Quantenoptik, Garching, Germany;* [2]*Munich Center for Quantum Science and Technology (MCQST), Ludwig-Maximilians-Universität München, München, Germany*

We implanted erbium dopants into nanophotonic silicon waveguides and cavities. We observe incorporation at well-defined lattice sites with narrow linewidths which is promising for the implementation of a scalable platform for distributed quantum information processing.

EB-P.16 MON

Nuclear spin precession in MEMS vapour cells - key element of a nuclear magnetic resonance gyroscope

•*J. Riedrich-Moeller, R. Cipolletti, M. Schmid, T. Buck, R. Roelver, and T. Fuchs; Robert Bosch GmbH, Corporate Sector Research and Advance Engineering, Advanced Technologies and Micro Systems, Renningen, Germany*

We report on free-induction decay measurements of nuclear spin precession of Xenon atoms confined in a small-sized vapour cell. The experiment is an important step towards the realization of a compact nuclear magnetic resonance gyroscope.

EB-P.17 MON

The contribution has been withdrawn.

EB-P.18 MON

Single-shot integrated multi-photon split state tomography

J. Zhang and •*A.A. Sukhorukov; ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Nonlinear Physics Centre, Research School of Physics, The Australian National University, Canberra, Australia*

We propose a segmented coupled waveguide array as a new form of compact optical quantum circuit and apply it for the on-chip multi-photon split state tomography with optimized performance and no need of reconfigurability.

EB-P.19 MON

Complex two-mode quadratures - a generalized formalism for continuous-variable quantum optics

•*L. Bello*[1], *Y. Michael*[1], *M. Rosenbluh*[1], *E. Cohen*[2], *and A. Pe'er*[1]; [1]*Department of Physics and BINA Center of Nanotechnology, Bar-Ilan University, Ramat Gan, 5290002, Israel;* [2]*Faculty of Engineering and BINA Center of Nanotechnology, Bar-Ilan University, Ramat Gan, 5290002, Israel*

We introduce a set of complex quadrature operators that treats degenerate and non-degenerate squeezing on the same footing. These complex operators describe the SU(1,1) algebra of two-photon devices and directly relate to observable physical quantities.

EB-P.20 MON

Continuous variable multimode quantum states via symmetric group velocity matching

•*V. Roman-Rodriguez*[1], *B. Brecht*[2], *S. Kaali*[3], *C. Silberhorn*[2], *N. Treps*[3], *E. Diamanti*[1], *and V. Parigi*[3]; [1]*LIP6, Sorbonne Universite, Paris, France;* [2]*Integrated Quantum Optics Group, Paderborn University, Paderborn, Germany;* [3]*Laboratoire Kastler Brossel, Sorbonne Universite, Paris, France*

In this work, we study the symmetric group velocity matching condition and the engineering of multimode spectral parameters in non-linear waveguides to generate scalable and configurable continuous variable optical quantum networks via ultrafast parametric down-conversion.

EB-P.21 MON

Sensing a THz Electric Field with Cold and Trapped Molecular Ions

•*F.L. Constantin; Laboratoire PhLAM, CNRS UMR 8523, University of Lille, Villeneuve d'Ascq, France*

Comparison of two-photon rovibrational spectroscopy measurements of trapped and laser-cooled HD^{+} ions with ab-initio quantum theory predictions may enable improved characterization of the amplitudes and phases of the Cartesian components of a THz electric field.

EB-P.22 MON

Nonlinear Transmission Line Model of a Josephson Traveling-Wave Parametric Amplifier including Noise and Dissipation

•*Y. Yuan, M. Haider, J. Russer, P. Russer, and C. Jirauschek; Technical University of Munich, Munich, Germany*

We present a nonlinear transmission line model for a Josephson traveling-wave parametric amplifier including noise and dissipation. Telegrapher's equations are derived for a nonlinear transmission line including resistive losses and noise in the substrate.

EB-P.23 MON

Non-Local Control of Light Dissipation with Pancharatnam-Berry Phase

•*R. Guo*[1], *A. N. Vetlugin*[1], *C. Soci*[1], *and N. I. Zheludev*[1,2]; [1]*Centre for Disruptive Photonic Technologies, Nanyang Technological University,, singapore, Singapore;* [2]*Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, , Southampton , United Kingdom*

We experimentally demonstrate for the first time that absorption of one of the photons from the entangled pair can be switched on and off by controlling the Pancharatnam-Berry phase of the other photon

EB-P.24 MON

Temporal Resolution of Partially Coherent Sources

•*S. De*[1], *J. Gil-Lopez*[1], *B. Brecht*[1], *C. Silberhorn*[1], *L.L. Sánchez*[2,3], *Z. Hradil*[4], *and J. Řeháček*[4]; [1]*Paderborn University, Paderborn, Germany;* [2]*Universidad Complutense, Madrid, Spain;* [3] *Max-Planck-Institut für die Physik des Lichts, Erlangen, Germany;* [4]*Palacký University, Olomouc, Czech Republic*

The impact of coherence on the resolution limit is subject to current debate. Here, we unambiguously resolve this dispute by realizing precise measurements of the time-shift between optical pulses with varying degrees of mutual coherence.

EB-P.25 MON

Dissipative phase transition in systems with two-photon driving and dissipation near the critical point

•*V.Y. Mylnikov, S.O. Potashin, G.S. Sokolovskii, and N.S. Averkiev; Ioffe Institute, St. Petersburg, Russia*

We study dissipative phase transition near the critical point for a system with two-photon driving and dissipation and predict the power-law behavior of the anomalous average both theoretically and with numerical simulations.

EB-P.26 MON

Variation of the Hong-Ou-Mandel interference dip with crystal length

•*S. Singh*[1,2], *V. Sharma*[1], *V. Kumar*[1], *and G.K. Samanta*[1]; [1]*Photonic Sciences Lab., Physical Research Laboratory, ahmedabad, India;* [2]*Indian Institute of Technology-Gandhinagar, Gandhinagar, India*

We experimentally studied the variation of Hong-Ou-Mandel (HOM) interference characteristics with the length of the nonlinear crystal producing single photons and achieved a HOM dip of width as narrow as 8.2±0.2 μm using continuous-wave pumping.

ROOM 2

EB-P.27 MON

Divergence of single photons with different orbital angular momentum

•V. Kumar, V. Sharma, S. Singh, and G.K. Samanta; *Physical Research Laboratory, Ahmedabad, India*

We experimentally measure the divergence of single-photon carrying different orbital-angular-momentum (OAM). Using vortex beam pumped parametric-down-conversion process, we observed that the single-photons detected through the coincidence imaging has OAM dependence divergence similar to the pump.

EB-P.28 MON

Coupling light to higher order transverse modes of a near-concentric optical cavity

A.N. Utama[1], •C.H. Chow[1], C.H. Nguyen[1], and C. Kurtsiefer[1,2]; *[1]Centre for Quantum Technologies, 3 Science Drive 2, Singapore*; *[2]Department of Physics, National University of Singapore, 2 Science Drive 3, Singapore*

We investigate the mode matching to selective higher order transverse modes in a near-concentric cavity by shaping the wavefront of an incoming Gaussian beam using a phase spatial light modulator.

EB-P.29 MON

Pulsed double-pass tapered amplifier for a multi-rail quantum memory in warm Cs vapor

•L. Meßner[1,2], L. Esguerra[1,2], M. Gündoğan[3,1], and J. Wolters[1,2]; *[1]Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Institute of Optical Sensor Systems, Berlin, Germany*; *[2]Technische Universität Berlin, Institut für Optik und Atomare Physik, Berlin, Germany*; *[3]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany*

We present a laser source for use in multi-rail EIT quantum memory experiments in warm Cs vapor cells.

ROOM 3

13:30 – 14:30

EJ-P: EJ Poster Session

EJ-P.1 MON

Modelling Analytically the Dynamic Response of Thermo-Optic Phase Shifters

•A. Crespi[1,2], S. Atzeni[1,2], C. Pentangelo[1,2], F. Ceccarelli[2,1], and R. Osellame[2,1]; *[1]Dipartimento di Fisica - Politecnico di Milano, Milano, Italy*; *[2]Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy*

We develop an analytical model for heat diffusion that describes both static and dynamic responses of thermo-optic phase shifters. This model works in typical geometrical settings of waveguide devices and fits to different fabrication platforms.

EJ-P.2 MON

Simulating physics of tomographically reconstructed photonic crystals

•L.J. Corbijn van Willenswaard[1,2], J. Wehner[3], N. Renaud[3], M. Schlottbom[2], P. Cloetens[4], J.J.W. van der Vegt[2], and W.L. Vos[1]; *[1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands*; *[2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands*; *[3]Netherlands eScience Center, Amsterdam, Netherlands*; *[4]ESRF–The European Synchrotron, Grenoble, France*

Manufacturing effects make real photonic crystals structurally different from the design crystals used for computations. We propose a computation using the reconstructed geometry of a real crystal to overcome this difference.

EJ-P.3 MON

Multiscale FEM for light propagation through locally periodic complex photonic structures

•M. Kozon[1,2], L.J. Corbijn van Willenswaard[1,2], W.L. Vos[1], M. Schlottbom[2], and J.J.W. van der Vegt[2]; *[1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands*; *[2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands*

Computational modelling of realistic photonic crystals is a notoriously difficult problem, especially due to its multiscale character. Here, we propose a multiscale FEM method to tackle this issue and apply it to several research problems.

EJ-P.4 MON

Accurate beam propagation methods assisted by ray-tracing

•A. Craciun[1,2] and T. Dascalu[1]; *[1]National Institute for Laser, Plasma and Radiation Physics, Atomistilor 409, Magurele 077125, Romania*; *[2]Doctoral School of Physics, University of Bucharest, Atomistilor 405, Magurele 077125, Romania*

We present a geometrical optics based propagation method that handles interference effects. We also present a version of Debye-Wolf integral, for which ray information is used to compute the amplitude strength factor and optical aberrations.

EJ-P.5 MON

Carrier dynamics in nitrogen-doped graphene under THz radiation

•R. Anvari and M.M. Dignam; *Department of Physics, Engineering Physics & Astronomy, Queen's university, Kingston, Canada*

Our calculations show the time evolution of the intarband current density of various nitrogen-doped graphene structures in response to pulsed terahertz fields. Our results explore the role of doping in terahertz mobility, and harmonic generation.

EJ-P.6 MON

Optimizing the laser diode ray tracing model for LERP system simulation based on likelihood image sampling

•E. Chatzizyrli[1,3], M. Hinkelmann[1,3], A. Afentaki[1], R. Lachmayer[1,2,3], J. Neumann[1,3], and D. Kracht[1,3]; *[1]Laser Zentrum Hannover e.V., Hanover, Germany*; *[2]Institute of Product Development, Leibniz University of Hanover, Hanover, Germany*; *[3]Cluster of Excellence PhoenixD, Hanover, Germany*

A ray tracing laser source model based on likelihood image sampling from experimental beam profile measurements was developed, which shows improved accuracy in multimode laser-excited remote phosphor system simulations.

EJ-P.7 MON

Complete design of a fully integrated tunable graphene-based plasmon coupler for the infrared

A. Natarajan, G. Demésy, and •G. Renversez; *Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, 13013, Marseille, France*

A fully integrated efficient and tunable surface plasmon coupler composed of a realistic non-tapered dielectric waveguide with graphene patches and sheet is designed for the infrared and optimized through rigorous numerical and theoretical studies.

NOTES

ROOM 1

9:00 – 10:30

PL-3: EQEC Plenary Talk and Award Ceremony

Chair: Olivier Dulieu, Laboratoire Aimé Cotton, CNRS, Orsay, FR and Thomas Udem, MPI für Quantenoptik, Garching, DE

This session will feature a plenary talk presented together with a series of prestigious EPS-QEOD, OSA and EOS Prizes and Awards.

PL-3.1 TUE (Plenary) 9:00

Attosecond Interferometry

•*N. Dudovich*; *Weizmann Institute of Science, Rehovot, Israel*

Attosecond interferometry reveals the internal coherence in ultrafast electronic phenomena. I will describe advanced interferometry schemes, resolving a range of processes – from tunneling and photoionization in atomic systems to ultrafast chiral phenomena and attosecond scale currents in solids.

Award Ceremony to take place from 10:00 CEST time.
The following Prizes and Awards will be remitted:

- EPS-QEOD Quantum Electronics Prize (1 recipient)
- EPS-QEOD Fresnel Prizes (2 recipients)
- EPS-QEOD Thesis Prizes (4 recipients)
- Vladilen Letokhov Medal (1 recipient)
- EPS-QEOD Prize for 'Research in Laser Science and Applications' (2020 recipient)
- EPS-QEOD & EPS Young Minds Best Student Presentation Awards (10 recipients)
- OSA recognition of newly elected Fellow Members
- OSA Foundation Student Grants (10 recipients)
- EOS Early Career Women in Photonics Award (1 recipient)

Consult https://www.cleoeurope.org/awards-prizes/ for further information on the Prizes and Awards and lists of recipients.

ROOM 1

11:00 – 12:30

EA-1: Waveguide-QED and Atom-light Interfaces

Chair: David Wilkowski, Centre for Quantum Technologies, Singapore

EA-1.1 TUE 11:00

Describing collectively enhanced nonlinearity in large ensemble of two-level emitters

•*M. Cordier, M. Schemmer, P. Schneeweiss, J. Volz, and A. Rauschenbeutel*; *Humboldt-Universität zu Berlin, Berlin, Germany*

We present an intuitive analytical model that allows one to calculate, in the low saturation regime, the full temporal and spectral quantum state of light resulting from the interaction with N two-level emitters.

EA-1.2 TUE 11:15

Cold atoms trapped around a nanofiber: a tool to probe collective quantum phaenomena

•*J. Berroir[1], T. Ray[1], N.V. Corzo[1], J. Raskop[1], D.V. Kupriyanov[2], A. Urvoy[1], and J. Laurat[1]*; *[1]Laboratoire Kastler-Brossel, Sorbonne Université, CNRS, ENS-Université PSL,*

ROOM 2

11:00 – 12:30

EB-3: Photonic Quantum Computation

Chair: Christine Silberhorn, University of Paderborn, Paderborn, Germany

EB-3.1 TUE (Invited) 11:00

The quest of quantum advantage with a photonics platform

•*F. Sciarrino*; *Sapienza Università di Roma, Roma, Italy*

Boson sampling is a computational problem that has been proposed as a candidate to obtain an unequivocal quantum computational advantage. We will review recent advances in photonic boson sampling, describing both the technological improvements achieved and the future challenges.

ROOM 3

11:00 – 12:30

CC-2: Nonlinear THz Spectroscopy and Techniques

Chair: Benedict Murdin, University of Surrey, Guildford, United Kingdom

CC-2.1 TUE (Keynote) 11:00

Nonlinear THz spectroscopy to study the solvent dynamics in water

•*M. Havenith*; *Department of Physical Chemistry II, Ruhr University Bochum, Bochum, Germany*

We developed nonlinear terahertz spectroscopy to record precise absorption of solvated samples. Our study unravelled unknown phases of water under nanoconfinement and provided a local, label free probe on protonation state of amino acids

ROOM 4

11:00 – 12:30

CL-2: Biological and Clinical Applications

Chair: Caron Jacobs, University of Cape Town, South Africa

CL-2.1 TUE (Invited) 11:00

Digital droplet microfluidic integrated Lab-in-a-fiber detection of SARS-CoV-2 viral RNA

•*H. Parker[1], S. Sengupta[1], A. Harish[1], R. Soares[2], H. Joensson[2], W. Margulis[1,3], A. Russom[2], and F. Laurell[1]*; *[1]KTH Royal Institute of Technology, Stockholm, Sweden*; *[2]Science for Life Laboratory, KTH Royal Institute of Technology, Solna, Sweden*; *[3]Research Institute of Sweden, Stockholm, Sweden*

We present a Lab-in-fiber (LIF) device combining loop-mediated isothermal amplification (LAMP), droplet microfluidics, and optofluidics to detect and quantify viral RNA for COVID-19 diagnostics. Our device offers an attractive alternative to well-established Lab-on-chip techniques

ROOM 5

11:00 – 12:30

EE-1: Ultrafast Phenomena in Waveguides

Chair: Olga Kosareva, Lomonosov Moscow State University, Russia

EE-1.1 TUE 11:00

Energy Noise and Timing Jitter of Few-Femtosecond Pulses Generated by Resonant Dispersive Wave Emission in Hollow-Core Waveguides

•*C. Brahms and J.C. Travers*; *Heriot-Watt University, Edinburgh, United Kingdom*

We numerically investigate the energy and timing fluctuations of tuneable resonant dispersive wave emission in hollow-core waveguides. We find that for saturated generation conditions, the generated pulses can be exceptionally stable while maintaining few-femtosecond duration.

EE-1.2 TUE 11:15

Spatiotemporal Imaging of 2D polariton wavepackets

•*Y. Kurman[1], R. Dahan[1], H. Herzig Shenfux[2], K. Wang[1], M. Yannai[1], Y. Adiv[1], O. Reinhardt[1], L.H.G. Tizei[3], S. Woo[3], J. Li[4], J.H. Edgar[4], M. Kociak[3], F.H.L. Koppens[2,5], and I. Kaminer[1]*; *[1]Technion, Israel*

ROOM 6

11:00 – 12:30

CK-3: Integrated Photonics Devices

Chair: Stéphane Calvez, LAAS-CNRS, France

CK-3.1 TUE (Invited) 11:00

Directional Coupling of Emitters Into Waveguides: A Symmetry Perspective

A. Lamprianidis[1], X. Zambrana-Puyalto[2], C. Rockstuhl[1], and •I. Fernandez-Corbaton[1]; *[1]Karlsruhe Institute of Technology, Karlsruhe, Germany*; *[2]Istituto Italiano di Tecnologia, Genova, Italy*

Experiments have shown strongly directional coupling of near-field emissions onto waveguides. We provide new physical insights into this effect by analyzing the symmetries and symmetry-breakings of the emitter-waveguide system, leading to a new experimental proposal.

NOTES

ROOM 7

11:00 – 12:30

EH-2: New Perspectives in Metamaterials and Nanophotonics

Chair: Vassili Fedotov, University of Southampton, Southampton, United Kingdom

EH-2.1 TUE (Keynote) 11:00

Challenges and Opportunities for Computational Nanophotonics

•*C. Rockstuhl; Karlsruhe Institute of Technology, Karlsruhe, Germany*

I discuss four recent developments in the field of computational nanophotonics: (a) multi-physics problem, (b) inverse design, (c) the use of methodologies from the field of artificial intelligence, and (d) multi-scale modelling.

ROOM 8

11:00 – 12:30

CI-1: Broadband Systems

Chair: Fabio Pittala, Huawei Technologies, Munich, Germany

CI-1.1 TUE 11:00

O+E-band Transmission over 50-km SMF using A Broadband Bismuth Doped Fibre Amplifier

•*Y. Hong, K.R.H. Bottrill, Y. Wang, N.K. Thipparapu, J.K. Sahu, P. Petropoulos, and D.J. Richardson; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*

We demonstrate the first transmission experiment utilising a 115-nm BDFA and achieve >65-Gb/s adaptively-loaded DMT transmission across the wavelength range from 1350 nm to 1460 nm over a SMF length of 50 km.

CI-1.2 TUE 11:15

7-Ring-Air-Core Trench-Assisted Fibre Supporting >300 Radially Fundamental OAM Modes Across S+C+L Bands

•*Y. Wang[1], K. Zhu[1], Y. Fang[1], W. Geng[1], W. Zhao[1], C. Bao[2], Y. Liu[1], W. Zhang[1], Y. Ren[2], Z. Pan[3], and Y. Yue[1]; [1]Nankai University, Tianjin,*

ROOM 9

11:00 – 12:30

EJ-2: Nonlinear Optics Modeling

Chair: Stefan Skupin, University of Lyon, France

EJ-2.1 TUE 11:00

How carrier memory enters the Haus master equation of mode-locking

J. Hausen[1], S. Gurevich[2,3], K. Lüdge[1], and •J. Javaloyes[3]; [1] Institute of Theoretical Physics, Technische Universität Berlin, Berlin, Germany; [2] Institute for Theoretical Physics, University of Münster, Münster, Germany; [3]Departament de Física, Universitat de les Illes Balears and IAC-3, Palma, Spain

We present a generalization of the Haus master equation for mode-locking in which a dynamical boundary condition allows describing complex pulse trains, such as the Q-switched and harmonic transitions, and weak interactions between localized states.

EJ-2.2 TUE 11:15

Bright localized patterns in singly resonant optical parametric oscillators

•*P. Parra-Rivas, C. Mas-Arabí, and F. Leo; Université Libre de Bruxelles, Bruxelles, Belgium*

We study the formation, bifurcation structure and stability of local-

ROOM 10

11:00 – 12:30

CD-3: Microresonators and Waveguides

Chair: Francesco Tani, Max Planck Institute for the Science of Light, Erlangen, Germany

CD-3.1 TUE 11:00

The contribution has been withdrawn.

CD-3.2 TUE 11:15

Low-threshold frequency comb generation using second-order nonlinearities in lithium niobate whispering gallery resonators

•*J. Szabados[1], K. Buse[1,2], and I. Breunig[1,2]; [1]Department of Microsystems Engineering - IMTEK, University of Freiburg, Freiburg ,*

ROOM 11

11:00 – 12:30

CH-3: Advanced Optical Sensing Techniques

Chair: Hatice Altug, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

CH-3.1 TUE 11:00

Collective measurements achieving super resolution

•*J.O. de Almeida[1], M. Lewenstein[1,2], and M. Skoteiniotis[3]; [1]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Av. Carl Friedrich Gauss 3, 08860, Castelldefels (Barcelona), Spain; [2]ICREA, Pg. Lluís Companys 23, 08010, Barcelona, Spain; [3]Física Teòrica: Informació i Fenòmens Quàntics, Departament de Física, Universitat Autònoma de Barcelona, E-08193, Bellaterra (Barcelona), Spain*

We use techniques of statistical inference, to analyse a measurement strategy to estimate the separation between two incoherent light sources independently of their centroid position, and in the limit of large number of photons.

CH-3.2 TUE 11:15

Super-Resolved Localization of Overlapping Sources Using SUPPOSe

•*G. Brinatti Vazquez[1], A.M. Lacapmesure[1], M. Toscani[1], S.R. Martínez[2], and O.E. Martínez[1]; [1]Laboratorio de Fotónica, Instituto de Ingeniería Biomédica, CONICET*

ROOM 12

11:00 – 12:30

CF-2: Ultrafast UV Sources

Chair: John Tisch, Imperial College London, London, United Kingdom

CF-2.1 TUE (Invited) 11:00

Progress in Soliton Dynamics in Hollow Capillary Fibres

•*J.C. Travers, C. Brahms, T.F. Grigorova, A. Lekosiotis, and F. Belli; School of Engineering and Physical Sciences, Heriot-Watt University, Edinburgh, United Kingdom*

We review soliton dynamics in hollow-capillary fibres: self-compression to sub-cycle optical attosecond pulses at gigawatt peak power in the near and mid-infrared, and efficient conversion to few-femtosecond pulses tunable across the VUV and DUV.

ROOM 1

Collège de France, Paris, France; [2]Department of Theoretical Physics, St-Petersburg State Polytechnic University, St.-Petersburg, Russia

We report on storage and retrieval of a single collective excitation in an atomic ensemble coupled to an optical nanofiber. We show theoretical and experimental advances on controllable atomic Bragg mirrors and atomic cavity systems.

EA-1.3 TUE 11:30

Correlating Photons Using the Collective Nonlinear Response of Atoms Weakly Coupled to an Optical Mode

•*J. Volz[1,2], A. Prassad[2], J. Hinney[2], S. Mahmoodian[3], K. Hammerer[3], S. Rind[2], P. Schneeweiss[1,2], M. Schemmer[1], A. Sørensen[4], and A. Rauschenbeutel[1,2]; [1]Humboldt-Universität zu Berlin, Berlin, Germany; [2]TU Wien-Atominstitut, Wien, Austria; [3]Leibniz University Hannover, Hannover, Germany; [4]University of Copenhagen, Copenhagen, Denmark*

We demonstrate collective enhancement of weak atomic nonlinearities. This enhancement manifests itself as an atom number-dependent change of the second order correlation of the transmitted light from flat over photon anti-bunching to strong photon-bunching.

EA-1.4 TUE 11:45

Systematic design of a novel photonic crystal waveguide platform for coupling guided light with trapped cold atoms

•*A. Bouscal[1], A. Urvoy[1], J. Berroir[1], T. Ray[1], M. Kemich[2], S. Mahapatra[2], F. Raineri[2,3], A. Levenson[2], K. Bencheikh[2], C. Sauvan[4], J.-J. Greffet[4], and J. Laurat[1]; [1]Laboratoire Kastler*

ROOM 2

EB-3.2 TUE 11:30

Experimental demonstration of quantum advantage for NP verification

•*F. Centrone[1,2], N. Kumar[3], E. Diamanti[1], and I. Kerenidis[3]; [1]Sorbonne Université, CNRS, LIP6, Paris, France; [2]Université de Paris, CNRS, IRIF, Paris, France; [3]School of Informatics, University of Edinburgh, Edinburgh, United Kingdom*

We showcase the power of linear optics through the implementation of a quantum protocol with coherent states. Our work provides evidence for a computational quantum advantage in the interactive setting, drawing near potentially useful applications.

EB-3.3 TUE 11:45

Quantum Optical Implementation of a non-Abelian U(3) Holonomy

•*V. Neef, J. Pinske, F. Klauck, L. Teuber, M. Kremer, M. Ehrhardt, M. Heinrich, S. Scheel, and A. Szameit; Institut für Physik, Universität Rostock, Rostock, Germany*

We experimentally realize a U(3) holonomy. By adiabatically prop-

ROOM 3

CC-2.2 TUE 11:45

Ultrafast Coherent Spectroscopy with Field Resolution at Mid-Infrared and THz Frequencies

•*T. Deckert[1,2], J. Allerbeck[1,2], L. Spitzner[2], T. Kurihara[3,2], and D. Brida[1,2]; [1]Université du Luxembourg, Luxembourg, Luxembourg; [2]Universität Konstanz, Konstanz, Germany; [3]The University of Tokyo,*

ROOM 4

CL-2.2 TUE 11:30

Remote heart sound characterization and classification using computational imaging

•*L. Cester[1], I. Starshynov[1], Y. Jones[2], P. Pellicori[2], and D. Faccio[1]; [1]School of Physics and Astronomy,University of Glasgow, glasgow, United Kingdom; [2]Robertson Centre for Biostatistics, University of Glasgow, glasgow, United Kingdom*

We show a method to retrieve heartbeat valve sounds remotely with laser light with high SNR. Wavelet data analysis isolates detailed sound signals beyond heart-beat amplitudes. An ANN can accurately classify heart condition and pathologies.

CL-2.3 TUE 11:45

Thermoregulation of immune cell dynamics

•*S. Wieser[1], I. Company[1], B. Ciraulo[3], C. Agazzi[1], J. Arroyo[3], R. Quidant[3], and V. Ruprecht[2]; [1]ICFO - Institute of Photonic Sciences, Castelldefels, Spain; [2]CRG - Centre of Genomic Regulation, Barcelona, Spain; [3]ETH - Zürich, Zürich, Switzerland*

ROOM 5

Institute of Technology, Haifa, Israel; [2]ICFO-Institut de Ciències Fotòniques, The Barcelona Institute of Science and Technology, Castelldefels (Barcelona), Spain; [3]CNRS, Université Paris-Saclay, Orsay, France; [4]Kansas State University, Manhattan, KS, USA; [5]ICREA-Institució Catalana de Recerca i Estudis Avanats, Barcelona, Spain

We measure the spatiotemporal dynamics of 2D phonon-polariton wavepackets using an ultrafast electron microscope. The electron probe enables recording non-destructively the propagating wavepacket from its formation, unveiling phenomena of light acceleration & deceleration.

EE-1.3 TUE (Invited) 11:30

Second order nonlinearity in Silicon Nitride waveguides via photo-induced self-organized gratings

•*C.-S. Brès; Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

We review our recent results on characterizing and increasing the efficiency of optically-induced second-order nonlinearity in silicon nitride, in an effort to bring reconfigurable three-wave mixing processes on chip.

ROOM 6

CK-3.2 TUE 11:30

Coherent Perfect Absorption in coupled Nano-Opto-ElectroMechanical Systems

•*F. Correia[1], G. Madiot[1], S. Barbay[1], and R. Braive[2]; [1]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Université de Paris, Paris, France*

The common realization of coherent perfect absorption with a photonic system is a Fabry-Pérot cavity with two counter-propagating laser fields whose relative phase and intensities are controlled. Here we demonstrate this concept with nano-opto-electromechanical systems.

CK-3.3 TUE 11:45

Efficient, low crosstalk and compact programmable photonic circuits by 3D femtosecond laser micromachining

•*F. Ceccarelli[1,2], C. Pentangelo[2,1], S. Atzeni[2,1], A. Crespi[2,1], and R. Osellame[1,2]; [1]Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN-CNR), Milano, Italy; [2]Dipartimento*

ROOM 7

EH-2.2 TUE 11:45

Crystalline atomically-thin films boost the nonlinear optical response

•A. Rodriguez Echarri[1], F. İyikanat[1], J. Cox[2,3], and J. García de Abajo[1,4]; [1]ICFO – Institut de Ciències Fotòniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels, Barcelona, Spain, Castelldefels, Spain; [2]Center for

ROOM 8

China; [2]University of Southern California, Los Angeles, USA; [3]University of Louisiana at Lafayette, Lafayette, USA

we propose and design a multi-ring-air-core trench-assisted fibre with 7 rings each supporting 58 OAM modes (i.e. 406 ones in total) at 1550 nm with low-level interring crosstalk after 100-km fibre propagation.

CI-1.3 TUE (Invited) 11:30

Machine learning enabled Raman amplifiers

•D. Zibar; DTU Fotonik, Kgs. Lyngby, Denmark

Advances in machine learning are spurring a new generation of optical communication and measurement systems. We demonstrate how machine learning can be used to realize arbitrary gains of Raman amplifiers in a controlled way

ROOM 9

ized patterns arising in singly resonant optical parametric oscillators. We show that these states undergo homoclinic snaking and we characterize their different dynamical regimes.

EJ-2.3 TUE 11:30

Dispersive Instabilities In Passively Mode-Locked Integrated External-Cavity Surface-Emitting Lasers

C. Schelte[1,2], •D. Hessel[1,2], J. Javaloyes[1], and S. Gurevich[1,2,3]; [1]Departament de Física, Universitat de les Illes Balears & Institute of Applied Computing and Community Code (IAC-3), Cra. de Valldemossa, km 7.5, E-07122 Palma de Mallorca, Spain; [2]Institute for Theoretical Physics, University of Münster, Wilhelm-Klemm-Str. 9, 48149 Münster, Germany; [3]Center for Nonlinear Science (CeNoS), University of Münster, Corrensstr. 2, 48149 Münster, Germany

We investigate a pulse instability appearing in passively mode-locked integrated external-cavity surface-emitting lasers. A train of satellites on the leading edge of a pulse becomes unstable due to carrier interaction and third order dispersion.

EJ-2.4 TUE 11:45

Orbital Edge and Corner States in Su-Schrieffer-Heeger Optical Lattices

D. Bongiovanni[1,2], •Z. Hu[1], D. Jukić[3], Y. Hu[1], D. Song[1], H. Buljan[1,4], R. Morandotti[2,5], and Z. Chen[1,6]; [1]TEDA Applied Physics Institute and School of Physics, Nankai University, Tianjin, China; [2]INRS-EMT, 1650 Blvd. Lionel-Boulet,

ROOM 10

Germany; [2]Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany

We generate frequency combs in millimeter-sized microresonators based purely on $\chi(2)$ –nonlinear-optical processes (second-harmonic generation, sum-frequency generation and optical parametric oscillation) using 85 μW pump power. Sub-μW thresholds are within reach using chip-integrated resonators.

CD-3.3 TUE 11:30

Optical Memory Based on Counterpropagating Light in Microresonators

•L. Del Bino[1,2,3], N. Moroney[1,2,4], and P. Del'Haye[1,5]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]National Physical Laboratory, Teddington, United Kingdom; [3]Heriot-Watt University, Edinburgh, United Kingdom; [4]Imperial College London, London, United Kingdom; [5]FAU Erlangen-Nurnberg, Erlangen, Germany

We demonstrate how symmetry-broken states arising from the Kerr nonreciprocity in microresonators can be used for all-optical memories and logic gates. We explore different materials allowing bitrates of 10Gbps or power as low as 1μW.

CD-3.4 TUE 11:45

Advances in Pockels-effect-based adiabatic frequency conversion in lithium niobate high-Q optical microresonators

•Y. Minet[1,2], M. Basler[3], H. Zappe[2], K. Buse[1,4], and I. Breunig[1,4]; [1]Laboratory for Optical Systems, Department of Microsystems Engineering - IMTEK, University of Freiburg, Freiburg, Germany;

ROOM 11

- FIUBA, Buenos Aires, Argentina; [2]Instituto de Investigaciones Matemáticas Luis A. Santaló. CONICET, FCEyN-UBA., Buenos Aires, Argentina

The simultaneous localization of sources overlapping within the PSF is performed using the SUPPOSe deconvolution algorithm improved in speed for this sparse situations, by replacing the genetic algorithm by a stochastic gradient descent method.

CH-3.3 TUE 11:30

Hadamard-transform high spectral resolution and broadband stimulated Raman Scattering microspectroscopy using an acousto-optic tunable filter

•L. Genchi[1], A. Bucci[1], S.P. Laptenok[1], A. Giammona[1], and C. Liberale[1,2]; [1]Biological and Environmental Science and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia; [2]Computer, Electrical and Mathematical Sciences and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

We present a high spectral resolution multiplexing acquisition modality for stimulated Raman scattering microscopy using the Hadamard transform. We demonstrate improved signal to noise ratio over conventional acquisitions in the Raman fingerprint and CH-stretch regions.

CH-3.4 TUE 11:45

Finesse-Enhanced Measurement of Thermal Capillary-Waves at Liquid-Phase Boundaries

•E. Haber[1], M. Douvidzon[1], and T. Carmon[2]; [1]Technion, Israel Institute of Technology, Haife, Israel; [2]Tel Aviv University, Tel Aviv, Israel

We report on a device, that optically interrogates capillary. Our resolution scales with wavelength di-

ROOM 12

CF-2.2 TUE 11:30

High repetition rate high harmonic generation with ultra-high photon flux

M. Tschernjaew[1], •S. Hädrich[1], R. Klas[2,3], M. Gebhardt[2,3], R. Horsten[4], S. Weerdenburg[4], S. Pyatchenkov[4], W. Coene[4,5], J. Rothhardt[2,3], T. Eidam[1], and J. Limpert[1,2,3,6]; [1]Active Fiber Systems GmbH, Jena, Germany; [2]Institut of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [3]Helmholtz-Institute Jena, Jena, Germany; [4]Optics Research Group, Delft University of Technology, Delft, Netherlands; [5]ASML Netherlands B.V., Veldhoven, Netherlands; [6]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We present a HHG source providing a large photon flux between 66eV and 150eV. It is driven by a 100W fiber-laser system equipped with a post-compression unit whose output is focused into a gas jet.

CF-2.3 TUE 11:45

Circularly Polarized DUV Pulses via Dispersive Wave Emission in Hollow Capillary Fibers

•A. Lekosiotis, C. Brahms, F. Belli, T.F. Grigorova, and J.C. Travers; Heriot-Watt University, Edinburgh, United Kingdom

We report the generation of ultrashort, circularly polarized pulses tunable in the DUV via soliton dy-

ROOM 1

Brossel, Sorbonne Université, CNRS, ENS-PSL, Collège de France, Paris, France; [2]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France; [3]Université de Paris, Paris, France; [4]Laboratoire Charles Fabry, Institut d'Optique Graduate School, Université Paris-Saclay, Palaiseau, France

We present a proposal for trapping Rb cold atoms near a novel design of a GaInP photonic crystal waveguide. Purcell factors higher than unity are predicted for atoms sitting in the two-color dipole trap.

EA-1.5 TUE 12:00

Single-Photon Source with Near-Millisecond Memory based on Room-Temperature Atomic Vapour

M. Zugenmaier, •R. Schmieg, K.B. Dideriksen, and E.S. Polzik; Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

We present a room-temperature single-photon source based on Raman scattering from an atomic vapour cell. The system features a built-in near-millisecond memory that allows deterministic and efficient conversion during readout.

EA-1.6 TUE 12:15

Spectroscopy of Rubidium with a Tuneable Single Photon Source

•P. Burdekin[1], S. Grandi[1,2], R. Newbold[1], R. Hoggarth[1], K. Major[1], E. Hinds[1], and A. Clarke[1]; [1]Centre for Cold Matter, Blackett Laboratory, Imperial College London, London, United Kingdom; [2]ICFO, Barcelona, Spain

We present our work on single-photon-level spectroscopy of rubidium and on frequency-tuning the

ROOM 2

agating quantum states in appropriately designed photonic waveguide systems, we evolve on closed loops within a degenerate subspace of dark states, resulting in a non-Abelian geometric phase.

EB-3.4 TUE 12:00

Versatile Photonic Entanglement Synthesizer in the Spatial Domain

•D. Barral[1], M. Walschaers[2], K. Bencheikh[1], V. Parigi[2], J.A. Levenson[1], N. Treps[2], and N. Belabas[1]; [1]Centre de Nanosciences et de Nanotechnologies C2N, Palaiseau, France; [2]Laboratoire Kastler Brossel, Paris, France

We present a spatial entanglement synthesizer based on evanescently coupled nonlinear waveguides. Our integrated-optics scheme is platform-independent and thus compatible with future light-based quantum technologies to generate robustly large or versatile multimode entangled states.

EB-3.5 TUE 12:15

Quantum Photonic Processor based on Programmable Integrated Silicon Nitride Circuits

•J. Epping[1], C. Taballione[1], R. van der Meer[2], H. Snijders[1], P. Hooischuur[2], B. Kassenberg[1], M. de Goede[1], P. Venderbosch[1], C. Toebes[2], H. van den Vlekkert[1], P. Pinkse[1,2], and J. Renema[1]; [1]QuiX BV, Enschede, Netherlands; [2]University of Twente, Enschede, Netherlands

We report the demonstration of a

ROOM 3

Tokyo, Japan

Noncollinear two-dimensional spectroscopy in the mid infrared enables phase-sensitive investigation of coherent low-energy dynamics in semiconductors and strongly correlated materials in a perturbative excitation regime as shown by preliminary measurements on indium antimonide.

CC-2.3 TUE 12:00

Enhanced electro-optic on-chip detection based on integrated nonlinear phase-shifters

•A. Herter[1], F.F. Settembrini[1], A. Shams-Ansari[2], M. Lončar[2], J. Faist[1], and I.-C. Benea-Chelmus[3]; [1]Quantum Optoelectronics Group, ETH Zürich, Zürich, Switzerland; [2]Laboratory for Nanoscale Optics, Harvard University, Cambridge, USA; [3]Capasso Group, Harvard University, Cambridge, USA

We investigate the potential of thin-film lithium niobate based electro-optic phase-shifters, integrated into a on-chip Mach-Zehnder-geometry for sub-cycle high-sensitivity electric field measurements in the THz-regime.

CC-2.4 TUE 12:15

Ultrafast Electro-Optic Modulation in CdSe/CdS Quantum Dots by intense THz Pulses

•C. Gollner[1], R. Jutas[1], D.N. Dirin[2,3], S.C. Boehme[2,3], A. Baltuška[1,4], M.V. Kovalenko[2,3], and A. Pugžlys[1,4]; [1]TU Wien, Photonics Institute, Vienna, Australia; [2]Institute of Inorganic Chemistry, Department of Chemistry and Applied Biosciences, ETH Zürich, Zurich, Switzerland; [3]Empa-Swiss Federal Laboratories for Mate-

ROOM 4

How fever and cold affect single immune cell dynamics remains an open question. Here we show that immune cell migration and polarization is regulated by temperature variations using a digital holographic thermo-microscope.

CL-2.4 TUE 12:00

Handheld instrument for the measurement of Macular Pigment Optical Density using structured light

D. Christaras[1,3], J. Mompean[2], H. Ginis[1], and •P. Artal[2]; [1]Department of Research, Athens Eye Hospital, Athens, Greece; [2]Laboratorio de Optica, Universidad de Murcia, Murcia, Spain; [3]UCL Institute of Ophthalmology, London, United Kingdom

A handheld instrument for the in-vivo measurement of macular pigment optical density was developed. The fundus is illuminated using structured light and a photodetector records the reflected signal resulting to a rapid, accurate and repeatable measurement.

CL-2.5 TUE 12:15

A Novel NIR-Absorber Developed with Mesoporous Silica Nanoparticles for Photothermal Applications

•P. Beyazkilic[1], S. Akcimen[1], Y. Midilli[1], B. Ortac[1], and C. Elbuken[1,2]; [1]Bilkent University, National Nanotechnology Research Centre, TR-06800, Ankara, Turkey; [2]University of Oulu, Faculty of Biochemistry and Molecular Medicine, Faculty of Medicine, FI-90014, Oulu,

ROOM 5

EE-1.4 TUE 12:00

Real-time measurements and simulations of incoherent supercontinuum dynamics and rogue waves in a noise-like pulse dissipative soliton fibre laser

F. Meng[1], •C. Lapre[1], C. Billet[1], J.-M. Merolla[1], C. Finot[2], T. Sylvestre[1], G. Genty[3], and J.M. Dudley[1]; [1]Institut FEMTO-ST, Université Bourgogne Franche-Comté CNRS UMR 6174, Besançon, France, Besançon, France; [2]Laboratoire Interdisciplinaire Carnot de Bourgogne, Université Bourgogne Franche-Comté CNRS UMR 6303, Dijon, France, Dijon, France; [3]Photonics Laboratory, Tampere University, Tampere, FI-33104, Finland , Tampere, Finland

Numerical simulations and real-time characterization experiments reveal unstable femtosecond dynamics and rogue wave statistics in a dissipative soliton fibre laser. The physics of this "noise-like pulse" regime is shown to arise from incoherent supercontinuum dynamics.

EE-1.5 TUE 12:15

Full-field Real-Time Measurement of Ultrafast Soliton Fission

•F. Gallazzi[1], S. Toenger[1], M. Närhi[1], J.M. Dudley[2], and G. Genty[1]; [1]Photonics Laboratory, Tampere University, Tampere, Finland; [2]Institut FEMTO-ST, Université Bourgogne Franche-Comté CNRS UMR 6174, Besançon, France

We characterize in real time the full-field associated with soliton fission induced by noise-seeded modula-

ROOM 6

di Fisica - Politecnico di Milano, Milano, Italy

Thermally-reconfigurable photonic processors suffer from large power dissipation and crosstalk. We show that thermally-insulating microstructures reduce them of an order of magnitude in reconfigurable femtosecond laser written circuits. This performance dramatically improves in vacuum.

CK-3.4 TUE 12:00

Waveguide subwavelength gratings bridged thin-film LiNbO3 ridge-waveguide grating couplers

•S. Yang[1,2], Y. Li[2], J. Xu[2], and X. Cheng[1,2]; [1]Department of Micro-nano Electronics, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University, Shanghai , China; [2]Center for Advanced Electronic Materials and Devices (AEMD), Shanghai Jiao Tong University, Shanghai , China

A ridge-waveguide grating coupler integrated with waveguide subwavelength gratings structure is fabricated on thin-film LiNbO3. A high coupling efficiency of -5.35 dB/coupler for TE input signals and over 90 nm 3-dB bandwidth are achieved.

CK-3.5 TUE 12:15

Magneto-biplasmonic slot waveguide isolator

•S. Abadian[1], G. Magno[1,2], V. YAM[1], and B. Dagens[1]; [1]Universite Paris-Saclay, Palaiseau, France; [2]Politecnico di Bari, Bari, Italy

Integration of optical isolators remains one of the main technological issue for photonic circuits. We present here a new concept of magnetoplasmonic isolator which enables broadband isolation ratio up to

ROOM 7

Nano Optics, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark; [3]Danish Institute for Advanced Study, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark; [4]ICREA – Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, 08010 Barcelona, Spain, Barcelona, Spain

The nonlinear optical properties of few-atom-tick films are investigated through rigorous quantum-mechanical simulations, in which we consider noble metals and different crystallographic orientations.

EH-2.3 TUE 12:00

Trapping, Dragging and Boosting Light with Dynamical Metamaterials

•*E. Galiffi[1], P.A. Huidobro[2], A. Alu[3], and J.B. Pendry[1]; [1]Imperial College London, London, United Kingdom; [2]Instituto Superior Tecnico, University of Lisbon, Lisbon, Portugal; [3]Photonics Initiative, ASRC, City University of New York, New York, USA*

Dynamically modulated systems offer novel directions for wave control: we demonstrate how time-modulation of material properties can trap light near surfaces, drag it without material motion, and amplify it unidirectionally, demonstrating a new amplification mechanism.

EH-2.4 TUE 12:15

Optical Magnetism without Metamaterials

•*J. Li[1], N. Papasimakis[1], K.F. MacDonald[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, Singapore, Singapore*

ROOM 8

CI-1.4 TUE 12:00

Optical Data Transmission with a Dissipative Kerr Soliton in an Ultrahigh-Q MgF_2 Microresonator

•*S. Tanaka[1], S. Fujii[1,2], K. Wada[1], H. Kumazaki[1], S. Kogure[1], S. Tasaka[1], T. Ohtsuka[1], S. Kawanishi[1], and T. Tanabe[1]; [1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan; [2]Quantum Optoelectronics Research Team, RIKEN Center for Advanced Photonics, Saitama, Japan*

We achieved WDM transmission over 40 km with the densest carrier spacing using a dissipative Kerr soliton from an MgF_2 microresonator. The result suggests the possibility of providing extremely high spectral efficiency.

CI-1.5 TUE 12:15

Subwavelength spaced optical phased array with a wide beam-steering for near-visible infrared applications

•*S. Sabouri, M.T. Catuneanu, L.A. Mendoza Velasco, M.T. Fathi, and K. Jamshidi; Integrated Photonic Devices Group, Chair of Radio Frequency and Photonics Engineering, Communications Laboratory, Faculty of Electrical and Computer Engineering, Technische Universität Dres-*

ROOM 9

Varennes, QC J3X 1S2, Canada; [3]Faculty of Civil Engineering, University of Zagreb, Zagreb 10000, Croatia; [4]Department of Physics, Faculty of Science, University of Zagreb, Zagreb 10000, Croatia; [5]Institute of Fundamental and Frontier Sciences, University of Electronic Science and Technology of China, Chengdu 610054, China; [6]Department of Physics & Astronomy, San Francisco State University, San Francisco, CA 94132, USA

We numerically and experimentally investigate corner and edge topological states in finite Su-Schrieffer-Heeger photonic lattices, focusing mainly on robust but poorly studied orbital states in both one- and two-dimensional systems.

EJ-2.5 TUE 12:00

Soliton blockade in bi-directional Kerr microresonators

•*Z. Fan and D.V. Skryabin; University of Bath, Bath, United Kingdom*

We report a method to block or release the unidirectional frequency comb by controlling the pump frequency offset between the counter-rotating waves.

EJ-2.6 TUE 12:15

Optical Pulse Propagation in Graphene-comprising Waveguides: Beyond the Perturbative Nonlinear Regime

•*A. Pitilakis and E.E. Kriezis; Aristotle University of Thessaloniki, Thessaloniki, Greece*

We present a consolidated overview of electromagnetic nonlinearity in graphene, spanning perturbative and thermodynamic regimes. Our focus is on all-optical applications

ROOM 10

[2]Gisela and Erwin Sick Chair of Micro-optics, Department of Microsystems Engineering - IMTEK, University of Freiburg, Freiburg, Germany; [3]Fraunhofer Institute for Applied Solid State Physics IAF, Freiburg, Germany; [4]Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany

Employing thinner resonators and specially designed GaN-based pulse generators now 80 GHz of mode-hop-free tuning within nanoseconds via Pockels-effect-based adiabatic frequency conversion in high-Q lithium niobate microresonators is feasible.

CD-3.5 TUE 12:00

Nonlinear Broadening of Electro-Optic Frequency Combs in All-Normal Dispersion Si3N4 Waveguides

•*I. Rebolledo-Salgado[1,2], Z. Ye[1], S. Christensen[3], F. Lei[1], K. Twayana[1], M. Zelan[2], J. Schröder[1], and V. Torres-Company[1]; [1]Dept. Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden; [2]Measurement Science and Technology, RISE Research Institutes of Sweden, Boras, Sweden; [3]Photonics Department, Technical University of Denmark, Lyngby, Denmark*

We demonstrate nonlinear broadening of an electro-optic frequency comb at 25 GHz repetition rate in a 20 cm long normal-dispersion low-loss silicon nitride waveguide.

CD-3.6 TUE 12:15

Electro-optic Kerr Modulation in Wide Silicon Waveguides in the Mid-IR

•*B.D.J. Sayers, L.M. Rosenfeld, and J.W. Silverstone; University of Bristol, Bristol, United Kingdom*

We demonstrate phase shifts using the electro-optic Kerr effect in wide silicon waveguides. This preliminary work shows potential to reduce loss in such phase shifters using novel waveguide geometries in

ROOM 11

vided by cavity finesse and achives angstrom scale resolution. We show preliminary results in distinguishing between viscosities.

CH-3.5 TUE 12:00

Frequency-Modulated Portable Light Source for Coherent Raman Imaging with Enhanced Sensitivity

•*M. Brinkmann[1], T. Würthwein[2], T. Hellwig[1], K. Wallmeier[2], and C. Fallnich[2,3,4]; [1]Refined Laser Systems GmbH, Münster, Germany; [2]Institute of Applied Physics, University of Münster, Münster, Germany; [3]Cells in Motion Interfaculty Centre, Münster, Germany; [4]University of Twente, Enschede, Netherlands*

We present a fiber optical parametric oscillator, combining a rapid and wide tunability across 780–980 nm within only 5 ms with a frequency modulation at 20 MHz for coherent Raman imaging with enhanced sensitivity.

CH-3.6 TUE 12:15

Plastic sorting with an integrated NIR spectral sensor

•*F. Ou[1,2], K.D. Hakkel[1], M. Petruzzella[1,2], A.v. Klinken[1], F. Pagliano[1,2], R.P.J.v. Veldhoven[1], and A. Fiore[1]; [1]Department of Applied Physics and Institute for Photonic Integration, Eindhoven University of Technology, Eindhoven, Netherlands; [2]MantiSpectra B.V., Eindhoven, Netherlands*

We describe a method for classify-

ROOM 12

namics in stretched hollow capillary fibers. Our technique allows energy up-scaling and extension to the VUV.

CF-2.4 TUE 12:00

Time-resolved Photoelectron Momentum Microscopy using a 1 MHz High-Harmonic Generation Beamline

•*G.S.M. Jansen, M. Keunecke, D. Schmitt, W. Bennecke, C. Möller, M. Reutzel, D. Steil, S. Steil, and S. Mathias; 1. Physical Institute, University of Göttingen, Göttingen, Germany*

Based on various recent experimental results, we present a novel setup for time-resolved extreme ultraviolet photoemission spectroscopy, providing full three-dimensional photoemission spectra from a 1 MHz high-harmonic generation source.

CF-2.5 TUE 12:15

Tunable Pulse Shape DUV Photocathode Laser for X-ray Free Electron Lasers at DESY

•*C. Li[1], O. Akcaalan[1], M. Frede[2], U. Gross-Wortmann[1], C. Mohr[1], O. Puncken[2], C. Vidoli[1], L. Winkelmann[1], and I. Hartl[1]; [1]Deutsches Elektronen-Sychrotron, Hamburg, Germany; [2]neoLASE GmbH, Hanover, Germany*

We report on a 1-20ps tunable pulse duration deep UV photocathode

ROOM 1

photon emission from dibenzoterrylene molecules. We discuss future plans to interface dibenzoterrylene emission with rubidium atoms to build a quantum memory.

ROOM 2

12-mode quantum photonic processor which is the largest universal quantum photonic processor to date. The processor is a fully reconfigurable linear interferometer using silicon nitride waveguide technology.

ROOM 3

rials Science and Technology, Dübendorf, Switzerland; [4]Center for Physical Sciences & Technology, Vilnius, Lithuania

We demonstrate that through the quantum confined Stark effect a free-space, ultrafast THz signal can be directly encoded onto an optical signal probing the absorption of a film consisting of CdSe/CdS quantum dots.

ROOM 4

Finland

Novel photothermal material is developed from mesoporous silica nanoparticles functionalized with a diimmonium-based dye. Nanoparticles show strong NIR absorption and reproducible heat generation performance under NIR light revealing their potential in therapeutic applications.

ROOM 5

tion instability using Fourier Transform spectral interferometry combined with an ultrabroadband reference field.

ROOM 6

20dB with reduced insertion losses.

ROOM 1

14:30 – 15:30

SP-1: Herbert Walter Award & Wolfgang Peter Schleich Talk

Chair: Gerd Leuchs, Max Planck Institute for the Science of Light, Erlangen, Germany

Presentation of the Herbert Walter Award

SP-1.1 TUE (Keynote)

Cavity QED, Cold Atoms and the Riemann Zeta Function

•*W.P. Schleich; Universität Ulm, Institut für Quantenphysik, Ulm, Germany; Institute of Quantum Technologies, German Aerospace Center (DLR), Ulm, Germany; Hagler Institute for Advanced Study and Department of Physics and Astronomy, Texas A&M University, College Station, USA; Institute for Quantum Science and Engineering (IQSE), Texas A&M University, College Station, USA; Texas A&M AgriLife Research, Texas A&M University, College Station, USA*

We summarize our work on the Quantum FEL, cold atoms in space and the realization of the Riemann zeta function by a quantum optical system and connect these topics to Herbert Walther.

ROOM 1

16:30 – 18:00

ED-3: Precision Spectroscopy and Fundamental Metrology II

Chair: Markku Vainio, Univerisity of Helsinki, Helsinki, Finland

ED-3.1 TUE 16:30

Double-Resonance Spectroscopy of Methane Using a Comb Probe

•*V. Silva de Oliveira[1], I. Silander[1], L. Rutkowski[2], A.C. Johansson[1], G. Soboń[3], O. Axner[1], K.K. Lehmann[4], and A. Foltynowicz[1]; [1]Department of Physics, Umeå University, Umeå, Sweden; [2]Université de Rennes, CNRS, IPR (Institut de Physique de Rennes)-UMR 6251, Rennes, France; [3]Laser and Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland; [4]Departments of Chemistry and Physics, University of Virginia, Charlottesville, VA, USA*

We use a 3.3 μm continuous wave pump and a 1.67 μm comb probe to detect and assign sub-Doppler $3\nu_3 \leftarrow \nu_3$ transitions in methane. We

ROOM 2

16:30 – 18:00

CD-4: Microresonators

Chair: Victor Torres Company, Chalmers University of Technology, Gothenburg, Sweden

CD-4.1 TUE (Invited) 16:30

Nonlinear and Quantum Photonics in Chip-Integrated Microresonators

•*K. Srinivasan; National Institute of Standards and Technology, Gaithersburg, USA; Joint Quantum Institute, University of Maryland, College Park, USA*

In this talk, I will describe our efforts in developing quantum and classical resources that connect the visible and telecommunications wavelength bands through chip-integrated Kerr nonlinear resonators.

ROOM 3

16:30 – 18:00

CG-3: Ultrafast Spectroscopy

Chair: Yann Mairesse, University of Bordeaux, CELIA, Bordeaux, France

CG-3.1 TUE (Tutorial) 16:30

First principles modeling of ultrafast pump probe spectroscopies

•*A. Rubio; Max Planck /Institute for the Structure and Dynamics of Matter, Hamburg, Germany; Center for Computational Quantum Physics Flatiron Institute, New York, USA*

We will review the recent advances in the first principles modeling of ultrafast phenomena in molecules and solids. We will treat light-matter interactions beyond perturbative regimes to account for novel hybrid-light matter states and describe strongly non liner phenomena.

ROOM 4

16:30 – 18:00

CA-3: High-intensity and Nonlinear Systems

Chair: Nicolaie Pavel, National Institute for Laser, Plasma and Radiation Physics, Magurele, Romania

CA-3.1 TUE (Invited) 16:30

Technology Development for Ultra-Intense OPCPA Systems

•*J. Bromage, S.-W. Bahk, I. Begishev, S. Bucht, C. Dorrer, C. Feng, B. Hoffman, C. Jeon, C. Mileham, J. Oliver, R. Roides, M. Shoup, M. Spilatro, B. Webb, and J. Zuegel; Laboratory for Laser Energetics, University of Rochester, Rochester, USA*

Technologies developed for MTW-OPAL, a midscale prototype all-OPCPA system, will be reviewed, highlighting 140-nm-wide amplification in DKDP to >10 J with 30% efficiency and subsequent recompression to 20 fs.

ROOM 5

16:30 – 18:00

EC-2: Nonlinear Topology

Chair: Nathan Goldman, Université Libre de Bruxelles, Belgium

EC-2.1 TUE (Invited) 16:30

Topological optical frequency combs and dissipative Kerr super-solitons

•*S. Mittal[1], G. Moille[2,1], K. Srinivasan[2,1], Y.K. Chembo[1], and M. Hafezi[1]; [1]University of Maryland, College Park, College Park, USA; [2]National Institute of Standards and Technology, Gaithersburg, USA*

We propose the generation of nested coherent optical frequency combs and dissipative Kerr super-solitons in a two-dimensional array of coupled ring resonators that creates a synthetic magnetic field, and thereby, exhibits topological edge states for photons.

ROOM 6

16:30 – 18:00

EI-2: From Single Photons to Engineered Photonic Environments

Chair: Rudolf Bratschitsch, University of Münster, Münster, Germany

EI-2.1 TUE 16:30

Bound in the continuum modes in indirectly-patterned hyperbolic media

•*H. Hezig Sheinfux[1], L. Orsini[1], M. Jung[2], I. Torre[1], M. Ceccanti[1], R. Abraham Maniyara[1], D. Barcons Ruiz[1], S. Castilla[1], N. C.H. Hesp[1], E. Janzen[3], V. Pruneri[1], J. H. Edgar[3], G. Shvets[2], and F. H. Koppens[1]; [1]ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain; [2]Cornell University, Ithaca, USA; [3]Kansas State University, Manhattan, USA*

We study a new type of nanocavity, where multimodal interference enhances internal reflections. Using near-field microscopy, we observe the unprecedented combination of high quality factors, above

ROOM 7

We show that metamaterial structuring is not necessary for the manifestation of optical magnetism: a strong optical magnetic response is an essential characteristic feature of a thin layer of homogeneous dielectrics.

ROOM 8

den, Dresden, Germany
We demonstrate a SiN-based array of 8 end-fire emitters with 800 nm spacing. The device is characterized at a wavelength of 852 nm. By considering 12 thermo-optical phase shifters, a beam-steering of ±30° is achieved.

ROOM 9

of highly confining NIR photonic waveguide structures, where graphene is in-plane and patterned.

ROOM 10

the mid-infrared.

ROOM 11

ing plastic types that take advantage of a miniaturised, low-cost, robust and mass-producible NIR spectral sensor based on integrated photonics technology, which opens new horizons for on-site materials sensing applications.

ROOM 12

laser for high repetition-rate x-ray free electron-lasers. We generate 5-10μJ pulses at 257.5nm in 800μs burst at 1MHz with 100ms burst separation.

NOTES

ROOM 7

16:30 – 18:00

EH-3: Advanced Control of Light with Metasurfaces

Chair: Vincenzo Galdi, University of Sannio, Benevento, Italy

EH-3.1 TUE (Invited) 16:30

Emerging Directions in Local and Nonlocal Flat Optics
•*F. Monticone*; *Cornell University, Ithaca, USA*
We discuss our recent efforts on different topics at the frontier of the field of flat optics, including fundamental limits and tradeoffs of metalenses, metasurface junctions supporting new types of guided waves, and nonlocal flat-optics.

ROOM 8

16:30 – 18:00

CB-2: High Power Semiconductor Lasers

Chair: Ute Troppenz, Fraunhofer Institute for Telecommunications, Heinrich-Herz-Institute, Berlin, Germany

CB-2.1 TUE 16:30

Increased Conversion Efficiency at 800 W Continuous Wave Output From Single 1-cm Diode Laser Bars at 940 nm
•P. Crump[1], A. Meissner-Schenk[2], T. Kaul[2], S. Strohmaier[2], M.M. Karow[1], A. Boni[1], A. Maaßdorf[1], D. Martin[1], and G. Tränkle[1]; [1]Ferdinand-Braun-Institut GmbH, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany; [2]TRUMPF Laser GmbH, Niederlassung Berlin, Berlin, Germany
1-cm laser bars with 4mm resonators emitting at 940 nm that integrate extreme triple asymmetric epitaxial designs, wide-aperture-emitter layouts and advanced coolers enable 800W continuous wave output power with over 60% conver-

ROOM 9

16:30 – 18:00

CE-3: Fabrication and Characterization Techniques

Chair: Michael Jetter, University of Stuttgart, Stuttgart, Germany

CE-3.1 TUE 16:30

Photo-deflection technique for characterization of chirality in diffractive metasurfaces
G. Leahu[1], •E. Petronijevic[1], R. Li Voti[1], A. Belardini[1], T. Cesca[2], C. Scian[2], G. Mattei[2], and C. Sibilia[1]; [1]University of Rome La Sapienza, Rome, Italy; [2]University of Padova, Padova, Italy
Here we show that a local, low-cost, scattering-free, non-destructive photo-deflection technique can be used to detect optical chirality in diffracted orders of a metasurface, with high sensitivity.

ROOM 10

16:30 – 18:00

CH-4: Fiber-based Sensors II

Chair: Jian-Jang Huang, National Taiwan University, Taiwan

CH-4.1 TUE 16:30

BIO-Bragg gratings: structured molecular networks for on-fiber bioanalysis
A. Juste-Dolz[1], •M. Delgado-Pinar[2], M. Avellà-Oliver[1,4], E. Fernández[1], D. Pastor[3], M.V. Andrés[2], and Á. Maquieira[1,4]; [1]Instituto Interuniversitario de Investigación de Reconocimiento Molecular y Desarrollo Tecnológico (IDM), Universitat Politècnica de València, Universitat de València, Valencia, Spain; [2]Laboratory of Fiber Optics - Institut de Ciència dels Materials (ICMUV), Universitat de València, Paterna, Spain; [3]Photonics Research Labs, Universitat Politècnica de València, Valencia, Spain; [4]Departament de Química, Universitat Politècnica de València, Valencia, Spain

ROOM 11

16:30 – 18:00

EB-4: Nonclassical Light Sources

Chair: Christoph Becher, Universität des Saarlandes, Saarbrücken, Germany

EB-4.1 TUE 16:30

Nonlinear waveguides for integrated quantum light source
•R. Domeneguetti[1], H. Conradi[2], M. Kleinert[2], C. Kießler[3], M. Stefszky[3], H. Herrmann[3], C. Silberhorn[3], U. Andersen[1], J. Neergaard-Nielsen[1], and T. Gehring[1]; [1]Center for Macroscopic Quantum States bigQ, Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]Fraunhofer Heinrich Hertz Institute, Berlin, Germany; [3]Integrated Quantum Optics, Paderborn University, Paderborn, Germany
We experimentally investigate the generation of continuous-wave optical squeezing from a titanium-indiffused lithium niobate waveguide resonator at low and high frequencies. The device promises inte-

NOTES

ROOM 1

achieve high absorption sensitivity using an enhancement cavity for the comb probe.

ED-3.2 TUE 16:45

Comb-calibrated Stimulated-Raman Spectroscopy of H2

•*M. Lamperti*[1], *L. Rutkowski*[2], *D. Ronchetti*[1], *D. Gatti*[1], *R. Gotti*[1], *G. Cerullo*[1], *F. Thibault*[2], *H. Jozwiak*[3], *S. Wojtewicz*[3], *P. Maslowski*[3], *P. Wcislo*[3], *D. Polli*[1], *and M. Marangoni*[2]; [1]*Politecnico di Milano and IFN-CNR, Lecco, Italy;* [2]*University of Rennes, CNRS, Rennes, France;* [3]*Nicolaus Copernicus University, Torun, Poland*

H2 is a benchmark system for fundamental physics, yet spectroscopy is hindered by the lack of dipole moment. We present a comb-calibrated coherent Raman spectrometer for advanced studies of its Q(1) 1-0 line

ED-3.3 TUE 17:00

Dual-comb cavity-enhanced absorption and dispersion spectroscopy from cavity mode widths and mode shifts measurement

•*D. Charczun*[1], *A. Nishiyama*[1], *G. Kowzan*[1], *A. Cygan*[1], *T. Voumard*[2], *T. Wildi*[2], *T. Herr*[2], *E. Obrzud*[3], *V. Brasch*[3], *D. Lisak*[1], *and P. Masłowski*[1]; [1]*Institute of Physics, Faculty of Physics, Astronomy and Informatics, Nicolaus Copernicus University in Toruń , Toruń , Poland;* [2]*Center for Free-Electron Laser Science (CFEL), German Electron-Synchrotron (DESY), Hamburg, Germany;* [3]*3. CSEM - Swiss Center for Electronics and Microtechnology, Neuchâtel, Switzerland*

We show the first dual-comb measurement of widths and positions of enhancement cavity modes delivering molecular absorption and dispersion spectra. This approach does not require reference spectrum or correction for the comb-cavity

ROOM 2

CD-4.2 TUE 17:00

Spontaneous polarization symmetry breaking of light in a microresonator

•*N. Moroney*[1,2], *L. Del Bino*[1], *M.T.M. Woodley*[2,3,4], *S. Zhang*[1], *L. Hill*[5], *V.J. Wittwer*[6], *T. Südmeyer*[6], *T. Wildi*[7], *G.-L. Oppo*[5], *M. Vanner*[2], *V. Brasch*[8], *T. Herr*[7], *and P. Del'Haye*[1]; [1]*Max Planck Institute for the Science of Light, Erlangen, Germany;* [2]*Imperial College London, London, United Kingdom;* [3]*National Physical Laboratory, London, United Kingdom;* [4]*Herriot-Watt University, Edinburgh, United Kingdom;* [5]*University of Strathclyde, Glasgow, United Kingdom;* [6]*Université de Neuchâtel, Neuchâtel, Switzerland;* [7]*Center for Free-Electron Laser Science (CFEL), Hamburg, Germany;* [8]*Swiss Center for Electronics and Microtechnology (CSEM), Neuchâtel, Switzerland*

We demonstrate the spontaneous symmetry breaking of the polarisation state of light. Linearly polarised

ROOM 3

ROOM 4

CA-3.2 TUE 17:00

Laser power stabilization for Advanced VIRGO

F. Cleva[1], *J.-P. Coulon*[1], *L.W. Wei*[1], *M. Turconi*[1], *M. Merzougui*[1], *E. Genin*[2], *G. Pillant*[2], *and* •*F. Kéfélian*[1]; [1]*ARTEMIS, Université Côte d'Azur - Observatoire de la Côte d'Azur - CNRS, Nice, France;* [2]*European Gravitational Observatory, Cascina, Italy*

We present the laser power stabilization in Advanced VIRGO using very high photocurrent photodiodes with excellent spatial uniformity. The RIN is currently 2.5E-9 $\mathrm{Hz}^{-1/2}$ and will be able to reach 1.2E-9 Hz^{-}1/2 for the most sensitive configuration

ROOM 5

EC-2.2 TUE 17:00

First realization of a nonlinearity-induced topological insulator

•*L.J. Maczewsky*[1], *M. Heinrich*[1], *M. Kremer*[1], *S.K. Ivanov*[2,3], *M. Ehrhardt*[1], *F. Martinez*[1], *Y.V. Kartashov*[3,4], *V.V. Konotop*[5,6], *L. Torner*[4,7], *D. Bauer*[1], *and A. Szameit*[1]; [1]*University Rostock, Institut für Physik, Rostock, Germany;* [2]*Moscow Institute of Physics and Technology, Moscow, Russia;* [3]*Institute of Spectroscopy, Russian Academy of Sciences, Moscow, Russia;* [4]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science & Technology, Barcelona, Spain;* [5]*Departamento de Física, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal;* [6]*Centro de Física Teórica e Computacional, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal;* [7]*Universitat Politècnica de Catalunya, Barcelona, Spain*

A nonlinear photonic Floquet topo-

ROOM 6

100, in nanocavity volumes as small as 100*100*3nm^3.

EI-2.2 TUE 16:45

Enhanced light-matter interaction in atomically thin semiconductors and 2D single photon emitters coupled to dielectric nano-antennas

•*L. Sortino*[1], *P. Zotev*[1], *R. Sapienza*[2], *S. Maier*[2,3], *and A. Tartakovskii*[1]; [1]*Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom;* [2]*Department of Physics, Imperial College London, London, United Kingdom;* [3]*Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig-Maximilians-Universitat Munchen, Munich, Germany*

Mie resonances in dielectric nanostructures represent a novel platform for engineering light-matter interaction at the nanoscale. In our work, we integrated atomically thin WSe_2 with gallium phosphide nanoantennas and demonstrate the luminescence enhancement in 2D excitons and native quantum emitters.

EI-2.3 TUE 17:00

Gate-switchable arrays of single photon emitters in monolayer MoS2

A. Hötger[1], *K. Barthelmi*[1], *A. Micevic*[1], *J. Klein*[2], *L. Sigl*[1], *F. Sigger*[1], *E. Mitterreiter*[1], *S. Gyger*[3], *T. Taniguchi*[4], *K. Watanabe*[4], *M. Lorke*[5], *M. Florian*[5], *F. Jahnke*[5], *V. Zwiller*[3], *K. Jöns*[6], *U. Wurstbauer*[7], *C. Kastl*[1], *K. Müller*[1], *J. Finley*[1], *and* •*A. Holleitner*[1]; [1]*Walter Schottky Institut and Physics Department, TUM, Munich, Germany;* [2]*Department of Materials Science and Engineering, MIT, Cambridge, USA;* [3]*KTH Royal Institute of Technology, Stockholm, Sweden;* [4]*National Institute for Materials Science, Tsukuba, Ibaraki, Japan;* [5]*Institut für Theoretische Physik, Universität Bremen, Bremen, Germany;* [6]*Department of Physics,*

ROOM 7

EH-3.2 TUE 17:00

High-Q collective resonances in plasmonic metasurfaces with ultra-weak angular dispersion

•Y. Liang[1], B. Jia[2], and Y. Kivshar[1]; [1]Australia National University, Canberra, Australia; [2]Swinburne University of Technology, Melbourne, Australia

We experimentally demonstrate an unprecedented high-Q (~30) surface lattice resonance with extremely weak angular dispersion in a plasmonic metasurface, which is excited by using a high numerical aperture objective (NA = 0.4).

ROOM 8

sion efficiency (67.5% peak).

CB-2.2 TUE 16:45

Watt-Class Single Mode 885 nm Diode Lasers

•J. Campbell, M. Labrecque, F. Foong, D. Renner, M. Mashanovitch, and P. Leisher; Freedom Photonics, Santa Barbara, USA

In this work, we demonstrate watt-class diffraction limited diode lasers at 885 nm. Our ridge waveguide lasers deliver >1800 mW output power and exhibit a peak electrical to optical efficiency of 42%.

CB-2.3 TUE 17:00

Pump laser diode optimized for lowered operating voltage while maintaining high power conversion efficiency

•J. Nikkinen, S. Talmila, V. Vilokkinen, P. Melanen, J. Sillanpää, and P. Uusimaa; Modulight Inc., Tampere, Finland

There is increasing demand for high-power, high-brightness, and high-efficiency laser diodes for kW-level fiber laser pumping. We present >12W pump laser diode optimized for lowered operating voltage while maintaining high efficiency of 60%

ROOM 9

CE-3.2 TUE 16:45

Heterodyne detection applied to the characterization of nonlinear integrated waveguides

•m. Ibnoussina; Laboratoire Interdisciplinaire Carnot de Bourgogne , Dijon, France

In this work, we present a technique relying on heterodyne interferometry for the characterization of nonlinear waveguides. This method can cope with a small nonlinear phase shift, low power, and large propagation loss.

CE-3.3 TUE 17:00

Unified FROG for characterizing 205 nm to 2000 nm, s or p polarization, from 2-cycle to 100 ps.

•D. Wilson[1,2], A. Ramirez[1], P. Lassonde[2], M. Kumar[2], A. Longa[2], A. Laramee[2], H. Ibrahim[2], F. Legare[2], and B. Schmidt[1]; [1]few-cycle inc., Varennes, Canada; [2]INRS-EMT, Varennes, Canada

A Frequency Resolved Optical Gating instrument accepting s or p polarized input pulses ranging from 205 nm to 2000 nm, durations from 2 cycles to 100 ps, and nano-Joule energies is presented.

ROOM 10

Bio-Bragg gratings are unlabelled, on-fiber biosensors based on the patterning of a periodic network of bioreceptors on the surface of a microfiber. Multiplexation and tunability perspectives, and minimized non-specific bindings in human serum are demonstrated.

CH-4.2 TUE 16:45

A High Sensitivity Ethanol Sensor Based on Photo-imprinted, Micro-ring Resonators on Optical-Fiber Tapers

V. Melissinaki, O. Tsilipakos, M. Kafesaki, M. Farsari, and •S. Pissadakis; Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece

A highly sensitive ethanol vapour sensor based on the imprinting of micro-ring resonators onto optical fiber tapers, using multi-photon lithography is presented. This hybrid, sensing probe readily achieves ethanol detection levels of 0.5ppm.

CH-4.3 TUE 17:00

Bend Sensor based on Eccentrical Bragg Gratings in Polymer Optical Fibres

•L. Leffers[1], J. Locmelis[1], K. Bremer[1], B. Roth[1,3], and L. Overmeyer[1,2,3]; [1]Hannover Centre for Optical Technologies, Gottfried Wilhelm Leibniz University Hanover, Nienburger Str. 17, Hanover, Germany; [2]Institute for Transport and Automation Technology, Gottfried Wilhelm Leibniz University Hanover, An der Universität 2, Hanover, Germany; [3]Cluster of Excellence PhoenixD, Gottfried Wilhelm Leibniz University Hanover, Welfengarten 1, Hanover, Germany

Bend sensing through eccentric FBGs in multimode polymer optical fibres is reported. Depending on FBG number, position and depth, 1D and 3D measurements are possible with prospect for diagnosis of musician's focal dystonia in future.

ROOM 11

gration with different platform chips for more complex optical systems.

EB-4.2 TUE 16:45

Indistinguishable photons from a tin-vacancy spin in diamond

•J. Görlitz[1], R. Morsch[1], D. Herrmann[1], P.-O. Collard[2], T. Iwasaki[3], T. Taniguchi[4], M. Markham[2], M. Hatano[3], and C. Becher[1]; [1]Saarland University, Saarbrücken, Germany; [2]Element Six Global Innovation Centre, Harwell Oxford, United Kingdom; [3]Tokyo Institute of Technology, Tokyo, Japan; [4]National Institute for Material Science, Tsukuba, Japan

The tin-vacancy centre in diamond is a promising candidate for realising an elementary node in quantum networks.We here investigate the emission of indistinguishable single photons and the long-term stability of the emission line.

EB-4.3 TUE 17:00

Investigation of Resonance Fluorescence in the Telecom C-Band from In(Ga)As Quantum Dots

•C. Nawrath, H. Vural, J. Fischer, R. Schaber, S.L. Portalupi, M. Jetter, and P. Michler; Institut für Halbleiteroptik und Funktionelle Grenzflächen, Center for Integrated Quantum Science and Technology (IQST) and SCoPE, University of Stuttgart, Stuttgart, Germany

As potential light sources for quantum communication, semiconductor quantum dots emitting around 1550nm are highly promising. We present an in-depth study on resonance fluorescence properties of In(Ga)As quantum dots emitting in the telecom C-band.

NOTES

ROOM 1

mode frequency mismatch

ED-3.4 TUE 17:15

Mid-infrared dual-comb absorption and dispersion spectroscopy and temperature measurement in a plasma

•*M.A. Abbas, F.J.M. Harren, L.v. Dijk, R. Krebbers, K.E. Jahromi, M. Nematollahi, and A. Khodabakhsh; Radboud University Nijmegen, Nijmegen, Netherlands*

We present an asymmetric mid-infrared dual-comb spectrometer with 5 GHz spectral resolution for time-resolved plasma diagnostics of methane and ethane, with 20μs time resolution, and measure the rovibrational temperature distribution of methane inside the plasma.

ED-3.5 TUE (Invited) 17:30

Precision Frequency Comb Spectroscopy of Single Molecular Ions

•*D. Leibrandt; National Institute of Standards and Technology, Boulder, CO, USA; University of Colorado, Boulder, CO, USA*

We use quantum-logic techniques to prepare and detect pure quantum states of a singular molecular ion, and demonstrate precision two-photon terahertz rotational spectroscopy with an optical frequency comb, achieving eleven digit resolution.

ROOM 2

light is input to a fibre cavity in which the Kerr nonlinearity causes the cavity field to acquire a random chirality.

CD-4.3 TUE 17:15

Nonlinear Frequency Conversion in the Hybrid Si_3N_4 - $LiNbO_3$ Integrated Platform

•*M. Churaev[1], A. Riedhauser[2], R.N. Wang[1], C. Möhl[2], V. Snigirev[1], S. Hönl[2], T. Blésin[1], D. Caimi[2], J. Liu[1], Y. Popoff[2,3], P. Seidler[2], and T.J. Kippenberg[1]; [1]Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]IBM Research Europe, Rüschlikon, Switzerland; [3]ETH Zürich, Zürich, Switzerland*

We demonstrate optical frequency comb generation in hybrid high-Q optical microresonators fabricated using direct wafer bonding of photonic Damascene silicon nitride wafer with thin-film lithium niobate-on-insulator (LNOI). The devices enable direct phase control via Pockels effect.

CD-4.4 TUE 17:30

Four-wave mixing and Arnold tongues in high finesse Kerr ring microresonators

•*D. Puzyrev, Z. Fan, A. Villois, and D. Skryabin; University of Bath, Bath, United Kingdom*

We find that the four-wave mixing threshold conditions in the high finesse Kerr ring microresonators break the pump laser parameter space into a sequence of Arnold tongues. We report synchronisation and frequency-domain symmetry breaking inside the tongues.

ROOM 3

CG-3.2 TUE 17:30

Attosecond Ionization Time Delay Around a Shape Resonance in Nitrogen Measured by the RABBIT-2ω method

•*V. Loriot[1], A. Marciniak[1], S. Nandi[1], G. Karras[1], M. Hervé[1], E. Constant[1], E. Plésiat[2], A. Palacios[2], F. Martin[2], and F. Lépine[1]; [1]Institute of Light and Matter, Lyon, France; [2]Universidad Autonoma de Madrid, Madrid, Spain*

We implement a self-calibrated variant of the RABBITT protocol (that reduce spectral congestion) to measure the photoelectron trapping near a molecular shape resonance at the attosecond timescale.

ROOM 4

CA-3.3 TUE 17:15

160W Cryogenic Regenerative Yb:YLF Amplifier

•*M. Pergament[1], U. Demirbas[1,4], M. Kellert[1], J. Thesinga[1], Y. Hua[1,2], and F. Kaertner[1,2,3]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Physics Department, University of Hamburg, Hamburg, Germany; [3]The Hamburg Centre for Ultrafast Imaging,, Hamburg, Germany; [4]Laser Technology Laboratory, Antalya Bilim University, Antalya, Turkey*

We demonstrate cryogenic Yb:YLF regenerative amplifier, using E//a and E//c axes. The amplifier generates up to 160 W with 16 mJ pulses at 10kHz has 2.2% RMS noise, and could be compress to sup-ps durations

CA-3.4 TUE 17:30

Highly tunable, multi-GHz repetition rate optical parametric oscillator driven by an electro-optic comb

•*H. Ye[1], V. Freysz[2], R. Bello-Doua[3], L. Pontagnier[1], G. Santarelli[1], E. Cormier[1,4], and E. Freysz[2]; [1]Laboratoire Photonique Numérique et Nanosciences (LP2N), Talence, France; [2]Université de Bordeaux, CNRS, LOMA, Talence, France; [3]ALPhANOV, Institut d'optique d'Aquitaine, Talence, France; [4]Institut Universitaire de France (IUF), Paris, France*

We present an optical parametric oscillator (OPO) synchronously pumped by an electro-optic comb.

ROOM 5

logical insulator in which the non-trivial topological phase itself is brought about by the self-action of a propagating wave packet is presented, and its protected edge states are experimentally demonstrated.

EC-2.3 TUE 17:15

Quantized Nonlinear Pumping with Photons

•*M. Jürgensen, S. Mukherjee, and M. Rechtsman; Pennsylvania State University, University Park, PA 16802, USA*

We theoretically propose and experimentally demonstrate quantized nonlinear Thouless pumping, despite non-uniform occupation of topological bands; the effect has no analogue in the linear domain. We observe the effect in arrays of coupled waveguides.

EC-2.4 TUE 17:30

Non-linearities in a driven-dissipative SSH lattice

•*N. Pernet[1], P. St-Jean[1], D. Solnyshkov[2], G. Malpuech[2], N. Carlon Zambon[1], B. Real[3], O. Jamadi[3], A. Lemaître[1], M. Morassi[1], L. Le Gratiet[1], T. Baptiste[1], A. Harouri[1], I. Sagnes[1], A. Amo[3], S. Ravets[1], and J. Bloch[1]; [1]Centre de Nanosciences et Nanotechnologies (C2N), CNRS, Université Paris-Saclay, Palaiseau, France; [2]Institut Pascal, CNRS, Université Clermont Auvergne, Clermont-Ferrand, France; [3]Physique des Lasers Atomes et Molécules, CNRS, Université de Lille, Lille, France*

We study the nonlinear response of

ROOM 6

Paderborn University, Paderborn, Germany; [7]Institute of Physics, University of Münster, Münster, Germany

We demonstrate the deterministic generation and gate-switching of quantum emitter arrays in monolayer MoS2 embedded in field-effect structures.

EI-2.4 TUE 17:15

Trions and excitons in optical spectra of TMDCs

•*V. Perebeinos[1], Y. Zhumagulov[2,3], A. Vagov[3], P. Faria Junior[2], and D. Gulevich[3]; [1]University at Buffalo, Buffalo, USA; [2]University of Regensburg, Regensburg, Germany; [3]ITMO University, St. Petersburg, Russia*

We quantify the role of strong Coulomb interaction, which leads to tightly bound excitons and trions. We solve for the three-particle wavefunction for trions and report absorption and photoluminescence spectra as a function of doping and temperature.

EI-2.5 TUE 17:30

Fully tuneable Bloch-Band polaritons emerging from WS2 monolayer excitons in an optical lattice at room temperature

•*L. Lackner[1], M. Dusel[2], C. Anton-Solanas[1], H. Knopf[3], F. Eilenberger[3], O. Egorov[4], S. Schröder[5], S. Höfling[2], and C. Schneider[1]; [1]University of Oldenburg, Oldenburg, Germany; [2]University Würzburg, Würzburg, Germany; [3]Friedrich Schiller University, Jena, Germany; [4]Friedrich Schiller University, Jena, Germany; [5]Fraunhofer IOF, Jena, Germany*

We study room temperature exciton-polaritons in a WS2-monolayer integrated in a fully tuneable photonic lattice, imprinted

ROOM 7

EH-3.3 TUE 17:15

Non-Diffracting Metallic Metasurfaces with High Directional Sensitivity

•J. Gorecki[1], O. Buchnev[1], C. Bailey[2], T. Cookson[2], M. Kaczmarek[2], P. Lagoudakis[2], and V. Fedotov[1]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]School of Physics and Astronomy, University of Southampton, Southampton, United Kingdom

We report a special class of metasurfaces in which transmission spectra displays a strong amplitude dependence with illumination angle. The effect is confined to a narrow wavelength band and responds up to angles of 60°.

EH-3.4 TUE 17:30

Magneto-optics in type-II hyperbolic metamaterial nanoantennas

•J. Kuttruff[1,2], A. Gabbani[3], G. Petrucci[3], Y. Zhao[4], M. Iarossi[4], E. Pedrueza-Villalmanzo[5], A. Dmitriev[5], A. Parracino[6], G. Strangi[7,8], D. Brida[1], F. De Angelis[4], F. Pineider[3], and N. Maccaferri[1]; [1]University of Luxembourg, Luxembourg, Luxembourg; [2]University of Konstanz, Konstanz, Germany; [3]Università di Pisa, Pisa, Italy; [4]Istituto Italiano di Tecnologia, Genova, Italy; [5]University of Gothenburg, Gothenburg, Sweden; [6]Istituto di Struttura della Materia, Roma, Italy; [7]Case Western Reserve University, Cleveland, USA; [8]Università della Calabria, Cosenza, Italy

We study magneto-optical circular dichroism in type-II hyper-

ROOM 8

CB-2.4 TUE 17:15

Vertical design approach for suppressing power saturation in GaAs-based high-power diode lasers

•S. Arslan, A. Boni, A. Maaßdorf, G. Erbert, D. Martin, J. Fricke, and P. Crump; Ferdinand-Braun-Institut gGmbh, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

Pulsed testing of high-power diode lasers using extreme triple asymmetric epitaxial designs reveals strong improvement in bias driven losses at high temperature compared to a baseline, as needed to obtain high power under CW operation.

CB-2.5 TUE 17:30

Role of Temperature Nonuniformity on Longitudinal Current Crowding in High Power Diode Lasers

•P. Leisher, M. Labrecque, E. Burke, K. McClune, D. Renner, and J. Campbell; Freedom Photonics LLC, Santa Barbara, USA

Longitudinal current crowding has recently been shown to limit the efficiency of cavity length scaling in high power diode lasers. We report on the role of temperature nonuniformity on the longitudinal current crowding effect.

ROOM 9

CE-3.4 TUE 17:15

Low random duty-cycle errors in periodically-poled KTP revealed by sum-frequency generation

•F. Mann, H. Chrzanowski, and S. Ramelow; Humboldt-Universität zu Berlin, Institut für Physik, Berlin, Germany

We have characterised bulk ppKTP regarding to its poling quality and hence its suitability as quantum frequency converter platform. From our measurements we can conclude low random duty cyle errors and low parasitic SPDC noise.

CE-3.5 TUE 17:30

The contribution has been withdrawn.

ROOM 10

CH-4.4 TUE 17:15

Superiority of a Square-core Multimode Fiber for Imaging and Spectroscopy

•Z. Lyu[1], M.C. Velsink[1,2], P.W.H. Pinkse[2], and L.V. Amitonova[1,3]; [1]Advanced Research Center for Nanolithography (ARCNL), Science Park 106, 1098XG, Amsterdam, Netherlands; [2]MESA+ Institute for Nanotechnology, University of Twente, PO Box 217, 7500AE, Enschede, Netherlands; [3]Department of Physics and Astronomy, Vrije Universiteit Amsterdam, De Boelelaan 1081, 1081HV, Amsterdam, Netherlands

For fiber based imaging and spectroscopy, a round-core multimode fiber (MMF) is commonly used. We experimentally and theoretically demonstrate that because of the homogeneous mode distribution, a square-core MMF is superior to a round-core MMF.

CH-4.5 TUE 17:30

Optical Fibre Humidity Sensor for Accessing the Wetting Condition of Oak Barrels

N. Poumpouridis [1,2], Z. Diamantakis [3,4], N. Gavalas [3,5], V. Laderos [3,6], S. Pissadakis[1], and •M. Konstantaki[1]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology – Hellas, Heraklion, Greece; [2]Physics Department, University of Crete, Heraklion, Greece; [3]Winemakers' Association of the Department of Heraklion - Wines of Crete, Heraklion, Greece; [4]Diamantakis Winery, Heraklion, Greece; [5]Gavalas Crete Wines, Heraklion, Greece; [6]Idaia Winery, Heraklion, Greece

ROOM 11

EB-4.4 TUE 17:15

Bright Purcell enhanced single-photon source in the telecom O-band based on a quantum dot in a circular Bragg grating

•S. Kolatschek, S. Bauer, C. Nawrath, J. Huang, J. Fischer, R. Sittig, M. Jetter, S.L. Portalupi, and P. Michler; Institut für Halbleiteroptik und Funktionelle Grenzflächen, Center for Integrated Quantum Science and Technology (IQST) and SCoPE, University of Stuttgart, Stuttgart, Germany

Quantum dots are excellent single-photon emitters with performances mainly limited by the high refractive index contrast. We present a bright Purcell enhanced telecom O-band quantum dot using a cicular Bragg grating cavity.

EB-4.5 TUE (Invited) 17:30

A fast and bright source of coherent single photons

•R. Warburton; Department of Physics, University of Basel, Basel, Switzerland

A single photon source is reported with a total end-to-end efficiency of 57%. The coherence of the photons is high – the two-photon interference visibility is 97.5%.

NOTES

ROOM 1

18:30 – 20:00

ED-4: Frequency Standards and Miniaturized Comb Platforms

Chair: Frans Harren, Radboud University, Nijmegen, The Netherlands

ED-4.1 TUE (Invited) 18:30

Optical atomic clocks for chronometric leveling

•*T. Mehlstäubler; Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; Leibniz Universität Hannover, Hannover, Germany*

I will introduce the concepts of

ROOM 2

CD-4.5 TUE 17:45

Ultra-Deep Multi-Notch Microwave Photonic Filter utilising On-Chip Brillouin procesing and Microring Resonators

•*M. Garrett[1,2], Y. Liu[1,2], D.-Y. Choi[3], K. Yan[3], S. J. Madden[3], and B. J. Eggleton[1,2]; [1]Institute of Photonics and Optical Science (IPOS), School of Physics, The University of Sydney, NSW 2006, Australia, Sydney, Australia; [2]The University of Sydney Nano Institute (Sydney Nano), The University of Sydney, NSW 2006, Australia, Sydney, Australia; [3]Laser Physics Centre, Australian National University, Canberra, ACT 2601, Australia, Canberra, Australia*

We present a multi-notch microwave photonic filter that cascades integrated microring resonators and on-chip Brillouin scattering to create spectrally-selective RF destructive interference, achieving a filter rejection of > 37 dB from 2 dB ring rejection.

18:30 – 20:00

EA-2: Cold Molecules

Chair: Jürgen Volz, Humboldt Universität, Berlin, Germany

EA-2.1 TUE (Tutorial) 18:30

Quantum effects in cod molecular collisions

•*E. Narevicius; Weizmann Institute of Science, Rehovot, Israel*

The tutorial will focus on experiments demonstrating quantum effects in cold molecular collisions were de Broglie wavelength reaches

ROOM 3

CG-3.3 TUE 17:45

Measurement of Time Delay in Giant Plasmonic Resonance by Recollision Process of High Harmonic Generation

•*D.H. Ko[1], G.G. Brown[1], C. Zhang[1], and P.B. Corkum[1,2]; [1]University of Ottawa, Ottawa, Canada; [2]National Research Council of Canada, Ottawa, Canada*

The time-dependent response of the giant plasmonic resonance in Xe has been investigated by employing the *in situ* measurement method of high harmonic generation using recollision electrons as exquisitely sensitive probes of ultrafast multi-electron interactions.

18:30 – 20:00

CG-4: Chemical Reactions and Molecular Dynamics

Chair: Mathieu Gisselbrecht, Lund University, Lund, Sweden

CG-4.1 TUE 18:30

Ultrafast dynamics of correlation bands following XUV molecular photoionization

•*A. Boyer[1], M. Hervé[1], V. Despré[2], P. Castellanos Nash[3], V. Loriot[1], A. Scognamiglio[1], G. Karras[1], R. Brédy[1], E. Constant[1], A. Tielens[3], A. Kuleff[2], and F. Lépine[1]; [1]Univ*

ROOM 4

The OPO delivers sub-picosecond signal pulses across 1.5-1.7 μm with flexible repetition rate ranging from 1 to 14 GHz.

CA-3.5 TUE 17:45

Tunable repetition rate OPO pumped by high power femtosecond harmonic-order controlled mode–locked ytterbium rod-type fiber laser.

•*V. FREYSZ and E. FREYSZ; Univ. Bordeaux, LOMA, UMR-5798, F 33400 Talence, France*

Tunable repetition rate OPO pumped by high-power femtosecond harmonic-order controlled mode–locked ytterbium rod-type fiber laser, provides femtosecond pulses tunable from 1.4 μm to 1.7 μm at different repetition rates without any changes of the OPO.

18:30 – 20:00

CJ-2: Mode-locked Fiber Lasers above 2 Micron

Chair: Sobon Grzegorz, Wroclaw University of Technology, Poland

CJ-2.1 TUE 18:30

All-fiber format source of 50 nJ 9 cycle pulses at 2.95 μm

•*I. Tiliouine, G. Granger, H. Delahaye, Y. Leventoux, V. Couderc, and S. Février; Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France*

We demonstrate that picosecond

ROOM 5

the bulk of the Su Schrieffer Heeger model. Taking advantage of the non-Hermitian nature of our system we unveil new stable solutions that have no counterpart in conservative systems.

EC-2.5 TUE 17:45

Nonlinear Control of PT-symmetry and Topological States

•*S. Xia[1], D. Kaltsas[2], D. Song[1], I. Komis[2], J. Xu[1], A. Szameit[3], H. Buljan[1,4], K. Makris[2,5], and Z. Chen[1,6]; [1]The MOE Key Laboratory of Weak-Light Nonlinear Photonics, TEDA Applied Physics Institute and School of Physics, Nankai University, Tianjin, China; [2]Department of Physics, University of Crete, Heraklion, Greece; [3]Institut für Physik, Universität Rostock, Rostock, Germany; [4]Department of Physics, Faculty of Science, University of Zagreb, Zagreb, Croatia; [5]Institute of Electronic Structure and Laser (IESL) – FORTH, Heraklion, Greece; [6]Department of Physics and Astronomy, San Francisco State University, California, USA*

We demonstrate that optical nonlinearity can effectively modulate the loss of a defect potential in a non-Hermitian topological lattice, leading to single-channel switching between PT and non-PT-symmetric regimes and maneuver of topological zero modes.

18:30 – 20:00

CA-4: Novel Laser Concepts

Chair: Jennifer Hastie, University of Strathclyde, Glasgow, United Kingdom

CA-4.1 TUE (Invited) 18:30

The Game of Light & Heat: Cryogenic Optical Refrigeration and Athermal Lasers

•*M. Sheik-Bahae[1], J. Kock[1], A. Albrecht[1], A. Volpi[1], S. Rostami[1], M. Peysokhan[1], R. Epstein[1], and M. Hehlen[2]; [1]University of New Mexico , Albuquerque, NM, USA; [2]Los*

ROOM 6

in an open cavity. Our study aims at the implementation of a highly versatile plaform to study non-linear, interacting bosons in lattices.

EI-2.6 TUE 17:45

Position-dependent valley polarization and valley coherence of WS2 monolayers

•*I. Komen, S. Van Heijst, S. Conesa-Boj, and L. Kuipers; Delft University of Technology, Delft, Netherlands*

We characterize the polarization properties of the photoluminescence from CVD-grown WS2 monolayer flakes. We find an inverse relationship between the non-uniform WS2 photoluminescence intensity, the valley polarization and the valley coherence.

18:30 – 20:00

CD-5: Supercontinuum Generation

Chair: Luca Carletti, University of Brescia, Italy

CD-5.1 TUE 18:30

Generation of an ultra-flat, low-noise and linearly polarized fiber supercontinuum covering 670 nm-1390 nm

•*E. Genier[1,2], S. Grelet[1], R.D. Engelsholm[1], P. Bowen[1], P.M. Moselund[1], O. Bang[3], J.M. Dudley[2], and T. Sylvestre[2]; [1]NKT Photonics*

ROOM 7

bolic nanoantennas. Experiments and numerical simulations reveal a broadband response, which we ascribe to the excitation of electric and magnetic dipole modes coupled to an external magnetic field.

EH-3.5 TUE 17:45

Giant Optical Chirality in All-dielectric Halide Perovskite Metasurfaces

G. Long[1,2], •G. Adamo[1], J. Tian[1], E. Feltri[1,3], H.N.S. Krishnamoorthy[1], M. Klein[1,2], and C. Soci[1,2]; [1]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, 21 Nanyang Link, Singapore 637371, Singapore, Singapore; [2]Energy Research Institute @ NTU (ERI@N), Research Techno Plaza, Nanyang Technological University, 50 Nanyang Drive, Singapore, Singapore, Singapore; [3]Department of Physics, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, Italy, Milano, Italy

We report giant chirality in all-dielectric halide perovskite metasurfaces. With circular dichroism potentially as high as 45% and remarkable light-emission properties, halide perovskite metasurfaces can rival conventional dielectric platforms for low cost, active metadevices.

ROOM 8

CB-2.6 TUE 17:45

DBR-tapered lasers at 783 nm with narrowband emission and output powers up to 7 W

•B. Sumpf, L.S. Theurer, M. Maiwald, A. Müller, A. Maaßdorf, J. Fricke, P. Ressel, and G. Tränkle; Ferdinand-Braun-Institut gGmbH, Berlin, Germany

Wavelength stabilized, high-power DBR tapered diode lasers emitting at 783 nm with output powers up to 7 W and a narrow spectral linewidth below 80 pm will be presented.

ROOM 9

CE-3.6 TUE 17:45

Sub-ps laser damage resistance of optical coatings for reflective components

•M. Stehlík, F. Wagner, and L. Gallais; Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, Marseille, France

We present experimental results on the Laser-Induced Damage Threshold at 500fs / 1030nm of dielectric coatings. The tested materials are intended to be used for the fabrication of Grating Waveguide Structures (GWS) enabling polarization, wavelength, or pulse duration tuning.

ROOM 10

A Fabry Perot optical fibre sensor with a hydroscopic photo- resin cavity is developed for monitoring the evolution of moisture content along the walls of oak barrels used in wine ageing

CH-4.6 TUE 17:45

Photonic lantern for multiplexing fiber Fabry-Perot sensors

•J. Flores[1], J. Zubia[1], and j. Villatoro[1,2]; [1]University of the Basque Country, Bilbao, Spain; [2]IKERBASQUE, Basque Foundation fos Science, Bilbao, Spain

In this work, we report on the use of a photonic lantern for multiplexing fiber Fabry-Perot interferometric sensors, hence to monitor multiple parameters. The interferometers must have proper cavity lengths to avoid crosstalk.

ROOM 11

NOTES

ROOM 7

18:30 – 20:00

CE-4: Luminescent Materials

Chair: Fiorenzo Vetrone, INRS, Montreal, Montreal, Canada

CE-4.1 TUE (Invited) 18:30

Compact Quantum Dots Photoligated with Multifunctional Zwitterionic Coating for Immunofluorescence and Imaging

•H. Mattoussi; Florida State University, Department of Chemistry and Biochemistry, Tallahassee, FL 32306, USA

ROOM 8

18:30 – 20:00

EB-5: Long-Range Distribution of Entanglement I

Chair: Tim van Leent, LMU, Munich, Germany

EB-5.1 TUE (Invited) 18:30

Efficient entanglement transfer between light and cold-atom quantum memories

•F. Hoffet, M. Cao, S. Qiu, A.S. Sheremet, H. Mamann, T. Nieddu, and J. Laurat; Sorbonne Universités, Laboratoire Kastler Brossel, Paris, France

ROOM 9

18:30 – 20:00

EC-3: Bound States and High-order Topology

Chair: Aitzol Garcia-Etxarri, Donostia International Physics Center, Spain

EC-3.1 TUE (Invited) 18:30

Using symmetry bandgaps to create a line of bound states in the continuum in 3D photonic crystals

A. Cerjan[1], •C. Jörg[1], W.A. Benalcazar[1], S. Vaidya[1], C.W. Hsu[2], G. von Freymann[3], and M.C. Rechtsman[1]; [1]Department

ROOM 10

18:30 – 20:00

CF-3: Nonlinear Pulse Propagation

Chair: Matteo Lucchini, Politecnico di Milano, Milano, Italy

CF-3.1 TUE 18:30

Guiding of Laser Pulses at the Theoretical Limit – 97% Throughput Hollow-Core Fibers

Y.-G. Jeong[1], R. Piccoli[1], A. Rovere[1], L. Zanotto[1], G. Tempea[2], D. Wilson[1,2], M. Ivanov[1,2], A. Ramirez[2], R. Morandotti[1,3], F. Légaré[1], L. Razzari[1], and •B.E.

ROOM 11

18:30 – 20:00

CH-5: Imaging in Scattering Media

Chair: Adrian Podoleanu, University of Kent, Canterbury, United Kingdom

CH-5.1 TUE (Invited) 18:30

Supercontinuum based mid-infrared OCT, spectroscopy, and hyperspectral imaging

C.R. Petersen[1,3], N.M. Israelsen[1,3], G. Woyessa[1], K. Kwarkye[1], R.E. Hansen[1], C. Markos[1,3], A. Khodabakhsh[4], F.J.M. Harren[4], P. Rodrigo[2], P. Tidemand-Lichtenberg[2],

ROOM 12

18:30 – 20:00

CC-3: High Power THz Sources

Chair: Dmitry Turchinovich, University of Bielefeld, Bielefed, Germany

CC-3.1 TUE 18:30

High Power THz Generation Using Tilted Pulse Fronts with Low Pump Pulse Energies

•F. Wulf, T. Vogel, S. Mansourzadeh, M. Hoffmann, and C. Saraceno; Ruhr-University Bochum, Bochum, Germany

We investigate THz generation us-

ROOM 1

optical clocks and their use for fundamental tests of the standard model as well as novel applications of clocks for mapping the Earth's geoid.

ED-4.2 TUE 19:00

Spectral Hole Burning for Ultra-stable Lasers

•S. Zhang[1], N. Lučić[1], N. Galland[1,2], R. Le Targat[1], A. Ferrier[3], P. Goldner[3], B. Fang[1], S. Seidelin[2,4], and Y. Le Coq[1]; [1]LNE-SYRTE, Observatoire de Paris, Université

ROOM 2

the characteristic length of interactions.

ROOM 3

Lyon, Univ Claude Bernard Lyon 1, CNRS, Institut Lumière Matière, Villeurbanne, France; [2]Theoretische Chemie, PCI, Universität Heidelberg, Heidelberg, Germany; [3]Leiden Observatory, Leiden University, Leiden, Netherlands

The relaxation timescales of correlation bands, features created by electron correlation, are measured experimentally in several molecules. A simple model based on Fermi golden rule is proposed to explain the size-dependency of the results.

CG-4.2 TUE 18:45

Coherent control of ultrafast XUV transient absorption

•P. Peng[1,2], Y. Mi[1], M. Lytova[2], M. Britton[2], X. Ding[1,2], A. Naumov[1], P. Corkum[1,2], and D. Villeneuve[1,2]; [1]Joint Attosecond Science Laboratory, National Research Council and University of Ottawa, Ottawa, Canada; [2]Department of Physics, University of Ottawa, Ottawa, Canada

We demonstrated coherent control of molecular absorption line shape and optical gain in ultrafast XUV transient absorption spectroscopy of hydrogen and deuterium molecules.

CG-4.3 TUE 19:00

Femtosecond-resolved Rydberg states dynamics in chiral molecules

•V. Wanie[1,2], E. Bloch[3], E.P. Månsson[1], L. Colaizzi[1,4], K. Saraswathula[1], S. Riabchuk[4], F. Légaré[2], A. Trabattoni[1], M.-C.

ROOM 4

pulses at 2 μm from a MHz repetition rate fiber laser can trigger the formation of frequency-shifted solitons up to 2.95 μm with 50 nJ energy and 86 fs duration pulse.

CJ-2.2 TUE 18:45

Passively mode-locked 2.8 μm polarization maintaining fiber laser

•A. Kouta[1], T. Berthelot[2], R. Becheker[1], S. Cozic[2], S. Idlahcen[1], T. Godin[1], P. Camy[3], S. Poulain[2], and A. Hideur[1]; [1]CORIA - CNRS - Université de Rouen Normandie - INSA Rouen, Rouen, France; [2]Le Verre Fluoré, Bruz, France; [3]CIMAP, ENSICAEN-CNRS-CEA-Université Caen Normandie, Caen, France

We report on the first demonstration of a passively mode-locked oscillator featuring a polarization maintaining erbium-doped ZBLAN fiber and generating a highly stable ultrashort pulses with 12 ps duration at a 28.8 MHz repetition rate.

CJ-2.3 TUE 19:00

Tuneable Self-Mode-Locking in a nJ- and fs-class Thulium-doped All-Fibre Laser

•D. Kirsch and M. Chernysheva; Leibniz Institute of Photonic Technology, Jena, Germany

The capability of filter-less tuneabil-

ROOM 5

Alamos National Laboratory , Los Alamos, NM, USA

Optical refrigeration has shown record cooling of Yb:YLF crystals to <90K, and cooling of a payload (IR sensor) to 130K. In parallel, exploiting this concept for developing lasers without internal heat generation has been advancing.

CA-4.2 TUE 19:00

Temperature-dependent spectroscopy of Yb:YLF and prospects for laser cooling

•S. Püschel, S. Kalusniak, C. Kränkel, and H. Tanaka; Leibniz-Institut für Kristallzüchtung, Berlin, Germany

We present temperature-dependent

ROOM 6

, Birkerød, Denmark; [2]FEMTO-ST, Besançon, France; [3]DTU Fotonik, Lyngby, Denmark

We report an ultra-flat octave-spanning (670-1390 nm) coherent supercontinuum using a femtosecond-pumped all-normal dispersion polarization-maintaining fiber with excellent noise (RIN<0.54%) and polarization properties (PER>17 dB).

CD-5.2 TUE 18:45

Temporal fine structure of all-normal dispersion fiber supercontinuum

A. Rampur[1], D.-M. Spangenberg[1], G. Stępniewski[2,3], D. Dobrakowski[2], K. Tarnowski[4], K. Stefańska[4], A. Paździor[5], P. Mergo[5], T. Martynkien[4], T. Feurer[1], •M. Klimczak[2], and A. Heidt[1]; [1]Institute of Applied Physics, University of Bern, Bern, Switzerland; [2]Faculty of Physics, University of Warsaw, Warsaw, Poland; [3]Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland; [4]Department of Optics and Photonics, Wroclaw University of Science and Technology, Wroclaw, Poland; [5]Laboratory of Optical Fiber Technology, Maria Curie-Sklodowska University, Lublin, Poland

Experimental characterization of spectro-temporal structure of octave-spanning, coherent fiber supercontinuum pulses is performed and full-field information is retrieved using time-domain ptychography. Fast femtosecond oscillations are observed and traced back to imperfections of the pump pulses.

CD-5.3 TUE 19:00

Noise Fingerprints of Fiber Supercontinuum Sources

•D.-M. Spangenberg[1], B. Sierro[1], A. Rampur[1], P. Hänzi[1], A. Hartung[2], P. Mergo[3], K. Tarnowski[3], T. Martynkien[3], M. Klimczak[4], and A. Heidt[1]; [1]Institute of Applied

ROOM 7

Highly fluorescent quantum dots (QDs) have been photoligated with multifunctional hydrophilic ligands that are compact and compatible with strain-promoted click conjugation. These QDs were then used as effective probes for immunofluorescence and in-vivo imaging.

CE-4.2 TUE 19:00

New laser crystals based on CaF2:Nd with double buffer ions for high energy lasers applications

•*C. Meroni*[1], *A. Braud*[1], *J.-L. Doualan*[1], *C. Maunier*[2], *D. Penninckx*[2], *and P. Camy*[1]; [1]*Centre de recherche sur les Ions, les Matéri-*

ROOM 8

Highly-efficient entanglement storage in quantum memories is a critical re-quirement for quantum networks. We present an experiment where we stored single-photon entanglement into two atomic-ensemble based quantum memories with an overall efficiency of 87%.

EB-5.2 TUE 19:00

Event-Ready Entanglement of Distant Atoms Distributed at Telecom Wavelength

•*T. van Leent*[1,2], *F. Fertig*[1,2], *M. Bock*[3], *R. Garthoff*[1,2], *Y. Zhou*[1,2], *S. Eppelt*[1,2], *W. Zhang*[1,2], *C. Becher*[3], *and H. Weinfurter*[1,2,4]; [1]*Fakultät*

ROOM 9

of Physics, The Pennsylvania State University, University Park, Pennsylvania 16802, USA; [2]*Ming Hsieh Department of Electrical Engineering, University of Southern California, Los Angeles, California 90089, USA*; [3]*Physics Department and Research Center OPTIMAS, University of Kaiserslautern, 67663 Kaiserslautern, Germany*

We show that photonic-crystal environments can create symmetry-specific bandgaps that host symmetry-protected bound states in the continuum along a complete line in the Brillouin zone, which we prove to be impossible in homogeneous environments.

EC-3.2 TUE 19:00

Second-order topological modes in all-dielectric systems

•*J. Košata and O. Zilberberg*; *ETH Zurich, Zurich, Switzerland*

We introduce a scheme to create 0D topological modes in patterned all-dielectric 2D metamaterials, pre-

ROOM 10

Schmidt[2]; [1]*INRS - EMT, Varennes, Canada*; [2]*few-cycle Inc., Varennes, Canada*; [3]*IFFS – UESTC, Chengdu, China*

We describe a compact, 1-m-long, hollow-core fiber (HCF) with 97.4% transmission. 1mJ, 170fs pulses are compressed to 25fs with 92% total efficiency, energy stability of 0.6% RMS and an M2 parameter of about 1.05.

CF-3.2 TUE 18:45

High-energy multidimensional solitary states in hollow-core fibres

•*G. Fan*[1], *R. Safaei*[1], *O. Kwon*[1], *K. Légaré*[1], *P. Lassonde*[1], *B. Schmidt*[2], *H. Ibrahim*[1], *and F. Légaré*[1]; [1]*Institut National de la Recherche Scientifique, Centre Énergie Matériaux et Télécommunications, Montreal, Canada*; [2]*few-cycle. Inc., Montreal, Canada*

We report the first observation of the formation of multidimensional solitary states in a gas-filled hollow-core fibre, presenting a route toward a new class of compact, tunable and high-energy spatiotemporally engineered light sources based on picosecond ytterbium technology.

CF-3.3 TUE 19:00

Raman conversion in a multipass cell

•*N. Daher*[1], *X. Délen*[1], *F. Guichard*[2], *M. Hanna*[1], *and P. Georges*[1]; [1]*Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, 91127,*

ROOM 11

C. Pedersen[2], *and* •*O. Bang*[1,3]; [1]*DTU Fotonik, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark*; [2]*DTU Fotonik, Technical University of Denmark, 4000 Roskilde, Denmark*; [3]*NORBLIS IVS, 2830 Virum, Denmark*; [4]*Trace Gas Research Group, IMM, Radboud University, Nijmegen, Netherlands*

We present the latest result on high average power MHz mid-IR supercontinuum lasers and their application in hyper-spectral imaging, real-time OCT, and trace gas monitoring.

CH-5.2 TUE 19:00

Ptychographic optical coherence tomography

•*M. Du*[1,2], *L. Loetgering*[1,2], *K.S.E. Eikema*[1,2], *and S. Witte*[1,2]; [1]*ARCNL, Amsterdam, Netherlands*; [2]*Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

ROOM 12

ing tilted pulse fronts with high power, high repetition rate driving lasers. It is shown that small beam sizes limit the maximum conversion efficiency due to spatial walk-off.

CC-3.2 TUE 18:45

Demonstration of Imaging-Free Terahertz Generation Setup Using Segmented Tilted-Pulse-Front Excitation

•*G. Krizsán*[1,2], *G. Polónyi*[2,3], *T. Kroh*[4,5], *G. Tóth*[1], *Z. Tibai*[1], *N.H. Matlis*[4], *F.X. Kärtner*[4,5], *and J. Hebling*[1,2,3]; [1]*Institute of Physics, University of Pécs, Pécs, Hungary*; [2]*Szentágothai Research Centre, University of Pécs, Pécs, Hungary*; [3]*MTA-PTE High-Field Terahertz Research Group, Pécs, Hungary*; [4]*Center for Free-Electron Laser Science, Desy, Hamburg, Germany*; [5]*The Hamburg Centre for Ultrafast Imaging, Univesity of Hamburg, Hamburg, Germany*

Generation of single-cycle THz pulses with more than 40 μJ energy at room temperature were demonstrated with an imaging-free, scalable terahertz pulse source.

CC-3.3 TUE 19:00

High efficiency, multicycle terahertz generation in periodically poled lithium niobate using a two-line laser

•*H. Olgun*; *Center for Free-Electron Laser Science , Hamburg, Germany*

Using a custom, home-built,

PSL, CNRS, Sorbonne Université, Paris, France; [2]Univ. Grenoble Alpes, CNRS, Grenoble INP and Institut Néel, Grenoble, France; [3]Institut de Recherche de Chimie Paris, Université PSL, Chimie ParisTech, CNRS, Paris, France; [4]Institut Universitaire de France, Paris, France

Ultra-stable lasers achieved by the spectral hole burning in rare-earth ion-doped crystals are realized and studied. Ultimate precision is evaluated from sensitivity measurements to various parameters (E-field, temperature, acceleration, detection noise).

ED-4.3 TUE 19:15

More Than 34 dB Backscattering Suppression in Microresonators

•*A.Ø. Svela[1,2,3], J.M. Silver[4], L. Del Bino[2], S. Zhang[2], M.M.T. Woodley[1], M.R. Vanner[1,3], and P. Del'Haye[2,5]; [1]Blackett Laboratory, Imperial College London, London, United Kingdom; [2]Max Planck Insitute for the Science of Light, Erlangen, Germany; [3]Clarendon Laboratory, Univeristy of Oxford, Oxford, United Kingdom; [4]National Physical Laboratory, Teddington, United Kingdom; [5]Friedrich Alexander University Erlangen-Nuremberg, Erlangen, Germany*

We demonstrate a method for reducing backscattering of light in whispering-gallery-mode resonators, achieving >34 dB suppression of the intrinsic backscattering level. The method relies on positioning a sub-wavelength-size scatterer within the resonator's evanescent field.

Heitz[5], N. Ben Amor[5], V. Blanchet[3], Y. Mairesse[3], B. Pons[3], and F. Calegari[1,4,6,7]; [1]Center for Free-Electron Laser Science, DESY, Hamburg, Germany; [2]Institut National de la Recherche Scientifique, Varennes, Canada; [3]Université de Bordeaux - CNRS - CEA, Talence, France; [4]Universität Hamburg, Hamburg, Germany; [5]Université Toulouse UPS CNRS, Toulouse, France; [6]The Hamburg Centre for Ultrafast Imaging, Hamburg, Germany; [7]Institute for Photonics and Nanotechnologies CNR-IFN, Milano, Italy

By exploiting the temporal resolution provided by a unique light source delivering few-femtosecond ultraviolet pulses, the ultrafast relaxation dynamics of photoexcited chiral molecules was studied using time-resolved circular dichroism measurements over few tens of femtoseconds.

CG-4.4 TUE 19:15

Probing influence of molecular dynamic polarization in photoemission delays near giant resonance in C60

•*S. Biswas[1,2], A. Trabattoni[3], P. Rupp[1,2], Q. Liu[1,2], J. Schötz[1,2], P. Wnuk[1,2], M. Galli[4,5], E.P. Mansson[3,4], V. Manie[3,4,6], M. Nisoli[4,5], U.D. Giovannini[7,8], A. Rubio[7,9], M. Magrakvelidze[10], H. Chakraborty[11], M.F. Kling[1,2], and F. Calegari[3,4,12]; [1]Physics Department, Ludwig-Maximilians-Universität Munich, Munich, Germany; [2]Max Planck Institute of Quantum Optics, Garching, Germany; [3]Center for Free-Electron Laser Science, DESY, Hamburg, Germany; [4]CNR-IFN, Milano, Italy; [5]Department of Physics, Politecnico di Milano, Milano, Italy; [6]INRS, Varennes (Qc), Canada; [7]MPSD and CFEL, Hamburg, Germany; [8]Dip. di Fisica e Chimica, Università degli Studi di Palermo, Palermo, Italy; [9]CCQ, The Flatiron Institute, New York, USA; [10]Department of Physics, University of Mary Washington,*

ity in a self-mode-locked oscillator is explored. The laser accesses a wavelength span of 1873-1962 nm with up to 68 mW output, 350 fs pulse duration and 44 MHz repetition rate.

CJ-2.4 TUE 19:15

Hybrid Mode-locking in a Thulium-doped Fiber Mamyshev Osillator

•*B. Schuhbauer[1], V. Adolfs[1], P. Repgen[1], M. Hinkelmann[1,2], A. Wienke[1], J. Neumann[1,2], and D. Kracht[1,2]; [1]Laser Zentrum Hannover e.V., Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany*

We present the characteristics of a self-starting hybrid mode-locked Mamyshev oscillator. It emitted a pulse train at 16.55 MHz with a pulse energy of 1.6 nJ. The chirped pulses could be compressed to 295 fs.

spectroscopy and lifetime measurements of Yb:YLF with a setup suppressing reabsorption in a range between 17 K to 440 K. This enables to re-evaluate the potential of Yb:YLF for laser cooling.

CA-4.3 TUE 19:15

100 fs LED-pumped Cr:LiSAF regenerative amplifier

•*H. Taleb, P. Pichon, F. Druon, F. Balembois, and P. Georges; Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, Palaiseau, France*

We demonstrate the first LED-pumped femtosecond Cr:LiSAF regenerative amplifier operating at a 10 Hz repetition rate. After recompression, we obtain 100 fs pulses with 0.3 mJ pulse energy at 835 nm.

Physics, University of Bern, Bern, Switzerland; [2]Leibniz-Institute of Photonic Technology, Jena, Germany; [3]Wroclaw University of Science and Technology, Wroclaw, Poland; [4]Faculty of Physics, University of Warsaw, Warsaw, Poland

We present a novel technique for measuring unique ”noise fingerprints” of fiber supercontinuum (SC) sources, revealing a strong dependence of SC relative intensity noise not only on the dispersion of the fiber, but also on its cross-sectional geometry.

CD-5.4 TUE 19:15

All-Optical Switching of Supercontinuum Spectra

•*O. Melchert[1,2,3], A. Tajalli[1,2], A. Pape[2], R. Arkhipov[4], S. Willms[1,2], I. Babushkin[1,2], D. Skryabin[5], G. Steinmeyer[6,7], U. Morgner[1,2,3], and A. Demircan[1,2,3]; [1]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering - Innovation Across Disciplines), Hannover, Germany; [3]Hannover Centre for Optical Technologies, Hannover, Germany; [4]St. Petersburg State University, St. Petersburg, Russia; [5]Department of Physics, University of Bath, Bath, United Kingdom; [6]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [7]Max Born Institute, Berlin, Germany*

We discuss all-optical switching of parts of soliton fission induced supercontinuum spectra using a dispersive wave, enabled by a nonlinear interaction mechanism. We achieve ultrafast switching times, high con-

aux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen, 6 Blvd Maréchal Juin, Caen, France; [2]CEA CESTA, 15 avenue des Sablières, CS 60001, Le Barp Cedex, France

The co-doping of CaF2:Nd3+ with different buffer ions enables a fine tailoring of spectroscopic properties making this family of material promising for large-scale high peak power diode-pumped amplifiers.

CE-4.3 TUE 19:15

Growth and Polarized Spectroscopy of Red-Emitting Monoclinic Eu:CsGd(MoO4)2 Crystal with a Layered Structure

•*A. Volokitina*[1,2]*, P. Loiko*[3]*, A. Pavlyuk*[4]*, S. Slimi*[1]*, R.M. Solé*[1]*, M. Aguiló*[1]*, F. Díaz*[1]*, and X. Mateos*[1]; [1]*Universitat Rovira i Virgili (URV), Tarragona, Spain*; [2]*ITMO University, St. Petersburg, Russia*; [3]*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen , France*; [4]*A.V. Nikolaev Institute of Inorganic Chemistry, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia*

17 at.% Eu:CsGd(MoO4)2 double molybdate crystal is grown from the flux. It is monoclinic, possesses a layered structure and exhibits perfect cleavage. An extremely strong polarization-anisotropy of spectroscopic properties of this red-emitting material is revealed.

für Physik, Ludwig-Maximilians-Universität, München, Germany; [2]Munich Center for Quantum Science and Technology (MCQST), München, Germany; [3]Fachrichtung Physik, Universität des Saarlandes, Saarbrücken, Germany; [4]Max-Planck-Institut für Quantenoptik, Garching, Germany

We present results demonstrating heralded entanglement between two distant Rubidium 87 atoms employing fiber links up to 22 km. To overcome attenuation loss in the fibers we use polarization-preserving quantum frequency conversion to telecom wavelength.

EB-5.3 TUE 19:15

Multimode quantum networking with trapped ions

•*V. Krutyanskiy*[1,2]*, V. Krcmarsky*[1,2]*, M. Canteri*[1,2]*, M. Meraner*[1,2]*, J. Schupp*[1,2]*, and B. Lanyon*[1,2]; [1]*Institute for Quantum Optics and Quantum Information of Austrian Academy of Sciences, Innsbruck, Austria*; [2]*University of Innsbruck, Innsbruck, Austria*

We demonstrate the production of trains of telecom photons, each maximally entangled with a different matter-qubit in a quantum register, and their use to distribute light-matter entanglement over a record 100 km of optical fiber.

senting analytical and numerical results and generalizing to a broad range of lattice structures.

EC-3.3 TUE 19:15

Non-Abelian Bloch oscillations in higher-order topological insulators

•*M. Di Liberto*; *Institute for Quantum Optics and Quantum Information, Innsbruck, Austria*

In this work, we show that higher-order topological insulators host peculiar non-Abelian Bloch oscillations with multiplied period, where the inter-band dynamics occurs in sync with with the Hall displacement of the wavepacket.

Palaiseau, France; [2]Amplitude Laser, 11 Avenue de Canteranne, Cité de la Photonique, 33600 Pessac, France

We demonstrate Raman frequency conversion of stretched femtosecond pulses in a KGW crystal included in a multipass cell. The generation of 1st and 2nd Stokes is obtained with ~41% and ~25% conversion efficiencies, respectively.

CF-3.4 TUE 19:15

Octave-spanning infrared supercontinuum generation in a graded-index multimode Lead-Bismuth-Gallate fiber

•*Z. Eslami*[1]*, A. Filipkowski*[2,3]*, D. Pysz*[2]*, M. Klimczak*[3]*, R. Buczynski*[2,3]*, and G. Genty*[1]; [1]*Photonics Laboratory, Tampere University, Tampere, Finland*; [2]*Łukasiewicz Research Network – Institute of Microelectronics and Photonics, Warsaw, Poland*; [3]*Faculty of Physics, University of Warsaw, Warsaw, Poland*

We demonstrate supercontinuum generation in the infrared from 1000 nm to 2800 nm in a lead-bismuth-gallate multimode graded-index fiber with near single-mode characteristics beam profile. Our results open the route towards high-power mid-infrared supercontinuum sources.

A new, high-resolution, 3D computational imaging method, termed ptychographic optical coherence tomography (POCT), is presented. We demonstrate the capabilities of POCT by imaging an axially discrete nano-lithographic structure and an axially continuous mouse brain sample.

CH-5.3 TUE 19:15

Enhanced transparency in strongly scattering media

•*A. Rates*[1]*, A.P. Mosk*[2]*, A. Lagendijk*[1]*, and W.L. Vos*[1]; [1]*Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands*; [2]*Debye Institute for NanoMaterials Science and Center for Extreme Matter and Emergent Phenomena, Utrecht University, Utrecht, Netherlands*

Based on the Mutual Extinction and Transparency effect, we control the total extinction of a highly scattering soot sample using two beams and controlling their relative phase and angle.

two-line laser source, record level optical-to-multicycle terahertz efficiencies of 0.49% at 290 GHz and 0.89% at 530 GHz were demonstrated in MgO doped PPLN crystals.

CC-3.4 TUE 19:15

High-Power Broadband THz Source in Organic Crystal BNA at MHz Repetition Rates

•*S. Mansourzadeh*[1]*, T. Vogel*[1]*, M. Shalaby*[2]*, F. Wulf*[1]*, and C.J. Saraceno*[1]; [1]*Ruhr Universität Bochum, Bochum, Germany*; [2]*Swiss Terahertz Research-Zurich , Zurich, Switzerland*

We investigate THz average power scaling at MHz repetition rate in the organic crystal BNA for the first time, reaching an average power of 490 μW at 10% duty cycle with conversion efficiency of 5×10-4.

Fredericksburg, USA; [11]Department of Natural Sciences, D L Hubbard Center for Innovation, Northwest Missouri State University, Maryville, USA; [12]Institut für Experimentalphysik, Universität Hamburg, DESY, Hamburg, Germany

Measurement of photoemission delays for C60 around giant plasmon resonance, using attosecond streaking metrology. Combined experimental and theoretical investigations reveal the influence of dynamic polarizability and collective excitation.

trast and satisfy the fan-out criterion.

ED-4.4 TUE 19:30

Broadband Optical Spectrum Downconversion to RF Using Integrated Dual-Comb Source

•*N. Dmitriev[1,2], A. Voloshin[1,5], S. Koptyaev[3], and I. Bilenko[1,4]; [1]Russian Quantum Center, Moscow, Russia; [2]Moscow Institute of Physics and Technology, Dolgoprudny, Russia; [3]Samsung R&D Institute Russia, SAIT-Russia Laboratory, Moscow, Russia; [4]Faculty of Physics, M.V. Lomonosov Moscow State University, Moscow, Russia; [5]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Luasanne, Switzerland*

For the first time, dual-comb operation of packaged fully integrated microcombs based on LD-pumped high-Q SiN microresonators down-converted 300 nm wide optical spectrum down-conversation to RF. It provides a route to an integrated broadband spectrometer.

EA-2.2 TUE 19:30

What could THz radiation bring to the field of ultracold gases?

•*A. Devolder[1], M. Desouter-Lecomte[2], O. Atabek[3], E. Luc-Koenig[4], and O. Dulieu[4]; [1]Chemical Physics Theory Group, Department of Chemistry, and Center for Quantum Information and Quantum Control, University of Toronto, Toronto, Canada; [2]Institut de Chimie Physique, CNRS, Université Paris-Sud, Université Paris-Saclay, Orsay, France; [3]Institut des Sciences Moléculaires d'Orsay, CNRS, Université Paris-Sud, Université Paris-Saclay, Orsay, France; [4]Laboratoire Aimé Cotton, CNRS, Université Paris-Sud, ENS Paris-Saclay, Université Paris-Saclay, Orsay, France*

New developments of THz source open new perspectives in control of ultracold systems. We propose two potential applications: control of scattering length and new paths for the formation of ultracold molecules.

CG-4.5 TUE 19:30

Inner Valence Hole Migration in Isopropanol

•*O. Alexander[1], T. Barillot[1], B. Cooper[1,2], T. Driver[1,3,4], D. Garratt[1], S. Li[4], A. Al Haddad[5,6], A. Sanchez-Gonzales[1], M. Agaker[7,8], C. Arrel[6], V. Averbukh[1], M. Bearpark[1], N. Berrah[9], C. Bostedt[5,6,10], J. Bozek[10], C. Brahms[1], P. Buksbaum[3], A. Clark[10], G. Doumy[5], R. Feifel[11], L. Fransinski[1], S. Jarosch[1], A. Johnson[1], L. Kjellsson[7], P. Kolorenc[12], Y. Kumagai[5], E. Larsen[1], P. Maria-Hernando[1], M. Robb[1], J.-E. Rubensson[7], M. Ruberti[1], C. Sathe[8], R. Squibb[11], J. Tisch[1], K. Ueda[13], M. Vacher[14], D. Walke[1], T. Wolf[3], D. Wood[1], V. Zhaunerchyk[11], A. Tan[1], P. Walter[4], T. Osipov[4], A. Marinelli[4], T. Maxwell[4], R. Coffee[4], A. Lutman[4], J. Cryan[4], and J. Marangos[1]; [1]Imperial College London, London, United Kingdom; [2]University College London, London, United Kingdom; [3]Stanford PULSE Institute, California, USA; [4]SLAC National Accelerator Laboratory, California, USA; [5]Argonne National Laboratory, Argonne, USA; [6]Paul-Scherrer Institute, Villigen, Switzerland; [7]Uppsala University, Uppsala, Sweden; [8]MAX IV Laboratory, Lund, Sweden; [9]University of Connecticut, Connecticut, USA; [10]EPFL, Lausanne, Switzerland; [11]University of Gothenberg, Gothenberg, Sweden; [12]Charles University, Prague, Czech*

CJ-2.5 TUE 19:30

2 μm mode-locked fiber laser enabled by NPR in a chalcogenide taper

•*I. Alamgir and M. Rochette; McGill University, Montreal, Canada*

We demonstrate the first thulium-doped mode-locked fiber laser based on nonlinear polarization rotation in a chalcogenide taper. The resulting laser is tunable and operates in both a continuous-wave mode-locked or a Q-switch mode-locked regime.

CA-4.4 TUE 19:30

Free-Space Intra-Cavity Dark Pulse Generation

•*M. Brunzell, M. Widarsson, F. Laurell, and V. Pasiskevicius; Royal Institute of Technology, Stockholm, Sweden*

First demonstration of free-space intra-cavity dark pulse generation through synchronized sum frequency generation between mode-locked and Nd:YVO4 laser. Cross-correlation shows dark pulses at 1064nm with sub-picosecond widths and 80% modulation depth at 150mW output.

CD-5.5 TUE 19:30

Transient Grating Single-shot Supercontinuum Spectral Interferometry (TG-SSSI)

•*S.W. Hancock, S. Zahedpour, and H.M. Milchberg; Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, USA*

We present transient grating single-shot supercontinuum spectral interferometry, a technique for the single-shot measurement of spatiotemporal (1D space + time) amplitude and phase of an ultrashort laser pulse.

ROOM 7

CE-4.4 TUE 19:30

Strategies for charging and discharging phosphors with persistent luminescence.

•*T. Delgado*[1], *V. Castaing*[1], *D. Rytz*[2], *E. Véron*[3], *M. Allix*[3], *and B. Viana*[1]; [1]*PSL University, Chimie ParisTech, IRCP-CNRS, Paris, France*; [2]*BREVALOR Sarl, Les Sciernes-d'Albeuve, Switzerland*; [3]*CNRS, CEMHTI UPR, Univ. Orléans, Orléans, France*

The persistent luminescence of afterglow materials such as aluminates and garnets in the shape of transparent ceramics and crystals is optimized thanks to volumetric effect and the election of the ideal charging source.

ROOM 8

EB-5.4 TUE 19:30

Telecom-Heralded Entanglement Distribution Between Remote Multimode Solid-State Quantum Memories

•*D. Lago-Rivera*[1], *S. Grandi*[1], *J.V. Rakonjac*[1], *A. Seri*[1], *and H. de Riedmatten*[1,2]; [1]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain*; [2]*ICREA-Institucio Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We demonstrate entanglement between two quantum nodes. The entanglement is generated by parametric down conversion, heralded by telecom photons and stored in multimode rare-earth based quantum memories. The memories share a delocalized excitation.

ROOM 9

EC-3.4 TUE 19:30

Realization of photonic square-root higher-order topological insulators

•*W. Yan*[1], *S. Xia*[1], *L. Tang*[1], *D. Song*[1], *J. Xu*[1], *and Z. Chen*[1,2]; [1]*The MOE Key Laboratory of Weak-Light Nonlinear Photonics, TEDA Applied Physics Institute and School of Physics, Nankai University, Tianjin, China*; [2]*Department of Physics and Astronomy, San Francisco State University, San Francisco, California, USA*

We experimentally demonstrate the square-root higher-order topological insulators, unveiling two kinds of corner states that reside in different band gaps of a photonic super-honeycomb lattice established with photorefractive cw-laser-writing technique.

ROOM 10

CF-3.5 TUE (Invited) 19:30

Laser lightning rod and artificial fog dissipation

•*J.-P. Wolf*; *University of Geneva, Geneva, Switzerland*

We present a unique TW-class ultrashort laser with kW average power. This laser is used for triggering and guiding upward flashing lightnings and for opening clear channels in fog for free space optical (FSO) communications.

ROOM 11

CH-5.4 TUE 19:30

Optical Coherence Microscopy for Integrated Photonics Devices Imaging

•*M.A. Sirotin*[1], *M.N. Romodina*[1], *E.V. Lyubin*[1], *I.V. Soboleva*[1,2], *V.V. Vigdorchik*[1], *K.R. Safronov*[1], *D.V. Akhremenkov*[1], *V.O. Bessonov*[1,2], *and A.A. Fedyanin*[1]; [1]*Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia*; [2]*Frumkin Institute of Physical Chemistry and Electrochemistry, Russian Academy of Sciences, Moscow, Russia*

We report on the development of a method for integrated photonics devices imaging based on phase-sensitive optical coherence microscopy. This method makes it possible to study the internal structure of devices and allows flaw detection.

ROOM 12

CC-3.5 TUE 19:30

Powerful Broadband Intra-Oscillator THz Generation Inside a Kerr-Lens Mode-Locked Diode-Pumped Laser Cavity

•*M. Hamrouni , J. Drs, J. Fischer, K. Komagata, N. Modsching , V.J. Wittwer , F. Labaye , and T. Südmeyer* ; *Laboratoire Temps-Fréquence (LTF), Institut de Physique, Université de Neuchâtel, Neuchâtel, Switzerland*

We exploit the intracavity enhanced performance of an ultrafast bulk oscillator to generate 150-μW of THz average power in 5-THz spectral bandwidth requiring only 7-W of diode-pump power.

ED-4.5 TUE 19:45

Spectra Characterization of Ring Quantum Cascade lasers

•B. Meng, M. Betrand, J. Hillbrand, M. Beck, and J. Faist; *ETH, Zurich, Switzerland*

The spectra of mid-infrared frequency comb based on the ring QCLs with the optimized structure reported. The spectra show multiple phase transitions, with a spectrum regime that be fitted by a sech2 function.

EA-2.3 TUE 19:45

Optical shielding of destructive chemical reactions between ultracold ground-state NaRb molecules

•A. Orban[1], T. Xie[2], M. Lepers[3], O. Dulieu[2], and N. Bouloufa-Maafa[2]; *[1]Institute for Nuclear Research (ATOMKI), H-4001 Debrecen, Pf. 51, Hungary*; *[2]Universite Paris-Saclay, CNRS, Laboratoire Aime Cotton, 91405 Orsay, France*; *[3]Laboratoire Interdisciplinaire Carnot de Bourgogne, CNRS, Universite de Bourgogne Franche-Comte, 21078 Dijon, France*

Optical shielding of destructive chemical reactions between ultracold ground-state NaRb molecules will be presented. The proposed optical shielding leads to dramatic suppression of inelastic collisions which opens the possibility for strong increase of trapping time.

Republic; *[13]Tohoku Universy, Sendai, Japan*; *[14]Universite du Nantes, Nantes, France*

Correlated neutral eigenstates and virtual orbitals drive purely electronic charge motion within a cation following photoemission. We employ novel detection methods in a few-femtosecond two-colour X-ray pump-probe arrangement to measure this in isopropanol.

CG-4.6 TUE 19:45

Time-resolved water-window X-ray spectroscopy of chemical reactions and charge dynamics in nano-solids in a liquid phase

•T. Balciunas[1], Y.-P. Chang[1], Z. Yin[2], A. Terpstra[1], C. Schmidt[1], J.-E. Moser[3], J.-P. Wolf[1], and H.J. Wörner[2]; *[1]GAP-Biophotonics, Université de Genéve, Geneva, Switzerland*; *[2]Laboratory for Physical Chemistry, ETH Zürich, Zürich, Switzerland*; *[3]Institute of Chemical Sciences and Engineering, Lausanne, Switzerland*

We demonstrate time–resolved soft–X–ray absorption spectroscopy of liquid samples at K edges of carbon, nitrogen and titanium L2,3 edge using a sub–um liquid jet to study dynamics in aqueous solutions and nanoparticles.

CJ-2.6 TUE 19:45

Dumbbell-shaped Mode-locked Ho3+ - doped Fiber Laser

•S.A. Filatova[1], V.A. Kamynin[1], Y.G. Gladush[2], E.M. Khabushev[2], D.V. Krasnikov[2], A.G. Nasibulin[2,3], and V.B. Tsvetkov[1]; *[1]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia*; *[2]Skolkovo Institute of Science and Technology, Moscow, Russia*; *[3]Aalto University, Espoo, Finland*

We demonstrate a self-starting mode-locked holmium-doped fiber laser with the simple dumbbell-shaped cavity utilizing a polymer-free SWCNT. The effect of SWCNT layers number on the generation modes, stability, and self-starting was studied.

CA-4.5 TUE 19:45

Metasurface Dichroic Mirrors: Application to Low Quantum Defect Lasers

K. Georgiev[1], K. Kamali[2], L. Xu[2,3], M. Rahmani[2,3], A. Miroshnichenko[4], D. Neshev[2,5], and •I. Buchvarov[1,5]; *[1]Physics Department, Sofia University, Bulgaria , Sofia , Bulgaria*; *[2]ARC Centre of Excellence TMOS, Research School of Physics, Australian National University, Canberra, Australia*; *[3]Advanced Optics and Photonics Laboratory, Department of Engineering, Nottingham Trent University, Nottingham, United Kingdom*; *[4]School of Engineering and Information Technology, University of New South Wales, Canberra, Australia*; *[5]John Atanasoff Center for Bio and Nano Photonics (JAC BNP), Sofia, Bulgaria*

We demonstrate the design and implementation of optical metasurface mirror with a steep spectral change of its reflection. Using it as a resonator pump mirror of an Yb-laser, stable operation is obtained without its damage.

CD-5.6 TUE 19:45

UV Extension of Supercontinuum via Tapered Single-ring PCF

•M.I. Suresh[1], J. Hammer[1], N.Y. Joly[1,2], P.S.J. Russell[1,2], and F. Tani[1]; *[1]Max Planck Institute for the Science of Light, Erlangen, Germany*; *[2]Friedrich-Alexander-Universität, Erlangen, Germany*

Tapered Kr-filled single-ring photonic crystal fibre, pumped by 220 fs 7.8 μJ pulses at 1030 nm, is used to generate a broadband supercontinuum with spectral power density 0.18 mW/nm between 200 and 350 nm.

ROOM 7

CE-4.5 TUE 19:45

Transparent Gahnite Ceramics Cr3+:ZnAl2O4 – Novel Red-Emitting Material

•*L. Basyrova*[1], *S. Balabanov*[2], *A. Belyaev*[2], *I. Mukhin*[3], *I. Kuznetsov*[3], *J.-L. Doualan*[1], *P. Camy*[1], *and P. Loiko*[1]; [1]*Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France*; [2]*G.G. Devyatykh Institute of Chemistry of High-Purity Substances, RAS, Nizhny Novgorod, Russia*; [3]*Institute of Applied Physics of the Russian Academy of Science, Nizhny Novgorod, Russia*

Transparent gahnite ceramics 1 at.% Cr:ZnAl2O4 are fabricated by hot pressing at 1520 ˚C / 40 MPa. Chromium ions Cr3+ reside in octahedral sites exhibiting intense broadband red luminescence with a lifetime of 2.14 ms.

ROOM 8

EB-5.5 TUE 19:45

A single ion and two photons: A programmable three-qubit interface

•*O. Elshehy, M. Steinel , S. Kucera, M. Kreis, and J. Eschner*; *Universität des Saarlandes, Saarbrücken, Germany*

We demonstrate a three-qubit protocol based on the sequential heralded absorption of two photons by a single 40Ca+ ion. The programmable protocol provides quantum repeater functionality or serves as a single-ion quantum memory.

ROOM 9

EC-3.5 TUE 19:45

Topological Corner State Laser in Kagome Waveguide Arrays

H. Zhong[1], *Y.V. Kartashov*[2], *A. Szameit*[3], *Y.D. Li*[1], *C.L. Liu*[1], *and* •*Y.Q. Zhang*[1]; [1]*Key Laboratory for Physical Electronics and Devices of the Ministry of Education & Shaanxi Key Lab of Information Photonic Technique, School of Electronic and Information Engineering, Xi'an Jiaotong University, Xi'an, China*; [2]*Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow, Russia*; [3]*Institute for Physics, University of Rostock, Rostock, Germany*

We predict that stable lasing in zero-dimensional corner states may occur in a second-order photonic topological insulator based on Kagome waveguide array with a rhombic configuration, under the balance between diffraction, focusing nonlinearity, uniform losses, two-photon absorption, and gain.

ROOM 10

ROOM 11

CH-5.5 TUE 19:45

Deep learning based direct aberration phase retrieval in stimulated emission depletion (STED) microscopy

•*Y. Wang*[1], *Y. Li*[2], *C. Hu*[2], *H. Yang*[2], *and M. Gu*[1]; [1]*Centre for Artificial-Intelligence Nanophotonics, School of Optical-Electrical and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China*; [2]*School of Optical-Electrical and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China*

We demonstrate a new and accurate method for the direct correction of phase aberration induced by the refractive index mismatch of specimen or systematic aberration in a stimulated emission depletion (STED) microscope using convolutional neural networks.

ROOM 12

CC-3.6 TUE 19:45

Two-color plasma THz transients at 400 kHz repetition rate

•*D.K. Kesim, C. Millon, A. Omar, T. Vogel, S. Mansourzadeh, F. Wulf, and C.J. Saraceno*; *Ruhr Universität Bochum, Bochum, Germany*

We demonstrate broadband THz generation using 36 μJ, 27 fs pulses via two-color air plasma at 400 kHz, the highest repetition rate reported. Acquired THz transients spanning 15 THz which was limited by detection.

13:30 – 14:30

CD-P: CD Poster Session

CD-P.1 TUE

Chiral high-harmonic spectroscopy in solids by polarization control of the driving strong field

•T. Heinrich[1], M. Taucer[2], O. Kfir[1,3], P.B. Corkum[2], A. Staudte[2], C. Ropers[1,3], and M. Sivis[1,3]; [1]4th Physical Institute – Solids and Nanostructures, University of Göttingen, Göttingen, Germany; [2]Joint Attosecond Science Laboratory, National Research Council of Canada and University of Ottawa, Ottawa, Canada; [3]Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

We demonstrate circularly polarized high harmonic generation in solids by using bi-chromatic three-fold driving fields and utilize the chiral sensitivity to investigate structural helicity of quartz and spontaneous chiral symmetry breaking at magnesium oxide surfaces

CD-P.2 TUE

High repetition rate green-pumped supercontinuum generation in calcium fluoride

•V. Marčiulionytė, V. Jukna, G. Tamošauskas, and A. Dubietis; Laser Research Center, Vilnius University, Vilnius, Lithuania

We demonstrate that loose focusing of the pump beam into a long (25 mm) CaF2 slab produces durable ultraviolet supercontinuum generation without optical degradation of untranslated crystal at a 10 kHz repetition rate.

CD-P.3 TUE

Picosecond VIS, UV and Deep UV Beams Generated at 100 kHz Diode-Pumped Yb:YAG Thin Disk Laser System

•H. Turcicova[1], O. Novak[1], J. Muzik[1,2], D. Stepankova[1,2], M. Smrz[1], and T. Mocek[1]; [1]HiLASE Centre, Inst. of Physics, CAS, Dolni Brezany, Czech Republic; [2]Faculty of Nuclear Sciences and Physical Engineering, CTU, Prague, Czech Republic

Generation of 1st up to 5th harmonic frequencies at 100 kHz picosecond Yb:YAG thin disk diode pumped laser is reported, based on SHG and SFG processes. Application potential of the harmonics is demonstrated.

CD-P.4 TUE

High-order breathing behaviour of solitons in a mode-locked laser

•X. Liu[1,2,3] and Y. Yang[1]; [1]College of Optical Science and Engineering, Zhejiang University, Hangzhou, China; [2]Nanjing University of Information Science & Technology, Nanjing, China; [3]Nanjing University of Aeronautics and Astronautics, Nanjing, China

We have experimentally revealed the superposition state of breathing soliton in a mode-locked laser, showing that there exist several breathing periods simultaneously for breathing soliton and breathing period is quite sensitive to the pump power.

CD-P.5 TUE

Temperature noncritical Pockels cell based on a single KTP crystal

S. Gagarskiy[1], S. Grechin[2], •P. Druzhinin[1], A. Sergeev[1], Y. Fomicheva[1], V. Rusov[3], N. Maklakova[4], and A. Yurkin[4]; [1]ITMO University, Sankt-Peterburg, Russia; [2]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; [3]Vavilov State Optical Institute, Saint Petersburg, Russia; [4]Siberian Monocrystal-Eksma, Novosibirsk, Russia

The temperature noncritical cut of KTP crystal for electro-optic Q-switch application is studied. Low temperature sensitivity allows using of single crystal Pockels cell scheme. Measured temperature range with contrast drop less than 10% was 10°C.

CD-P.6 TUE

Integrated phononic-photonic circuits on GaAs as a platform for microwave to optical signal transduction

•A. Khurana[1,2], P. Jiang[1], and K.C. Balram[1,3]; [1]Quantum Engineering Technology Labs, University of Bristol, Bristol BS8 1FD, United Kingdom; [2]School of Physics, H.H. Wills Physics Laboratory, University of Bristol, Bristol BS8 1FD, United Kingdom; [3]Department of Electrical and Electronics Engineering, University of Bristol, Woodland Road, Bristol BS8 1UB, United Kingdom

We demonstrate an acousto-optic modulator on a suspended GaAs platform for efficient microwave-to-optical transduction. Owing to high refractive index and photoelastic coefficients, GaAs offers strong optomechanical coupling to achieve a VπL of 0.22V.cm, even for relatively lower optical quality factors.

CD-P.7 TUE

In vivo zebrafish embryo heart using a new fast multiphoton microscope

•D. Zalvidea[1], Y. Lazis[2], X. Trepat[1], A. Raya[2], and E. Rebollo[3]; [1]Institute for Bioengineering of Catalonia (IBEC), Barcelona, Spain; [2]Center of Regenerative Medicine in Barcelona (CRMB), Barcelona, Spain; [3]Molecular Biology Institute of Barcelona (IBMB), Barcelona, Spain

We have designed and built a fast multiphoton microscope that allowed for deep volumetric imaging zebrafish embryo heart with a speed of 524x524x100 μm3 per second.

CD-P.8 TUE

Scalable Integrated Waveguide with CVD-Grown MoS2 and WS2 Monolayers on Exposed-Core Fibers

•G.Q. Ngo[1], A. George[2], A. Tuniz[3], E. Najafidehaghani[2], Z. Gan[2], T. Bucher[1], H. Knopf[1,4,5], S. Saravi[1], T. Lühder[6], S. Warren-Smith[7], H. Ebendorff-Heidepriem[7], A. Turchanin[2], M. Schmidt[6], and F. Eilenberger[1,4,5]; [1]Institute of Applied Physics, Friedrich Schiller University, Albert-Einstein-Str. 15, 07745 Jena, Germany; [2]Institute of Physical Chemistry, Friedrich Schiller University, Lessingstrasse 10, 07745 Jena, Germany; [3]University of Sydney, School of Physics, Physics Road, Camperdown NSW 2006, Australia; [4]Fraunhofer-Institute for Applied Optics and Precision Engineering IOF, Albert-Einstein-Str. 7, 07745 Jena, Germany; [5]Max Planck School of Photonics, 07745 Jena, Germany; [6]Leibniz Institute for Photonic Technology IPHT, Albert-Einstein-Str. 13, 07745 Jena, Germany; [7]Institute for Photonics and Advanced Sensing, University of Adelaide, Adelaide SA 5005, Australia

We introduce scalable integrated waveguides, where MoS2 and WS2 crystals are directly grown on the core of microstructured exposed-core fibers (ECFs) and demonstrate enhanced second-harmonic generation, third-harmonic generation, in-fiber exciton excitation, and photoluminescence collection.

CD-P.9 TUE

Chip-Scale Beta-Barium Borate Platform for Near-Infrared to Deep-Ultraviolet Nonlinear Integrated Photonics

•M.S. Mohamed and S. Forouhar; Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA

We present a novel chip-scale platform based on beta-barium borate nonlinear crystal-on-insulator, which provides an extended multi-octave spanning spectrum for nonlinear optical processes in integrated photonic circuits, from the near-infrared to the deep-ultraviolet range.

CD-P.10 TUE

Frequency comb generation based on optical parametric oscillation with second-order nonlinear materials

•N. Amiune[1], K. Buse[1,2], and I. Breunig[1,2]; [1]Department of Microsystems Engineering - IMTEK, University of Freiburg, Freiburg, Germany; [2]Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany

We investigate $\chi^{(2)}$ mid-infrared frequency comb generation based on degenerate optical parametric oscillation in a mm-sized cadmium silicon phosphide (CdSiP$_2$) whispering-gallery resonator. First observations of sidebands due to internally pumped second harmonic generation are presented.

CD-P.11 TUE

Heterogeneous silicon nitride waveguide integrated with few-layer WS$_2$ for on-chip nonlinear optics

Y. Wang[1], •V. Pelgrin[1,2], S. Gyger[3], C. Lafforgue[2], V. Zwiller[3], K.D. Jöns[3,4], E. Cassan[2], and Z. Sun[1,5]; [1]Department of Electronics and Nanoengineering, Aalto University, Aalto, Finland; [2]Universite' Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [3]Department of Applied Physics, KTH Royal Institute of Technology, Stockholm, Sweden; [4]Department of Physics, Paderborn University,, Paderborn, Germany; [5]QTF Centre of Excellence, Department of Applied Physics, Aalto University, Aalto, Finland

We report on the experimental investigation and the numerical modelling of nonlinear pulse propagation in a heterogeneous silicon nitride channel waveguide with the integration of a few-layer WS$_2$ flake significantly increasing the effective nonlinearity.

CD-P.12 TUE

Photorefractive induced slowdown of nanosecond light pulses in the nanosecond regime

•N. Bouldja[1,2], A. Grabar[3], M. Sciamanna[1,2], and D. Wolfersberger[1,2]; [1]Chaire Photonique, LMOPS, CentraleSupélec,, Metz, France; [2]Université de Lorraine, LMOPS, CentraleSupélec,, Metz, France; [3]Institute of Solid State Physics and Chemistry, Uzhhorod National University, Uzhhorod, Ukraine

We theoretically and experimentally demonstrate for the first time the possibility to slowdown nanosecond light pulses in a photorefractive crystal at room temperature.

CD-P.13 TUE

Dispersion engineered sum-frequency generation in a periodically poled thin-film LiNbO$_3$ nanowaveguide

•P. Kumar, M. Younesi, S. Saravi, T. Pertsch, and F. Setzpfandt; Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany

We experimentally demonstrate group index matched type-II sum frequency generation in a periodically poled thin film LiNbO$_3$ nanowaveguide through careful design of the waveguide dimensions to control the dispersion properties of its guided modes.

CD-P.14 TUE

Conical Third Harmonic Generation from Volume Nanogratings Induced by Filamentation of Femtosecond Pulses in Transparent Bulk Materials

•R. Grigutis[1], V. Jukna[1], M. Navickas[1], G. Tamošauskas[1], K. Staliūnas[1,2], and A. Dubietis[1]; [1]Laser Research Center, Vilnius University, Vilnius, Lithuania; [2]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

We demonstrate that filamentation of femtosecond laser pulses at high repetition rate inscribes a nanograting in the volume of transparent material, that has a certain spectrum of periods to phase match conical third harmonic generation.

CD-P.15 TUE

Kerr beam self-cleaning and supercontinuum generation in a graded-index few-mode photonic crystal fiber

•*F. Shabana M.A*[1,2], *V. Tombelaine*[2], *G. Huss*[2], *A.N. Ghosh*[3], *T. Sylvestre*[3], *J.-L. Auguste*[1], *M. Fabert*[1], *A. Tonello*[1], *V. Couderc*[1], *F. Reynaud*[1], *and P. Leproux*[1]; [1]*XLIM - Université de Limoges, Limoges, France*; [2]*LEUKOS, Limoges, France*; [3]*FEMTO-ST - Université Bourgogne Franche-Comté, Besançon, France*

We introduce the observation of Kerr-induced beam self-cleaning (KBSC) and supercontinuum generation in a few-mode photonic crystal fiber with a graded-index germanium-doped core. The very weak peak power threshold of KBSC process is highlighted.

CD-P.16 TUE

Performance of silicon OPUFs under variable input losses

•*J.E. Villegas*[1,2], *B. Paredes*[1], *and M. Rasras*[1]; [1]*New York University- Tandon School of Engineering, Brooklyn, USA*; [2]*New York University Abu Dhabi, Abu Dhabi, United Arab Emirates*

Study of the power stability of integrated silicon optical physical unclonable functions as hardware primitives of modern secure systems.

CD-P.17 TUE

A multi-channel pump-probe system for trARPES experiments

•*T. Golz, G. Indorf, J. Heye Buss, M. Petev, S. Starosielec, M. Schulz, and R. Riedel*; *Class 5 Photonics GmbH, Hamburg, Germany*

Here we present an optical parametric chirped pulse amplifier (OPCPA) multi-channel pump-probe laser systems providing pulses spanning from the XUV up to the THz range with a repetition rate of 100 kHz.

CD-P.18 TUE

All-fibered high-quality 28-GHz to 112 GHz pulse sources based on nonlinear compression of optical temporal besselons

•*A. Sheveleva and C. Finot*; *Laboratoire Interdisciplinaire CARNOT de Bourgogne, DIJON, France*

With a setup based on temporal and spectral processing we generate high quality pulse trains at high repetition rates (up to 112 GHz). Nonlinear propagation further compresses the pulses to subpicosecond durations.

CD-P.19 TUE

Ultrafast All-Optical Two-Colour Switching in Asymmetric Dual-Core Fibre

•*M. Longobucco*[1,2], *I. Astrauskas*[3], *A. Pugžlys*[3], *D. Pysz*[1], *F. Uherek*[4], *A. Baltuška*[3], *R. Buczyński*[1,2], *and I. Bugár*[1,4]; [1]*Department of Glass, Łukasiewicz - Institute of Microelectronics & Photonics, Wólczyńska 133, 01-919 Warsaw, Poland*; [2]*Department of Photonics, Faculty of Physics, University of Warsaw, Pasteura 5, 02-093 Warsaw, Poland*; [3]*Photonics Institute, TU Wien, Gußhausstraße 27-387, 1040 Vienna, Austria*; [4]*International Laser Centre, Ilkovičova 3, 841 04 Bratislava, Slovakia*

We present a two-colour control (1030 nm) – signal (1560 nm) pulse switching approach, using a highly nonlinear, fabricated in-house all-solid dual-core optical fibre with high contrast of refractive index and slight structual dual-core asymmetry.

CD-P.20 TUE

Electric Field Measurements in Plasmas with E-FISH Using Focused Gaussian Beams

•*T.L. Chng*[1], *S. Starikovskaia*[1], *and M.-C. Schanne-Klein*[2]; [1]*Laboratoire de Physique des Plasmas, École Polytechnique, Palaiseau, France*; [2]*Laboratoire d'Optique et Biosciences, École Polytechnique, Palaiseau, France*

We present a new theoretical and experimental analysis of electric field measurements in non-equilibrium plasmas using the E-FISH method, and show that the use of focused laser beams strongly affects the signal generation.

CD-P.21 TUE

Experimental investigation of the saturated regime of short pulse amplification in counter-pumped Raman amplifiers

•*G. Vanderhaegen, P. Szriftgiser, M. Conforti, A. Kudlinski, and A. Mussot*; *University of Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France*

We report an experimental study of the influence of the pulses width on a counter-propagating Raman pump. Transient and saturation effects and high signal powers are highlighted.

CD-P.22 TUE

Dual-pump Optical Parametric Oscillation in a 4H-SiC-on-insulator Microring Resonator

•*X. Shi*[1], *W. Fan*[1], *A. Yi*[2], *X. Ou*[2], *K. Rottwitt*[1], *and H. Ou*[1]; [1]*DTU Fotonik, Technical University of Denmark, Kgs. Lyngby, Denmark*; [2]*State Key Laboratory of Functional Materials for Informatics, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China*

We experimentally observe on-chip Kerr-nonlinearity based dual-pump optical parametric oscillation in a 4H-SiC-on-insulator microring resonator. The demonstration indicates SiC is a potential material for the frequency comb generation.

CD-P.23 TUE

Impact of Signal Waveform on the Accuracy of the Perturbation Methods for Compensation of Fiber Nonlinearity

•*S.V. Suchkov*[1], *A.A. Reduk*[1,2], *and S.K. Turitsyn*[1,3]; [1]*Novosibirsk State University, Novosibirsk, Russia*; [2]*Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia*; [3]*Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom*

We examine the impact of a carrier pulse shape on the accuracy of the perturbation theory of fiber channels. We demonstrate that temporally compact carrier pulses can be more efficient than conventional waveforms.

CD-P.24 TUE

Single pass second harmonic generation of 17 W at 532 nm and high resolution relative-intensity-noise transfer study.

•*C. Dixneuf*[1,2], *G. Guiraud*[2], *H. Ye*[1], *Y.-V. Bardin*[2], *M. Goeppner*[2], *G. Santarelli*[1], *and N. Traynor*[2]; [1]*LP2N, IOGS, CNRS and Université de Bordeaux, Talence, France*; [2]*Azurlight Systems, Pessac, France*

A complete characterization of the RIN transfer between fundamental and second harmonic is presented for the first time in our knowledge with a highly resolved method for a high output power of 17W at 532nm.

CD-P.25 TUE

Electric Field Induced Second Harmonic Generation In Silicon Waveguides: the role of the disorder

•*R. Franchi*[1], *C. Vecchi*[1], *M. Ghulinyan*[2], *and L. Pavesi*[1]; [1]*Nanoscience Laboratory, Department of Physics, University of Trento, Trento, Italy*; [2]*Sensors and Devices, Fondazione Bruno Kessler, Trento, Italy*

We demonstrate an improvement of the electric-field induced second-harmonic generation in an interdigitated poled silicon waveguide. Moreover, we study the role of the waveguide width fluctuations in widening of the generation bandwidth.

CD-P.26 TUE

Fabrication of Large Aperture PPRKTP with Short Period (3.43 μm) Using Coercive Field Engineering

•*C.S.J. Lee, A. Zukauskas, and C. Canalias*; *KTH Royal Institute of Technology, Stockholm, Sweden*

We demonstrate high-quality periodic poling of a 3-mm thick RKTP crystal with period of 3.43 μm using coercive field engineering. The PPRKTP shows a normalized conversion efficiency of 1.4 %/Wcm for SHG at 405 nm.

CD-P.27 TUE

Pure Nonlinear Optical Response in Plasmonic Nanoantennas

•*A. Niv*; *Ben-Gurion University of The Negev, Sde Boker, Israel*

We use a deep subwavelength-sized plasmonic heterodimer to explore a new source of optical nonlinearity. We present SHG from this source and discuss its efficiency, 3ed-order processes, higher harmonics generation, optical-rectification, and chaos.

CD-P.28 TUE

TI-REX: A Tunable Infrared laser for Experiments in nanolithography

•*Z. Mazzotta*[1,2], *J. Mathjissen*[1,2], *K. Eikema*[1,2], *O. Versolato*[1,2], *and S. Witte*[1,2]; [1]*Advanced Research Center for Nanolithography, Amsterdam, Netherlands*; [2]*LaserLaB, Department of Physics and Astronomy, Vrije Universiteit, Amsterdam, Netherlands*

TI-REX is a nanosecond mid-IR light source, with spectral tunability from 1.45 to 4.5μm, pulse energy up to 100mJ, and accurate temporal pulse shape control, and a great future tool for plasma-based extreme-ultraviolet generation studies.

CD-P.29 TUE

Quasi-Phase Matching and Crystal Segmentation for Robust Optical Parametric Amplification

•*M. Al-Mahmoud*[1], *V. Coda*[2], *A. Rangelov*[1], *and G. Montemezzani*[2]; [1]*Department of Theoretical Physics, Sofia University, Sofia, Bulgaria*; [2]*Université de Lorraine, CentraleSupélec, LMOPS,, Metz, France*

Combination of quasi-phase-matching with segmentation of the nonlinear crystal dramatically increases the robustness of frequency conversion processes with respect to changes of wavelengths, temperature or pump power, as illustrated for Optical Parametric Amplification.

CD-P.30 TUE

Enhancing the brightness of luminescent concentrators by one order of magnitude using light recycling

•*P. Pichon*[1], *M. Nourry-Martin*[1,2], *F. Druon*[1], *S. Darbon*[2], *P. Georges*[1], *and F. Balembois*[1]; [1]*Université Paris-Saclay, Institut d'Optique Graduate School, CNRS, Laboratoire Charles Fabry, 91127, Palaiseau, France*; [2]*CEA, DAM, DIF, F-91297, Arpajon, France*

This work shows how to enhance by one order of magnitude the brightness of LED-pumped luminescent concentrators. This results in a system counting among the brightest incoherent light sources emitting 2kW/cm^2/sr (63W from 1mm^2).

ROOM 1

CD-P.31 TUE

Improvement of Multiple-plate GaAs Stacks for Mid-infrared Quasi-phase-matching Wavelength-conversion Devices Fabricated with Room-temperature Bonding

•*I. Shoji, R. Tanimoto, and Y. Takahashi; Chuo University, Tokyo, Japan*

We achieved high transmittance over the whole aperture of a 25-plate GaAs stack for quasi-phase-matched mid-IR wavelength-conversion. This was accomplished by improved fabrication process using the room-temperature bonding.

CD-P.32 TUE

PP-crystals Lengths Optimization to Improve the Efficiency of Two-Cascade Nearly-Degenerate DFG of 3μm Radiation from Fiber NIR Lasers

•*I. Larionov, A. Gulyashko, and V. Tyrtyshnyy; NTO "IRE-Polus", Fryazino, Russia*

PP-crystals lengths optimization leads to 40% efficiency of the single-pass parametric down-conversion of two fiber lasers radiation to mid-IR range in experiment. The theoretical model gives the dependence between PP-crystals lengths and pump beam parameters.

CD-P.33 TUE

Manufacturing and characterization of frequency tripling mirrors

•*S. Balendat[1], M. Jupé[1,3], M. Steinecke[1], L. Jensen[1,3], A.K. Oskouei[4], W. Rudolph[4], D. Zuber[2,3], U. Morgner[2,3], and D. Ristau[1,2,3]; [1]Laser Zentrum Hannover e. V., Hannover, Germany; [2]Institute of Quantum Optics, Leibniz Universität Hannover, Hannover, Germany; [3]PhoenixD, Leibniz Universität Hannover, Hannover, Germany; [4]Dept. Physics and Astronomy, University of New Mexico, Albuquerque, USA*

We raised our layer thickness precision for an IBS process to produce THG mirrors by combining a high-resolution BBM including a multiplexer and establishing coating routines. Additionally the influence of the laser bandwidth is investigated.

CD-P.34 TUE

Multi-ordered IR Raman from KTiOPO4 in the nanosecond regime

•*K.M. Mølster, R. Lindberg, and F. Laurell; Department of Applied Physics, Royal Institute of Technology, KTH, Stockholm, Sweden*

We report 55% pump depletion into multi-ordered Raman generation in y-cut KTiOPO4 by stimulated polariton scattering. The output spectrum consists of combs separated by 8 and 20 THz, spanning 1095 nm to 1736 nm.

CD-P.35 TUE

Toward industrial and fibered non-linear sum frequency generation devices

•*A. Mehlman[1,2], D. Holleville[1], M. Lours[1], S. Bise[1], O. Acef[1], A. Boutin[2], K. Lepage[2], and L. Fulop[2]; [1]LNE-SYRTE, Paris, France; [2]Kylia, Paris, France*

We report on the development of an all-fibered sum frequency generation device using a PPLN crystal. A 5-5.5%/(W*cm) conversion efficiency and an 80% coupling efficiency were reached, with a peak-to-peak residual power fluctuations under 2%.

CD-P.36 TUE

Complex Optical Waveguiding Structures Induced By Bessel Beams

•*Y. Chai[1,2], N. Marsal[1,2], and D. Wolfersberger[1,2]; [1]Université de Lorraine, CentraleSupélec, LMOPS, F-57000 Metz, France; [2]Chair in Photonics, CentraleSupélec, LMOPS, F-57000 Metz, France*

We numerically study interactions of Bessel beams in a photorefractive medium. Playing with nonlinearity, complex multi-channels structures can be induced by single or two counter-propagating Bessel beams. These results provide a prospect for all-optical interconnects.

CD-P.37 TUE

Mode selective photon addition to a multimode quantum field using SPDC process

•*S. Kaali[1], G. Roeland[1], V. Roman-Rodriguez[2], N. Treps[1], V. Parigi[1], and M. Walschaers[1]; [1]Laboratoire Kastler Brossel, Sorbonne Universite, CNRS, ENS-PSL Université, College de France, 4 place Jussieu, F-75252, Paris, France; [2]Sorbonne Universite, CNRS, LIP6, 4 place Jussieu, F-75005, Paris, France*

We propose a theoretical scheme to generate non-gaussian quantum states by the mode selective photon addition to a multimode Gaussian state. This can be implemented via the Spontaneous Parametric down-conversion process in nonlinear bulk crystals.

CD-P.38 TUE

QPM-LN-Based 40GHz to 40GHz Switch Using Cascaded Nonlinearities

•*Y. Fukuchi, G. Abe, and K. Kawanaka; Tokyo University of Science, Tokyo, Japan*

Characteristics of an all-optical switch employing a 3-cm-long QPM-LN are investigated through switching experiments considering the temporal widths of the input clock and signal pulses. Stable and efficient 40GHz to 40GHz operation is successfully demonstrated.

CD-P.39 TUE

Novel features of white light emission observed in transparent Cr-doped YAG ceramics

•*M. Chaika, T. Hanulia, R. Tomala, and W. Strek ; Institute of Low Temperature and Structure Research, Wroclaw, Poland*

Laser-induced white light emission was observed from transparent Cr:YAG ceramics on the surface of the sample and is not observed in volume. This phenomenon was discussed in terms of inter-valence charge transfer mechanism.

CD-P.40 TUE

Self-referenced multiplex CARS imaging with picosecond pulse generated supercontinuum by using second and third order nonlinearities

•*S. Wehbi[1,2], T. Mansuryan[1], M. Fabert[1], A. Tonello[1], K. Krupa[3], S. Wabnitz[4], S. Vergnole[2], and V. Couderc[1]; [1]University of Limoges-XLIM, Limoges, France; [2]ALPhANOV Optics & Lasers Technology Center, Bordeaux, France; [3]Institute of Physical Chemistry, Warsaw, Poland; [4]DIET, Rome, Italy*

We developed a self-referenced multiplex CARS imaging system, operating in the picosecond domain. The large band Stokes wave is generated either in X(2)-X(3) crystals, or in multimode optical fiber under the Kerr self-cleaning process.

CD-P.41 TUE

Surface dominance in high harmonic generation in AlN thin film

•*J. Seres[1], E. Seres[1], C. Serrat[2], and T. Schumm[1]; [1]Atominstitut - E141, Technische Universität Wien, Vienna, Austria; [2]Universitat Politècnica de Catalunya, Departament de Física, Terrassa, Spain*

Based on the measurement of beam propagation and spectral characteristics, we conclude that high order harmonics in AlN thin film are generated on the surface of the film. Time-dependent density-functional simulations corroborate the experimental results.

CD-P.42 TUE

Enhanced Supercontinuum Generation in the Mid-IR using Graphene Covered SiGe waveguides

•*P. Demongodin[1], R. Armand[1], M. Sinobad[1], A. Della Torre[1], J.-M. Hartmann[2], V. Reboud[2], J.-M. Fedeli[2], C. Grillet[1], and C. Monat[1]; [1]Institut des Nanotechnologies de Lyon, Ecully, France; [2]CEA-LETI, Grenoble, France*

We experimentally demonstrate that hybrid graphene/SiGe waveguides could effectively enhance the mid-infrared supercontinuum bandwidth. Through impacting the supercontinuum dynamics, graphene could provide unique opportunities to control the supercontinuum performance of mid-IR chip-based devices.

ROOM 2

13:30 – 14:30

ED-P: ED Poster Session

ED-P.1 TUE

Cavity ring-down Fourier transform spectroscopy based on a near infrared optical frequency comb

•*R. Dubroeucq[1], A. Głuszek[2], G. Soboń[2], and L. Rutkowski[1]; [1]Univ Rennes, CNRS, IPR (Institut de Physique de Rennes) - UMR 6251, Rennes, France; [2]Laser & Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wroclaw, Poland*

We perform cavity ring-down spectroscopy based on a near-infrared frequency comb source and retrieve the multiplex decays using a time-resolved fast-scanning Fourier transform spectrometer.

ED-P.2 TUE

Simple method of carrier-envelope-offset locking with f-3f self-referencing solely by a dispersion-controlled silicon-nitride waveguide

•*A. Ishizawa[1], K. Kawashima[1,2], R. Kou[3], X. Xu[1], T. Tsuchizawa[4], T. Aihara[4], K. Yoshida[1,2], T. Nishikawa[2], K. Hitachi[1], G. Cong[3], N. Yamamoto[3], K. Yamada[3], and K. Oguri[1]; [1]NTT Basic Research Laboratories, Atsugi-shi, Japan; [2]Tokyo Denki University, Adachi-ku, Japan; [3]Platform Photonics Research Center, AIST, Tsukuba, Japan; [4]NTT Device Technology Laboratories, Atsugi-shi, Japan*

We demonstrate a very simple and robust method of carrier-envelope-offset locking with f-3f self-referencing trough third-harmonic light and a 2.5-octave-wide supercontinuum spectrum (400-2500 nm at -45 dB level) solely by a dispersion-controlled 5-mm-long silicon-nitride waveguide.

ED-P.3 TUE

Shifted Wave Interference Fourier Transform Spectroscopy of THz Quantum Cascade Laser Frequency Combs operating above 70 K

•*A. Forrer*[1], *S. Cibella*[2], *G. Torrioli*[2], *M. Beck*[1], *J. Faist*[1], *and G. Scalari*[1]; [1]*ETH Zürich, Zürich, Switzerland*; [2]*CNR-Istituto di Fotonica e Nanotecnologie, Rome, Italy*

We investigate the coherence and phases of THz Quantum Cascade Laser frequency combs by Shifted Wave Interference Fourier Transform spectroscopy. The result indicates FM modulated emission and shows different phase relations compared to mid-IR QCLs.

ED-P.4 TUE

The Schawlow–Townes limit in frequency comb metrology

•*G. Steinmeyer*; *Max-Born-Institut, Berlin, Germany*; *Humboldt-Universität, Berlin, Germany*

Frequency-comb based metrology has seen a dramatic increase of precision in the recent decades. Schawlow-Townes noise imposes a previously unrecognized limitation that is expected to limit further progress at the sub-10^{-20} fractional uncertainty level.

ED-P.5 TUE

Stability frequency transfer demonstration at 10-13 level of a semiconductor based Frequency Comb via electrical and optical injection locking

K. Manamanni, T. Steshchenko, •*V. Roncin, and F. Du-Burck*; *Laboratoire de Physique des Lasers UMR CNRS 7538, Université Sorbonne Paris Nord, Villetaneuse, France*

Fundamental physics, spectroscopy or quantum systems need compact and transportable frequency references with metrological stability performances. We report, the frequency stabilization of a 1.55μm Quantum-dot Fabry-Perot diode with a relative stability at 10-13 level.

ED-P.6 TUE

High-resolution spectroscopy of molecular iodine using a narrow-linewidth laser at telecom wavelength

•*K. Ikeda, R. Kato, Y. Goji, D. Akamatsu, and F.-L. Hong*; *Department of Physics, Yokohama National University, 79-5 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan*

The absolute frequency and hyperfine structure of the P(57)45-0, P(91)48-0, R(73)46-0 transitions of molecular iodine at 514.1 nm were measured. Hyperfine constants were calculated by fitting the measured hyperfine splitting to a four-term Hamiltonian.

ED-P.7 TUE

High-Quality Level-Crossing Resonances in Cesium Vapor Cells for Applications in Atomic Magnetometry

•*D. Brazhnikov*[1,2], *S. Ignatovich*[1], *V. Vishnyakov*[1], *I. Mesenzova*[1], *and A. Goncharov*[1,2,3]; [1]*Institute of Laser Physics SB RAS, Novosibirsk, Russia*; [2]*Novosibirsk State University, Novosibirsk, Russia*; [3]*Novosibirsk State Technical University, Novosibirsk, Russia*

We propose novel schemes for observing the high-quality zero-field level-crossing resonances that noticeably expand the capabilities of standard schemes. The experiments were performed with cesium buffered vapor cells. Possible applications to atomic magnetometry are discussed.

NOTES

ROOM 1

8:30 – 10:00

JSI-2: Phononic Crystals and Acoustic Metamaterials

Chair: Roberto Li Voti, Sapienza Università di Roma, Rome, Italy

JSI-2.1 WED (Invited) 8:30

Perfect-bandgap tapered nanophononic metamaterial beam for thermal insulation

•*O. Wright; Division of Applied Physics, Faculty of Engineering, Hokkaido University, Sapporo, Japan*

Acoustic metamaterials can be tailored to efficiently block phonon propagation. We present the use of tapered meta-beam structures consisting of five unit cells of slowly varying size that extend the phonon propagation frequency gap significantly.

ROOM 2

8:30 – 10:00

CA-5: Mid-infrared Lasers

Chair: Xavier Mateos, Universitat Rovira i Virgili, Tarragona, Spain

CA-5.1 WED 8:30

1-Watt SESAM-Modelocked fs-Cr:ZnS Oscillator at 2.4 μm

•*A. Barh, B.O. Alaydin, J. Heidrich, M. Gaulke, M. Golling, C.R. Phillips, and U. Keller; ETH Zurich, Zürich, Switzerland*

We present a novel GaSb-based SESAM to modelock 2.4-μm Cr:ZnS oscillators, producing 120 fs transform limited pulses at average output power of 1 W from a 250 MHz cavity, scalable to 0.5 GHz.

CA-5.2 WED 8:45

Sub-9 Optical-cycle Kerr-lens Mode-locked Combined Gain Media Laser Based on Tm-doped Sesquioxide

•*A. Suzuki[1], C. Kränkel[2], and M. Tokurakawa[1]; [1]Institute for Laser Science, University of Electro-Communications, Chofu, Japan; [2]Zentrum für Lasermaterialien, Leibniz-Institut für Kristallzüchtung, Berlin, Germany*

We report on the Kerr-lens mode-locked combined gain media laser based on Tm:Lu2O3 and Tm:Sc2O3

ROOM 3

8:30 – 10:00

CB-3: Technologies for LIDAR Applications

Chair: Stephen Sweeney, University of Surrey, Guildford, United Kingdom

CB-3.1 WED 8:30

Experimental investigation of nanosecond pulsed tapered-waveguide lasers obtaining extremely high brightness values

•*H. Christopher, A. Zeghuzi, A. Klehr, J.-P. Koester, H. Wenzel, and A. Knigge; Ferdinand-Braun-Institut gGmbH, Berlin, Germany*

The influence of the lateral index guiding trench width is studied experimentally to obtain an excellent brightness value of 27.4 W/mm/mrad at >18 W output power under 3.3 ns long pulse operation from tapered-waveguide lasers.

CB-3.2 WED 8:45

Low-noise, Frequency-agile, Hybrid Integrated Laser for LiDAR

•*G. Lihachev[1], J. Riemensberger[1], W. Weng[1], J. Liu[1], H. Tian[2], A. Siddharth[1], R.N. Wang[1], V. Snigirev[1], J. He[1], S. Bhave[2], and T. Kippenberg[1]; [1]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland; [2]OxideMEMS Lab, Purdue University, West Lafayette, USA*

We demonstrate a hybrid integrated

ROOM 4

8:30 – 10:00

CC-4: Novel Approach THz Sources

Chair: Juliette Mangeney, LPENS/CNRS, Paris, France

CC-4.1 WED 8:30

Corrugated graphene for synchrotron-like coherent THz emission

•*R. Kerjouan[1], E. Riccardi[1], P.H. Huang[1], M. Rosticher[1], A. Pierret[1], J. Tignon[1], S. Dhillon[1], M.-B. Martin[2], B. Dlubak[3], P. Seneor[3], D. Dolfi[2], K. Watanabe[4], T. Taniguchi[4], R. Ferreira[1], and J. Mangeney[1]; [1]Laboratoire de Physique de l'Ecole normale supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université Paris-Diderot, Sorbonne Paris Cité, Paris, France; [2]Thales Research and Technology, Palaiseau, France; [3]Unité Mixte de Physique, CNRS-Thales, Université Paris-Saclay, Palaiseau, France; [4]National Institute for Materials Science, Tsukuba, Japan*

We investigate corrugated graphene based devices and show their potential to generate synchrotron-like radiation tunable in the THz spectral range. Transport measurements at 4 K and Raman characterization of these devices show unique interesting features.

CC-4.2 WED 8:45

Terahertz Sources Based on Time-Dependent Metasurfaces

•*J. Tunesi[1], L. Peters[1], J.S. Totero Gongora[1], L. Olivieri[1], A. Fratalocchi[2], A. Pasquazi[1], and M. Peccianti[1]; [1]Emergent Photonics Lab (EPic), Dept. of Physics and Astronomy, University of Sussex, Falmer, United Kingdom; [2]PRIMALIGHT, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia*

We demonstrate a time-dependent random metasurface exhibiting sub-

ROOM 5

8:30 – 10:00

CE-5: Micro and Nanostructures

Chair: Daniel Milanese, University of Parma, Parma, Italy

CE-5.1 WED 8:30

Fabrication of Microstructured Optical Fiber (MOF) segments by two-photon lithography 3D printing

a. bertoncini and •c. liberale; King Abdullah University of Science and Technology, Thuwal, saudi arabia

Here we show the drawing-less fabrication of microstructured optical fibers (MOFs) segments by high-resolution 3D printing (two-photon lithography) and their combination to realize complex photonic devices integrated on optical fibers.

CE-5.2 WED 8:45

Nanoimprint Lithography for the Replication of Optical Microstructures on Azopolymer Thin Films

•*J. Strobelt[1], D. Stolz[1], M. Leven[1], L. Kurlandski[2], and D.J. McGee[2]; [1]Beuth Hochschule für Technik Berlin, Berlin, Germany; [2]The College of New Jersey, Ewing, USA*

A new process for the replication of optical microstructures is reported. It combines microstructure fabrication on azopolymer films with nanoimprint lithography. Compar-

ROOM 6

8:30 – 10:00

CF-4: Ultrafast Lasers

Chair: Jean-Pierre Wolf, University of Geneva, Geneva, Switzerland

CF-4.1 WED 8:30

100 MW Thin-Disk Oscillator

•*S. Goncharov, K. Fritsch, and O. Pronin; Helmut-Schmidt University, Hamburg, Germany*

Highest peak power femtosecond oscillator delivering 100 MW, 140-fs pulses with 14 μJ energy is demonstrated.

CF-4.2 WED 8:45

Tunable Thermal Lensing Enabled by Silicate Bonding of Sapphire to SESAMs: Novel Devices for High-Power Lasers

•*L. Lang[1], F. Saltarelli[1], G. Lacaille[2], S. Rowan[2], J. Hough[2], I.J. Graumann[1], C.R. Phillips[1], and U. Keller[1]; [1]ETH Zürich - Institute of Quantum Electronics, Zurich, Switzerland; [2]University of Glasgow - Institute for Gravitational Research, Glasgow, United Kingdom*

We demonstrate a new type of high-power-compatible SESAM with ad-

ROOM 7

8:30 – 10:00

EG-2: Coupling at the Nanoscale I

Chair: Igor Aharanovich, University of Technology Sydney, Sydney, Australia

EG-2.1 WED 8:30

Coupling A Single Molecule To An Interrupted Nanophotonic Waveguide

•*R.C. Schofield*[1], *S. Boissier*[1], *L. Jin*[2], *A. Ovvyan*[2], *S. Nur*[1], *F.H.L. Koppens*[3], *C. Toninelli*[4], *W.H.P. Pernice*[2], *K.D. Major*[1], *E.A. Hinds*[1], *and A.S. Clark*[1]; [1]*Imperial College London, London, United Kingdom*; [2]*Universität Münster, Münster, Germany*; [3]*ICFO, Barcelona, Spain*; [4]*LENS and CNR-INO, Florence, Italy*

We demonstrate coherent coupling of a molecular single photon emitter to an interrupted nanophotonic waveguide and develop a method for calculating coupling efficiency, applicable to many nanophotonic structures that cannot be decomposed into well-defined modes.

EG-2.2 WED 8:45

3 Ways to View the Local Density of Optical States

W. Barnes[1,2], *S. Horsley*[1], *and* •*W. Vos*[2]; [1]*Department of Physics and Astronomy, University of Exeter, Stocker Road, Exeter, EX4 4QL, United Kingdom*; [2]*Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, 7500 AE Enschede, Netherlands*

We theoretical analyze the fundamentals of the local density of states that is central to emission control,

ROOM 8

8:30 – 10:00

EC-4: Band Topology II

Chair: Alexander Szameit, Rostock University, Rostock, Germany

EC-4.1 WED 8:30

Non-abelian holonomies in a generalized Lieb lattice.

V. Brosco[1], •*L. Pilozzi*[1], *R. Fazio*[2,3], *and C. Conti*[1,4]; [1]*Institute for Complex Systems, National Research Council (ISC-CNR), Via dei Taurini 19, 00185 Rome, Italy*; [2]*The Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11, I-34151 Trieste, Italy*; [3]*Dipartimento di Fisica, Università di Napoli Federico II, Monte S. Angelo, I-80126 Napoli, Italy*; [4]*Department of Physics, University Sapienza, Piazzale Aldo Moro 5, 00185 Rome, Italy*

We design modulated photonic waveguide arrays for the generation and detection of non-abelian gauge fields. Exploiting the Thouless pumping we show that photon beam displacement quantization can be traced back to the existence of non-Abelian topological invariants.

EC-4.2 WED 8:45

Topological Anderson Localization Transition in Time-Multiplexed Quantum Walks

•*S. De*[1], *D. Bagrets*[2], *K.W. Kim*[2], *S. Barkhofen*[1], *J. Sperling*[1], *B. Brecht*[1], *A. Altland*[2], *T. Micklitz*[3], *and C. Silberhorn*[1]; [1]*Paderborn University, Paderborn, Germany*; [2]*Universität zu Köln, Köln, Germany*; [3]*Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro, Brazil*

The experimental feasibility of topological Anderson localization

ROOM 9

8:30 – 10:00

CI-2: Digital Signal Processing

Chair: Darko Zibar, DTU Fotonik, Kgs. Lyngby, Denmark

CI-2.1 WED (Invited) 8:30

Towards 50G/100G Passive Optical Networks with Digital Equalisation and Coherent Detection

•*R. Killey*; *University College London, London, United Kingdom*

Recent advances in the development of low-complexity coherent transceiver technology for passive optical networks are reviewed. These include reducing optical network unit complexity, increasing laser phase noise tolerance and implementing effective machine-learning based equalisation.

ROOM 10

8:30 – 10:00

CJ-3: Multimode Nonlinear Fiber Optics and SC Generation

Chair: William Wadsworth, University of Bath, Bath, United Kingdom

CJ-3.1 WED (Invited) 8:30

Latest experimental advances in nonlinear multimode fiber optics

Y. Leventoux[1], *M. Fabert*[1], *M. Sapantan*[1], •*K. Krupa*[2], *A. Tonello*[1], *G. Granger*[1], *S. Fevrier*[1], *T. Mansuryan*[1], *A. Niang*[3], *B. Wetzel*[1], *G. Millot*[4,5], *S. Wabnitz*[6,7], *and V. Couderc*[1]; [1]*Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France*; [2]*Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland*; [3]*Dipartimento di Ingegneria dell'Informazione, Università degli Studi di Brescia, Brescia, Italy*; [4]*Université Bourgogne Franche-Comté, ICB UMR CNRS 6303, Dijon, France*; [5]*Institut Universitaire de France (IUF), Paris, France*; [6]*DIET, Sapienza Università di Roma, Rome, Italy*; [7]*Novosibirsk state University, Novosibirsk, Russia*

We present our recent results in multimode nonlinear fiber optics, including coherent combining of self-cleaned beams, and development of new SW/MID-IR laser sources. Novel 3D beam diagnostics will be also discussed.

ROOM 11

8:30 – 10:00

CD-6: Guided Wave Devices

Chair: Rachel Grange, ETH Zurich, Zurich, Switzerland

CD-6.1 WED 8:30

General measurement technique of the ratio between chromatic dispersion and the nonlinear coefficient

•*D. Castelló-Lurbe*[1], *A. Carrascosa*[2,3], *E. Silvestre*[2,4], *A. Díez*[2,3], *J. Van Erps*[1], *N. Vermeulen*[1], *and M.V. Andrés*[2,3]; [1]*Brussels Photonics, Department of Applied Physics and Photonics, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussel, Belgium*; [2]*Institut Universitari de Ciències dels Materials, Universitat de València, Catedrático Agustín Escardino 9, 46980 Paterna, Spain*; [3]*Departament de Física Aplicada i Electromagnetisme, Universitat de València, Dr. Moliner 50, 46100 Burjassot, Spain*; [4]*Departament d'Òptica, Universitat de València, Dr. Moliner 50, 46100 Burjassot, Spain*

A novel approach to determine directly the ratio between chromatic dispersion and the nonlinear coefficient in any guiding medium is presented and demonstrated in polarization-maintaining and single-mode fibers with normal and anomalous dispersion.

CD-6.2 WED 8:45

Analysis of laser-inscription of waveguides in bulk Silicon via ultrashort pulses

•*A. Alberucci*[1], *N. Alasgarzade*[1], *M. Blothe*[1], *M. Chambonneau*[1], *C.P. Jisha*[1], *and S. Nolte*[1,2]; [1]*Friedrich-Schiller University Jena, Jena, Germany*; [2]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

The process of writing Silicon waveguides using ultrashort lasers is investigated. After addressing the nonlinear propagation of the

NOTES

ROOM 1

JSI-2.2 WED (Invited) 9:00

Heat and hypersound management in 2D phononic crystals

•B. Graczykowski; Adam Mickiewicz University, Poznan, Poland

The presentation is devoted to experimental studies on the propagation of GHz-THz in nanostructured materials. In particular, such topics as hypersonic phononic crystals, thermal rectification, photoactuation, and elastic size effect will be discussed.

ROOM 2

at 2.1 μm. Pulses as short as 60 fs with an average power of 52 mW were obtained.

CA-5.3 WED 9:00

Mid-Infrared Laser Emissions of Tm^{3+}-doped Garnets: The Case Study of Disordered Tm:CNGG Crystal

•L. Guillemot[1], P. Loiko[1], Z. Pan[2], J.-L. Doualan[1], A. Braud[1], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]Institute of Chemical Materials, China Academy of Engineering Physics, Mianyang, China

Mid-infrared laser emissions from disordered Tm:CNGG garnet crystal are studied and assigned to vibronic processes and $^3H_4 \rightarrow ^3 H_5$ electronic transition. A Tm:CNGG laser generated 548 mW at 2.13 & 2.33μm with a slope efficiency of 58.2%.

CA-5.4 WED 9:15

Passively Q-switched Diode-Pumped Thulium Laser at 2305 nm

E. Kifle[1], •P. Loiko[1], L. Guillemot[1], J.-L. Doualan[1], F. Starecki[1], A. Braud[1], A. Hideur[2], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]CORIA UMR6614, CNRS-INSA-Université de Rouen, Normandie Université, Saint Etienne du Rouvray, France

A diode-pumped mid-infrared Tm:LiYF4 laser operating on the 3H4→3H5 transition is passively Q-switched by Cr2+:ZnSe. The

ROOM 3

laser with intrinsic linewidth of 40 Hz, 1.5 GHz tuning range, 1 MHz actuation bandwidth attained by a DFB laser self-injection locking to a Si3N4 microresonator with integrated AlN piezoactuator.

CB-3.3 WED (Invited) 9:00

High-power VCSEL beam scanners for 3D sensing

•F. Koyama; Tokyo Institute of Technology, Yokohama, Japan

The device concept and experiments for high-power VCSEL beam-scanners will be presented for 3D sensing. We demonstrate a VCSEL beam-scanner, which offers watt-class high power operations and high-resolution non-mechanical beam steering functions.

ROOM 4

cycle phase dynamics when coupled with a photoexcited electromagnetic source. The ultrafast photoexcitation of nanostructured Silicon acts as a temporal discontinuity, modifying the nonlinearity responsible for terahertz emission.

CC-4.3 WED 9:00

Large HgTe nanocrystals for THz technology

•T. Apretna[1], S. Massabeau[1], C. Gréboval[2], N. Goubet[2], S. Dhillon[1], R. Ferreira[1], E. Lhuillier[2], and J. Mangeney[1]; [1]Laboratoire de Physique de l'Ecole Normale Supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université Paris-Diderot, Sorbonne Paris Cité, Paris, France; [2]Sorbonne Université, CNRS, Institut des NanoSciences de Paris, Paris, France

Large HgTe nanocrystals (~100nm) grown by colloidal synthesis show attractive properties for the development of advanced THz optoelectronic devices as they exhibit strong absorption in the THz range and hot carrier lifetimes of few picoseconds.

CC-4.4 WED 9:15

Robust Self-Referenced Generator of Programmable Multi-Millijoule THz-Rate Bursts

•V. Stummer[1], T. Flöry[1], E. Kaksis[1], A. Pugzlys[1,2], and A. Baltuska[1,2]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Center for Physical Sciences & Technology, Vilnius, Lithuania

We demonstrate a technique for the programmable generation and multi-millijoule amplification of ultrashort pulse bursts, which can be applied to any master-oscillator regenerative-amplifier system with very low implementation complexity and high stability in burst performance.

ROOM 5

isons of the original microstructure and the final replica show excellent reproduction fidelity.

CE-5.3 WED 9:00

Nanopatterning of Phase-Change Material Thin Films for Tunable Photonics

•L. Bobzien[1], A.-K.U. Michel[1], N. Lassaline[1], C.R. Lightner[1], A.C. Hernandez Oendra[1], S. Meyer[2], I. Giannopoulos[3], A. Sebastian[3], S. Bisig[4], D.N. Chigrin[2], and D.J. Norris[1]; [1]Optical Materials Engineering Laboratory, Department of Mechanical and Process Engineering, Zurich, Switzerland; [2]DWI Leibniz Institute for Interactive Materials, Aachen, Germany; [3]IBM Research-Zurich, Rüschlikon, Zurich, Switzerland; [4]Heidelberg Instruments Nano, Zurich, Switzerland

Tunable nanooptics enabled by phase-change materials (PCMs) have sparked tremendous research interest due to the PCMs reversibly switchable refractive index. We report sub-diffraction limited tip-induced switching of PCMs with feature sizes down to 100 nm.

CE-5.4 WED 9:15

Nanogeometry-Induced Spectral Modification of self-Assembled Low-Dimensional WS2 Structures

•I. Komen, S. Van Heijst, S. Conesa-Boj, and K. Kuipers; Delft University of Technology, Delft, Netherlands

We characterize the optical (Raman) response of CVD-grown WS2 pyramids and nanoflowers. Studying the dependence of the Raman features on position, temperature and polarization, we find how the geometry of the nanostructures induces spectral modifications.

ROOM 6

justable thermal lens by silicate-bonding sapphire to the SESAM. We modelock a high-power thin-disk-laser, achieving 233-W average-power, a 70-W-improvement over state-of-the-art SESAMs in the same laser.

CF-4.3 WED 9:00

Recent Progress and Perspectives of Intra-Oscillator High Harmonic Generation Using Thin-Disk Lasers

•J. Fischer, J. Drs, F. Labaye, N. Modsching, V.J. Wittwer, and T. Südmeyer; Laboratoire Temps-Fréquence (LTF), Institut de Physique, Université de Neuchâtel, Neuchatel, Switzerland

We discuss recent developments and the state-of-the-art of high harmonic generation inside thin-disk laser oscillators and their potential for further scaling of the XUV performance.

CF-4.4 WED 9:15

Highly stable thin-disk multipass amplifier delivering 1kW of average output power with excellent beam quality

•F. Bienert[1], A. Loescher[1], C. Röcker[1], M. Gorjan[2], J. Aus-der-Au[2], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge (IFSW) Universität Stuttgart, Stuttgart, Germany; [2]MKS/Spectra-Physics Rankweil, Rankweil, Austria

We present a CPA-free thin-disk multipass amplifier delivering a 1MHz pulse train with a pulse duration of 340 fs at an output power of 1033 W and an excellent beam quality of M2x=1.16 and

ROOM 7

antennae, energy transfer. We discuss the equivalence of 3 completely different viewpoints from quantum optics, nanophotonics, electrical engineering.

EG-2.3 WED 9:00

A scanning planar Yagi-Uda antenna for fluorescence detection

•N. Soltani[1,4], E. Rabbany Esfahany[1,4], G. Schulte[2,4], S.I. Druzhinin[2,4], J. Müller[3,4], B. Butz[3,4], H. Schönherr[2,4], N. Markešević[1,5], and M. Agio[1,4,6]; [1]Laboratory of Nano-Optics, University of Siegen, Siegen, Germany; [2]Physical Chemistry I, University of Siegen, Siegen, Germany; [3]Institute of Materials Engineering, University of Siegen, Siegen, Germany; [4]Center for Micro- and Nanochemistry and Engineering (Cμ), University of Siegen, Siegen, Germany; [5]Nanoscience Center, University of Jyväskylä, Jyväskylä, Finland; [6]National Institute of Optics (INO), National Research Council (CNR), Florence, Italy

We introduce a scanning planar Yagi-Uda antenna to improve fluorescence detection. Dyes labeling double-stranded DNA molecules immobilized in the antenna exhibit directional emission. The method is thus suitable for sensing biomolecules with low-NA optics

EG-2.4 WED 9:15

Circular Bragg grating resonators for optical read-out of NV centres in nanodiamonds encapsulated in silicon nitride

•J. Monroy Ruz[1,2], C. Skoryna Kline[1,2], J. Smith[2], J. Rarity[2], and K.C. Balram[2]; [1]Quantum Engineering Centre for Doctoral Training, HH Wills Physics Laboratory, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Technology Labs, Department of Electrical and Electronic Engineering, Universtiy of Bristol, Bristol, United Kingdom

We present the fabrication of circu-

ROOM 8

transitions is studied. We put forward time-multiplexed quantum walks with tunable coin operations for realizing the targeted effect arising from the interplay between disorder and topology.

EC-4.3 WED 9:00

Probing the Floquet bulk winding number through Bloch sub-oscillations

•L.K. Upreti[1], C. Evain[2], S. Randoux[2], P. Suret[2], A. Amo[2], and P. Delplace[1]; [1]Univ. Lyon, ENS de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, Lyon, France; [2]Univ. Lille, CNRS, Physique des Lasers Atomes et Molecules, Lille, France

We report a new family of Bloch oscillations in quantum walks. The number of turning points distinguishes these oscillations within one Bloch period. The topological winding number governs them, and this can be probed in a photonic setup.

EC-4.4 WED 9:15

Topological Characterization of Photonic Crystals

•M. Blanco de Paz[1], H. Alaeian[2], M. G. Vergniory[1,3], B. Bradlyn[4], G. Giedke[1,3], D. Bercioux[1,3], and A. García-Etxarri[1,3]; [1]Donostia International Physics Center, San Sebastian, Spain; [2]Electrical and Computer Engineering Physics and Astronomy, Purdue University, W. Lafayette, USA; [3]IKERBASQUE, Basque Foundation for Science, Bilbao, Spain; [4]Department of Physics and Institute for Condensed Matter Theory, University of Illinois at Urbana-Champaign, Urbana, USA

We combine the theory of Topological Quantum Chemistry and Wilson loops calculations to characterize the topology of 2D photonic

ROOM 9

CI-2.2 WED 9:00

Experimental demonstration of 100 Gb/s 50Km Downstream Using PolMux MultiCAP OSSB Transmission and Heterodyne Reception based on 10G Electronics for Passive Optical Networks

•M. Barrio[1], D. Izquierdo[2,1], J. Cerda[3], S. Sarmiento[4], J.A. Altabas[5], J.A. Lazaro[3], and I. Garces[1]; [1]I3A, University of Zaragoza, Zaragoza, Spain; [2]Centro Universitario de la Defensa, Zaragoza, Spain; [3]Universitat Politècnica de Catalunya, Barcelona, Spain; [4]ICFO, Castelldefels, Spain; [5]Bifrost Communications, Kgs Lyngby, Denmark

We present a 100Gb/s downstream PON link based on a PolMux, multi-CAP OSSB modulation signal received by a coherent receiver. 50km transmission is achieved using 10G electronic and photonic devices with a sensitivity of -20dBm.

CI-2.3 WED 9:15

An analysis of linear digital equalization in 50Gbit/s HS-PONs to compensate the combined effect of chirp and chromatic dispersion

•F.A. Nogueira Sampaio[1], E. Pincemin[1], N. Genay[1], L. Anet Neto[2], R. Le Bidan[2], and Y. Jaouen[3]; [1]Orange Labs, Lannion, France; [2]IMT Atlantique, Plouzané, France; [3]Telecom Paris, Palaiseau, France

We study the impacts of frequency chirp and chromatic dispersion (CD) in 50Gbit/s Non-Return-to-Zero (NRZ) transmissions in an Intensity Modulation and Direct Detection (IM/DD) channel with a Minimum-Mean-Square Error Equalizer (MMSE-LE) at reception.

ROOM 10

CJ-3.2 WED 9:00

0.75-6 μm supercontinuum generation using spatiotemporal nonlinear dynamics in graded index multimode fiber

•Y. Leventoux[1], G. Granger[1], T. Mansuryan[1], M. Fabert[1], K. Krupa[2], A. Tonello[1], S. Wabnitz[3], V. Couderc[1], and S. Février[1]; [1]Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France; [2]Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland; [3]DIET, Sapienza University of Rome, Rome, Italy

We demonstrate that the interplay between the nonlinear processes in graded index multimode fibers can be controlled in order to seed a three octave spanning supercontinuum ranging from 0.75 to 6 μm.

CJ-3.3 WED 9:15

Octave-spanning Infrared Supercontinuum Generation in a Graded-Index Multimode tellurite Fiber

•E. Krutova[1], Z. Eslami[1], T. Karpate[2,3], M. Klimczak[3], R. Buczynski[2,3], and G. Genty[1]; [1]Photonics Laboratory, Tampere University, Tampere, Finland; [2]Łukasiewicz Research Network – Institute of Microelectronics and Photonics, Warsaw, Poland; [3]Faculty of Physics, University of Warsaw, Warsaw, Poland

We demonstrate for the first time octave-spanning supercontinuum generation from 1000 nm to 3000 nm in a tellurite multimode

ROOM 11

writing pulse analytically and numerically, we characterize the index profile of the written waveguides using transversally-shifted inputs.

CD-6.3 WED 9:00

High performance Kerr effect in hybrid 2D material-SiN waveguide platform

•V. Pelgrin[1,2], Y. Wang[2], J. Peltier[1], C. Alonso-Ramos[1], L. Vivien[1], Z. Sun[2,3], and E. Cassan[1]; [1]Université Paris Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Department of Electronics and Nanoengineering, Aalto University, Aalto, Finland; [3]QTF Centre of Excellence, Department of Applied Physics, Aalto University, Aalto, Finland

Hybridization of 2D highly nonlinear materials with the silicon platform introduce a boosting of nonlinear effects while remaining TPA free at telecom wavelength. With optimization of the structures, nonlinear performance almost compares to SOI waveguides.

CD-6.4 WED 9:15

Stimulated Brillouin scattering of helical Bloch modes in chiral three-core photonic crystal fibre

•X. Zeng[1], W. He[1], J. Huang[1], P. Roth[1,2], G.K.L. Wong[1], M.H. Frosz[1], B. Stiller[1,2], and P.S.J. Russell[1,2]; [1]Max-Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany

We report stimulated Brillouin scattering of helical Bloch modes in chiral photonic crystal fibre with a three-fold rotationally symmetric core. Conservation of azimuthal order, not topological charge, plays a crucial role in the scattering process.

NOTES

ROOM 1

JSI-2.3 WED 9:30

Acoustic Phonon Localization in One-dimensional Quasiperiodic Structures

•*P. Priya, E.R. Cardozo de Oliveira, A. Rodriguez, and N.D. Lanzillotti-Kimura; Centre de Nanosciences et de Nanotechnologies (C2N), Université Paris-Saclay, CNRS, Palaiseau, France*

We theoretically demonstrate the localization of acoustic phonons in the range of 20-100 GHz in one-dimensional complex quasiperiodic systems composed of AlGaAs/GaAs heterostructures.

JSI-2.4 WED 9:45

Accidental bound state in the continuum in a chain of dielectric disks

M. Sidorenko[1], O. Sergaeva[1], •Z. Sadrieva[1], C. Roques-Carmes[2], P. Muraev[3,4], D. Maksimov[3,4], and A. Bogdanov[1]; [1]Department of Physics and Engineering, ITMO University, St. Petersburg, Russia; [2]Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA, USA; [3]Kirensky Institute of Physics, Federal Research

ROOM 2

laser generates 357 mW at 2304.6 nm and the best pulse characteristics (duration/energy) are 870 ns/4.4 μJ.

CA-5.5 WED 9:30

Efficient Laser Operation of Transparent “Mixed” 7 at.% Er:(Lu,Sc)2O3 Sesquioxide Ceramics near 2.8 μm

•*L. Basyrova[1], P. Loiko[1], W. Jing[2], Y. Wang[3], H. Huang[2], M. Aguiló[4], F. Díaz[4], E. Dunina[5], A. Kornienko[5], U. Griebner[3], V. Petrov[3], X. Mateos[4], B. Viana[6], and P. Camy[1]; [1]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France; [2]Institute of Chemical Materials, China Academy of Engineering Physics, Mianyang, China; [3]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [4]Universitat Rovira i Virgili (URV), FiCMA-FiCNA-EMaS, Tarragona, Spain; [5]Vitebsk State Technological University, Vitebsk, Belarus; [6]Chimie ParisTech, PSL University, CNRS, Institut de Recherche de Chimie Paris, Paris, France*

Transparent “mixed” sesquioxide ceramic 7 at.% Er:(Lu,Sc)2O3 is synthesized by HIPing at 1750 °C/200 MPa and its spectroscopy is studied. The ceramic laser generates 342 mW at 2.71&2.85 μm with a slope efficiency of 41.7%.

CA-5.6 WED 9:45

High-Energy, Widely Tunable and Efficient Mid-Infrared Lasers Based on Single-Crystal Fe:CdTe

M.P. Frolov[1], Y.V. Korostelin[1], V.I. Kozlovsky[1], S.O. Leonov[1,2], •P. Fjodorow[3], and Y.K. Skasyrsky[1]; [1]P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia; [2]Bauman Moscow State Technical University, Moscow, Russia; [3]Institute for Combustion and Gas Dynamics – Reactive Fluids, University of Duisburg-Essen,

ROOM 3

CB-3.4 WED 9:30

Analysis of the phase-locking dynamics of a III-V-on-silicon frequency comb laser

•*A. Verschelde[1], K. Van Gasse[2], B. Kuyken[2], M. Giudici[1], G. Huyet[1], and M. Marconi[1]; [1]Institut de Physique de Nice, Nice, France; [2]Ghent University - IMEC, Ghent, Belgium*

We analyze the phase-locking of a III-V-on-silicon frequency comb laser with a stepped-heterodyne technique. We measure the modal phase dispersion and reconstruct the pulse envelope as a function of the saturable absorber bias voltage.

CB-3.5 WED 9:45

Broadband optical frequency comb generation using hybrid integrated InP-Si3N4 diode lasers

•*H.M.J. Bastiaens[1], G. Neijts[1], A. Memon[1], Y. Fan[1], J. Mak[1], D. Geskus[2], M. Hoekman[2], V. Moskalenko[3], E.A.J.M. Bente[3], and K.-J. Boller[1]; [1]Laser Physics and Nonlinear Optics, Department for Science and Technology, University of Twente, Enschede, Netherlands; [2]LioniX International BV, Enschede, Netherlands; [3]Photonic Integration*

ROOM 4

CC-4.5 WED 9:30

Terahertz generation using a ZnGeP2 photoconductive antenna

•*V. Bulgakova[1], P. Chizhov[1], A. Ushakov[1], N. Yudin[2,3,4], M. Zinovev[2,3,4], S. Podzyvalov[2,3,4], T. Dolmatov[1], V. Bukin[1], and S. Garnov[1]; [1]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; [2]National Research Tomsk State University, Tomsk, Russia; [3]V. E. Zuev Institute of atmospheric optics SB RAS, Tomsk, Russia; [4]LLC “Laboratory of Optical Crystals”, Tomsk, Russia*

The paper discusses the generation of terahertz radiation using the ZnGeP2 photoconductive antennas. The THz waveform was obtained. The antenna’s terahertz energy dependence versus optical energy was measured. The ZnGeP2 and CVD-ZnSe antennas were compared.

CC-4.6 WED 9:45

Generation of radially- and azimuthally-polarized terahertz cylindrical vector beams from spintronic terahertz emitter

•*H. Niwa[1], N. Yoshikawa[1], M. Kawaguchi[1], M. Hayashi[1], and R. Shimano[1,2]; [1]Department of Physics, University of Tokyo, Hongo, Tokyo, Japan; [2]Cryogenic Research Center, University of Tokyo, Yayoi, Tokyo, Japan*

We demonstrate the generation of radial and azimuthal terahertz

ROOM 5

CE-5.5 WED 9:30

The contribution has been withdrawn.

CE-5.6 WED 9:45

Ultrabroadband Moth-Eye Antireflection Structures on GaSe Produced by Focused-Ion Beam Milling

P. Sulzer, •M. Hagner, A. Liehl, M. Cimander, H. Kempf, A. Bitzer, A. Herter, and A. Leitenstorfer; Department of Physics and Center for Applied Photonics, University of Konstanz, Konstanz, Germany

Moth-eye structures are fabricated on GaSe by focused-ion beam milling, suppressing reflections

ROOM 6

M2y=1.18.

CF-4.5 WED 9:30

Cryogenic Yb:YLF lasers mode-locked with saturable Bragg reflectors

•*U. Demirbas[1,3], J. Thesinga[1], M. Kellert[1], S. Reuter[1], F.X. Kärtner[1,2], and M. Pergament[1]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Notkestraße 85, 22607, Hamburg, Germany; [2]Physis Department and The Hamburg Centre for Ultrafast Imaging, University of Hamburg, Luruper Chaussee 149, Hamburg, Germany; [3]Laser Technology Laboratory, Antalya Bilim University, 07190 Dosemealti, Antalya, Turkey*

We report a SBR mode-locked cryogenic Yb:YLF laser generating sub-5-ps pulses with 28-W average power around 1017 nm and 105-ps pulses with 40-W average power around 995 nm, by employing E//a and E//c axes, respectively.

CF-4.6 WED 9:45

Design of a Passively Mode-locked Microlaser with an Er-doped Microcavity and Carbon Nanotubes

•*R. Imamura[1], A. Nakashima[1], K. Nagashima[1], T.S.L.P. Suzuki[1], R. Ishida[1], S. Fujii[1,2], and T. Tanabe[1]; [1]Department of Electronics and Electrical Engineering, Faculty of Science and Technology, Keio University, Yokohama, Japan; [2]Quantum Optoelectronics Research Team, RIKEN Center for Advanced*

ROOM 7

lar Bragg grating resonators on silicon nitride to increase the collection efficiency of NV centre in encapsulated nanodiamonds.

EG-2.5 WED 9:30

Nanophotonic Structures for Cavity Optomechanics

J.M. Fitzgerald, S.K. Manjeshwar, W. Wieczorek, and •P. Tassin; Chalmers University of Technology, Göteborg, Sweden

We show that techniques and structures from nanophotonics, such as photonic crystal membranes and bound states in the continuum, can be used to access entirely new regimes in cavity optomechanics.

EG-2.6 WED 9:45

Fano lineshapes and mode splittings: Can they be artificially generated orobscured by the numerical aperture?

•Z. Geng, J. Theenhaus, B.K. Patra, J.-Y. Zheng, J. Busink, E.C. Garnett, and S.R.K. Rodriguez; Center for Nanophotonics, AMOLF, Amsterdam, Netherlands

We demonstrate experimentally and theoretically how a moderate numerical aperture of the measurement setup can artificially generate

ROOM 8

crystals. Including LDOS information in the analysis provides meaningful insights on the topological states of light.

EC-4.5 WED 9:30

Breakdown of Spin-to-Helicity Locking in Symmetry-Protected Topological Photonic Crystal Edge States

•T. Bauer[1], S. Arora[1], R. Barczyk[2], E. Verhagen[2], and K. Kuipers[1]; [1]Kavli Institute of Nanoscience Delft, Delft University of Technology, Delft, Netherlands; [2]Center for Nanophotonics, AMOLF, Amsterdam, Netherlands

We experimentally reveal the influence of higher-order Bloch harmonics in edge states of topological photonic crystals emulating the quantum spin Hall effect, leading to a breakdown of the coupling between their local spin and helicity.

EC-4.6 WED 9:45

Topological photonics: Mistaken paradigms and new opportunities

•A. Garcia-Etxarri[1,2], M. Blanco de Paz[1], C. Devescovi[1], B. Bradlyn[3], M. Garcia Vergniory[1,2], D. Bercioux[1,2], M. Proctor[4], and P. Arroyo Huidobro[5]; [1]Donostia International Physics Center, San Sebastian, Spain; [2]IKERBASQUE, Basque Foundation for Science, Bilbao, Spain; [3]Department of Physics and Institute for Condensed Matter Theory, University of Illinois at

ROOM 9

CI-2.4 WED 9:30

Estimation for IQ skew of A Transmitter in Digital Coherent Communication Systems

•N. Tsuchida, T. Kuno, Y. Mori, and H. Hasegawa; Nagoya University, Nagoya, Japan

This paper presents a novel method for estimating transmitter IQ skew in digital coherent communication systems. Numerical simulations confirm that its estimation error is less than 0.04 ps even if other IQ impairments are present.

CI-2.5 WED 9:45

A Novel Sixth-Order Algorithm for the Direct Zakharov-Shabat Problem

S. Medvedev[1,2], •I. Vaseva[1,2], I. Chekhovskoy[1,2], and M. Fedoruk[1,2]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Federal Research Center for Information and Computational Technologies, Novosibirsk, Russia

We propose a novel sixth-order conservative scheme based on Magnus expansion and Padé approximation

ROOM 10

graded-index fiber. Our results could pave the way to high-power supercontinuum light sources in the mid-infrared.

CJ-3.4 WED 9:30

Spatial self-beam cleaning in spatiotemporally mode-locked fiber lasers

•U. Tegin[1,2], B. Rahmani[1], E. Kakkava[2], D. Psaltis[2], and C. Moser[1]; [1]Laboratory of Applied Photonics Devices, Ecole federale polytechnique de Lausanne, Lausanne, Switzerland; [2]Optics Laboratory, Ecole federale polytechnique de Lausanne, Lausanne, Switzerland

A novel technique by controlling spatiotemporal nonlinearities to achieve spatial self-beam cleaning in mode-locked lasers is presented. Multimode fiber oscillator with single-mode beam, 24 nJ and sub-100 fs pulses is demonstrated.

CJ-3.5 WED 9:45

Multi-octave coherent supercontinuum generation under anomalousdispersion regime in a ZBLAN-based master oscillator fiber amplifier

•S.A. Rezvani[1], K. Ogawa[2], and T. Fuji[1]; [1]Toyota Technological Institute, Nagoya, Japan; [2]FiberLabs Inc., Saitama, Japan

A fully stable polarized supercontinuum spanning from 0.35-4.5 μm is generated under anomalous dispersion in polarization-maintaining

ROOM 11

CD-6.5 WED 9:30

Optical parametric oscillator based on silicon nitride waveguides

•N.M. Lüpken[1], D. Becker[1], T. Würthwein[1], K.-J. Boller[2,1], and C. Fallnich[1,2,3]; [1]Institute of Applied Physics, University of Münster, Münster, Germany; [2]MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [3]Cells in Motion Interfaculty Centre, University of Münster, Münster, Germany

We present waveguide-based optical parametric oscillation in silicon nitride with the potential of full integration. The tunable light source paves the path towards integrated CARS measurements or mid-infrared absorption spectroscopy.

CD-6.6 WED 9:45

Difference-frequency generation in silicon nitride waveguides based on all-optical poling

•B. Zabelich, E. Sahin, O. Yakar, E. Nitiss, and C.-S. Brès; Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

We demonstrate difference-frequency generation in silicon nitride waveguide leveraging all-optical poling. Appropriate dispersion engineering can shift the nonlinear frequency conver-

NOTES

ROOM 1

Center KSC SB RAS, Krasnoyarsk, Russia; [4]*Siberian Federal University, Krasnoyarsk, Russia*
We experimentally analyze for the first time an off-Γ BIC in a one-dimensional periodic chain of disks and demonstrate its transformation to a resonant state with the decrease of the chain's length.

11:00 – 12:30

CJ-4: Mode-locked Fiber Lasers

Chair: Sobon Grzegorz, Wroclaw University of Technology, Wroclaw, Poland

CJ-4.1 WED 11:00

Multipulse and Molecule states in a broadband Mamyshev oscillator around 1550 nm
•*C. Lapre*[1], *C. Billet*[1], *F. Meng*[1], *M. Mabed*[1], *C. Finot*[2], *L. Salmela*[3], *G. Genty*[3], *and J. Dudley*[1]; [1]*Institut FEMTO-ST, Université Bourgogne Franche-Comté CNRS UMR 6174, Besançon, France, Besançon, France*; [2]*Laboratoire Interdisciplinaire Carnot de Bourgogne, Université Bourgogne Franche-Comté CNRS UMR 6303, Dijon, France, Dijon, France*; [3]*Photonics Laboratory, Tampere University, Tampere, FI-33104, Finland , Tampere, Finland*
Frequency resolved optical gating and dispersive Fourier transform measurements provide new insights into stable and unstable dynamics in a fibre Mamyshev oscillator generating 100 nm bandwidth pulses around 1550 nm.

ROOM 2

Duisburg, Germany
We present our recent results obtained with single-crystal Fe:CdTe lasers. In particular, different pumping schemes and operation temperatures are investigated. The developed laser systems are characterized regarding efficiency, output energy and tunability.

11:00 – 12:30

CH-6: On-chip Solutions for Optical Sensing

Chair: Robert Halir, University of Málaga, BIONAND - Centro Andaluz de Nanomedicina y Biotecnología, Málaga, Spain

CH-6.1 WED 11:00

Investigations of Protein-Ligand Reaction Kinetics by Transistor-Microfluidic Integrated Sensors
•*K.-Y. Tsai*[1], *Y.-C. Lee*[2], *C.-H. Chou*[3], *and J.-J. Huang*[4]; [1] *Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei , Taiwan*; [2] *Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, Taiwan*; [3] *Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, Taiwan*; [4] *Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taipei, Taiwan*
In this work, the IGZO-TFT (thin-film transistor) biosensor integrated with a tailored microfluidic chip was developed to explore binding kinetics of protein-ligand biochemical interactions in the real-time manner.

ROOM 3

Group, Electrical Engineering Department, Eindhoven University of Technology, Eindhoven, Netherlands
Using hybrid integration of long, low-loss Si3N4 waveguide circuits with InP semiconductor amplifiers, we demonstrate on-chip frequency comb generation. The comb densely covers a 25-nm broad spectrum with more than 1600 comb-lines at 2-GHz spacing.

11:00 – 12:30

CF-5: Ultrashort Pulses in the mid-IR

Chair: Cristian Manzoni, CNR, Istituto di Fotonica e Nanotecnologie (IFN), Rome, Italy

CF-5.1 WED (Invited) 11:00

High-Brightness Seven-Octave Light Source
U. Elu[1], *L. Maidment*[1], •*L. Vamos*[1], *F. Tani*[2], *D. Novoa*[2], *M.H. Frosz*[2], *V. Badikov*[3], *D. Badikov*[3], *V. Petrov*[4], *P.S.J. Russell*[2,5], *and J. Biegert*[1,6]; [1]*ICFO– Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Barcelona, Spain*; [2]*Max-Planck Institute for Science of Light, Erlangen, Germany*; [3]*High Technologies Laboratory, Kuban State University, Krasnodar, Russia*; [4]*Max-Born-Institute for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany*; [5]*Department of Physics, Friedrich-Alexander-Universität,, Erlangen, Germany*; [6]*ICREA, Barcelona, Spain*
We present a high brightness source combining soliton self-compression and intra-pulse difference frequency generation which spans seven optical octaves (UV to THz) with stable carrier-envelope phase.

ROOM 4

pulses using a spintronic terahertz emitter. Combining the external magnetic-field tuning and mode conversion, our method enables convenient access toward the terahertz cylindrical vector beams.

11:00 – 12:30

CM-2: Semiconductor Processing

Chair: Ya Cheng, Shanghai Institute of Optics and Fine Mechanics, China

CM-2.1 WED 11:00

Monitoring Ultrafast Laser Micro-Excitation and Modification Deep inside GaAs
•*A. Wang, A. Das, J. Hermann, and D. Grojo*; *Aix-Marseille Université, CNRS, LP3, UMR7341, Marseille, France*
We measure laser-induced microscale carrier excitation inside GaAs by monitoring the fluorescence. Results reveal the requirements existing on the pulse energy, duration, and focusing numerical aperture to obtain modification deep inside GaAs.

ROOM 5

of mid-infrared radiation. Their performance is characterized via electro-optic sampling, yielding reflectivites below one percent over a range of multiple octaves.

11:00 – 12:30

CB-4: Quantum Cascade Lasers

Chair: Dmitri Boiko, CSEM, Neuchâtel, Switzerland

CB-4.1 WED 11:00

Actively mode-locked pulses from a mid-IR quantum cascade laser
•*J. Hillbrand*[1,2], *N. Opačak*[1], *M. Piccardo*[2], *H. Schneider*[3], *G. Strasser*[1], *F. Capasso*[2], *and B. Schwarz*[1,2]; [1]*Institute of Solid State Electronics, TU Wien, Vienna, Austria*; [2]*Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, USA*; [3]*Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany*
The ultrafast carrier transport in mid-infrared quantum cascade lasers (QCLs) has long been considered an insurmountable obstacle for the generation of short pulses. Here, we report on transformation-limited picosecond pulses from a high-performance mid-IR QCL.

ROOM 6

Photonics, Saitama, Japan
In this work, we report on a numerical investigation that clarified the optimum design parameters to achieve passive ML with a toroidal WGM microlaser.

11:00 – 12:30

EG-3: Coupling at the Nanoscale 2

Chair: Claus Ropers, Georg-August University & Max Planck Institute for Biophysical Chemistry, Göttingen, Germany

EG-3.1 WED 11:00

Breakdown of polaritons in ultrastrongly coupled nanophotonic systems
•*S. Rajabali*[1], *E. Cortese*[2], *M. Beck*[1], *S. De Liberato*[2], *J. Faist*[1], *and G. Scalari*[1]; [1]*Quantum Optoelectronics Group, Institute of Quantum Electronics, ETH Zürich, Zürich, Switzerland*; [2]*School of Physics and Astronomy, University of Southampton, Southampton, United Kingdom*
We theoretically and experimentally show a physical limit for the confinement of electromagnetic field which can ultimately limit the light-matter coupling enhancement in an ultra-strong coupling regime due to the excitement of high momentum propagating matter resonances.

ROOM 7

Fano resonances and Rabi splittings, and conclude with general guidelines to avoid pitfalls in studying such optical systems.

11:00 – 12:30

CE-6: Materials for Waveguides and Resonators

Chair: Daniel Milanese, University of Parma, Parma, Italy

CE-6.1 WED 11:00

Photonic Transformers

•*M. Douvidzon*[1], *S. Maayani*[1], *H. Nagar*[2], *T. Admon*[2], *V. Shuvayev*[3], *L. Yang*[4], *L. Deych*[3], *Y. Roichman*[2], *and T. Carmon*[2]; [1]*Technion, Haife, Israel;* [2]*Tel Aviv University, Tel Aviv, Israel;* [3]*Queems College of Cuny, New York, USA;* [4]*Washington University in St. Louis, St. Louis, Missouri, USA*

We report on transformable micro-photonic devices that change their functionality while operating. Assisted by holographic-tweezers, we gradually deform the shape of a droplet whispering-gallery cavity and split a resonant mode to a 10-GHz separated doublet.

ROOM 8

Urbana-Champaign, Urbana, USA; [4]*Department of Mathematics, Imperial College London , London, United Kingdom;* [5]*Instituto de Telecomunicações, Instituto Superior Tecnico-University of Lisbon,, Lisbon, Portugal*

We apply “Topological Quantum Chemistry” to photonic crystals. Through this method, we found the first instance of bosonic fragile topology as well as higher-order photonic Photonic TIs and novel 3D photonic topological effects.

11:00 – 12:30

EA-3: Quantum Optomechanics and Detectors

Chair: Lukas Slodicka, Palacky University of Olomouc, Olomouc, Czech Republic

EA-3.1 WED 11:00

Bell Correlations Between Light and Vibrations at Ambient Conditions

•*S. Tarrago Velez*[1], *V. Sudhir*[2,3], *N. Sangouard*[4], *and C. Galland*[1]; [1]*Institue of Physics, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland;* [2]*LIGO Laboratory, Massachusetts Institute of Technology, Cambridge, USA;* [3]*Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, USA;* [4]*Departement Physik, Universität Basel, Klingelbergstrasse, Basel, Switzerland*

In this talk we present a new scheme leveraging Spontaneous Raman Spectroscopy and Time Resolved Single Photon Counting in order to produce Bell correlations between light and vibrations at ambient conditions.

ROOM 9

for the numerical implementation of the nonlinear Fourier transform. The scheme allows the use of fast algorithms with low computational complexity.

11:00 – 12:30

EF-3: 2D Transverse Dynamics and Quantum Effects

Chair: Kestutis Staliunas, ICREA, Barcelona, Spain

EF-3.1 WED 11:00

Penrose wave amplification in superfluids of light

•*M.C. Braidotti*[1], *R. Prizia*[1,2], *E.M. Wright*[3], *and D. Faccio*[1]; [1]*School of Physics and Astronomy, University of Glasgow, G12 8QQ, Glasgow, United Kingdom;* [2]*Institute of Photonics and Quantum Sciences, Herriot-Watt University, EH14 4AS, Edinburgh, United Kingdom;* [3]*Wyant College of Optical Sciences, University of Arizona, Arizona 85721, Tucson, USA*

Fluids of light in defocusing media can be used to mimic curved spacetimes. We present the first experimental measurement of Penrose superradiance, i.e. the amplification of waves from a vortex spacetime, in a photonic superfluid.

ROOM 10

ZBLAN fiber using pulses at the vicinity of 2 μm from a master oscillator fiber amplifier

11:00 – 12:30

CA-6: High-Power Yb-lasers

Chair: Clara Saraceno, Ruhr University Bochum, Bochum Germany

CA-6.1 WED (Invited) 11:00

Broadband Ytterbium fiber CPA-system delivering 120fs, 10 mJ pulses at 1 kW average power

•*J. Buldt*[1], *H. Stark*[1], *M. Müller*[1], *A. Klenke*[1,2], *and J. Limpert*[1,2,3]; [1]*Institute of Applied Physics, Jena, Germany;* [2]*Helmholtz-Institute, Jena, Germany;* [3]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We present on a fiber CPA-system based on coherent combining which exploits the gain-bandwidth of Ytterbium through aggressive but elaborate spectral shaping and delivers 120 fs, 10 mJ pulses at 1 kW average power.

ROOM 11

sion towards the middle-infrared based on a grating inscribed with telecommunication signals.

11:00 – 12:30

EB-6: Long-Range Distribution of Entanglement II

Chair: Jürgen Eschner, University of Saarland, Germany

EB-6.1 WED 11:00

Long-Distance Entanglement Distribution for Trapped-Ion based Quantum Networks

•*T. Bauer*[1], *J. Arenskötter*[1], *M. Bock*[1,2], *S. Kucera*[1], *J. Eschner*[1], *and C. Becher*[1]; [1] *Universität des Saarlandes, Fakultät NT, FR Physik, 66123 Saarbrücken, Germany;* [2]*Österreichischen Akademie der Wissenschaften, Institut für Quantenoptik und Quanteninformation, 6020 Innsbruck, Austria*

We present an experiment towards trapped-ion based quantum networks where we demonstrate high-fidelity entaglement distribution over up to 40 km of fiber using a SPDC-source and polarization-preserving frequency conversion to the telecom C-band.

NOTES

ROOM 1

CJ-4.2 WED 11:15

Autosetting Mode-locked Laser with Genetic Algorithm Optimization and Advanced Intracavity Controls

•*J. Girardot, F. Billard, A. Coillet, M. Nafa, E. Hertz, and P. Grelu; Laboratoire ICB UMR 6303 CNRS, Photonics Dpt, Université Bourgogne—Franche-Comté, Dijon, France*

We present a smart ultrafast fiber laser with interfaced intracavity controls applying on both nonlinear and spectral transfer functions. After running an evolutionary algorithm, the self-starting pulsed output optimizes various user-defined merit functions.

CJ-4.3 WED 11:30

Deep reinforcement learning algorithm for self-tuning 8-figure fiber laser

A. Kokhanovskiy[1], •E. Kuprikov[1], K. Serebrennikov[1], and S. Turitsyn[1,2]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Aston Institute of Photonic Technologies, Birmingham, United Kingdom

We demonstrate the performance of Q-learning algorithm for searching stable dissipative soliton generation inside 8-figure fiber laser via tuneable spectral filtration.

ROOM 2

CH-6.2 WED 11:15

Tantalum Pentoxide Slot Waveguides for Waveguide Enhanced Raman Spectroscopy

•*Z. Liu[1,2], Q. Zhao[3], P. Shi[1,2], B. Mitchell[4], H. Zhao[1,2], N. Le Thomas[1,2], D. Blumenthal[3], and R. Baets[1,2]; [1]Photonics Research Group, Ghent University-IMEC, Gent, Belgium; [2]Center for Nano- and Biophotonics, Ghent University, Gent, Belgium; [3]Department of Electrical and Computer Engineering, University of California, Santa Barbara, Santa Barbara, USA; [4]UCSB Nanofabrication Facility, University of California, Santa Barbara, Santa Barbara, USA*

We demonstrate a waveguide-enhanced Raman sensor utilizing tantalum pentoxide slot waveguides. The high index contrast and optimized waveguide geometry improve the signal intensity by 4x compared to a conventional silicon nitride slot waveguide.

CH-6.3 WED 11:30

Spectroscopic Gas Detection Using Thin-film Mesoporous Waveguides

•*A. Datta, S. Alberti, M. Vlk, and J. Jágerská; UiT The Arctic University of Norway, Tromsø, Norway*

Chip-integrated waveguides for gas sensing have inadequate evanescent field interaction. A thin-film mesoporous waveguide has enhanced sensitivity through gas interaction with the field inside the waveguide-core, demonstrated through spectroscopic detection of acetylene at 1520 nm.

ROOM 3

CF-5.2 WED 11:30

Generation of sub-half-cycle 10 μm pulses using four-wave mixing through two-color filamentation

W.-H. Huang[1,2], Y. Zhao[1], S. Kusama[1], C.-W. Luo[2], and •T. Fuji[1]; [1]Toyota Technological Institute, Nagoya, Japan; [2]National Chiao Tung University, Hsinchu, Taiwan

We have experimentally demonstrated the generation of sub-half-cycle pulses at 10 μm through filamentation in nitrogen. The absolute value of the CEP was consistent with a simple four-wave difference frequency generation model.

ROOM 4

CM-2.2 WED 11:15

Deep surface amorphization in silicon induced by spectrally-tuned ultrashort laser pulses

M. Garcia-Lechuga[1], N. Casquero[2], A. Wang[3], D. Grojo[3], and •J. Siegel[2]; [1]Departamento de Física Aplicada, Universidad Autónoma de Madrid, Madrid, Spain; [2]Laser Processing Group, Instituto de Óptica, IO-CSIC, Madrid, Spain; [3]Aix-Marseille University, CNRS, LP3 UMR 7341, Marseille, France

Deep surface amorphization in silicon for telecom waveguide writing applications is achieved by tuning the femtosecond laser writing wavelength from 515nm-4000nm. Amorphous layers of 128 nm can be achieved, much exceeding the current 70 nm-limit.

CM-2.3 WED 11:30

Laying the foundations of ultrafast stealth dicing of silicon with picosecond laser pulses at 2-μm wavelength

•*M. Blothe[1], M. Chambonneau[1], T. Heuermann[1,2], M. Gebhardt[1,2], J. Limpert[1,2,3], and S. Nolte[1,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Albert-Einstein-Str. 15, 07745, Jena, Germany; [2]Helmholtz Institute Jena, Fröbelstieg 3, 07743, Jena, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Albert-Einstein-Straße 7, 07745, Jena, Germany*

Transversally elongated modifications were induced into the bulk of silicon with 2-μm picosecond laser pulses. The modified samples showed a reduced breaking strength and may serve in future for dicing applications.

ROOM 5

CB-4.2 WED 11:15

Ultra-low Threshold Quantum Cascade Laser

•*Z. Wang, F. Kapsalidis, R. Wang, M. Beck, G. Scalari, and J. Faist; ETH Zürich, Zürich, Switzerland*

We present a quantum cascade laser operating at 4.3 μm wavelength and exhibiting a threshold current of only 11.0 mA while generating a single-mode maximum power of 0.23 mW at -20 °C in continuous-wave operation.

CB-4.3 WED 11:30

Mid-Infrared Quantum Cascade Lasers with 9 Stages for Regrowth-Free Low Voltage Continuous Wave Operation

•*D. Burghart, W. Oberhausen, K. Zhang, A. Gardanow, J. Krakofsky, G. Boehm, and M.A. Belkin; Walter Schottky Institut and Department of Electrical and Computer Engineering, Technische Universität München, Garching, Germany*

We report room temperature continuous-wave operation of quantum cascade lasers at 7μm with only 9 active regions and operating voltage below 5V compatible with standard laser diode drivers, while not requiring regrowth or epidise-down mounting.

ROOM 6

EG-3.2 WED 11:15

Dual-Tone Raman Study of Optical Picocavities

•*S. Verlekar, A. Ahmed, W. Chen, and C. Galland; École polytechnique fédérale de Lausanne, Lausanne, Switzerland*

Nanoparticle-on-mirror (NPoM) nanocavities are studied under dual-tone laser excitation. We leverage the multimode nature of these structures to probe the generation mechanism of plasmonic picocavities.

EG-3.3 WED 11:30

Maximal coupling of light into 2D polaritons

•*E. J. C. Dias[1] and J. García de Abajo[1,2]; [1]ICFO - The Institute of Photonic Sciences, Castelldefels, Spain; [2]ICREA - Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We quantify the coupling strength between light and 2D polaritons in thin films, using point and line scatterers, and find universal constraints that limit its fundamental maximum allowed values.

ROOM 7

CE-6.2 WED 11:15

Fabry-Pérot Based Temporal Standard at 8.5 μm for Electro-Optic Delay Tracking

•*T. Amotchkina[1], M. Trubetskov[1], A. Weigel[1,2,3], D. Hahner[2], S.A. Hussain[2,3], P. Jacob[1,2], I. Pupeza[1,2], and V. Pervak[2]; [1]Max-Planck-Institut für Quantenoptik, Garching, Germany; [2]Ludwig-Maximilian-Universität München, Garching, Germany; [3]Molekuláris- Ujjlenyomat Kutató Közhasznú Nonprofit Kft., Budapest, Hungary*

We demonstrate the elongation of a few-cycle mid-infrared pulse via a Fabry-Pérot type optical filter, providing a monochromatic mid-infrared waveform for electro-optic delay tracking, which is robust against variations of the initial mid-infrared pulse.

CE-6.3 WED 11:30

Optical birefringence in strain tuneable silk fibroin whispering gallery mode cavities

•*N. Korakas[1,2], D. Vurro[4], O. Tsilipakos[1], A. Cucinotta[3], S. Selleri[3], S. Iannotta[4], and S. Pissadakis[1]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece; [2]Department of Materials Science & Technology, University of Crete, Heraklion, Greece; [3]Department of Engineering and Architecture, University of Parma, Parma, Italy; [4]Institute of Materials for Electronics and Magnetism (IMEM), CNR, Parma, Italy*

Whispering gallery modes resonation at the 1.5μm spectral band is used for the investigation of the light-localization and photo-elastic properties of cylindrically shaped silk fibroin cavities, in the Silk I and II structures.

ROOM 8

EA-3.2 WED 11:15

Detection of a Levitated Nanoparticle's Position via Self-Homodyne

•*D.S. Bykov[1], L. Dania[1], K. Heidegger[1], G. Cerchiari[1], R. Blatt[1,2], and T.E. Northup[1]; [1]Institut für Experimentalphysik, Universität Innsbruck, Technikerstrasse 25, Innsbruck, Austria; [2]Institut für Quantenoptik und Quanteninformation, Österreichische Akademie der Wissenschaften, Technikerstrasse 21a, Innsbruck, Austria*

We demonstrate a technique to increase the efficiency with which the position of a levitated nanoparticle is detected. The method is based on self-homodyne of scattered light and theoretically can reach the Heisenberg limit.

EA-3.3 WED 11:30

A High Cooperativity Silicon Nitride Optomechanical Transducer

•*M.J. Bereyhi, A. Arabmoheghi, N.J. Engelsen, and T.J. Kippenberg; Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*

We report the design, fabrication, and characterization of a monolithic nano-optomechanical silicon nitride transducer. Our system features a 1D photonic crystal cavity $(Q \approx 10^5)$ integrated with a high-Q $(Q > 10^6)$ nanobeam with optomechanical cooperativity exceeding 10^3.

ROOM 9

EF-3.2 WED 11:15

Can some semiconductor lasers operate as Bose Einstein condensates?

•*S. Barland[1], P. Azam[1], G.L. Lippi[1], R. Nyman[2], and R. Kaiser[1]; [1]Université Côte d'Azur, Institut de Physique de Nice, Valbonne, France; [2]Physics Department, Imperial College , London, United Kingdom*

Lasers are known as out of equilibrium light emitting devices. Yet we observe signatures of photon thermalization and Bose Einstein condensation of photons (thermal equilibrium processes) in a Vertical Cavity Surface Emitting Laser.

EF-3.3 WED 11:30

Filamentation and beam-reshaping in a 2D quadratic nonlinear medium

•*R. Jauberteau[1,2], S. Wehbi[1,3], T. Mansuryan[1], K. Krupa[4], F. Baronio[2], B. Wetzel[1], A.B. Aceves[5], A. Tonello[1], S. Wabnitz[6], and V. Courderc[1]; [1]Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France; [2]Università di Brescia, Brescia, Italy; [3]ALPhANOV, Optics & Lasers Technology Center, Institut d'optique d'Aquitaine, Talence, France; [4]Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland; [5]Department of Mathematics, Southern Methodist University, Dallas, USA; [6]Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza University, Rome, Italy*

We reported the spatial filamentation, followed by the recovery of a bell-shaped beam for the second harmonic wave in a quadratic crystal. Such behavior is accompanied by spectral broadening covering the entire visible spectrum.

ROOM 10

CA-6.2 WED 11:30

Towards the Multi-kW Ultrafast Green Thin-Disk Laser

•*C. Röcker[1], A. Loescher[1], F. Bienert[1], P. Villeval[2], D. Lupinski[2], D. Bauer[3], A. Killi[3], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge (IFSW), Stuttgart, Germany; [2]Cristal Laser, Messein, France; [3]Trumpf Laser GmbH, Schramberg, Germany*

We present an ultrafast green laser with near-diffraction-limited beam quality delivering more than 1.4 kW of average power. It is based on second harmonic generation of a Yb:YAG thin-disk multipass amplifier in LBO.

ROOM 11

EB-6.2 WED 11:15

Hybrid Teleportation Protocols for Heterogeneous Quantum Networks

•*T. Darras[1], A. Cavaillès[1], H. Le Jeannic[2], H. Dong[1], B. Asenbeck[1], G. Guccione[1], and J. Laurat[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-PSL Université, Collège de France, Paris, France; [2]Laboratoire Photonique Numérique et Nanoscience, Universit'e de Bordeaux, Institut d'Optique, CNRS, UMR 5298, Bordeaux, France*

Based on hybrid entanglement between discrete- and continuous-variable optical qubits, we report an entanglement swapping protocol that enables the connection of nodes relying on different encodings of quantum information in a heterogeneous quantum network.

EB-6.3 WED 11:30

How to send entangled photons across hundreds of km? A multimode platform for near-term quantum repeaters

•*M. Lipka[1,2], M. Mazelanik[1,2], A. Leszczyński[1,2], W. Wasilewski[1], and M. Parniak[1,3]; [1]Centre for Quantum Optical Technologies, Centre of New Technologies, University of Warsaw, Warsaw, Poland; [2]Faculty of Physics, University of Warsaw, Warsaw, Poland; [3]Niels Bohr Institute, University of Copanhagen, Copenhagen, Denmark*

Quantum-entangled pairs of photons find broad applications, yet require feasible quantum repeaters to be distributed on inter-city distances. We present an experimental platform for Bell-state generation across 500 modes and analyze its performance as a wavevector-multiplexed quantum repeater.

NOTES

ROOM 1

CJ-4.4 WED 11:45

Generation of ~625nJ Pulses from a Mamyshev Oscillator with a few-mode LMA Yb-doped Fiber

•*D. Lin[1], D. Xu[1], J. He[2], Y. Feng[1], Z. Ren[1], and D.J. Richardson[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]Cambridge Graphene Centre, University of Cambridge, Cambridge, United Kingdom*

We demonstrate a Maymshev oscillator based on a 25μm core diameter Yb-doped fiber. The oscillator generates pulses with an energy of 625nJ that can be compressed to ~44 fs with a peak power of ~5.6MW.

CJ-4.5 WED (Invited) 12:00

Revealing the soliton buildup dynamics in mode-locked fiber lasers

•*X. Liu[1,2,3] and L. Huang[1]; [1]College of Optical Science and Engineering, Zhejiang University, Hangzhou, China; [2]Nanjing University of Information Science & Technology, Nanjing, China; [3]College of Astronautics, Nanjing University of Aeronautics and Astronautics, Nanjing, China*

We discuss real-time dynamics of soliton evolution in mode-locked fiber lasers, including the entire buildup dynamics of soliton, soliton molecule, harmonic mode-locking based on TS-DFT technique, and the temporal evolution using time-lens technique.

ROOM 2

CH-6.4 WED 11:45

Multicolor hologram based on plasmonic nanohole arrays and detour phase: design and simulation

•*S.S. Mousavi Khaleghi[1], D. Wen[1], J. Cadusch[1], and K.B. Crozier[1,2,3]; [1]Department of Electrical and Electronic Engineering, University of Melbourne, Victoria 3010, Australia; [2]School of Physics, University of Melbourne, Victoria 3010, Australia; [3]ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Victoria, Australia*

We design nanohole arrays that serve as color filters with high transmission and low cross-talk. We design two multicolor holograms based on these and simulate their performance, demonstrating good fidelity to the desired holographic images.

CH-6.5 WED 12:00

Mach-Zehnder interferometer assisted ring resonator configuration for refractive index sensing

•*M. Yadav and A. Aksnes; Norwegian University of Science and Technology, Trondheim, Norway*

Four-fold enhancement in the dynamic range of a ring resonator sensor is presented. The Mach-Zehnder interferometer assisted ring resonator configuration is utilized to achieve this enhanced dynamic range, which is independent of the Q-factor.

ROOM 3

CF-5.3 WED 11:45

OPCPA Front-End based on a Cr:ZnS Laser for Femtosecond Pulse Generation in the Mid-Infrared

•*P. Fuertjes, L. von Grafenstein, C. Mei, U. Griebner, and T. Elsaesser; Max Born Institute, Berlin, Germany*

A novel front-end for mid-IR OPCPAs based on a fs Cr:ZnS laser is presented. The 2-μm pumped 1 kHz OPCPA delivers >400 μJ idler pulses tunable between 5.4 – 6.8 μm with sub-150 fs duration.

CF-5.4 WED 12:00

Carrier-envelope phase characterization using harmonic spectral interference in mid-infrared laser filament in argon

•*P. Polynkin[1], C. Gollner[2], V. Shumakova[2], J. Barker[1], A. Pugzlys[2], and A. Baltuska[2]; [1]College of Optical Sciences, University of Arizona, Tucson, USA; [2]Photonics Institute, Vienna University of Technology, Vienna, Austria*

We quantify the carrier-envelope phase of an ultrafast mid-infrared laser source at 3.9um by measuring the phase of the spectral interference between adjacent odd harmonics generated by this laser on its filamentation in argon gas.

ROOM 4

CM-2.4 WED 11:45

Pulse Duration and Temporal Contrast as Critical Parameters for Internal Structuring of Silicon

•*A. Das, A. Wang, O. Utéza, and D. Grojo; Aix-Marseille Université, CNRS, LP3, F-13288, Marseille, France*

By synchronizing 1550-nm pulses of durations from 190 fs to 5 ns, we investigate the key dynamical aspects of interactions to achieve 3D laser writing inside silicon.

CM-2.5 WED 12:00

3D Laser Structured Mirror-Waveguide Circuits: a New Optical PCB Platform for Silicon Photonics

•*A. Rahimnouri, G. Djogo, and P. Herman; University of Toronto, Toronto, Canada*

Femtosecond laser glass processing of micro-void mirror disks and waveguides inside of fused silica facilitated high-density bending of 3D waveguide circuits for efficient optical routing and vertical light coupling into silicon photonic chips.

ROOM 5

CB-4.4 WED 11:45

Frequency Control of a Mid-Infrared Quantum Cascade Laser Frequency Comb by Near-Infrared Light Injection and Intensity Modulation

•*K. Komagata[1], A. Shehzad[1], M. Hamrouni[1], R. Matthey[1], F. Kapsalidis[2], P. Jouy[3], M. Beck[2], V.J. Wittwer[1], A. Hugi[3], T. Südmeyer[1], and S. Schilt[1]; [1]Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, CH-2000 Neuchâtel, Switzerland; [2]Institute for Quantum Electronics, ETH Zurich, CH-8093 Zurich, Switzerland; [3]IRsweep AG, Laubisrütistrasse 44, CH-8712 Stäfa, Switzerland*

We study the response of a mid-infrared quantum cascade laser frequency comb to optical injection of intensity-modulated near-infrared light. We demonstrate MHz actuation bandwidth of the comb properties necessary for tightly-locking a dual comb spectrometer.

CB-4.5 WED 12:00

Heating Dynamics of Pulse-Pumped Quantum-Cascade Lasers

V. Dudelev[1], D. Mikhailov[1], D. Chistyakov[1], A. Babichev[2], V. Mylnikov[1], A. Gladyshev[2], S. Losev[1], I. Novikov[2], A. Lyutetskiy[1], S. Slipchenko[1], N. Pikhtin[1], L. Karachinsky[2], A. Egorov[3], and •G. Sokolovskii[1]; [1]Ioffe Institute, Saint-Petersburg, Russia; [2]Connector Optics LLC, Saint-Petersburg, Russia; [3]ITMO University, Saint-Petersburg, Russia

We report on the temperature dynamics measurements of pulse-pumped quantum-cascade lasers with μm-scale spatial and sub-ns temporal resolution allowing for detection of mK/ns heating rates inside the active region

ROOM 6

EG-3.4 WED 11:45

Cavities with Giant Brownian Fluctuations

•*M. Douvidzon[1], U. Chattopadhyay[2], Y. Chong[2], and T. Carmon[3]; [1]Technion, Israel Institute of Technology, Technion City, Israel; [2]Nanyang Technological University, Singapore, Singapore; [3]Tel Aviv University, Tel Aviv, Israel*

We report on the softest optical micro resonator at room conditions. We operate a submerged micro-drop near the Winsor III phase and measure a Q=10^5, capillary amplitude and frequency of 6 nm and 155 Hz

EG-3.5 WED 12:00

Metal-molecule charge transfer through Fermi level equilibration in plasmonic systems

•*A. Stefancu[1], S. Lee[2], Z. Li[3], M. Liu[3], R. Ciceo-Lucacel[1], N. Leopold[1], and E. Cortes[2]; [1]Babes-Bolyai University, Cluj-Napoca, Romania; [2]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig-Maximilians-Universität München, Munich, Germany; [3]State Key Laboratory of Powder Metallurgy, School of Physical and Electronics, Central South University, Changsha, China*

In this study we highlight, and monitor by SERS, a new metal-molecule charge transfer pathway, complementary to photoexcitation or plasmon assisted charge carrier production, through Fermi level equilibration of plasmonic materials and adsorbed molecules.

ROOM 7

CE-6.4 WED 11:45

New strategies to shorten the time response of thermo-optic switches in a glass chip

•*P. Paiè [1], M. Calvarese[1,2], F. Ceccarelli [1], F. Sala[1,2], A. Bassi[1,2], R. Osellame[1,2], and F. Bragheri[1]; [1]Istituto di Fotonica e Nanotecnologie, IFN-CNR, Milano, Italy; [2]Dipartimento di Fisica, Politecnico di Milano, Milano , Italy*

In this work we present the design, fabrication and characterization of a fast thermo-optical switch. By layout optimization, surface laser microstructuring and driving voltage tuning, we prove a switching time of less than 100 μs.

CE-6.5 WED 12:00

Whispering gallery mode resonances in thermally poled borosilicate glass optical microcavities

•*N. Korakas[1,2], V. Tsafas[1,3], G. Filippidis[1], B. Moog[4], C. Craig[4], D.W. Hewak[4], M.N. Zervas[4], and S. Pissadakis[1]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece; [2]Department of Materials Science & Technology, University of Crete, Heraklion, Greece; [3]Department of Physics, University of Crete, Heraklion, Greece; [4]Optoelectronics Research Centre (ORC), University of Southampton, Southampton, United Kingdom*

Whispering gallery mode resonances are investigated in thermally poled, borosilicate glass, cylindrical cavities. Experimental results reveal the role of poling losses in the selective suppression of spectral resonances upon their radial order and polarization state.

ROOM 8

EA-3.4 WED 11:45

Integrated free-space optomechanics with AlGaAs heterostructures

•*A. Glushkova[1], S.K. Manjeshwar[1], J.M. Fitzgerald[2], S.M. Wang[1], P. Tassin[2], and W. Wieczorek[2]; [1]Department of Microtechnology and Nanoscience, Chalmers University of Technology, Göteborg, Sweden; [2]Department of Physics, Chalmers University of Technology, Göteborg, Sweden*

We fabricated and characterized suspended bi-layered photonic crystal slabs in AlGaAs heterostructures. Our approach allows to create integrated, closely spaced membranes, which can exhibit photonic bound states in the continuum to increase light-matter interaction.

EA-3.5 WED 12:00

How to observe single photons at 200 000 camera frames per second?

•*M. Lipka[1] and M. Parniak[1,2]; [1]Centre for Quantum Optical Technologies, Centre of New Technologies, University of Warsaw, Warsaw, Poland; [2]Niels Bohr Institute, University of Copanhagen, Copenhagen, Denmark*

Quantum technologies often benefit from spatially-resolved single-photon detection and adaptive real-time measurements. We present an order of magnitude faster camera localizing single-photons in real-time (a few us), and demonstrate it for twin-photons correlation measurements.

ROOM 9

EF-3.4 WED 11:45

Two-Photon Pumped Polariton Condensation

•*N. Landau[1], D. Panna[1], S. Feldman[1], R. Jacovi[1], S. Brodbeck[2], C. Schneider[2], S. Höfling[2], and A. Hayat[1]; [1]Department of Electrical Engineering, Technion – Israel Institute of Technology, Haifa, Israel; [2]Technische Physik and Wilhelm-Conrad-Röntgen-Research Center for Complex Material Systems, Universität Würzburg, Würzburg, Germany*

We report the first observation of two-photon excitation of a polariton condensate, demonstrated by angle- and time-resolved photoluminescence in a GaAs-based microcavity. Our results pave the way towards realization of a polariton-based THz laser source.

EF-3.5 WED 12:00

Photon-photon polaritons in chi-2 microresonators

•*D. Skryabin, V. Pankratov, A. Villois, and D. Puzyrev; University of Bath, Bath, United Kingdom*

We present a concept of new quasi-particles - photon-photon polaritons - and demonstrate how the polaritonic resonance splitting, avoided crossings, and Rabi dynamics can be observed in chi-2 ring microresonators using the pump-probe arrangement.

ROOM 10

CA-6.3 WED 11:45

Thin-disk multipass amplifier for kilowatt-class ultrafast lasers above 100 mJ

•*J. Dominik[1], M. Scharun[1], M. Rampp[2], B. Dannecker[1], D. Bauer[1], T. Metzger[2], A. Killi[1], and T. Dekorsy[3]; [1]TRUMPF Laser GmbH, Schramberg, Germany; [2]TRUMPF Scientific Lasers GmbH + Co. KG, Unterföhring, Germany; [3]German Aerospace Center (DLR), Institute of Technical Physics and Stuttgart University, Stuttgart, Germany*

We report on an industrially stable thin-disk multipass amplifier capable of delivering diffraction-limited beam quality, multi-kilowatt average power and pulse energies above 100 mJ.

CA-6.4 WED 12:00

kW-class ceramic Yb:Lu2O3 thin disk laser

•*S. Esser[1], X. Xu[2], J. Zhang[3], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge, University of Stuttgart, Stuttgart, Germany; [2]Jiangsu Key Laboratory of Advanced Laser Materials and Devices, School of Physics and Electronic Engineering, Jiangsu Normal University, Xuzhou, China; [3]Key Laboratory of Transparent and Opto-functional Inorganic Materials, Shanghai Institute of Ceramics, Chinese Academy of Science, Shanghai, China*

We report on a ceramic Yb:Lu2O3 thin-disk laser delivering a continuous-wave output power of 1190W in mutlimode operation with an optical efficiency of 64%. In fundamental mode operation 360W of output power were achieved.

ROOM 11

EB-6.4 WED 11:45

Optical Fiber Transmission of Squeezed States of Light and Homodyne Detection with a Real-time True Local Oscillator

•*I. Suleiman, J. Arnbak, X. Guo, J. Neergaard-Nielsen, T. Gehring, and U. Lund Andersen; Denmark Technical University, Kongens Lyngby (Copenhagen), Denmark*

We demonstrate transmission and homodyne detection of 1550 nm squeezed light through up to 10 km single-mode fiber with a real-time independent local oscillator, measuring up to 3.6 dB of squeezing below vacuum noise.

EB-6.5 WED 12:00

Spectral Hong-Ou-Mandel Interference Between Independently Generated Single Photons for Scalable Frequency-Domain Quantum Processing

•*A. Khodadad Kashi[1,2] and M. Kues[1,2]; [1]Institue of Photonics, Leibniz University, Hannover, Germany; [2]Cluster of Excellence PhoenixD, Hannover, Germany*

Via a reconfigurable photonic frequency circuit, we show spectral bosonic and fermionic Houng-Ou-Mandel interference between independently created pure single photons, demonstrating photon number scalability and versatility of the frequency processing approach.

NOTES

ROOM 1

ROOM 2

CH-6.6 WED 12:15

Integrated Multispectral Scanner for Chlorophyll Monitoring

•*P. Maidment[1], M.N. Malik[2], A. Bogoni[2], C. Klitis[1], and M. Sorel[1,2]; [1]James Watt School of Engineering, University of Glasgow, Glasgow, United Kingdom; [2]Sant'Anna School of Advanced Studies, Pisa, Italy*

Active multispectral sensors are an effective technology for biological monitoring. A triple-wavelength scanning system with compact semiconductor lasers to probe chlorophyll is demonstrated. The system architecture has been translated into a compact silicon photonic chip.

ROOM 3

CF-5.5 WED 12:15

Ultrafast, High-flux hard X-ray Source driven by a Few-cycle 5 μm OPCPA

•*L. von Grafenstein, A. Koç, C. Hauf, M. Woerner, M. Bock, E. Escoto, U. Griebner, and T. Elsaesser; Max Born Institute, Berlin, Germany*

A novel table-top hard X-ray source at 8 keV driven by few-cycle 5-μm laser pulses with 3.0 mJ energy provide a total number of 1.5×109 Cu-Kα photons per pulse at 1 kHz repetition rate.

ROOM 4

CM-2.6 WED 12:15

Laser nanofabrication deep inside silicon wafers

R. Asgari Sabet[1,2], A. Ishraq[1,2], and •O. Tokel[1,2]; [1]Bilkent University, Department of Physics, Ankara, Turkey; [2]National Nanotechnology Research Center, Turkey, Ankara, Turkey

Here, we introduce the first controlled nano-fabrication capability in the bulk of silicon wafers. We exploit smart use of structured beams and demonstrate "in-chip" nanostructuring with features lower than 250 nm.

ROOM 5

CB-4.6 WED 12:15

Linewidth Enhancement Factor of Mid-IR Quantum Cascade Lasers

•*M. Bertrand, M. Franckié, A. Forrer, F. Kapsalidis, M. Beck, and J. Faist; Institute for Quantum Electronics, ETH Zürich, Zürich, Switzerland*

We present measurements of the linewidth enhancement factor of Mid-IR Quantum Cascade Lasers using a coherent beatnote spectroscopy technique. We provide also theoretical predictions to explain the experimentally observed devices' behavior.

ROOM 6

EG-3.6 WED 12:15

Nano-IR study of light-matter interaction between intersubband transitions in quantum wells and patch antenna resonators by polymer expansion

•*M. Malerba[1], L. Baldassarre[2], R. Gillibert[2], V. Giliberti[3], S. Sotgiu[2], M. Ortolani[2,3], and R. Colombelli[1]; [1]C2N, Université de Paris Saclay, Palaiseau, France; [2]Dipartimento di Fisica, Università La Sapienza, Roma, Italy; [3]Center for Life Nanoscience, Istituto Italiano diTecnologia, Roma, Italy*

By inserting a layer of polyethylene inside a metal-heterostructure-metal optical cavity resonator and shining mid-IR light, we detect strong coupling of light/matter interactions and map EM fields from a single patch nanoantenna as polymer expansion.

ROOM 5

13:30 – 14:30

SP-2: Hot Topics: What's Next in Integrated Frequency Combs

Chair: Marco Piccardo, Harvard University, Cambridge, MA, USA

This session will showcase a 1-hour virtual panel discussion organized by OSA's Integrated Photonics Technical Group. The event will offer an overview of the many existing approaches based on active (lasers) and passive (high-Q resonators) devices, using different nonlinearities (Chi2 and Chi3) and spanning various spectral regions (from the visible to the THz). The featured presenters will discuss the physical mechanism of comb generation, device characteristics, and applications as well as highlight exciting related talks at CLEO Europe. Panelists include Miriam Vitiello, CNR; Benedikt Schwarz, TU Wien; Tobias Kippenberg, EPFL; Scott Papp, NIST; and Ingo Breunig, University of Freiburg.

ROOM 1

14:30 – 16:00

CH-7: Microscopy and Imaging Sensors

Chair: Martina Gerken, Christian-Albrechts-Universität, Kiel, Germany

CH-7.1 WED (Invited) 14:30

Photonic Antennas for Ultra-sensitive Biosensing and Bioimaging

P. Winkler[1], M. Sanz-Paz[1], E. Herkert[1], and •M. Garcia-Parajo[1,2]; [1]ICFO-Institute of Photonic Sciences, Barcelona, Spain; [2]ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain

Photonic antennas are metallic

ROOM 2

14:30 – 16:00

CF-6: Ultrafast Mid-IR Sources

Chair: Takao Fuji, Toyota Technological Institute, Nagoya, Japan

CF-6.1 WED 14:30

Milliwatt-Level Multi-Octave Mid-Infrared Generation by a Diode-Pumped Cr:ZnS Oscillator

•*N. Nagl[1], V. Pervak[1], F. Krausz[1,2], and K.F. Mak[2]; [1]Ludwig-Maximilians-Universität München, Garching, Germany; [2]Max-Planck-Institut für Quantenoptik, Garching, Germany*

We report the generation of a

ROOM 3

14:30 – 16:00

CM-3: Temporal and Spatial Beam Shaping for Laser Processing I

Chair: Francois Courvoisier, University of Franche-Comté, Besançon, France

CM-3.1 WED 14:30

On-The-Fly Laser Beam Shaping With Acousto-Optofluidics

•*M. Duocastella[1,2], A. Zunino[2,3], and S. Surdo[2]; [1]Universitat de Barcelona, Barcelona, Spain; [2]Istituto Italiano di Tecnologia, Genoa, Italy; [3]University of Genoa, Genoa, Italy*

We present a new system for on-demand beam shaping based on

ROOM 4

14:30 – 16:00

CB-5: Mid-infrared Semiconductor Lasers

Chair: Mikhail Belkin, Walter Schottky Institute, Garching, Germany

CB-5.1 WED (Invited) 14:30

Mid-IR lasers epitaxially integrated on on-axis Silicon

•*E. Tournié, M. Rio Calvo, L. Monge Bartolome, Z. Loghmari, R. Teissier, A.N. Baranov, L. Cerutti, and J.-B. Rodriguez; IES, Univ. Montpellier, CNRS, Montpellier, France*

We review our recent results on GaSb-based laser diodes (LDs) and InAs/AlSb quantum-cascade lasers

ROOM 5

14:30 – 16:00

EG-4: Nonlinear and Ultrafast Nano-optics

Chair: Riccardo Sapienza, Imperial College London, United Kingdom

EG-4.1 WED 14:30

Extremely Non-adiabatic Switch-off of Deep-strong Light-Matter Coupling

•*J. Mornhinweg[1], M. Halbhuber[1], V. Zeller[1], C. Ciuti[2], D. Bougeard[1], R. Huber[1], and C. Lange[1,3]; [1]Department of Physics, University of Regensburg, Regensburg, Germany; [2]Université de Paris, Laboratoire Matériaux et Phénomènes*

ROOM 6

14:30 – 16:00

CE-7: Integrated Optoelectronic Devices

Chair: Katia Gallo, KTH – Royal Institute of Technology, Stockholm, Sweden

CE-7.1 WED 14:30

Coupling of a 2D Heterostructure to a Photonic Polymer Waveguide via Mode-center Encapsulation

•*A. Frank[1], J. Zhou[2], J.A. Grieve[1,5], J. Viana-Gomez[6], I. Verzhbitskiy[2], A. Ling[1,2], and G. Eda[2,3,4]; [1]Centre for Quantum Technologies, National University of Singapore, Singapore, Singapore; [2]Department of Physics, National University of Singapore,*

ROOM 7

CE-6.6 WED 12:15

Self-Written Waveguides as Low-Loss Interconnects and Temperature Sensor

•*A. Günther[1,3], R. Garg[2], L. Zheng[2,3], B. Roth[2,3], and W. Kowalsky[1,3]; [1]Institute of High Frequency Technology, Braunschweig, Germany; [2]Hannover Centre for Optical Technologies, Hannover, Germany; [3]Cluster of Excellence PhoenixD, Hannover, Germany*

Self-written waveguides represent a promising class of optical interconnects. They enable a rigid connection and minimize coupling losses between different optical elements. Furthermore, their characteristics enable a usage as thermal sensing element simultaneously.

ROOM 8

EA-3.6 WED 12:15

Tomography of a Feedback Measurement with Photon Detection

•*S. Izumi, J.S. Neergaard-Nielsen, and U.L. Andersen; Center for Macroscopic Quantum States (bigQ), Department of Physics, Technical University of Denmark, Kongens Lyngby, Denmark*

We experimentally develop a measurement consisting of real-time feedbak controlled displacement combined with photon detector for the discrimination of the superpositions of the vacuum and single photon state, and characterize it via quantum detector tomography.

ROOM 9

EF-3.6 WED 12:15

Pattern formation in colloids driven by optical single feedback.

•*V. Bobkova, A. Goenner, and C. Denz; University of Muenster, Muenster, Germany*

We investigate the nonlinear dynamics of self-organization in a colloidal suspension driven by an optical single feedback system. Pattern formation is obtained as a result of an interplay of stochastic processes in colloids and optomechanical forces action.

ROOM 10

CA-6.5 WED 12:15

Efficient diode-pumped crygenic Yb:YLF laser with 500 W cw output power from a single rod

•*M. Kellert[1], U. Demirbas[1,3], J. Thesinga[1], S. Reuter[1], F.X. Kärtner[1,2], and M. Pergament[1]; [1]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Physics Department, University of Hamburg, Hamburg, Germany; [3]Laser Technology Laboratory, Department of Electrical and Electronics Engineering, Antalya Bilim University, Antalya, Turkey*

We present >500W cw output power from cryogenically cooled Yb:YLF laser in rod geometry by employing E//c axis for lasing. A wavelength shift from 995nm to 1019nm is observed and underlying physical mechanisms are discussed.

ROOM 11

EB-6.6 WED 12:15

Experimental demonstration of robust quantum steering

•*S. Wollmann[1], R. Uola[2], and A. Costa[3]; [1]University of Bristol, Bristol, United Kingdom; [2]University of Geneva, Geneva, Switzerland; [3]Federal University of Parana, Curitiba, Brazil*

We demonstrate quantum steering based on generalised entropies and criteria with minimal assumptions based on the so-called dimension-bounded steering. Further, we investigate their robustness against experimental imperfections such as misalignment in the shared measurement reference-frame.

NOTES

ROOM 7

14:30 – 16:00

EA-4: Cavity-QED and Cold Gases

Chair: Sebastian Blatt, MPQ Garching, Germany

EA-4.1 WED (Invited) 14:30

Creating optical lattices with sound using confocal cavity QED

•*B. Lev[1], Y. Guo[1], and J. Keeling[2]; [1]Stanford University, Stanford, USA; [2]University of St. Andrews, St. Andrews, United Kingdom*

We present an experiment that creates an optical lattice with sound, adding a new tool to the toolbox of quantum simulation. We measure

ROOM 8

14:30 – 16:00

EF-4: Nonlinear Regimes in Optical Fibers

Chair: Stephane Barland, Institut de Physique de Nice, Nice, France

EF-4.1 WED 14:30

Loss induced multiple symmetry breakings in the Fermi Pasta Ulam recurrence process

•*G. Vanderhaegen[1], P. Szriftgiser[1], M. Conforti[1], A. Kudlinski[1], S. Trillo[2], and A. Mussot[1]; [1]University of Lille, CNRS, UMR 8523 - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France; [2]Department of Engineering,*

ROOM 9

14:30 – 16:00

CA-7: Ultrafast Lasers

Chair: Nicolai Tolstik, NTNU Norwegian University of Science and Technology, Trondheim, Norway

CA-7.1 WED 14:30

69-W Sub-100-fs Yb:YAG Thin-Disk Laser Oscillator

•*J. Drs, J. Fischer, N. Modsching, F. Labaye, V.J. Wittwer, and T. Südmeyer ; Laboratoire Temps-Fréquence, Université de Neuchâtel, Avenue de Bellevaux 51, Neuchâtel, Switzerland*

We demonstrate a Kerr-lens mode-locked thin-disk laser oscillator gen-

ROOM 10

14:30 – 16:00

EB-7: Quantum Imaging and Interference

Chair: Martin Ringbauer, University of Innsbruck, Austria

EB-7.1 WED 14:30

High-dimensional quantum operations using structured photons

M. Hiekkamäki, S. Prabhakar, and •R. Fickler; Tampere University, Tampere, Finland

We demonstrate a flexible scheme to perform a broad range of high-dimensional quantum gates using structured photons. We use this

ROOM 11

14:30 – 16:00

EI-3: Graphene Heterolayers

Chair: Vasili Perebeinos, University at Buffalo, Buffalo, USA

EI-3.1 WED 14:30

Optoelectronic read-out of local current-induced spin polarization in gated graphene/WTe_2 heterostructures

•*C. Kastl; Walter Schottky Institut and Physics Department, Technical University of Munich, Garching, Germany; – Munich Center for Quantum Science and Technology (MC-QST), Munich, Germany*

ROOM 12

14:30 – 16:00

EJ-3: Tailored Light

Chair: Julien Javaloyes, University of the Balearic Islands, Palma, Spain

EJ-3.1 WED 14:30

Conical refraction with generalized Bessel-Gaussian beams

•*V.Y. Mylnikov[1], E.U. Rafailov[2], and G.S. Sokolovskii[1]; [1]Ioffe Institute, St. Petersburg, Russia; [2]Aston University, Birmingham, United Kingdom*

We investigate conical refraction of the linearly polarized generalized Bessel-Gaussian beam and demon-

ROOM 1

nanostructures that enhance and confine light into nanometer dimensions. I will discuss various antenna geometries and their suitability for monitoring nanoscale dynamic processes in living cells with single molecule detection sensitivity.

CH-7.2 WED 15:00

Sub-Nyquist label-free fiber-based ghost imaging

•*K. Abrashitova[1] and L. Amitonova[1,2]; [1]ARCNL, Amsterdam, Netherlands; [2]Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

The diffraction limit restricts the amount of information that can be captured with a standard optical system. Here we demonstrate label-free fiber-based computational ghost imaging that over-

ROOM 2

multi-octave-spanning coherent mid-infrared light via intra-pulse difference-frequency generation driven directly by a diode-pumped high-peak-power and low-noise Cr:ZnS oscillator, providing over 75 mW of average power between 2.8-14 μm.

CF-6.2 WED 14:45

Kerr-lens modelocked Cr:ZnS oscillator for spectroscopy and microscopy applications

•*J.G. Meyer and O. Pronin; Helmut-Schmidt-Universität, Hamburg, Germany*

We report a broadband Kerr-lens modelocked Cr:ZnS oscillator emitting 39 fs pulses with a peak power of 360 kW. It represents a promising source for unique spectroscopic applications in the molecular fingerprint region.

CF-6.3 WED 15:00

Yb-laser-based sub-60fs Mid-Infrared Source Tunable from 2.5μm to 10μm

•*R. Budriūnas[1,2], K. Jurkus[1], and A. Varanavičius[2]; [1]Light Conversion, Ltd, Vilnius, Lithuania; [2]Vilnius University Laser Research Centre, Vilnius, Lithuania*

Dual optical parametric amplifier setup capable of generating broadband few-cycle pulses tunable throughout 2.5μm-10μm is presented. Output power >1.5 W

ROOM 3

cascading two acousto-optofluidic cavities. By implementing it in a laser writing workstation, we demonstrate high-throughput material processing with multiple Bessel, annular and Gaussian beams.

CM-3.2 WED 14:45

Field enhancement on nano-structures inside dielectrics

•*K. Ardaneh, R. Giust, and F. Courvoisier; FEMTO-ST Institute, Univ. Bourgogne Franche-Comte, UMR CNRS 6174, 15B avenue des Montboucons, Besancon, France*

Femtosecond Bessel pulses create nano-plasma rods inside the bulk of dielectrics. We have investigated, by performing Particle-In-Cell simulations, surface waves, field enhancement and heating on these structures, depending on the plasma profile.

CM-3.3 WED 15:00

Excitation of Orbital Angular Momentum Modes in Helical Bragg Waveguide Inscribed by Femtosecond Laser Beam in YAG Crystal

•*A. Okhrimchuk[1,2], V. Likhov[1,2], S. Vasiliev[1], and A. Pryamikov[1]; [1]Prokhorov General Physics Institute of Russian Academy of Sciences, Moscow, Russia; [2]Mendeleev University of Chemical Technology of Russia, Moscow, Russia*

A few mode waveguide with the de-

ROOM 4

(QCLs), grown on on-axis (001) Si substrates by molecular-beam epitaxy, and covering emission wavelengths from 2 to 10 μm.

CB-5.2 WED 15:00

Precise mid-infrared characterization of InGaSb/GaSb SESAMs

J. Heidrich, •M. Gaulke, B.O. Alaydin, M. Golling, A. Barh, and U. Keller; ETH Zürich, Institute for Quantum Electronics, Ultrafast Laser Physics, Zürich, Switzerland

We present high-precision (<0.04%) nonlinear reflectivity and pump-probe setups to characterize mid-infrared InGaSb/GaSb quantum-well-based SESAMs

ROOM 5

Quantiques, CNRS, Paris, France; [3]3Department of Physics, TU Dortmund University, Dortmund, Germany

We deactivate deep-strong light-matter coupling extremely non-adiabatically. The switch-off is characterized by pronounced subcycle polarization oscillations more than an order of magnitude faster than the optical cycle duration, as verified by our quantum model.

EG-4.2 WED 14:45

Observation of modal interferences in plasmonic nano-resonators by ultrafast transmission electron microscopy

•*H. Lourenço-Martins[1,2], A. Geese[2], A. Feist[2], M. Sivis[1,2], J. Schrauder[2], and C. Ropers[1,2]; [1]Max Plank Institute for Biophysical Chemistry, Göttingen, Germany; [2]IV. Physical Institute, University of Göttingen, Göttingen, Germany*

In this talk, we will demonstrate that an ultrafast transmission electron microscope can be used to quantively analyse the modes population and dephasing of plasmonic excitations in a single resonator at the nano-scale.

EG-4.3 WED 15:00

Broadband Four-Wave Mixing Enhancement in 2D Transition-Metal Dichalcogenides Using Plasmonic Structures

•*Y. Dai[1], Y. Wang[1], S. Das[1], H. Xue[1], M. Ahmadi[1], S. Li[2], and Z. Sun[1]; [1]Department of Electronics and Nanoengineering, Aalto University, Espoo, Finland; [2]International Center for Young Scientists (ICYS), National Institute for Materials Science (NIMS), Tsukuba, Japan*

The significantly enhanced

ROOM 6

Singapore, Singapore; [3]Centre for Advanced 2D Materials, National University of Singapore, Singapore, Singapore; [4]Department of Chemistry, National University of Singapore, Singapore, Singapore; [5]Quantum Research Centre, Technology Innovation Institute, Abu Dhabi, Abu Dhabi; [6]Departamento de Física, Centro de Física, Braga, Portugal

We demonstrate the integration of a 2D heterostructure into the photonic mode-center of an elastomer ridge waveguide. The established geometry enhances mode-coupling by more than two orders of magnitude compared to surface placement.

CE-7.2 WED 14:45

Focused-ion-beam Implantation of Luminescence Centers in Gallium Nitride in Optical Telecom Frequency Band

•*J.-K. So[1], C. Soci[1], W. Gao[1], and N.I. Zheludev[1,2]; [1]Nanyanag Technological University, Singapore, Singapore; [2]University of Southampton, Southampton, United Kingdom*

We report on-demand and site-specific creation of near-infrared color centers in GaN films by Ga+ implantation where the luminescence is attributed to optical transitions of neutral gallium atoms originating from implanted Ga+ ions.

CE-7.3 WED 15:00

Charge Carrier Density Determination Via Magneto-Electroluminescence Spectroscopy in Resonant Tunneling Diodes

•*E.R. Cardozo de Oliveira[1,2], A. Naranjo[1], A. Pfenning[3], V. Lopez-Richard[1], G.E. Marques[1], L. Worschech[3], F. Hartmann[3], S. Höfling[3], and M. Daldin Teodoro[1]; [1]Departamento de Física, Universidade Federal de São Carlos, São Carlos, Brazil; [2]Université*

ROOM 7

the continuous dispersion relation of the phonons.

EA-4.2 WED 15:00

Structural phase transitions in cold atoms mediated by optical feedback

•*G. Baio, G.R.M. Robb, A.M. Yao, G.-L. Oppo, and T. Ackemann*; *Department of Physics, University of Strathclyde, Glasgow, United Kingdom*

We present novel structural transitions between hexagon, stripe, honeycomb phases in cold atomic clouds, where effective interactions are mediated by a retro-reflected

ROOM 8

University of Ferrara, Ferrara, Italy

We report a complete experimental description of the optical fiber losses effect in the Fermi Pasta Ulam recurrence process. The tuning of those losses highlights multiple critical values for which symmetry breakings occur.

EF-4.2 WED 14:45

Spatio-temporal observation of higher-order modulation instability in a recirculating fiber loop

•*F. Copie, P. Suret, and S. Randoux*; *Univ. Lille - PhLAM - Physique des Lasers Atomes et Molécules, Lille, France*

We report new observations regarding higher-order modulation instability in a fiber optics experiment. Single-shot space-time recordings reveal the deterministic pulse-splitting dynamics as well as an interplay with spontaneous MI mediated by the pump-signal frequency detuning.

EF-4.3 WED 15:00

Effect of synchronization mismatch on modulation instability in passive fiber-ring cavity

•*S. Negrini, F. Copie, S. Coulibaly, M. Conforti, A. Kudlinski, and A. Mussot*; *University of Lille, Villeneuve-d'Ascq, France*

We experimentally, numerically and theoretically investigate the impact of synchronization mismatch on modulation instability in passive fiber-ring cavities. We demon-

ROOM 9

erating 69-W 84-fs pulses at 17.3-MHz repetition rate. This corresponds to the highest average power of any sub-100-fs laser oscillator.

CA-7.2 WED 14:45

SESAM mode-locked Yb:YAB thin-disk oscillator delivering an average output power of 19 W

•*F. Beirow*[1], *B. Dannecker*[1], *B. Weichelt*[1], *D. Rytz*[2], *T. Graf*[1], *and M. Abdou Ahmed*[1]; [1]*Institut für Strahlwerkzeuge (IFSW), University of Stuttgart, Stuttgart, Germany*; [2]*Electro-Optics Technology GmbH (EOT), Idar-Oberstein, Germany*

We present first modelocking experiments of Yb:YAB in thin-disk configuration. In multimode operation an output power of 155 W was achieved. In mode-locked operation, 19.2 W at a pulse duration of 462 fs was obtained.

CA-7.3 WED 15:00

Efficient Yb-doped laser oscillator delivering 729 mW in 22-fs pulses

•*F. Labaye*[1], *V.J. Wittwer*[1], *M. Hamrouni*[1], *N. Modsching*[1], *E. Cormier*[2,3], *and T. Südmeyer*[1]; [1]*Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, Neuchâtel, Switzerland*; [2]*Laboratoire Photonique, Numérique et Nanosciences, UMR 5298, CNRS-IOGS-Université Bordeaux, Talence, France*; [3]*Institut Universitaire de France (IUF), Paris,*

ROOM 10

technique to investigate two-photon interference effects using multiple spatial modes along a single beam-path.

EB-7.2 WED 14:45

A Controllable Source of High-dimensional Entagled Photon Pairs

•*J. Gil-Lopez, V. Ansari, C. Silberhorn, and B. Brecht*; *ntegrated Quantum Optics Group, Institute for Photonic Quantum Systems (PhoQS), Paderborn, Germany*

We present a highly controllable source of maximally entangled high-dimensional photon pairs. Combining dispersion engineering of the PDC process and spectral shaping of the pump, up to six-dimensional states with user chosen dimension are generated.

EB-7.3 WED 15:00

Ghost Imaging Exchange-Free

•*J. Hance and J. Rarity*; *Quantum Engineering Technology Laboratory, Department of Electrical and Electronic Engineering, University of Bristol, Bristol, United Kingdom*

We have developed a protocol for ghost imaging that is always counterfactual - while imaging an object, no light interacts with it. This provides both better visibility/SNR and less absorbed intensity than ghost imaging.

ROOM 11

We utilize an optoelectronic detection scheme based on magneto-optical Kerr microscopy to resolve large spin polarizations in graphene/WTe_2 heterostructures. The current-induced spin-orientation is driven by interlayer coupling and Berry curvature in the WTe_2.

EI-3.2 WED 14:45

Graphene/Bi2Se3Heterojunction Phototransistor Using PhotogatingEffect Modulated by Tunable Tunneling Resistance

•*H.H. Yoon*[1,2], *F. Ahmed*[1], *Y. Dai*[1,2], *H.A. Fernandez*[1,2], *X. Cui*[1,2], *X. Bai*[1,2], *D. Li*[1,2], *M. Du*[1,2], *H. Lipsanen*[1], *and Z. Sun*[1,2]; [1]*Department of Electronics and Nanoengineering, Aalto University, Fi-00076 Aalto, Finland*; [2]*Finnish Centre of Excellence in Quantum Technology, Department of Applied Physics, Fi-00076 Aalto, Finland*

A Dirac-source field-effect transistor combined based on a lateral heterochannel and a vertical tunnel junction has been realized, enabling us to explore photogating effect modulated by tunable tunneling resistance for high-performance light detection.

EI-3.3 WED 15:00

Photoinduced Intersubband Absorption and Enhanced Photobleaching in Twisted Bilayer Graphene

•*E.A.A. Pogna*[1], *X. Miao*[2], *D. von Dreifus*[3], *T.V. Alencar*[4], *M.V.O. Moutinho*[5], *P. Venezuela*[6], *P.-W. Chiu*[7], *C. Manzoni*[8], *G. Cerullo*[8], *M. Ji*[2], *and A.M. de Paula*[3]; [1]*Istituto di Nanoscienze CNR-NANO, Lab. NEST, Pisa, Italy*; [2]*Laboratory of Surface Physics and Department of Physics, Fudan University, Shanghai, China*; [3]*Departamento de Física, Universidade Federal de Minas Gerais, Belo Horizonte-MG, Brazil*; [4]*Departamento de Física, Universidade Federal de Ouro Preto, Ouro Preto-MG, Brazil*; [5]*Núcleo*

ROOM 12

strate drastic changes in the focal intensity patterns for different beam parameters, including multi-ring Lloyd's distributions and inversion of orientation of associated half-rings.

EJ-3.2 WED 14:45

Complexly Shaped Vector Beams via Conical Diffraction Cascade

•*M.W. Iqbal, N. Marsal, and G. Montemezzani*; *Université de Lorraine, CentraleSupélec, LMOPS, Metz, France*

Modeling of a two-crystals conical diffraction cascade with intermediate transformation in wave-vector space predicts the formation of highly complex shaped vector beams that lose the usual radial circular symmetry. The theoretical findings are confirmed experimentally.

EJ-3.3 WED 15:00

Local tailoring of light in inhomogeneous scattering media

•*I. Kresic*[1], *K.G. Makris*[2,3], *and S. Rotter*[1]; [1]*Institute for Theoretical Physics, Vienna University of Technology (TU Wien), Vienna, Austria*; [2]*ITCP-Physics Department, University of Crete, Heraklion, Greece*; [3]*Institute of Electronic Structure and Lasers (IESL), Foundation for Research and Technology - Hellas, Heraklion, Greece*

We present a framework to mod-

ROOM 1

comes the Nyquist and Abbe limits.

CH-7.3 WED 15:15

Subwavelength Video-Rate Terahertz Carrier Microscopy

•*R. Tucker, L. Peters, J.S. Totero Gongora, J. Tunesi, M. Rowley, A. Pasquazi, and M. Peccianti; Emergent Photonics Lab, University of Sussex, Brighton, United Kingdom*

We demonstrate a microscopy approach for high-frame-rate imaging of carrier dynamics in targets. A parallel large-area optical pump terahertz probe provides near-field resolution and enables the investigation of responses under arbitrary photo-excitation textures.

CH-7.4 WED 15:30

Scattering field imaging along an optical waveguide in operando

•*Y. Haddad, J. Chrétien, S. Margueron, J.-C. Beugnot, and G. Fanjoux; FEMTO-ST institut, BESANCON, France*

We present a non-destructive and non-invasive imaging spectroscopic technique with a high spatial and

ROOM 2

at 3μm and >450mW at 10μm is achieved using an 80W pump laser.

CF-6.4 WED 15:15

Broadband Pulse Generation at Infrared Frequencies Based on a multi-kHz Ytterbium Amplifier

•*K. Keller[1], A. Budweg[2], J. Allerbeck[1,2], and D. Brida[1,2]; [1]Université du Luxembourg, Luxembourg, Luxembourg; [2]University of Konstanz, Konstanz, Germany*

Two-stage optical parametric amplification enables the generation of sub-20 fs pulses at near- to mid-infrared frequencies, spanning from 1.5 to 2.5 μm (120 – 200 THz) and tunable up to 5 μm (60 THz).

CF-6.5 WED 15:30

Electro-Optic Sampling with Percent-Level Detection Efficiency

•*C. Hofer[1,2], D. Gerz[1,2], M. Gebhardt[3,4], T. Heuermann[3,4], T.P. Butler[2], C. Gaida[5], J. Limpert[3,4,5], F. Krausz[1,2], and I. Pupeza[1,2]; [1]Ludwig Maximilians University Munich, Garching, Germany; [2]Max Planck Institute of Quantum Optics, Garch-*

ROOM 3

pressed cladding in the form of helix was inscribed in YAG:Nd crystal. Conversion of Gaussian beam into modes with orbital angular momentum is experimentally demonstrated at Bragg resonance.

CM-3.4 WED 15:15

Optical Properties of Nanogratings Inscribed with Conical Phase Fronts

•*K. Lammers[1], E. Alimohammadian[2], A. Alberucci[1], G. Djogo[2], S. Nolte[1,3], and P.R. Herman[2]; [1]Institute of Applied Physics, Abbe School of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We present a novel degree of freedom by which the properties of nanogratings can be altered: the conical phase front of the inscription beam. We will discuss its influence on the optical properties of nanogratings.

CM-3.5 WED 15:30

Laser-fabrication of arrays of channels with subwavelength diameter and micrometric depth at the surface of glass

•*N. Sanner[1], X. Liu[1,2], D. Grojo[1], and O. Utéza[1]; [1]Aix Marseille Univ., CNRS, LP3 UMR 7341, Marseille, France; [2]State Key Laboratory of Transient Optics and Photonics,*

ROOM 4

at 2.05 μm. The SESAMs show modulation depths between 1-2.4%, low saturation fluences, low non-saturable losses and fast recovery times.

CB-5.3 WED 15:15

Auger Recombination in Mid-Infrared Quantum Well Lasers

T. Eales[1], •I. Marko[1], A. Adams[1], A. Andrejew[2], K. Vizbaras[2,3], and S. Sweeney[1]; [1]Advanced Technology Institute, University of Surrey, Guildford, United Kingdom; [2]Walter Schottky Institut, Technische Universität München, Garching, Germany; [3]Brolis Semiconductors UAB, Vilnius, Lithuania

Auger recombination is significant in near- and mid-infrared emitters. The quantum well geometry permits two fundamentally different Auger transitions. Our analysis demonstrates that the temperature dependence can be explained by a thermally activated Auger process.

CB-5.4 WED 15:30

Gain characterization of 2-μm GaSb VECSELs

•*M. Gaulke, J. Heidrich, B.Ö. Alaydin, M. Golling, A. Barh, and U. Keller; Institute for Quantum Electronics, ETH, Zurich, Switzerland*

We present spectral gain and gain saturation measurements for mid-infrared GaSb-based VECSEL gain

ROOM 5

four-wave mixing is achieved in a broadband range in 2D transition-metal dichalcogenides using plasmonic structures. This enhancement is attributed to the plasmon-induced strongly confined electric field, promising for 2D nonlinear optical applications.

EG-4.4 WED 15:15

Second Harmonic Generation in monolayer WS2 with double resonant Bragg-Cavities

•*H. Knopf[1,2,3], M. Zilk[1], S. Bernet[1,2], G.Q. Ngo[1], F.A. Abtahi[1], A. George[4], E. Najafidehaghani[4], Z. Gan[4], M. Weissflog[1,3], T. Vogl[4], A. Turchanin[4], U. Schulz[2], S. Schröder[2], and F. Eilenberger[1,2,3]; [1]Institute of Applied Physics, Friedrich-Schiller-University, Jena, Germany; [2]Fraunhofer Institute of Applied Optics and Precision Engineering IOF, Jena, Germany; [3]Max Planck School of Photonics, Jena, Germany; [4]Institute of Physical Chemistry, Friedrich Schiller University, Jena, Germany*

We show enhanced nonlinear frequency generation in 2D-materials using monolithic dielectric Bragg mirror based resonators with high Q-factors at the pump and second harmonic wavelength. We report on fabrication and measured energy- and polarization dependencies.

EG-4.5 WED 15:30

Ultrafast dynamics of heat in metals

A. Block[1] and •Y. Sivan[2]; [1]ICN2, Catalan Institute of Nanoscience and Nanotechnology, Barcelona, Spain; [2]Ben-Gurion University, Beer-Sheva, Israel

We provide a thorough theoretical description and experimental ob-

ROOM 6

Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [3]Technische Physik, Physikalisches Institut and Röntgen Center for Complex Material Systems (RCCM), Universität Würzburg, Würzburg, Germany

Optoelectronic properties of purely n-doped resonant tunneling diodes (RTDs) are studied through magnetotransport and magneto-electroluminescence. We take advantage of the RTDs electroluminescence to investigate the charge carrier dynamics and accumulation, complementing traditional transport measurements.

CE-7.4 WED 15:15

Integration of a perovskite-based amplifier and photodetector system in rigid and solid substrates

•*I. Suárez; Escuela Técnica Superior de Ingeniería, Avenida de la Universidad s/n, Burjassot, Spain*

CH3NH3PbI3 perovskite thin films were integrated in polymer waveguides to construct an amplifier-photodetector system. The device is integrated in both rigid and flexible substrates and demonstrates, experimental and theoretically, ASE and photocurrent under light illumination.

CE-7.5 WED 15:30

Strain-induced optoelectronic tunability of fiber grown 2D transition metal di-chalcogenides

•*A. Niv[2] and A. Ya'akobovitz[1]; [1]Ben-Gurion University of The Negev, Beer-Sheva, Israel; [2]Ben-Gurion University of The Negev, Sde-Boqer, Israel*

The bandgap of sheared MoS2 is

ROOM 7

driving beam. Nontrivial recovery of inversion symmetry due to atomic transport is demonstrated.

EA-4.3 WED 15:15

The contribution has been withdrawn.

EA-4.4 WED 15:30

Wave-packet dynamic in a SU(2) non-Abelian Gauge field

M. Hasan[1,2], C. Madasu[1,2], K. Rathod[2,3], C.C. Kwong[1,2], C. Miniatura[1,2,3], F. Chevy[4], and •D. Wilkowski[1,2,3]; [1]Nanyang Quantum Hub, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore,

ROOM 8

strate that the sidebands position and shape depends on this parameter.

EF-4.4 WED 15:15

Spatiotemporal Soliton Attractor in Multimode Graded-index Fibers

•M. Ferraro[1], M. Zitelli[1], F. Mangini[2], and S. Wabnitz[1]; [1]Department of Information Engineering, Electronics and Telecommunications (DIET), Sapienza University of Rome, Rome, Italy; [2]Department of Information Engineering (DII), University of Brescia, Brescia, Italy

Experimental evidence of spatiotemporal femtosecond soliton propagation over long spans of parabolic graded-index (GRIN) fibers, supported by numerical simulations, reveals that initial multimode soliton pulses naturally and irreversibly evolve into a singlemode soliton.

EF-4.5 WED 15:30

Condensation of optical waves in multimode fibers: observation and thermodynamic characterization

•K. Baudin[1], A. Fusaro[1], J. Garnier[2], K. Krupa[3], N. Berti[1], C. Michel[4], I. Carusotto[5], S. Ricca[6], G. Millot[1], and A. Picozzi[1]; [1]Université de Bourgogne , Dijon, France; [2]Ecole

ROOM 9

France

A cross-pumping approach for BULK laser oscillators enables overcoming previous bandwidth limitations. Applied to a Kerr-lens mode-locked Yb:CALGO laser enable to generate 22 fs pulses with an average power of 729 mW and 25% optical-to-optical efficiency.

CA-7.4 WED 15:15

High-Peak Power Single-Cavity Dual-Comb Solid-State Laser with 100-fs Pulse Duration

J. Pupeikis, B. Willenberg, C. Bauer, •C. Phillips, and U. Keller; Department of Physics, Institute of Quantum Electronics, ETH Zurich, Zurich, Switzerland

We demonstrate a 230-kW peak power Yb:CaF2 dual-comb oscillator with 100-fs pulse duration from both combs simultaneously. The common-path polarization-multiplexed cavity delivers two combs at 80-MHz repetition rate with 208 Hz tunable repetition rate difference.

CA-7.5 WED 15:30

Dual-comb mode-locked laser simultaneously operating in two different dispersion regimes

•M. Kowalczyk[1], X. Zhang[2,3], V. Petrov[4], Z. Wang[2], and J. Sotor[1]; [1]Laser & Fiber Electronics Group, Faculty of Electronics, Wroclaw University of Science and Technology, Wrocław, Poland; [2]State Key Labora-

ROOM 10

EB-7.4 WED 15:15

Hong-Ou-Mandel-Enabled Quantum Imaging

B. Ndagano, H. Defienne, •A. Lyons, and D. Faccio; School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom

Here we exploit the mapping between the number of coincidence events and the temporal delay between two photons in HOM interference to demonstrate full HOM imaging directly on a camera.

EB-7.5 WED 15:30

Experimental Higher-Order Interference in Quantum Mechanics Induced by Optical Nonlinearities

•P. Namdar[1], I. Alonso Calafell[1], A. Trenti[1], M. Radonjic[2], B. Dakic[1,3], P. Walther[1], and L. Rozema[1]; [1]Vienna Center for Quantum Science and Technology, Faculty of Physics, Uni-

ROOM 11

Multidisciplinar de Pesquisas em Computação - NUMPEX-COMP, Campus Duque de Caxias, Universidade Federal do Rio de Janeiro, Duque de Caxias, Rio de Janeiro, Brazil; [6]Instituto de Física, Universidade Federal Fluminense, UFF, Niterói, Rio de Janeiro, Brazil; [7]Dep. of Electrical Engineering, National Tsing Hua University, Hsinchu, Taiwan; [8]IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy

High-sensitivity femtosecond microscopy with broad spectral coverage reveals photoinduced intersubband absorption and enhanced photobleaching bands in twisted bilayer graphene endowed with picosecond relaxation time and twist angle-tunable energy position.

EI-3.4 WED 15:15

Hybrid Graphene-WS2 Mach-Zehnder modulator on passive silicon waveguide

•C. Wu[1,2], S. Brems[1], I. Asselberghs[1], C. Huyghebaert[1], V. Sorianello[3], M. Romagnoli[3], J. Van Campenhout[1], D. Van Thourhout[2], and M. Pantouvaki[1]; [1]imec, Leuven, Belgium; [2]Ghent University-imec, Department of information Technology, Gent, Belgium; [3]Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Pisa, Italy

In this work, we integrate an graphene-oxide-WS2 stack on silicon passive waveguide. The Loss and electro-optical effects are both characterized with Mach-Zehnder interferometer.

EI-3.5 WED 15:30

Anisotropic Terahertz Pump-Probe Response of Bilayer Graphene

•A. Seidl[1,2], R. Anvari[3], M.M. Dignam[3], P. Richter[4], T. Seyller[4], H. Schneider[1], M. Helm[1,2], and S. Winnerl[1]; [1]Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-

ROOM 12

ify a pre-existing dielectric structure such that it confines light following a desired intensity distribution. The local index tuning required leaves the initial and the modified structure uni-directionally indistinguishable.

EJ-3.4 WED 15:15

Optimal Design of Arrays of Nonlinear Nanoantennas

M. Gandolfi[1], C. De Angelis[1], and •M. Guasoni[2]; [1]CNR-INO and Department of Information Engineering, University of Brescia, Brescia, Italy; [2]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

We develop a theoretical model that provides relatively simple semi-analytical formulas to describe the near and the far-field scattered from an array of nonlinear nanoantennas. This substantially simplifies the inverse design.

EJ-3.5 WED 15:30

Silent White Light: Intensity Noise Suppression in Superluminescent Diodes

•K.N. Hansmann, W. Elsäßer, and R. Walser; Technische Universität Darmstadt, Institut für Angewandte Physik, Darmstadt, Germany

Temperature dependent suppression of intensity fluctuations

ROOM 1

spectral resolution based on the detection of the Rayleigh scattering field radiated out of an optical waveguide in operation.

CH-7.5 WED 15:45

Interferometric phase retrieval in optical transient detection

•*A. Esteban-Martín, J. García-Monreal, F. Silva, and G.J. de Valcárcel*; *Departament d'Òptica i Optometria i Ciències de la Visió, Universitat de València, Burjassot (València), Spain*

We report a nonlinear-crystal-based transient detection imaging system with off-axis digital holographic Fourier filtering for complex-field retrieval of a dynamic scene while suppressing stationary background and remarkable ability of to detect phase-sign changes.

ROOM 2

ing, Germany; [3]*Institute of Applied Physics, Abbe Centre of Photonics, Friedrich-Schiller Univ. Jena, Jena, Germany*; [4]*Helmholtz-Institute Jena, Jena, Germany*; [5]*Active Fiber Systems GmbH, Jena, Germany*

Employing a high-power, 2-μm laser source, we demonstrate detection of octave-spanning mid-infrared waveforms via electro-optic sampling, reaching percent-level detection efficiencies and an intensity dynamic range that surpasses 14 orders of magnitude at 9 μm.

CF-6.6 WED 15:45

Shaping and Phase Characterization of Ultrashort Pulses in the Mid-Infrared by AOM Shaper-Based D-Scan

•*F. Nicolai*[1], *N. Müller*[1], *C. Manzoni*[2], *G. Cerullo*[2], *and T. Buckup*[1]; [1]*Physikalisch-Chemisches Institut, Universität Heidelberg, Heidelberg, Germany*; [2]*IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy*

An AOM-shaper based dispersion scan setup for characterization of mid-infrared pulses is implemented. Flexible shaping and phase characterization for several phases as well as pulse compression down to 45 fs FWHM autocorrelation are demonstrated.

ROOM 3

Xi'an Institute of Optics and Precision Mechanics of CAS, Xi'an, China

Using customized micro-Bessel beams of reduced length, we demonstrate the fabrication of arrays of submicrometer-diameter channels by laser ablation (pitch=1.5 μm, depth=5 μm). Influence of crosstalk between channels on the laser writing process is discussed.

CM-3.6 WED 15:45

Dynamic higher order Bessel beam mixing – the formation of an optical drill

•*G. Kontenis*[1,2], *D. Gailevičius*[1,2], *and K. Staliūnas*[1,3,4]; [1]*Vilnius University, Faculty of Physics, Laser Research Center, Vilnius, Lithuania*; [2]*Femtika LTD, Vilnius, Lithuania*; [3]*ICREA, Barcelona, Spain*; [4]*UPC, Dep. de Fisica, Terrassa (Barcelona), Spain*

We demonstrate the formation of an optical drill by superposition of two higher order Bessel beams of different helicities. We dynamically form and mix the Bessel beams by application of a programmable Spatial Light Modulator.

ROOM 4

chips. Small-signal-gain up to 5 % and saturation-fluences of 4 μJ/cm^2 were measured for a commercial 2-μm VECSEL.

CB-5.5 WED 15:45

Toward mid-infrared laser diodes on Silicon photonic integrated circuits

•*L. Monge Bartolome, M. Rio Calvo, M. Bahriz, J.-B. Rodriguez, L. Cerutti , and E. Tournié* ; *Institut d'Electronique et des Systèmes, Montpellier, France*

Monolithic integration of mid-IR LDs on PICs requires direct epitaxy on on-axis Si substrates and fabrication of cleavage-free cavities. We report on both goals: the first etched-facets GaSb-based lasers grown on on-axis operating in CW-RT.

ROOM 5

servation of femtosecond-scale heat diffusion in a metal film. Various unexpected phenomena such as the cooling and refocusing of the electron heat spot are analyzed and explained.

EG-4.6 WED 15:45

Describing SPDC at the Nanoscale: A Quasinormal Mode Approach

•*M.A. Weissflog*[1,2], *S. Saravi*[1], *C. Gigli*[3], *G. Marino*[3], *A. Borne*[3], *G. Leo*[3], *T. Pertsch*[1,4], *and F. Setzpfandt*[1]; [1]*Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University, Jena, Germany*; [2]*Max Planck School of Photonics, Jena, Germany*; [3]*Matériaux et Phénomènes Quantiques, Université de Paris and CNRS, Paris, France*; [4]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*

We describe Spontaneous Parametric Downconversion in dielectric nanoresonators based on their quasinormal modes. By revealing the governing modal interactions, our approach provides a capable tool for designing nanoscale photon-pair sources with tailored emission properties.

ROOM 6

shown to blueshift, while a redshift is predicted. Further investigation points to the intricate interplay of the electronic bandgap and tightly bound quasi-particles in the form of trions and excitons.

CE-7.6 WED 15:45

Temperature Dynamics in Silicon Core Fibers during CO$_2$-Laser Processing

•*K. Mühlberger, C.M. Harvey, and M. Fokine*; *Department of Applied Physics, KTH Royal Institute of Technology, Stockholm, Sweden*

The as-drawn optical quality of silicon core optical fibers can be improved by CO$_2$-laser post-processing. Critical temperature dynamics in the fiber during laser processing are studied, in-situ and non-contact, using an interferometric technique.

Singapore; [2]MajuLab, International Joint Research Unit UMI 3654, CNRS, Université Côte d'Azur, Sorbonne Université, National University of Singapore, Nanyang Technological University, Singapore, Singapore; [3]Centre for Quantum Technologies, National University of Singapore, Singapore, Singapore; [4]. Laboratoire Kastler Brossel, ENS-PSL Université, CNRS, Sorbonne Université, College de France, Paris, France

We present wave-packet dynamic in a synthetic non-Abelian gauge field using an ultracold Fermionic gas. Here, anisotropic Zitterbewegung-like oscillation are observed in two-dimensional plane. Applications to quantum information and atomtronics are discussed.

EA-4.5 WED 15:45

Electric field correlation measurements on the electromagnetic groundstate in the non-local regime

•F.F. Settembrini[1], A. Herter[1], I.-C. Benea-Chelmus[2], F. Lindel[3], G. Scalari[1], and J. Faist[1]; [1]ETH Zürich, Institute for Quantum Optoelectronics, Zürich, Switzerland; [2]Harvard University, John A. Paulson School of Engineering, Cambridge, USA; [3]Albert-Ludwigs-Universität Freiburg, Physikalisches Institut, Freiburg, Germany

We present temporal and spatial electric field correlation measurements performed on the electromagnetic ground state at terahertz frequencies in the non-local regime. We investigate the scaling of these correlations with the sampled space-time volume.

Polytechnique, Palaiseau, France; [3]Institute of Physical Chemistry Polish Academy of Sciences, Varsovia, Poland; [4]Université Côte d'Azur, Nice, France; [5]Università di Trento, Povo, Italy; [6]University of Adolfo Ibáñez, Santiago, Chile

We report the observation and the thermodynamic characterization of light condensation in multimode fibers: below a critical value of the kinetic energy, the fundamental mode gets macroscopic populated, in agreement with the equilibrium theory.

EF-4.6 WED 15:45

Multicore fibers: a novel platform for a robust and reconfigurable self-organisation of light

S. Jain[1], K. Ji[1], J. Sahu[1], D.J. Richardson[1], J. Fatome[2], S. Wabnitz[3], and •M. Guasoni[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]Laboratoire Interdisciplinaire Carnot de Bourgogne, CNRS, University of Bourgogne-Franche-Comte, Dijon, France; [3]Department of Information Engineering, Electronics and Telecommunications (DIET), Sapienza University, Rome, Italy

Multicore fibers offer many degrees of freedom with respect to the single-core counterpart. This paves the way to a plethora of unexplored types of self-organization disclosing novel opportunities for high-power lasers and optical communications

tory of Crystal Materials, Shandong University, Jinan, China; [3]Center of Nanoelectronics, School of Microelectronics, Shandong University, Jinan, China; [4]Max Born Institute for Nonlinear Optics and Ultrafast Spectroscopy, Berlin, Germany

We present a single-cavity dual-comb mode-locked oscillator based on intrinsic polarization-multiplexing in a birefringent Yb:CNGS gain medium. The laser simultaneously generates two pulse trains in a conservative (117 fs) and chirped (2.36 ps) soliton regimes.

CA-7.6 WED 15:45

Multi-GHz repetition rate, deep ultraviolet femtosecond source operating in the burst mode

•H. Ye[1], L. Pontagnier[1], C. Dixneuf[1,2], G. Santarelli[1], and E. Cormier[1,3]; [1]Laboratoire Photonique Numérique et Nanosciences (LP2N), Talence, France; [2]Azurlight Systems, Pessac, France; [3]Institut Universitaire de France (IUF), Paris, France

we present a multi-GHz repetition rate, femtosecond deep UV source in the burst mode based on FHG of an EO comb, promising for the application of driving multi-bunch X-band photoinjectors.

versity of Vienna, Boltzmanngasse 5, Vienna, Austria; [2]Scientific Computing Laboratory, Center for the Study of Complex Systems, Institute of Physics, University of Belgrade, Belgrade, Serbia; [3]Institute for Quantum Optics & Quantum Information (IQOQI), Austrian Academy of Sciences, Boltzmanngasse, Vienna, Austria

It has been proven theoretically and confirmed experimentally that quantum mechanics exhibits only second-order interference. However, this makes several implicit assumptions. Here we highlight these assumptions experimentally, showing that optical nonlinearities can induce higher-order interference.

EB-7.6 WED 15:45

Anyonic two-photon statistics and hybrid entanglement with a semiconductor chip

•F. Baboux[1], S. Francesconi[1], A. Raymond[1], N. Fabre[1], A. Lemaître[2], P. Milman[1], M.I. Amanti[1], and S. Ducci[1]; [1]Université de Paris/CNRS - MPQ, Paris, France; [2]CNRS/Université Paris Saclay - C2N, Palaiseau, France

We employ SPDC in an AlGaAs chip to engineer the wavefunction and exchange statistics of photon pairs directly at the generation stage. We simulate fermions, anyons, and generate hybrid frequency-polarization entangled states for applications in quantum information.

Rossendorf, Dresden, Germany; [2]Institute for Applied Physics, Technische Universität Dresden, Dresden, Germany; [3]Department of Physics, Engineering Physics & Astronomy, Queen's University, Kingston, Canada; [4]Institute of Physics, Technical University Chemnitz, Chemnitz, Germany

We studied the pump-induced anisotropy of the intraband excitation in bilayer graphene in degenerate terahertz pump-probe experiments. The differential transmission signal increases approximately linearly with the excitation field, in qualitative agreement with our microscopic model.

EI-3.6 WED 15:45

Plasmons in graphene nanoribbons: a platform for nonlinear optics

•A. Rodríguez[1], J. García de Abajo[1,2], and J. Cox[3,4]; [1]ICFO - The institute of Photonic Sciences, Castelldefels, Spain; [2]ICREA – Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, 08010 Barcelona, Spain, Barcelona, Spain; [3]Center for Nano Optics, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark; [4]Danish Institute for Advanced Study, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark

We excite propagating plasmons in 1-D graphene nanoribbons and study them through rigorous quantum-mechanical simulations that account for nonlocal, quantum finite-size, and edge-termination effects in both linear and nonlinear optical response.

in semiconductor light sources are explained via the interaction between a statistically distributed classical electric field and a pumped atomic three-level-system with varying pumping rate.

EJ-3.6 WED 15:45

Optical waveguides based upon a gauge field

•A. Alberucci[1], C.P. Jisha[1], and S. Nolte[1,2]; [1]Friedrich-Schiller University Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We discuss light waveguiding due to a synthetic gauge field. Our proposal relies on longitudinally periodic structures, where the gauge field corresponds to a point-wise shift of the longitudinal index modulation.

10:00 – 11:00

CC-P: CC Poster Session

CC-P.1 WED

Deterministic spatiotemporal focusing of terahertz waves through scattering media

•V. Kumar, V. Cecconi, A. Pasquazi, J. Gongora, and M. Peccianti; University of Sussex, Falmer, United Kingdom

we theoretically demonstrate spatiotemporal refocusing of THz waves following a direct measurement of the transfer matrix of the scattering medium. Our approach combines the advantages offered by field-sensitive detection with the nonlinear wavefront shaping of THz waves.

CC-P.2 WED

Low Noise Terahertz Photodetectors in the 0.6-2.8 THz Range based on Quantum Dot Single Electron Transistors

•M. Asgari[1], L. Viti[1], D. Coquillat[2], V. Zannier[1], L. Sorba[1], and M. Serena Vitiello[1]; [1]CNR Nano-Institute and Scuola Normale Superiore, Pisa, Italy; [2]Laboratoire Charles Coulomb, Campus du Triolet, Université Montpellier, Montpellier, France

In this work, we describe that quantum dot single electron transistors based on InAs/InAs0.3P0.7 heterostructured nanowires and planar on-chip nanoantennas, behave as highly sensitive quantum detector at 0.6-2.8 THz range.

CC-P.3 WED

A Broadband Suspended Hollow Vivaldi Antenna for THz Quantum Cascade Lasers

•U. Senica, M. Beck, J. Faist, and G. Scalari; ETH Zurich, Zurich, Switzerland

We present a broadband (1.5-4.5 THz) suspended hollow Vivaldi antenna. When mounted on a broadband THz Quantum Cascade Laser with emission spanning more than 1 THz, the far-field has a FWHM beam width of (5° × 9°).

CC-P.4 WED

Towards efficient broadband difference frequency mixing and terahertz generation in metallic nanostructures

•I. Babushkin[1], A. Demircan[1], U. Morgner[1], J. Herrman[2], and A. Husakou[2]; [1]Institute of Quantum Optics, Leibniz University, Welfengarten 1, 30167, Hannover, Germany; [2]Max Born Institute, Max Born Str. 2a, 12489, Berlin, Germany

We show that resonances, resulting from the confinement of electrons in metallic nanostructures lead to strong nonlinearities at low frequencies. They can be used for effective low-harmonic (for instance THz or MIR) generation.

CC-P.5 WED

Comparative Study on efficient THz Generation in the organic Crystal DAST driven by mid-IR Pulses

C. Gollner[1], •R. Jutas[1], M. Shalaby[2,3], C. Brodeur[2], I. Astrauskas[1], A. Baltuska[1,4], and A. Pugzlys[1,4]; [1]TU Wien, Photonics Institute, Vienna, Austria; [2]Swiss Terahertz Research-Zurich, Zurich, Switzerland; [3]Key Lab of Terahertz Optoelectronics, Beijing, China; [4]Center for Physical Sciences & Technology, Vilnius, Lithuania

We report on unprecedentedly high THz generation efficiencies approaching 6% by optical rectification of 2 micrometer pulses in the organic crystal DAST, and investigate an underlying interplay between the wavelength and intensity of the driving pulses.

CC-P.6 WED

The contribution has been withdrawn.

CC-P.7 WED

Giant Controllable Gigahertz to Terahertz Harmonic Generation in Semiconductor Superlattices

•M. Fernandes Pereira[1], V. Anfertev[2], A. Apostolakis[3], Y. Shevchenko[3], and V. Vaks[2]; [1]Department of Physics, Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates; [2]Institute for Physics of Microstructures, Russian Academy of Sciences, GSP-105, Nizhny Novgorod, Russia; [3]Institute of Physics, Czech Academy of Sciences, Prague, Czech Republic

Giant control of GHz-THz nonlinear harmonic generation in semiconductor superlattices is delivered by a combination of structural design and externally applied static bias. Our nonequlibrium manybody simulations and experimental data are in excellent agreement.

CC-P.8 WED

Bursting and excitability in neuromorphic resonant tunneling diodes

•I. Ortega-Piwonka[1,2], O. Piro[1], B. Romeira[3], J. Figueiredo[4], and J. Javaloyes[1,2]; [1]Departament de Física, Universitat de les Illes Balears, Palma de Mallorca, Spain; [2]Institute of Applied Computing and Community Code (IAC-3), Palma de Mallorca, Spain; [3]Ultrafast, Bio and Nanophotonics, International Iberian Nanotechnology Laboratory (INL), Braga, Portugal; [4]Centra-Ciências and Departamento de Física, Faculda de de Ciências, Universidade de Lisboa, Lisboa, Portugal

Resonant tunneling diodes can operate as excitable devices, with potential applications in spike signaling and neural networks. In this study, an RTD connected to DC voltage is modeled and characterized in terms of its parameters.

CC-P.9 WED

High-quality 3D printed THz waveguides with optimized processing parameters for COC filaments

•E. Mavrona, J. Graf, E. Hack, and P. Zolliker; Empa, Dübendorf, Switzerland

New low-cost optical devices can be manufactured with 3D printing while using THz transparent materials. We present the 3D printing of high-quality THz waveguides while optimizing the 3D printing parameters of cyclic olefin copolymer (Topas).

CC-P.10 WED

The Role of Gas Dynamics on Laser Filamentation THz Sources Operating at High Repetition Rates

•C. Lanara[1,2], A.D. Koulouklidis[1], C. Daskalaki[1], V.Y. Fedorov[3,4], and S. Tzortzakis[1,2,3]; [1]Institute of Electronic Structure and Laser (IESL), Heraklion, Greece; [2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [3]Texas A&M University at Qatar, Doha, Qatar; [4]P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia

We report on the impact of laser pulse repetition rate on two-color filamentation based terahertz sources. A 50% decrease on the terahertz energy is observed when the repetition rate increases from 0.6 to 6 kHz.

CC-P.11 WED

Experimental exploration of longitudinal modes in spherical shells at 220 GHz – 330 GHz: applications to corneal sensing

•F. Zarrinkhat[1,2], J. Lamberg[2], M. Baggio[2], A. Tamminen[2], J. Ala-Laurinaho[2], E.E.M. Khaled[3,4], J. Manuel Rius[1], J. Romeu Robert[1], and Z. Taylor[2]; [1]CommSensLab, Technical University of Catalonia/UPC, Barcelona, Spain; [2]Department of Electronics and Nanoengineering, Aalto University, MilliLab, Espoo, Finland; [3]Department of Electrical Engineering, Assiut University, Assiut, Egypt; [4]High Institute of Engineering and Technology, Sohage, Egypt

Agreement between the reflectivity of a spherical shell and equivalent planar structure is demonstrated at 220-330 GHz. The Gaussian-beam illumination on spherical surfaces results in a non-trivial alignment to achieve broadband THz sensing of corneal tissue.

CC-P.12 WED

High-resolution molecular spectroscopy in micrometric thin cells

J.C. de Aquino Carvalho, J. Lukusa Mudiayi, P. Resendiz-Vasquez, B. Darquié, D. Bloch, I. Maurin, and •A. Laliotis; Laboratoire de Physique des Lasers, UMR7538 CNRS, Université Sorbonne Paris Nord, Villetaneuse, France

We present linear sub-Doppler rovibrational spectroscopy of molecular gases confined in a thin cell of micrometric thickness. These experiments pave the way towards compact frequency references and spectroscopic measurements of the Casimir-Polder interaction with molecules.

CC-P.13 WED

Monte Carlo Modeling of a Short Wavelength Strain Compensated Quantum Cascade Detector

•J. Popp[1], M. Haider[1], M. Franckié[2], J. Faist[2], and C. Jirauschek[1]; [1]Technical University of Munich, Munich, Germany; [2]ETH Zurich, Zurich, Switzerland

We present simulation results of a short wavelength strain compensated quantum cascade detector based on an ensemble Monte Carlo approach. The modeled detectivity of 5.06×10^7 Jones at 300 K shows good agreement with the experimental value.

CC-P.14 WED

Nonlinear Generation of THz Vortex Beams with Tunable Orbital Angular Momentum in Si Microdisks

•H. Pi, F. He, J. Yan, and X. Fang; School of Electronics and Computer Science, University of Southampton, Southampton, United Kingdom

We demonstrate waveguide-coupled microdisks that emit THz light with tunable orbital angular momentum. The topological charge of the THz light can be tuned by changing the driving infrared wavelengths in the difference-frequency generation process.

CC-P.15 WED

Terahertz pulse generation in ZnTe crystal pumped around the bandgap

•D. Zhai, E. Herault, F. Garet, and J.-L. Coutaz; IMEP-LAHC, Le Bourget du lac, France

We generate THz waveforms in ZnTe by optical rectification of femtosecond laser pulses whose photon energy is tuned from1.55 to 2.56 eV. We observed a peak of the THz signal at the ZnTe bandgap energy.

CC-P.16 WED

Investigation of optimal THz band for corneal water content quantification

•M. Baggio[1], A. Tamminen[1], S. Presnyakov[2], N.P. Kravchenko[2], I.I. Nefedova[1], J. Ala-Laurinaho[1], E. Brown[3], S. Deng[4], V. Wallace[5], and Z.D. Taylor[5]; [1]Aalto University, Espoo, Finland; [2]HSE University, Moscow, Russia; [3]Wright State University, Dayton, USA; [4]University of California, Los Angeles, USA; [5]University of Western Australia, Perth, Australia

Low terahertz frequency reflectometry is a promising technique for human cornea sensing. In particular, two waveguide bands (WR 5.1 and WR 2.2) are compared in terms of sensitivity to corneal water content and thickness variations.

10:00 – 11:00

CF-P: CF Poster Session

CF-P.1 WED

Ultrafast nonlinear spectroscopy of nematic liquid crystals via transient frequency-shear detection
E. Neradovskaia, G. Cheriaux, C. Claudet, and •A. Jullien; Université Côte d'Azur, CNRS, Institut de Physique de Nice, Valbonne, France
We report a novel time-resolved ultrafast spectroscopy setup to investigate third-order nonlinear dynamics, through transient Kerr-induced carrier-frequency shift measurement. The method is applied to ultrafast spectroscopy of orientated nematic liquid crystals.

CF-P.2 WED

Octave-Spanning Mid-Infrared Passive Optical Resonator
•E. Fill[1,2], A.-K. Raab[1,2], M. Högner[2], P. Sulzer[1,2,3,4], D. Gerz[1,2], L. Fürst[1,2], and I. Pupeza[1,2]; [1]Ludwig-Maximilians-Universität, Garching, Germany; [2]Max-Planck-Institut für Quantenoptik, Garching, Germany; [3]Department of Physics and Astronomy, Vancouver, Canada; [4]Quantum Matter Institute, Vancouver, Canada
35-word abstract: We demonstrate an ultrabroadband passive optical resonator to which the seeding laser is coupled through a wedged diamond plate. Using gold mirrors, frequency combs in the near-IR and the mid-IR regions are simultaneously resonantly enhanced.

CF-P.3 WED

supercontinuum generation in a nitrogen filled multipass cell
•A.B. Wahid, V. Hariton, K. Fritsch, and O. Pronin; helmut-schmidt universität, hamburg, Germany
we perform efficient supercontinuum generation in a multipass cell taking advantage of the Raman nonlinearity of nitrogen gas for 25 μJ and 230 fs pulses.

CF-P.4 WED

Lorentzian autocorrelation of mid-infrared pulses from water vapor absorption
•L. Vamos[1], C. Hensel[1], L. Maidment[1], I. Tyulnev[1], U. Elu[1], D. Sanchez[1], M. Enders[1], and J. Biegert[1,2]; [1]ICFO - Institut de Ciencies Fotoniques, Castelldefels, Barcelona, Spain; [2]ICREA, Castelldefels, Barcelona, Spain
Propagation of ultrashort mid-infrared laser pulses was simulated to validate the Lorentzian shape in intensity autocorrelation measurements due to linear absorption and dispersion in moist air.

CF-P.5 WED

Two-dimensional spectral shearing interferometry designed for mode-locked Cr:ZnS lasers
•T. Kugel[1,2], D. Okazaki[1], K. Arai[1], and S. Ashihara[1]; [1]Institute of Industrial Science, University of Tokyo, Tokyo, Japan; [2]Institute of Experimental Physics, Graz University of Technology, Graz, Austria
We present Cr:ZnS laser pulse characterization by two-dimensional spectral shearing interferometry. It enables the direct spectral phase measurement of mid-infrared pulses with energies as low as 2 nJ.

CF-P.6 WED

Generation of optical vortices with diverse topological charge via angular momentum transfer
•I. Lopez-Quintas[1], W. Holgado[1], R. Drevinskas[2], P.G. Kazansky[2], Í.J. Sola[1], and B. Alonso[1]; [1]Grupo de Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, University of Salamanca, 37008, Salamanca, Spain; [2]Optoelectronics Research Centre, University of Southampton, SO17 1BJ, Southampton, United Kingdom
We propose an in-line method to produce collinear optical vortices with different topological charges based on the interaction between radially or azimuthally varying linear polarization fields with the spin and orbital angular momenta of light.

CF-P.7 WED

Self-started figure-8 mode-locked fiber laser for space borne optical frequency comb
•Y. Takeuchi, R. Saito, S. Endo, T. Kurihara, and M. Musha; Institute for Laser science,Univ. of Electro-communications, Chofu, Japan
We have developed an all-PM figure-8 mode-locked laser for optical-based high-precision microwave generation in space. Our mode-locked laser has obtained the optical spectrum of 45.1 nm and observed self-starting of mode-locking without active trigger.

CF-P.8 WED

Towards 1 J-level multipass spectral broadening.
•V. Hariton[1,2], K. Fristch[1], G. Figueira[2], and O. Pronin[1]; [1]Helmut-Schmidt-University, Hamburg, Germany; [2]Instituto Superior Técnico, Lisboa, Portugal
We propose a novel multi-pass spectral broadening concept based on a concave-convex arrangement with scaling potential up to 1-J energy and TW peak-power. In a proof-of-principle experiment, efficient and homogeneous compression of pulses is achieved.

CF-P.9 WED

Neodymium-doped polarization maintaining all-fiber laser with dissipative soliton resonance mode-locking at 905 nm
•A.A. Mkrtchyan[1], Y. Gladush[1], M. Melkumov[2], A. Khegai[2], K. Sitnik[1], P.G. Lagoudakis[1], and A.G. Nasibulin[1,3]; [1]Skolkovo Institute of Science and Technology, Moscow, Russia; [2]Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Moscow, Russia; [3]Aalto University, Department of Chemistry and Materials Science, Espoo, Finland
Here we demonstrate all-fiber polarization-maintaining mode-locked rectangular shape pulse laser operating at 905 nm wavelength in NALM scheme. Numerical simulation showed perfect correspondence of obtained pulses to dissipative soliton resonance regime.

CF-P.10 WED

Femtosecond OPO employing Brewster angle prism retroreflectors
•D.E. Hunter and R.A. McCracken; Heriot-Watt University, Edinburgh, United Kingdom
We demonstrate a low-cost OPO in which dielectric mirrors are replaced by Brewster angle prism retroreflectors (Pellin-Broca prisms). Exploiting total internal reflection, these prisms form a high-finesse cavity supporting femtosecond pulses tuneable across 1100-1400nm.

CF-P.11 WED

Multi-color FROG with a Single Monolayer of WS_2
•M. Noordam[1], J. Hernandez-Rueda[1,2], and K. Kuipers[1]; [1]Kavli Institute of Nanoscience, Delft, Netherlands; [2]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands
We simultaneously characterize two different colour ultrafast laser pulses by exploiting the high nonlinear response of monolayer of WS_2 and concurrently measuring the nondegenerate FROG traces of the sum-frequency and four-wave mixing nonlinear processes.

CF-P.12 WED

Tunable femtosecond optical parametric amplifier pumped by 1 kHz ultrafast thin-disk laser pulses for coherent anti-Stokes Raman scattering
•X. Zhao[1], M. Baudisch[2], M. Beutler[2], T. Gabler[1], S. Nolte[1,3], and R. Ackermann[1]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller Universität Jena, Jena, Germany; [2]APE Angewandte Physik & Elektronik GmbH, Berlin, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany
A tunable optical parametric amplifier pumped by thin-disk laser pulses provides a maximum pulse energy of ~200 μJ, at 700-900 nm and a pulse duration of ~1 ps for fs-CARS system in high pressure gases.

CF-P.13 WED

Harnessing Amplitude and Phase Spectral Correlations to Recover the Dynamics of Optical Frequency Combs
•M. Ansquer[1], V. Thiel[2], S. De[3], B. Argence[1], F. Bretenaker[4], and N. Treps[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, ENS-Université PSL, CNRS, Collège de France, Paris, France; [2]Department of Physics and Oregon Center for Optical, Molecular, and Quantum Science, University of Oregon, Eugene, USA; [3]Integrated Quantum Optics Group, Applied Physics, Paderborn University, Paderborn, Germany; [4]Université Paris-Saclay, CNRS, ENS Paris-Saclay, CentraleSupélec, LuMIn, Gif-sur-Yvette, France
The intensity, carrier envelope offset, repetition rate and central wavelength noises of a frequency comb are extracted from spectral covariance matrices. Intensity related dynamics is investigated from amplitude-phase correlations and compared to a simple model.

CF-P.14 WED

High resolution spectrally resolved interferometry in the mid-IR
•M. Kurucz[1,2], R. Flender[1], T. Grosz[1], A. Borzsonyi[1,2], U. Gimzevskis[3], A. Samalius[3], D. Hoff[4], and B. Kiss[1]; [1]ELI-ALPS, ELI-HU Non-Profit Ltd, Szeged, Hungary; [2]University of Szeged, Szeged, Hungary; [3]OPTOMAN, Vilnius, Lithuania; [4]Single cycle instruments, Jena, Germany
Spectrally resolved interferometric techniques combined with nonlinear processes are presented, aiming for high accuracy phase measurement in the MIR. Using these methods spectral phase can be determined at two spectral bands from a single interferogram.

CF-P.15 WED

Kilowatt-average-power compression of millijoule pulses in a gas-filled multi-pass cell.
•C. Grebing[1,2], M. Müller[1], J. Buldt[1], H. Stark[1], and J. Limpert[1,2,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [3]Helmholtz-Institute Jena, Jena, Germany
We demonstrate the generation of 1-mJ, 31-fs pulses with an average power of 1 kW by close-to lossless post-compression of 200-fs pulses from a high-power Yb:fiber laser system in an argon-filled Herriott-type multi-pass cell.

ROOM 2

CF-P.16 WED

85 fs Yb:YAG bulk oscillator with separated Kerr-lens and gain media

•*M. Khalili Kelaki, J. Gabriel Meyer, and O. Pronin*; *Helmut-Schmidt-Universität, Hamburg, Germany*

We present peak power scaling of a Kerr-lens mode-locked Yb:YAG bulk oscillator. By lowering the repetition rate and controlling the Kerr-lens in a separate medium a peak power increase from 68 to 136 kW was achieved.

CF-P.17 WED

Regenerative shaping of ultrashort light pulses

•*K. Regelskis, G. Liaugminas, G. Dubosas, and J. Želudevičius*; *Center for Physical Sciences & Technology, Vilnius, Lithuania*

We present a regenerative ultrashort light pulse shaper based on double-stage Mamyshev regenerators connected in closed loop with electrically-controlled acousto-optic switcher. This scheme enables the formation of high quality ultrashort light pulses.

CF-P.18 WED

Second-harmonic generation by diamond color centers

•*A. Abulikemu[1], Y. Kainuma[2], T. An[2], and M. Hase[1]*; *[1]Department of Applied Physics, University of Tsukuba, Tsukuba, Japan*; *[2]School of Materials Science, Japan Advanced Institute of Science and Technology, Nomi, Japan*

In this presentation, we report the observation of second-harmonic generation (SHG) from diamond crystals, whose inversion symmetry is broken by the nitrogen-vacancy (NV) center. Furthermore, we have investigated the tunability of wavelength for the SHG output.

CF-P.19 WED

Non-instantaneous Third-order Polarization in Gases at Low Intensities

•*A. Husakou[1], F. Morales[1], M. Richter[1], and V. Olvo[2]*; *[1]Max Born Institute, Max Born Str. 2a, 12489, Berlin, Germany*; *[2]Department of Physics, Voronezh State University, Universitetskaya Ploshchad', 1, 394036, Voronezh, Russia*

Using first-principle simulations we show that, contrary to common belief, nonlinear polarization cannot be described by an instantaneous function of the electric field even at low intensities and far from resonances.

ROOM 3

10:00 – 11:00

CE-P: CE Poster Session

CE-P.1 WED

The contribution has been withdrawn.

CE-P.2 WED

Analysis and Assessment of Tube Thickness Variation Effect in Hollow-Core Inhibited Coupling Tube Lattice Fibers

•*F. Melli[1], F. Giovanardi[2], L. Rosa[1], F. Benabid[3], and L. Vincetti[1]*; *[1]Department of Engineering "Enzo Ferrari", University of Modena and Reggio Emilia, Modena, Italy*; *[2]Department of Engineering and Architecture, University of Parma, Parma, Italy*; *[3]GPPMM Group, XLIM Institute, CNRS UMR 7252, University of Limoges, Limoges, France*

The effects of geometrical imperfections in Inhibited Coupling Tube Lattice Fibers are investigated. The impact of incremental variations of the tube thickness approaching their apex is analyzed and modeled in terms of cladding mode coupling.

CE-P.3 WED

Raman Spectroscopy of gallium phosphide nanowires under 5% elastic strain

•*V. Sharov[1,2], P. Alekseev[2], V. Fedorov[1], and I. Mukhin[1]*; *[1]Saint-Petersburg Academic University, Saint-Petersburg, Russia*; *[2]Ioffe Institute, Saint-Petersburg, Russia*

Polarized Raman spectra of highly-strained gallium phosphide NWs were obtained and analyzed. Strain effects such as shifting, splitting and broadening of certain Raman modes were discussed via deformation potential theory and Mie theory.

CE-P.4 WED

Development of a New Sintering Technique for Fabricating High-Quality Nd3+- and Yb3+-doped Y2O3 Transparent Ceramics

•*G. Stanciu, F. Voicu, C.-A. Brandus, E.-C. Tihon, S. Hau, C. Gheorghe, G. Croitoru, and L. Gheorghe*; *National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Magurele, Romania*

A multi-step sintering method was used to fabricate high-quality Nd:Y2O3 and Yb:Y2O3 transparent ceramic laser media. Structural and morphological characteristics, the spectroscopic properties, and laser emission performances of the obtained ceramics were investigated.

CE-P.5 WED

Zinc Oxide Optical Ceramic Codoped with Er3+ and Yb3+ Ions

E. Gorohova[1], I. Venevtsev[2], S. Eron'ko[1], •L. Basyrova[3], I. Alekseeva[1], A. Khubetsov[1], O. Dymshits[1], A. Zhilin[1], and P. Loiko[3]; *[1]S.I. Vavilov State Optical Institute, St. Petersburg, Russia*; *[2]Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia*; *[3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France*

Zinc oxide optical ceramics codoped with Er3+ and Yb3+ ions is fabricated by uniaxial hot pressing at 1180 ˚C. The structure of ceramic (hexagonal, wurtzite-type) and its spectroscopic properties are studied evidencing the ZnO→RE3+ energy-transfer.

CE-P.6 WED

Red-Emitting Manganese Doped MgAl2O4 Ceramic Spinels Studied by Time- and Temperature-Resolved Luminescence Spectroscopy

N. Khaidukov[1], •A. Pirri[2], M. Brekhovskikh[1], G. Toci[3], M. Vannini[3], B. Patrizi[3], and V. Makhov[4]; *[1]N. S. Kurnakov Institute of General and Inorganic Chemistry, Moscow, Russia*; *[2]Istituto di Fisica Applicata "N. Carrara", Consiglio Nazionale delle Ricerche, Florence, Italy*; *[3]Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche, Florence, Italy*; *[4]P. N. Lebedev Physical Institute, Moscow, Russia*

Ceramic samples of MgAl2O4 spinel doped exclusively with tetravalent manganese ions, Mn4+, have been prepared as red-emitting (651 nm) phosphors and studied using time-resolved luminescence spectroscopy technique in the temperature range of 10 – 290 K

CE-P.7 WED

Hollow Antiresonant Optical Fiber Modified with Thin Films Containing Highly-Luminescent Gd2O3:Nd3+ Nanophosphors

•*V. Demidov[1,2], A. Matrosova[1,2,3], S. Evstropiev[1,2,3,4], N. Kuzmenko[3], V. Aseev[3], N. Nikonorov[3], and K. Dukelskii[1,3,5]*; *[1]R&P Association Vavilov State Optical Institute, St. Petersburg, Russia*; *[2]Bauman Moscow State Technical University, Moscow, Russia*; *[3]ITMO University, St. Petersburg, Russia*; *[4]Saint-Petersburg State Institute of Technology, St. Petersburg, Russia*; *[5]The Bonch-Bruevich St.-Petersburg State University of Telecommunications, St. Petersburg, Russia*

Cubic Gd2O3 crystals were applied for the modification of a silica hollow-core antiresonant fiber with thin films based on highly-luminescent Gd2O3:Nd3+ nanophosphors synthesized by the polymer-salt method which allows non-CVD formation of active silica layers

CE-P.8 WED

Deep-red activated persistent luminescence nanoparticles via upconversion

L. Giordano[1,2], L. Carvalho Veloso Rodrigues[1], •B. Viana[2], and T. Delgado[2]; *[1]Department of Fundamental Chemistry, Institute of Chemistry, University of São Paulo, São Paulo, Brazil*; *[2]IRCP, CNRS, Chimie Paristech, PSL University , Paris, France*

This work proposes to combine upconverting nanoparticles and persistent luminescent nanoparticles by dry impregnation. The assemblies present persistent luminescence under excitation in the first biological window at 980 nm opening the path to bioimaging applications.

CE-P.9 WED

The contribution has been withdrawn.

CE-P.10 WED

Fano Resonances in Corrugated Ring coupled Bragg Waveguide System

•*P. Rawat, V. Mere, and S.K. Selvaraja*; *Indian Institute of Science , Bengaluru, India*

We experimentally demonstrate the Fano resonance in a corrugated ring coupled to a corrugated bus waveguide system and report that it is strongly dependent upon the coupling gap between ring and waveguide.

CE-P.11 WED

Production of Biaxial Polarization-Maintaining Optical Fiber with Panda-Type and Elliptical-Core Geometry

•*A. Karatutlu, E. Yapar Yıldırım, E. Kendir, and B. Ortaç*; *Bilkent University UNAM - Institute of Materials Science and Nanotechnology, Ankara, Turkey*

This work demonstrates two-axes high polarization extinction ratio over 30 dB within operation temperatures from -60 ˚C to +85 ˚C using a novel geometry combined with Panda-type and elliptical-core PM fiber designs.

ROOM 3

CE-P.12 WED

Two-photon Absorption in $Ca_3(VO_4)_2$ Crystal

D.S. Chunaev, E.E. Dunaeva, S.B. Kravtsov, I.S. Voronina, and •P.G. Zverev; Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia

Two-photon absorption coefficient in calcium orthovanadate under irradiation with trains of 25-ps laser pulses at the wavelength of 523.5 nm was measured to be 0.25 cm/GW.

CE-P.13 WED

Insight into the performance of mode-locking with heating SWNT composites

•C. Jin and X. Liu; State Key Laboratory of Modern Optical Instrumentation, College of Optical Science and Engineering, Zhejiang University, Hangzhou, China

For the first time, we have studied on the performance of SWNT-based SA composites under different temperatures which is expected to provide a reference to research on high thermal endurance property SA in fiber lasers.

CE-P.14 WED

Large-scale, high-resolution, wide-gamut structural coloration of flexible substrate

•N. Li and A. Fratalocchi; King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

We propose a low-cost structural color technique based on self-assembly that exploits the interaction of scattering and resonances of complex hierarchical nanostructures. It realizes full color gamut, 127000 DPI resolution, large-scale printing (4-inch) simultaneously.

ROOM 4

10:00 – 11:00

JSII-P: JSII Poster Session

JSII-P.1 WED

THz-Pump/SC-Probe Spectroscopy and the Non-resonant Dynamic Stark Effect of Molecules

•B.J. Kang[1], E.J. Rohwer[1], M. Cascella[2], S.-X. Liu[3], R.J. Stanley[4], and T. Feurer[1]; [1]Institute of Applied Physics, University of Bern, 3012 Bern, Switzerland; [2]Department of Chemistry and Hylleraas Centre for Quantum Molecular Sciences, University of Oslo, N-0315 Oslo, Norway; [3]Department of Chemistry and Biochemistry, University of Bern, 3012 Bern, Switzerland; [4]Department of Chemistry, Temple University, Philadelphia, Pennsylvania 19122, USA

We demonstrate THz Stark spectroscopy of solvated molecules using intense single-cycle THz pulses, thereby overcoming limitations of traditional Stark spectroscopy: No sample freezing, peak fields beyond the dielectric breakdown in conventional experiments and arbitrary polarization.

NOTES

13:30 – 14:30

EC-P: EC Poster Session

EC-P.1 WED

First observation of a fractal topological insulator

•T. Biesenthal[1], L. Maczewsky[1], Z. Yang[2], M. Kremer[1], M. Heinrich[1], M. Segev[2], and A. Szameit[1]; [1]Institut für Physik, Universität Rostock, 18059 Rostock, Germany; [2]Physics Department and Solid State Institute, Technion-Israel Institute of Technology, Haifa 32000, Israel

We experimentally demonstrate the first fractal topological insulator. We show the existence of topological protected edge states despite the absence of any bulk: every site in our structure is on an edge, external or internal.

EC-P.2 WED

The contribution has been withdrawn.

EC-P.3 WED

The contribution has been withdrawn.

EC-P.4 WED

The contribution has been withdrawn.

EC-P.5 WED

Measurement of the Band Dispersions of a Floquet-Bloch Lattice Realised with Coupled Fiber Rigns

•C. Lechevalier, C. Evain, P. Suret, F. Copie, A. Amo, and S. Randoux; Université de Lille, CNRS, UMR 8523-PhLAM-Physique des Lasers Atomes et Molécules, F-5900 Lille, France

We report the single-shot measurement of the dispersive band structure in a Floquet-Bloch photonic lattice realized with a double fibre loop system. This open the door to the full experimental characterization of Floquet-lattice systems.

EC-P.6 WED

Two-Dimensional PT-Symmetric Floquet Topological Insulator

•A. Fritzsche[1,2], M. Kremer[2], L. Maczewsky[2], Y. Joglekar[3], M. Heinrich[2], R. Thomale[1], and A. Szameit[2]; [1]Institute for Theoretical Physics and Astrophysics, Julius-Maximilans University of Würzburg, Würzburg, Germany; [2]Universität Rostock, Institute of physics, Rostock, Germany; [3]Department of Physics, Indiana University-Purdue University Indianapolis (IUPUI), Indianapolis, USA

We present a theoretical proposal for a two-dimensional PT-symmetric topological insulator (TI) that supports two counter-propagating topologically protected boundary states and discuss ongoing experiments to confirm the theoretical predictions.

EC-P.7 WED

Topological confinement of light in photonic crystal nanocavites

•R. Barczyk[1], N. Parappurath[1], S. Arora[2], T. Bauer[2], F. Alpeggiani[2], K. Kuipers[2], and E. Verhagen[1]; [1]Center for Nanophotonics, AMOLF, Amsterdam, Netherlands; [2]Kavli Institute of Nanoscience, Delft University of Technology, Delft, Netherlands

We employ far-field Fourier spectroscopy to characterize the confinement of light at telecom frequencies in topological photonic crystal ring cavities and cavity-waveguide couplers. We explore the hallmarks of topological protection, quantifying dispersion, loss, and coupling.

EC-P.8 WED

Direct visualization of on-chip THz topological states

•J. Wang[1], R. Wang[2], X. Zhang[1], Q. Wu[1], D. Song[1], J. Xu[1], and Z. Chen[1]; [1]The MOE Key Laboratory of Weak-Light Nonlinear Photonics, TEDA Institute of Applied Physics and School of Physics, Nankai University, Tianjin, China; [2]Innovation Laboratory of Terahertz Biophysics, National Innovation Institute of Defense Technology, Beijing, China

We demonstrate nonlinear generation of terahertz topological edge states in an SSH lattice engineered on a LiNbO3 chip, manifested directly in the bandgap from the dispersion relation and further verified by the characteristic electric field distribution.

EC-P.9 WED

A Topological Phase Transition in Random Photonic Multilayer Structures

•D. Whittaker; Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom

A mapping between photonic multilayers and chiral tight-binding models shows that a topological phase transition can be observed by measuring transmission through randomly layered structures. This is verified experimentally using analogous transmission line structures.

EC-P.10 WED

Direct quantification of robustness in topologically-protected photonic edge states at telecom wavelengths

•S. Arora[1], T. Bauer[1], R. Barczyk[2], E. Verhagen[2], and L. Kuipers[1]; [1]Delft University of Technology, Delft, Netherlands; [2]AMOLF, Amsterdam, Netherlands

We experimentally quantify the back-scattering contribution of the edge states in topological photonic crystals emulating the quantum valley Hall effect. Measuring the vectorial near field reveals two orders of magnitude higher robustness compared to a conventional waveguide.

EC-P.11 WED

Cubic 3D Chern photonic insulators with orientable large Chern vectors

•C. Devescovi[1], M. García Díez[2], I. Robredo Magro[1], M. Blanco de Paz[1], B. Bradlyn[2], J. Luis Mañes[2], M. García Vergniory[1,3], and A. García Etxarri[1,3]; [1]Donostia International Physics Center (DIPC), Donostia-San Sebastian, Spain; [2]University of the Basque Country (UPV-EHU), Bilbao, Spain; [3]Basque Foundation for Science (IKERBASQUE), Bilbao, Spain

We propose a general strategy to design 3D topological insulating photonic crystals where Chern vectors of any magnitude, sign or direction can be implemented at will, possibly in a weakly magnetic environment.

EC-P.12 WED

Quantifying the robustness of light transport in topological photonic waveguides

G. Arregui[1], J. Gomis-Bresco[1], C.M. Sotomayor-Torres[1,2], and •P.D. García[1]; [1]ICN2 - Instituto Catalán de Nanociencia y Nanotecnología, Bellaterra, Spain; [2]ICREA - Institució Catalana de Recerca i Estudis Avancats, Barcelona, Spain

Topological photonics has triggered so much attention due to its potential to engineer topological edge states robust against imperfection. Here, we analyze and quantify this claimed protection of topological transport compared to standard photonic transport.

EC-P.13 WED

Free space topological surface states at the surface of uncorrugated finite gyrotropic photonic crystals

•A. Tasolamprou[1], M. Kafesaki[1], C. Soukoulis[1], E. Economou[1], and T. Koschny[2]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology Hellas, N. Plastira 100, Heraklion, Greece; [2]Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA, Ames, USA

We present a photonic crystal that sustains topological surface states at the free space interface. Band structure and direct scattering simulations demonstrate the topological surface mode unidirectionalilty and immunity to defects and back-scattering.

EC-P.14 WED

Second harmonic generation of spatiotemporal optical vortices (STOVs) and conservation of orbital angular momentum

S. Zahedpour Anaraki, •S.W. Hancock, and H.M. Milchberg; University of Maryland, College Park, USA

We generate the second harmonic of pulses containing spatio-temporal optical vortices (STOVs) and directly measure their amplitude and phase in space and time. We demonstrate conservation of orbital angular momentum of STOVs under SHG.

EC-P.15 WED

Topological nanophotonics with time-reversal-invariant plasmonic lattices

•P.A. Huidobro; Instituto de Telecomunicacoes, IST-University of Lisbon, Lisbon, Portugal

Plasmonic lattices allow to realise time-reversal invariant topological phases for subwavelength-confined light. Retarded and radiative interactions are ubiquitous in nanophotonics, and their effect in the topological properties of edge and corner modes will be discussed.

EC-P.16 WED

Cavityless Lasing in Planar Topological Structure

•A. Palatnik, M. Sudzius, S. Meister, and K. Leo; Dresden Integrated Center for Applied Physics and Photonic Materials, Technische Universität Dresden, Dresden, Germany

We report a one-dimensional (1D) planar topological laser based on a topological interface state formed by two 1D photonic crystals. The crystals have different band topology leading to formation of an interface state.

EC-P.17 WED

Investigation of a negative next-nearest-neighbor-coupling in evanescently coupled dielectric waveguides

•J. Schulz[1], C. Jörg[1,2], and G. von Freymann[1,3]; [1]Physics Department and Research Center OPTIMAS, TU Kaiserslautern, Kaiserslautern, Germany; [2]Department of Physics, The Pennsylvania State University, Pennsylvania , USA; [3]Fraunhofer Institute for Industrial Mathematics ITWM, Kaiserslautern, Germany

We experimentally demonstrate a negative NNN-coupling constant, arising naturally in a dielectric waveguide structure, fabricated by direct-laser-writing, and show how we can tune between positive and negative ratios for NN and NNN coupling

EC-P.18 WED

Bound States in the Continuum and Unidirectional Guided Resonances in Anisotropic Structures with Multiple Radiation Channels

•S. Mukherjee[1], J. Gomis-Bresco[1], D. Artigas[1,2], and L. Torner[1,2]; [1]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain; [2]Department of Signal Theory and Communications, Universitat Politecnica de Catalunya, Barcelona, Spain

Anisotropic antiguiding structures with two distinct radiation channels support solitary bound states in the continuum. This system can also be tuned to radiate in only one radiation channel, forming unidirectional guided resonances.

ROOM 1

EC-P.19 WED

Spontaneously Appearing Polarization Singularities in Vertical-Cavity Lasers with Feedback

•*T. Ackemann*[1] *and T. Guillet*[2]; [1] *SUPA and Department of Physics, University of Strathclyde, Glasgow, United Kingdom;* [2]*Laboratoire Charles Coulomb (L2C), Univ. Montpellier, CNRS, Montpellier, France*

We study the stability of nonlinear vector vortex beams in a vertical-cavity semiconductor laser against perturbations of the cylindrical symmetry. Different states arise depending on the interaction of a half-wave plate with the residual intrinsic anisotropies.

EC-P.20 WED

Three-dimensional fully-structured light by counter-propagation of self-similar beams

•*E. Asché, R. Droop, E. Otte, and C. Denz; Institute of Applied Physics, University of Münster , Münster, Germany*

We fully-structure light in amplitude, phase, and polarization in its transverse and longitudinal extent by counter-propagation of self-similar beams. Spiraling intensity as well as polarization distributions are sculpted upon propagation, as evinced by artificial counter-propagation.

EC-P.21 WED

Light Spin-Orbit Coupling in High-Order Harmonic Generation via Graphene's Band Anisotropy

•*A. García-Cabrera, R. Boyero-García, Ó. Zurrón-Cifuentes, L. Plaja, and C. Hernández-García; Grupo de Investigación en Aplicaciones del Láser y Fotónica, Universidad de Salamanca, Salamanca, Spain*

We unveil a novel spin-orbit coupling in high-order harmonic generation driven by a vector beam in single layer graphene. Our simulations show spin-to-orbital angular momentum conversion due to the graphene's band anisotropy.

EC-P.22 WED

Topological edge transport in a Lieb-like photonic lattice

•*J.J. Wichmann, H. Hanafi, J.-P. Lang, and C. Denz; Institute of Applied Physics and Center for Nonlinear Science, 48149 Münster, Germany*

We report on topologically protected edge states in a four-band Lieb-like photonic lattice of evanescently coupled helical waveguides. Our results demonstrate adjustable group velocities depending on the driving potential and the selected edge termination.

EC-P.23 WED

Robustness of the topological interface state in a 1D photonic crystal resonator with an air-gap

•*S. Kim*[1,2]*, H.J. Choi*[1]*, M. Scherrer*[3]*, K. Moselund*[3]*, and C.-W. Lee*[1]; [1]*Institute of Advanced Optics and Photonics, Hanbat National University, Daejeon, South Korea;* [2]*Department of Physics, Sejong University, Seoul, South Korea;* [3]*IBM Research , Rüschlikon, Switzerland*

We verify the effect of air-gap on the topological interface states between two photonic crystals with distinct Zak phases of π based on a one-dimensional system, resulting in the shift of topological modes.

EC-P.24 WED

Resonant Coupling between Orbital-Angular-Momentum Modes in Femtosecond Laser Written Helical Bragg Waveguides

•*A. Pryamikov*[1]*, S. Vasiliev*[1]*, V. Likhov*[1,2]*, and A. Okhrimchuk*[1,2]; [1]*Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia;* [2]*Mendeleev University of Chemical Technology of Russia, Moscow, Russia*

In this work we investigate optical properties of a new type of micro – structured waveguide called helical Bragg waveguide. The resonant coupling between OAM modes of the waveguide has been studied theoretically and experimentally.

ROOM 2

13:30 – 14:30

EH-P: EH Poster Session

EH-P.1 WED

Ultrafast Thermal Manipulation of Plasmons in Atomically Thin Films

•*E. J. C. Dias*[1]*, R. Yu*[1]*, and J. García de Abajo*[1,2]; [1]*ICFO - The Institute of Photonic Sciences, Castelldefels, Spain;* [2]*ICREA - Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We demonstrate the ability of graphene and thin metal films to undergo ultrafast photothermal optical modulation under pump-probe conditions, with depths as large as >70% over a wide spectral range.

EH-P.2 WED

SHG behaviors due to coupled plasmon mode in Au nanorod trimer

•*A. Sugita, S. Oh, and Y. Nakatsuka; Shizuoka University, Hamamatsu, Japan*

We present SHG behaviors in dolmen-type Au nanorod (AuNR) trimer. SHG intensity from trimer was 20 times higher than that from referential monomeric AuNR. Efficient SHG conversions resulted from coupled plasmons in noncentro-symmetrically arranged AuNR's.

EH-P.3 WED

Rich Broadband Chiral Behavior in Low-cost Plasmonic Nanostructures

•*E. Petronijevic*[1]*, A. Belardini*[1]*, G. Leahu*[1]*, T. Cesca*[2]*, C. Scian*[2]*, G. Mattei*[2]*, and C. Sibilia*[1]; [1]*University of Rome La Sapienza, Rome, Italy;* [2]*University of Padova, Padova, Italy*

We demonstrate broadband chiral behaviour of plasmonic metasurfaces fabricated by low-cost nanopshere lithography. Experimental and numerical analysis reveals rich resonant features, tuneable by wavelength and incident angle, interesting for chiral sensing and chiral nanoscale sources.

EH-P.4 WED

Formation of plasmonic metasurfaces using spatial light modulator

M. Bitarafan, •S. Annurakshita, J. Toivonen, and G. Bautista; Tampere University, Tampere, Finland

We demonstrate a high-speed optical technique to fabricate plasmonic metasurfaces with a complex distribution of meta-atoms in a polymer film using spatial light modulator.

EH-P.5 WED

Low loss dielectric loaded plasmonic waveguides for sensing applications above nine microns

•*M. David*[1]*, A. Dabrowska*[2]*, M. Sistani*[1]*, E. Hinkelmann*[3]*, I.C. Doganlar*[1]*, B. Schwarz*[1]*, H. Detz*[1,3]*, W.M. Weber*[1]*, B. Lendl*[2]*, G. Strasser*[1]*, and B. Hinkov*[1]; [1]*Institute of Solid State Electronics and Center for Micro- and Nanostructures, Vienna, Austria;* [2]*Institute of Chemical Technologies and Analytics, Vienna, Austria;* [3]*Central European Institute of Technology, Brno University of Technology, Brno, Czech Republic*

Undoped germanium is investigated as dielectric material for long-wave infrared plasmonics. Basic plasmonic properties are calculated and fabricated samples are characterized experimentally. The typical attenuation is found to be around 12 dB/mm.

EH-P.6 WED

Bismuth-based gap-plasmon metasurfaces for visible photonics with volatile tuning potential

•*C. Ruiz de Galarreta*[1,2]*, E. Nieto-Pinero*[1]*, M. Garcia-Pardo*[1]*, C.D. Wright*[2]*, R. Serna*[1]*, and J. Toudert*[1]; [1]*Laser Processing Group, Instituto de Optica, Madrid, Spain;* [2]*College of Engineering Mathematics and Physical Sciences, University of Exeter, Exeter, United Kingdom*

We report the use of bismuth as an excellent plasmonic metal for the design of gap plasmon absorbing metasurfaces operating at visible wavelengths, towards the development of highly efficient, and high purity, and potentially active structural colour generators.

EH-P.7 WED

Investigation of the optical properties of Al-doped Ag Layers

E. Mariegaard, I.S. Støvring, A. Lavrinenko, and •R. Malureanu; Technical University of Denmark, DTU Fotonik, Kgs Lyngby, Denmark

In this article we show that, although the Al-doped Ag ultrathin layers are morphologically stable, their collision energy is about 3 times higher than the one of Ag, making them unsuitable for many plasmonic applications.

EH-P.8 WED

enhancing photocatalytic efficiency through plasmonic nanoparticles with Au–TiO2 based nanostructures.

•*A. Sousa-castillo*[1,2]*, A. Mariño-lópez*[2]*, Y. Negrín-Montecelo*[2]*, M. Comesaña-Hermo*[3]*, S. Krühler*[1]*, L. de S. Menezes*[1]*, S.A. Maier*[1,4]*, M.A. Correa-Duarte*[2]*, and E. Cortés*[1]; [1]*chair in hybrid nanosystems, nanoinstitutmünchen, fakultät für physik, ludwig maximilians-universität münchen, münchen, Germany;* [2]*CINBIO, universidade de vigo, Vigv, Spain;* [3]*université de paris, ITODYS, CNRS, UMR , paris, France;* [4]*experimental solidstate physics group, department of physics, imperial collegelondon, london, United Kingdom*

in this work, we have focused on the role of the amount and composition of plasmonic nanoparticles for their photosensitizing capabilities. The mechanism has been studied in photodriven processes by ultrafast transient spectroscopies.

ROOM 2

EH-P.9 WED

Using cryogenic temperatures and crystalline gold platelets to dramatically reduce the optical losses observed in the coupling between a metallic film and an individual colloidal CdSe/CdS nanocrystals

A. Coste[1], L. Moreaud[2], G. Colas des Francs[3], S. Buil[1], X. Quélin[1], E. Dujardin[2], and •J.-P. Hermier[1]; [1]Université Paris-Saclay, UVSQ, CNRS, GEMaC, Versailles, France; [2]CEMES/CNRS UPR 8011, Toulouse, France; [3]Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), UMR 6303 CNRS, Université Bourgogne Franche-Comté, Dijon, France

In this paper, we show the strong decrease of optical losses for the fluoresence of individual colloidal nanocrystals by a crystalline gold film and operating at 4K.

ROOM 3

13:30 – 14:30

EI-P: EI Poster Session

EI-P.1 WED

Dark Exciton Formation and Relaxation Dynamics in Monolayer WSe$_2$

•S. Kusaba[1], K. Watanabe[2], T. Taniguchi[2], K. Yanagi[3], and K. Tanaka[1,4]; [1]Department of Physics, Kyoto University, Sakyo-ku, Kyoto, Japan; [2]National Institute for Materials Science, Tsukuba, Ibaraki, Japan; [3]Department of Physics, Tokyo Metropolitan University, Hachioji, Tokyo, Japan; [4]Institute for Integrated Cell-Material Sciences, Sakyo-ku, Kyoto, Japan

We investigated dark exciton formation and relaxation dynamics in hBN-encapsulated high-quality monolayer WSe$_2$ by time-resolved photoluminescence spectroscopy. Finite rise time of dark exciton time profile reflects the thermal decay process of the hot dark excitons.

EI-P.2 WED

The contribution has been withdrawn.

EI-P.3 WED

Excitons in Lead-Halide Perovskite Nanocrystals from Tight-Binding GW/BSE Approach

•G. Biffi[1,2], Y. Cho[3], R. Krahne[1], and T.C. Berkelbach[3,4]; [1]Istituto Italiano di Tecnologia, Genova, Italy; [2]Università degli studi di Genova, Genova, Italy; [3]Columbia University, New York, USA; [4]Flatiron Institute, New York, USA

Test showing the dependence of the excitonic energy on the number of transitions per unit cell included in the Bethe-Salpeter matrix

EI-P.4 WED

Macroscopic Signatures of the Non-Perturbative Response of Single Layer Graphene to Intense Laser Fields

•R. Boyero-García, Ó. Zurrón-Cifuentes, A. García-Cabrera, C. Hernández-García, and L. Plaja; Grupo de Investigación en Aplicaciones de Láser y Fotónica, departamento de Física Aplicada, Universidad de Salamanca, Salamanca, Spain

We explore the electronic dynamics of graphene subjected to an intense laser through high-order harmonic generation. Our results reveal that the macroscopic emission presents an unequivocal signature of the non-perturbative response of graphene.

EI-P.5 WED

Epitaxial growth of CH(NH$_2$)$_2$PbI$_3$ thin films on CH$_3$NH$_3$PbBr$_3$ single crystal substrates by vapor phase deposition

•Z. Liu[1], T. Matsushita[2], M. Sotome[1,2], and T. Kondo[1,2]; [1]Department of Materials Engineering, The University of Tokyo, Tokyo, Japan; [2]Research Center for Advanced Science and Technology, The University of Tokyo, Tokyo, Japan

By partially limiting the halide ion inter-diffusion, we have achieved the epitaxial growth of I-rich perovskite thin films on the CH$_3$NH$_3$PbBr$_3$ single crystal substrates using vapor phase deposition.

EI-P.6 WED

Optimum absorption of MoS2 monolayer using Cavity Resonator Integrated Filtering

•J.-B. Dory[1,2], O. Gauthier-Lafaye[2], S. Calvez[2], and A. Mlayah[1,2]; [1]CEMES-CNRS, Université de Toulouse, Toulouse, France; [2]LAAS-CNRS, Université de Toulouse, Toulouse, France

This work explores the numerical conception and the fabrication of devices combining MoS2 monolayer and photonic structures. The reported hybrid device shows an optimal optical response to study the photoluminescence of the integrated MoS2 monolayer.

EI-P.7 WED

The contribution has been withdrawn.

ROOM 4

13:30 – 14:30

JSI-P: JSI Poster Session

JSI-P.1 WED

Generalized law of heat conduction including the intrinsic coherence of thermal phonons

•Z. Zhang[1], Y. Guo[1], M. Nomura[1], J. Chen[2], and S. Volz[1]; [1]The University of Tokyo, Tokyo, Japan; [2]Tongji University, Shanghai, China

We propose a formalism supported by theoretical arguments and direct atomic simulations, which takes into account both the conventional phonon gas model and the internal wave nature of thermal phonons.

JSI-P.2 WED

Radiative sky cooling of silicon solar cells: investigation of photonic pathways through coupled optical-electrical-thermal modelling

•J. Dumoulin[1], E. Drouard[2], and M. Amara[1]; [1]INL UMR5270, Univ. Lyon, INSA-Lyon, CNRS, Villeurbanne, France; [2]INL UMR5270, Univ. Lyon, Ecole Centrale de Lyon, Ecully, France

Radiative sky cooling is a promising method to efficiently cool silicon solar cells. We aim to develop a coupled optical-electrical-thermal model in order to study various photonic pathways to enhance radiative sky cooling.

JSI-P.3 WED

Designing Mesoporous Acoustic Cavities for Opto-Phononic Sensing in the Gigahertz Range

•E.R. Cardozo de Oliveira[1], M. Esmann[1], N.L. Abdala[2], M.C. Fuertes[3], P.C. Angelomé[3], O. Ortiz[1], A. Bruchhausen[4], H. Pastoriza[4], B. Perrin[5], G.J.A.A. Soler-Illia[2], and N.D. Lanzillotti-Kimura[1]; [1]Centre National de Recherche Scientifique, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Instituto de NanoSistemas – Universidad Nacional de San Martín-CONICET, Buenos Aires, Argentina; [3]Gerencia Química & Instituto de Nanociencia y Nanotecnología, Centro Atómico Constituyentes, CNEA-CONICET, Buenos Aires, Argentina; [4]Centro Atómico Bariloche & Instituto de Nanociencia y Nanotecnología, CNEA-CONICET, Rio Negro, Argentina; [5]Sorbonne Université, CNRS, Institut des NanoSciences de Paris, Paris, France

Multilayered nanoacoustic resonators based on mesoporous oxide thin-films showing acoustic resonances in the 5-100 GHz range are presented, with experimental results and simulations. Finally, we propose new complex mesoporous systems with potential for nanoacoustic sensors.

JSI-P.4 WED

Angular filtering for Brillouin spectroscopy in the 20-300 GHz range

•A. Rodriguez, P. Priya, P. Senellart, C. Gomez-Carbonell, A. Lemaître, M. Esmann, and N.D. Lanzillotti-Kimura; Centre de nanosciences et de nanotechnologies, Palaiseau, France

We present a versatile custom-built Brillouin spectroscopy setup to probe acoustic phonons in the 20 to 300 GHz range of tunable optophononic cavities with high spectral resolution at broadband acoustical and optical frequencies.

JSI-P.5 WED

Engineering Low-Loss Silicon Quantum Photonics in the Mid-Infrared

•D.A. Sulway[1,2], L.M. Rosenfeld[2], Y. Yonezu[3], Q.M.B. Palmer[1,2], P. Jiang[2], T. Aoki[3], J.G. Rarity[2], and J.W. Silverstone[2]; [1]Quantum Engineering Centre for Doctoral Training, University of Bristol, Bristol, United Kingdom; [2]Quantum Engineering Technology Labs, University of Bristol, Bristol, United Kingdom; [3]Department of Applied Physics, Waseda University, Tokyo, Japan

To achieve low-loss silicon quantum photonics, we demonstrate a two-photon-absorption reduced single-photon source, and a high-performance fiber-to-chip coupler, both operating in the mid-infrared on the 220-nm silicon platform.

ROOM 4

JSI-P.6 WED

Spike propagation in a nanolaser-based optoelectronic neuron

•*I. Ortega-Piwonka*[1,2], *O. Piro*[1], *J. Figueiredo*[3], *B. Romeira*[4], *and J. Javaloyes*[1,2]; [1]*Departament de Física, Universitat de les Illes Balears, Palma de Mallorca, Spain;* [2]*Institute of Applied Computing and Community Code (IAC-3), Palma de Mallorca, Spain;* [3]*Centra-Ciências and Departamento de Física, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal;* [4]*Ultrafast, Bio and Nanophotonics, International Iberian Nanotechnology Laboratory (INL), Braga, Portugal*

An optoelectronic, neuromorphic circuit consisting of a resonant tunneling diode and a nanolaser is demonstrated as an excitable pulse generator. The optical pulses are quantitatively characterized. Next, two units are integrated to propagate pulses.

NOTES

ROOM 1

8:30 – 10:00

JSI-3: Nanophononic and Optomechanical Systems. Radiative Heat Transfer Thermal Rectification.

Chair: Roberto Li Voti, Sapienza Università di Roma, Rome, Italy

JSI-3.1 THU 8:30

Towards Integrated Nanoacoustics: Fiber-integrated Microcavities for Efficient Generation of Coherent Acoustic Phonons in the 20 GHz Range

O. Ortiz[1], F. Pastier[2], A. Rodriguez[1], P. Priya[1], A. Lemaitre[1], C. Gomez Carbonell[1], I. Sagnes[1], A. Harouri[1], P. Senellart[1], V. Giesz[2], M. Esmann[1], and •D. Lanzillotti-Kimura[1]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies (C2N), Palaiseau, France; [2]Quandela SAS, Palaiseau, France

We integrate opto-phononic resonators working at ~20 GHz to single-mode fibers lifting the need for focusing optics to excite and detect coherent acoustic phonons in a pump-probe scheme.

JSI-3.2 THU 8:45

Experimental Optimization of the Thermal Rectification of a Far-Field Diode Based on VO2

•J. Ordonez-Miranda[1], I. Forero-Sandoval[2], F.F. Dumas-Bouchiat[3], C. Champeaux[3], and J.J. Alvarado-Gil[4]; [1]LIMMS, CNRS-IIS UMI 2820, The University of Tokyo, 153-8505, Tokyo, Japan; [2]Institut Pprime, CNRS, Université de Poitiers, ISAE-ENSMA, F-86962 , Futuroscope Chasseneuil, France; [3]Université de Limoges, CNRS, IRCER, UMR 7315, F-87000, Limoges, France; [4]Applied Physics Department, CINVESTAV-IPN Mérida, C.P. 97310, Mérida, Yucatán, Mexico

An optimum rectification factor of

ROOM 2

8:30 – 10:00

CG-5: Symmetries in Ultrafast Science

Chair: Cord Arnold, Lund University, Sweden

CG-5.1 THU (Invited) 8:30

Attosecond Dual Nature of Core Excitons

•M. Lucchini[1,2], S.A. Sato[3,4], G.D. Lucarelli[1,2], B. Moio[1,2], G. Inzani[1], R. Borrego-Varillas[2], F. Frassetto[5], L. Poletto[5], H. Huebener[3], U. De Giovannini[3], A. Rubio[3], and M. Nisoli[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]Institute for Photonics and Nanotechnologies, IFN-CNR, Milano, Italy; [3]Max Planck Institute for the Structure and Dynamics of Matter, Hamburg, Germany; [4]Center for Computational Sciences, University of Tsukuba, Tsukuba, Japan; [5]Institute for Photonics and Nanotechnologies, IFN-CNR, Padova, Italy

Ultrafast core-exciton dynamics was measured in MgF_2 by attosecond transient-reflection spectroscopy. We found that the atomic nature of excitons dominates the few-femtosecond response, while their solid-state nature dictates the attosecond timing of the system.

ROOM 3

8:30 – 10:00

CH-8: Spectroscopy at the Molecular Level

Chair: Maria Garcia Parajo, ICFO-Institute of Photonic Sciences, Barcelona, Spain

CH-8.1 THU (Invited) 8:30

Mid-IR Laser Spectroscopy for Protein Analysis in Aqueous Solution

•B. Lendl, C.K. Akhgar, A. Dabrowska, S. Freitag, D.-R. Hermann, G. Ramer, and A. Schwaighofer; Institute of Chemical Technologies and Analytics, Technische Universität Wien, Vienna, Austria

Advanced sensing schemes for the analysis of proteins in aqueous solutions using broadly tunable mid-IR external-cavity quantum cascade lasers and their application in life sciences and down stream bio-process monitoring will be discussed.

ROOM 4

8:30 – 10:00

CB-6: Integration on Silicon

Chair: Sylvie Menezo, Scintil Photonics, Lyon, France

CB-6.1 THU (Invited) 8:30

III-V components on a SOI platform by selective MOVPE without buffer layers for Si photonic integrated circuits

•K.M. Lau, Y. Xue, Z. Yan, L. Lin, and Y. Han; Hong Kong University of Science & Technology, Clear Water Bay, Hong Kong

III-V micro-lasers and p-i-n photodetectors selectively grown on (001) silicon-on-insulator (SOI) wafers will be described. Lateral growth of III-V from the patterned silicon device layer is dislocation free and can be used for high-performance devices.

ROOM 5

8:30 – 10:00

CA-8: Laser Beam Control

Chair: Takunori Taira, Riken Spring-8, Saitama, Japan

CA-8.1 THU 8:30

>30 W Vortex Laser Using Vortex Output Coupler

•J.W.T. Geberbauer, W.R. Kerridge-Johns, and M.J. Damzen; Imperial College London, London, United Kingdom

We demonstrate record 31W vortex (LG0±1) laser in CW and up to 500kHz Q-switching (21.1ns, 304μJ), using modified Sagnac interferometric output coupler. The vortex has 96% modal purity with switchable handedness for high-power applications.

CA-8.2 THU 8:45

Thin-disk multi-pass amplifier delivering azimuthally polarized ultra-short pulses with an average power of 1.74 kW

•A. Loescher, C. Röcker, T. Graf, and M. Abdou Ahmed; Institut für Strahlwerkzeuge, University of Stuttgart, Pfaffenwaldring 43, 70569 Stuttgart, Germany

We present our latest achievements on the amplification of ultrafast beams with radial/azimuthal polarization using a thin-disk multipass amplifier. Up to 1.74 kW of average output power could be extracted at 300 kHz repetition rate.

ROOM 6

8:30 – 10:00

CM-4: Surface Engineering and Functionalisation

Chair: Gert-Willlem Romer, University of Twente, Twente, Netherlands

CM-4.1 THU (Invited) 8:30

Optical FIB: Far-fieldfabrication with real-nanoscale spatial resolution in any solid materials

Z.-Z. Li[1], L. Wang[1], Q.-D. Chen[1], and •H.-B. Sun[1,2]; [1]Jilin University, Changchun, China; [2]Tsinghua University, Beijing, China

we report an optical far-field-induced near-field breakdown technology as is abbreviated as optical FIB. It in principle can be applied to any solid materials to reach 10-nm spatial resolution in femtosecond laser direct writing.

ROOM 7

8:30 – 10:00

CK-4: Silicon Photonics

Chair: Max Yann, KTH - Royal Institute of Technology, Stockholm, Sweden

CK-4.1 THU (Invited) 8:30

Multimode Silicon Photonics

•*D. Dai; Zhejiang University, Hangzhou, China*

A review is given for multimode silicon photonics, including multimode silicon photonic devices for MDM systems, silicon photonic devices assisted by higher-order modes, and high-performance photonic devices with the fundamental mode only in multimode waveguides.

ROOM 8

8:30 – 10:00

EE-2: HHG in Condensed Matter

Chair: Valentina Shumakova, University of Vienna, Austria

EE-2.1 THU 8:30

High-harmonic generation in monolayer WSe_2 under photo-carrier doping

•*K. Nagai[1], K. Uchida[1], S. Kusaba[1], T. Endo[2], Y. Miyata[2], and K. Tanaka[1,3]; [1] Department of Physics, Kyoto University, Sakyo-ku, Kyoto, Japan; [2] Department of Physics, Tokyo Metropolitan University, Hachioji, Tokyo, Japan; [3] Institute for Integrated Cell-Material Sciences, Kyoto University, Sakyo-ku, Kyoto, Japan*

We experimentally confirmed the main high-harmonic generation mechanism in monolayer WSe_2 by using photo-carrier doping effect. The ratio of the interband to intraband contribution is suggested to switch around the absorption edge of the monolayer.

EE-2.2 THU 8:45

Low-Divergence, Soft X-Ray Harmonic Combs with Tunable Line Spacing from Necklace-Structured Driving Lasers

L. Rego[1], N.J. Brooks[2], Q.L.D. Nguyen[2], J. San Román[1], I. Binnie[2], L. Plaja[1], H.C. Kapteyn[2], M.M. Murnane[2], and •C. Hernández-García[1]; [1] Universidad de Salamanca, Salamanca, Spain; [2] University of Colorado, Boulder, USA

Necklace-structured high-harmonic generation is theoretically and experimentally implemented to produce high-frequency harmonic combs with tunable frequency

ROOM 9

8:30 – 10:00

EF-5: Micro-combs in Microresonators

Chair: German de Valcarcel, University of Valencia, Spain

EF-5.1 THU 8:30

Bidirectional initiation of dissipative solitons in photonic molecules

•*Ó.B. Helgason, Z. Ye, J. Schröder, and V. Torres-Company; Chalmers University of Technology, Gothenburg, Sweden*

We demonstrate the initiation of dissipative solitons in linearly coupled microresonators using a continuous wave laser by tuning into resonance from either the blue side or the red side.

EF-5.2 THU 8:45

A Kerr Oscillator based on Counterpropagating Light in a Microresonator

•*M.T.M. Woodley[1,2,3], L. Hill[1,4], L. Del Bino[1,2,5], G.-L. Oppo[4], and P. Del'Haye[5,6]; [1] National Physical Laboratory, Teddington, United Kingdom; [2] SUPA and Department of Physics, Heriot-Watt University, Edinburgh, United Kingdom; [3] Department of Physics, Blackett Laboratory, Imperial College London, London, United Kingdom; [4] SUPA and Department of Physics, University of Strathclyde, Glasgow, United Kingdom; [5] Max Planck Institute for the Science of Light, Erlangen, Germany; [6] Department*

ROOM 10

8:30 – 10:00

EH-4: Plasmonics for Enhanced Light-Matter Interaction

Chair: Andrei Lavrinenko, Technical University of Denmark, Copenhagen, Denmark

EH-4.1 THU 8:30

Material-Insensitive Optical Response From Disordered Plasmonic Nanostructures

•*C. Liu[1], P. Mao[2], Y. Niu[3], Y. Qin[4], F. Song[4], M. Han[4], R. Palmer[3], S. Zhang[2,5,6], and S. Maier[1,7]; [1] Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig Maximilians University of Munich, Munich, Germany; [2] School of Physics and Astronomy, University of Birmingham, Birmingham, United Kingdom; [3] College of Engineering, Bay Campus, Swansea University, Swansea, United Kingdom; [4] College of Engineering and Applied Sciences, Nanjing University, 210093 Nanjing, China, Nanjing, China; [5] Department of Physics, University of Hong Kong, Hong Kong, China, Hong Kong, China; [6] Department of Electrical & Electronic Engineering, University of Hong Kong, Hong Kong, China, Hong Kong, China; [7] Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom, London, United Kingdom*

Due to unique dielectric functions, the optical response of materials varies. We demonstrate that the disorder dramatically reduces the material dependence in optical response, produce identical colour for plasmonic nanostructures composed of different metals.

EH-4.2 THU 8:45

Plasmon-Induced Trap State Emission Excited by Two-Photon Absorption

•*O. Ojambati; Cavendish Laboratory, Department of Physics, JJ Thompson Avenue, University of Cambridge, Cambridge, United*

ROOM 11

8:30 – 10:00

CE-8: Materials and Fabrication of Specialty Optical Fibers

Chair: Natalie Wheeler, University of Southampton, Southampton, United Kingdom

CE-8.1 THU 8:30

Thermal Stability of Type II Modifications by IR Femtosecond Laser in Highly-Doped Aluminosilicate Glass Optical Fibers

•*Y. Wang[1], M. Cavillon[1], J. Ballato[2], T. Elsmann[3], M. Rothhardt[3], B. Poumellec[1], and M. Lancry[1]; [1] Institut de Chimie Moléculaire et des Matériaux d'Orsay (ICMMO), Université Paris Saclay, C.N.R.S, Orsay, France; [2] Center of Optical Materials Science and Engineering Technologies (COMSET), Clemson University, Clemson, USA; [3] Leibniz Institute of Photonic Technology, Albert-Einstein-Str, Jena, Germany*

Type II modifications are inscribed into aluminosilicate optical fibers using a femtosecond laser, and their thermal stability is investigated through isochronal annealing experiments. Results suggest improved thermal stability relative to conventional silica fibers.

CE-8.2 THU 8:45

Silicate glass composite fibers with nanodiamonds-embedded core

•*A. Filipkowski[1,2], M. Mrózek[3], G. Stępniewski[1,2], M. Ficek[4], T. Karpate[1], M. Głowacki[4], A. Wojciechowski[3], M. Klimczak[1], R. Bogdanowicz[4], W. Gawlik[3], and R. Buczyński[1,2]; [1] Faculty of Physics, University of Warsaw, Warsaw, Poland; [2] Łukasiewicz Research Network - Institute of Microelectronics and Photonics, Warsaw, Poland; [3] Institute of Physics, Jagiellonian University, Kraków, Poland; [4] Faculty of Electronics, Telecommunications and Informatics, Gdańsk University of Technology, Gdańsk, Poland*

ROOM 12

8:30 – 10:00

EG-5: Light-driven Phenomena at the Nanoscale

Chair: Niek van Hulst, ICFO - The Institute of Photonic Sciences, Castelldefels, Spain

EG-5.1 THU (Invited) 8:30

Atomic-scale, light-driven dynamics of plasmonic nanojunctions

W. Chen[1], P. Roelli[1], A. Ahmed[1], S. Verlekar[1], H. Hu[2], K. Banjac[1], M. Lingenfelder[1], G. Tagliabue[1], and •C. Galland[1]; [1] Ecole Polytechnique Fédérale Lausanne (EPFL), Lausanne, Switzerland; [2] The Institute for Advanced Studies, Wuhan University, Wuhan, China

We report the observation of quantum-confined emitters forming inside gold plasmonic nanojunctions under green light excitation. We propose that non-thermal photo-excited carriers are causing atomic reconfiguration near the gold surface.

ROOM 1

61% is experimentally observed for far-field thermal diode made up of a VO2 film placed in vacuum and in front of a heat fluxmeter.

JSI-3.3 THU 9:00

Dynamically Tuned Infrared Emission using VO2 Thin Films.

•M.C. Larciprete[1], M. Centini[1], S. Paoloni[2], I. Fratoddi[3], S.A. Dereshgi[4], K. Tang[5], J. Wu[6], and K. Aydin[4]; [1]Dipartimento di Scienze di Base ed Applicate per l'Ingegneria, Sapienza Università di Roma, Italy, Roma, Italy; [2]Dipartimento di Ingegneria Industriale, Università degli Studi di Roma Tor Vergata, Roma, Italy; [3]Dipartimento di Chimica, Sapienza Università di Roma, Roma, Italy; [4]Department of Electrical and Computer Engineering, Northwestern University, Evanston (Illinois), USA; [5]Department of Materials Science and Engineering, University of California, Berkeley (California), USA; [6]Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley (California), USA

We investigated the infrared emission of VO2 during phase transition and demonstrate that VO2 thin films are promising candidates for tuning and controlling the thermal radiation of an underlying hot body with different emissivity features.

JSI-3.4 THU 9:15

Highly efficient thermionic cooling nano-device: the quantum cascade cooler

•M. Bescond[1,2] and K. Hirakawa[1,2]; [1]LIMMS-CNRS, Tokyo, Japan; [2]Institute of Industrial Science and INQIE, University of Tokyo, Tokyo, Japan

ROOM 2

CG-5.2 THU 9:00

Observation of Rotational Doppler Shift for Harmonic Generation in Solids

•W. Komatsubara, K. Konishi, J. Yumoto, and M. Kuwata-Gonokami; The University of Tokyo, Tokyo, Japan

Spin angular momentum exchange of harmonic generation in solids can be observed by the Rotational Doppler Shift (RDS). Here, we generate harmonics from the crystal with no rotational symmetry and observe the two different RDS.

CG-5.3 THU 9:15

Rotational Quantum Beat Lasing without Inversion

•M. Richter[1], M. Lytova[2,3], F. Morales[1], S. Haessler[4], O. Smirnova[1], M. Spanner[2,3], and M. Ivanov[1]; [1]Max-Born-Institute, Berlin, Germany; [2]Department of Physics, University of Ottawa,

ROOM 3

CH-8.2 THU 9:00

Mid-infrared gas sensor based on hybrid graphene nanostructures and ultrathin gas-adsorbing polymer

•N.J. Bareza[1], B. Paulillo[1], K. Gopalan[1], R. Alani[1], and V. Pruneri[1,2]; [1]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels, Barcelona, Spain; [2]ICREA-Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys, 23, 08010 , Barcelona, Spain

Here, we present a novel gas sensing scheme in mid-infrared plasmonic detection based on a hybrid combination of graphene nanostructures and gas-adsorbing polymer. The plasmonic resonance is tuned with varying gas concentrations via reversible chemical doping of graphene.

CH-8.3 THU 9:15

Generating, probing and utilising photo-induced surface oxygen vacancies for trace molecular detection

•D. Glass[1,2], E. Cortes[1,3], R. Quesada-Cabrera[2], I.P. Parkin[2], and S.A. Maier[1,3]; [1]The Blackett Laboratory, Department of Physics,

ROOM 4

CB-6.2 THU 9:00

InGaAs Nano-ridge Laser Emitting in the Telecom O-band Monolithically Grown on a 300 mm Si Wafer

•D. Colucci[1,2], Y. Shi[1], M. Baryshnikova[2], Y. Mols[2], M. Muneeb[1], Y. De Koninck[2], M. Pantouvaki[2], J. Van Campenhout[2], B. Kunert[2], and D. Van Thourhout[1]; [1]Ghent University, Ghent, Belgium; [2]IMEC, Leuven , Belgium

Nano-ridge engineering is a novel approach for the monolithic integration of active components on the Silicon Photonics platform. By demonstrating lasing from a InGaAs nano-ridge we further extend its reach to telecom applications.

CB-6.3 THU 9:15

Hybrid-integrated extended cavity mode-locked laser using SiN and a generic III/V platform

•E. Vissers[1,2], S. Poelman[1,2], K. Van Gasse[1,2], and B. Kuyken[1,2]; [1]Photonics Research Group, Department of Information Technology, Ghent University IMEC, Ghent,

ROOM 5

CA-8.3 THU 9:00

Generation of a Radially Polarised Beam in a Solid-State Laser Using an Intracavity Spatially Variant Waveplate

T. Jefferson-Brain, Y. Lei, P. Kazansky, and •W. Clarkson; University of Southampton, Southampton, United Kingdom

Direct excitation of a radially polarized mode from an end-pumped Nd:YVO4 laser using an intracavity spatially variant waveplate is reported. The laser yielded a radially polarized output of 1.3W with a 35:1 polarization extinction ratio.

CA-8.4 THU 9:15

Geometrical Laguerre-Gaussian mode generation from an off-axis pumped Nd:GdVO4 degenerate laser

•Y. Ma[1], A.J. Lee[2], H.M. Pask[2], K. Miyamoto[1,3], and T. Omatsu[1,3]; [1]Chiba University, Chiba, Japan; [2]MQ Photonics Research Centre,

ROOM 6

CM-4.2 THU 9:00

Observation of Surface Plasmon Polaritons excited on Si Transiently Metalized with An Intense Femtosecond Laser pulse

•Y. Iida, M. Tateda, and G. Miyaji; Tokyo University of Agriculture and Technology, 2-24-16 Nakacho, Kognei, Tokyo 184-8588, Japan

We report on first observation of surface plasmon polaritons excited on Si transiently metalized with an intense femtosecond laser pulse. We found their characteristic properties can be controlled by a time delay of double pulses.

CM-4.3 THU 9:15

All Optical Holographic Encryption in Reduced Graphene Oxide Based on Laser Direct Writing

•Y. Dong, X. Fang, D. Lin, X. Ma, X. Chen, and M. Gu; Centre for Artificial-Intelligence Nanophotonics, School of Optical-Electrical

ROOM 7

CK-4.2 THU 9:00

InGaAs microdisk cavities monolithically integrated on Si with room temperature emission at 1530 nm

•P. Tiwari, A. Fischer, S. Mauthe, E. Brugnolotto, N. Vico Triviño, M. Sousa, D. Caimi, H. Schmid, and K.E. Moselund; IBM Research Europe, Rueschlikon, Switzerland

We present monolithically integrated InGaAs cavities on Si by template-assisted-selective-epitaxy with evidence of room-temperature lasing at 1530nm, and compare them with previously demonstrated InP-on-Si lasers. This allows for integrated InP/InGaAs QWs for increased carrier confinement.

CK-4.3 THU 9:15

Heterogeneous Integration of Uni-Travelling-Carrier Photodiodes using Micro-Transfer-Printing on a Silicon-Nitride Platform

•D. Maes[1,2], G. Roelkens[1], M. Zaknoune[2], C. Op de Beeck[1], S. Poelman[1], M. Billet[1], M. Muneeb[1],

ROOM 8

content, up to the soft x-rays. Remarkably, the emitted harmonics present extremely low divergence, which further decreases with frequency

EE-2.3 THU (Invited) 9:00

High energy high harmonic generation (HHG) in liquids

S. Jarosch, O. Alexander, T. Avni, J. Barnard, C. Ferchaud, E. Larson, •M. Matthews, and J. Marangos; Imperial College London, London, United Kingdom

We present carrier-envelope-phase (CEP) dependent extreme-ultraviolet (XUV) harmonic emission from isopropanol which extends to 50eV with emission features supporting a recombination mechanism. The emission is damped by scattering of the driven electron from neighbouring molecules.

ROOM 9

of Physics, Friedrich Alexander University Erlangen-Nuremberg, Erlangen, Germany

We present experimental and theoretical self-switching behaviours in counterpropagating light in a Kerr microresonator, due to symmetry restoration on average. These results pave the way for chip-integrated all-optical generation of waveforms, encoding, and cryptographic applications.

EF-5.3 THU (Invited) 9:00

Lithium-Niobate-Based Frequency Combs

•M. Yu; John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, USA

We discuss the recent development of electro-optic and Kerr frequency combs, powered by integrated lithium niobate photonics. Specifically, I will cover the generation, control and dynamics of microcombs in modulator-based, single- and coupled-cavity based geometries.

ROOM 10

Kingdom

We demonstrate that a plasmonic nanocavity enhances two-photon excited photoluminescence by 106 - 108 and this efficient nonlinear interaction elicits new trap states emission in single quantum dots while suppressing band-edge emission.

EH-4.3 THU 9:00

Energy-resolved few-cycle nanoplasmonic photoemission dynamics

P. Sándor[1], •B. Lovász[1], Z. Pápa[1], B. Bánhegyi[1], P. Rácz[1], C. Prietl[2], J.R. Krenn[2], and P. Dombi[1]; [1]Wigner Research Centre for Physics, Budapest, Hungary; [2]Institut für Physik, Karl-Franzens-Universität, Graz, Austria

Energy-selective and time-resolved photoemission from nanoparticles of various geometries enables localized characterization of few-cycle plasmon transients.

EH-4.4 THU 9:15

Mechanisms of Spontaneous Emission Rate Enhancement in Metal-Insulator-Metal Cavities

•D. Ghindani, A.R. Rashed, and H. Caglayan; Tampere University, Tampere, Finland

Tailoring the emission and radiation properties of an emitter is of fun-

ROOM 11

We report nanodiamond-embedded core optical fibers drawn from silicate glass canes and tubes. Two techniques of ND nanofilm deposition are compared and presence of NDs in a free-form core is confirmed with photoluminescence imaging.

CE-8.3 THU 9:00

High-temperature polymer multimaterial fibers

•P. Akrami[1], A.I. Adamu[1], G. Woyessa[1], H.K. Rasmussen[2,3], O. Bang[1,4], and C. Markos[1]; [1]DTU Fotonik, Department of Photonics Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark; [2]DTU Mekanik, Department of Mechanical Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark; [3]University College Absalon, Centre for Engineering and Science, 4400 Kalundborg, Denmark; [4]SHUTE Sensing Solutions A/S, 3490 Kvistgård, Denmark

The fabrication of a heat-resistant multimaterial polymer optical fiber withstanding temperatures up to 180 degrees consisting of two different grades of the cyclo-olefin polymer Zeonex and high-performance thermoplastic PSU developed using a co-extrusion method

CE-8.4 THU 9:15

Nanocrystal-doped fibres using glass powder doping – towards new laser transitions in fibre lasers

•M. Jäger[1], M. Lorenz[1], R. Müller[1], J. Kobelke[1], K. Wondraczek[1], R. Valiente[2], A. Diego-Rucabado[2], I. Cano[2], F. Aguado[2], J. Gluch[3],

ROOM 12

EG-5.2 THU 9:00

Optical trapping and self-assembly of particle clusters using on-chip plasmonic nanotweezers

C. Pin[1,2,3], G. Magno[4,5], A. Ecarnot[4], E. Picard[2], E. Hadji[2], V. Yam[4], F. de Fornel[1], B. Dagens[4], and •B. Cluzel[1]; [1]ICB, Université Bourgogne Franche-Comté, Dijon, France; [2]CEA Grenoble, Université Grenoble Alpes, Grenoble, France; [3]RIES, Hokkaido University, Sapporo, Japan; [4]C2N, Université Paris-Saclay, Palaiseau, France; [5]DEI, Politecnico di Bari, Bari, Italy

Single beads and self-assembled bead clusters are trapped using a periodic chain of gold nanorods on a photonic silicon waveguide. The trapping efficiency, orientation, compactness, and stability of the observed cluster configurations are statistically analysed.

EG-5.3 THU 9:15

Optical Suppression of Energy Barriers in Single Molecule-Metal Binding

•Q. Lin[1], S. Hu[1], T. Földes[2,3], J. Huang[1], D. Wright[1], J. Griffiths[1], B. de Nijs[1], E. Rosta[2,3], and J. J. Baumberg[2,3]; [1]Nanophotonics Centre, Department of Physics,

ROOM 1

We propose a novel semiconductor heterostructure cooling device, identified as "quantum cascade cooler" (QCC). Its concept is based on successive resonant tunneling and thermionic emission processes through a series of quantum wells.

JSI-3.5 THU 9:30

Synthetic Magnetic Fields and Non-Hermitian Dynamics for Phonons in a Nano-Optomechanical System

•J.J. Slim, J. del Pino, J.P. Mathew, and E. Verhagen; AMOLF, Amsterdam, Netherlands

We establish synthetic magnetic fields and parametric amplification for nanomechanical transport by modulating optomechanical interactions. We show that the controlled breaking of time-reversal symmetry and non-Hermitian dynamics lead to chiral propagation and directional amplification.

JSI-3.6 THU 9:45

Ultra-thin and high selective emission with additional lossless layer

•D.H. Kim[1], G.J. Lee[1], S.-Y. Heo[1], S. Son[2], K.M. Kang[1], H. Lee[2], and Y.M. Song[1]; [1]Gwangju Institute of Science and Technology, Gwangju, South Korea; [2]Korea University, Seoul, South

ROOM 2

Ottawa, Canada; [3]National Research Council of Canada, Ottawa, Canada; [4]Laboratoire d'Optique Appliquée, CNRS, École Polytechnique, ENSTA Paris, Institut Polytechnique de Paris, Palaiseau, France

We show that lasing without inversion arises naturally during propagation of intense femtosecond laser pulses in air. It is triggered by the combination of molecular ionization and molecular alignment, both unavoidable in intense light fields.

CG-5.4 THU 9:30

Extreme-Ultraviolet Vortices of very high Topological Charge

•A. Kumar Pandey[1], A. de las Heras[2], J. San Román[2], L. Plaja[2], E. Baynard[1], G. Dovillaire[3], M. Pittman[1], S. Kazamias[1], O. Guilbaud[1], and C. Hernández-García[1]; [1]Laboratoire Irène Joliot-Curie, Université Paris-Saclay, UMR CNRS, Rue Ampère, Bâtiment 200, F-91898, Orsay, France; [2]Grupo de Investigación en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, Universidad de Salamanca, E-37008 , Salamanca, Spain; [3]Imagine Optic, 18, rue Charles de Gaulle, Orsay, France

We report the generation, and intensity, wavefront, modal content characterization of optical vortices with topological charges as high as 100 in the extreme-ultraviolet spectral range. Furthermore, we complement the experimental observations with advanced simulations.

CG-5.5 THU 9:45

Ellipticity dependent excitation and high harmonic generation from intense mid-IR laser pulses in ZnO

P. Herrmann[1], •R. Hollinger[1,2], V. Korolev[1], M. Zapf[3], V. Shumakova[4], R. Röder[3], I. Uschmann[1], A. Pugžlys[4], A. Baltuška[4], M.

ROOM 3

Imperial College London, London, United Kingdom; [2]Department of Chemistry, University College London, London, United Kingdom; [3]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Ludwig-Maximilians-Universität, Muchen, Germany

Defects can strongly affect properties of metal-oxide semiconductors (MOS). Using UVC irradiation, surface vacancies can be induced in MOS. Here, we generate, probe and utilise these defects using Raman spectroscopy for trace molecular detection applications.

CH-8.4 THU 9:30

Single-molecule Lifetime Imaging of the Local Density of States of Plasmonic and Dielectric Nanostructures

•V. Krachmalnicoff[1], R.M. Cordova-Castro[1], B. van Dam[1], G. Blanquer[1], A. Gulinatti[2], G. Acconcia[2], Y. De Wilde[1], and I. Izeddin[1]; [1]Institut Langevin - ESPCI Paris, Paris, France; [2]Politecnico di Milano, Milano, Italy

We show that single-molecule localization lifetime microscopy enables Local-Density-of-States measurement close to a plasmonic nanostructure. We demonstrate how to circumvent the plasmonic mirage effect and reconstruct the real position of detected events in three dimensions.

CH-8.5 THU 9:45

Optical Magnetic Field Sensing based on Metamaterial Nanomechanics

G. Lan[1,2], J.-Y. Ou[1], and •E. Plum[1]; [1]University of Southampton, Southampton, United Kingdom; [2]Heilongjiang University, Harbin, China

ROOM 4

Belgium; [2]Center for Nano- and Biophotonics (NB-Photonics), Ghent University, Ghent, Belgium

A hybrid integrated mode-locked laser made using a SiN extended cavity coupled to a generic III/V platform gain section is demonstrated. The RF linewidth is 31 Hz, which is lower than monolithic integrated lasers.

CB-6.4 THU 9:30

Carrier recombination and temperature-dependence of GaInSb quantum well lasers for silicon photonics applications

•C.R. Fitch[1], G.W. Read[1], I.P. Marko[1], D.A. Duffy[1], L. Cerutti[2], J.-B. Rodriguez[2], E. Tournié[2], and S.J. Sweeney[1]; [1]Advanced Technology Institute and Department of Physics, University of Surrey, Guildford, United Kingdom; [2]IES, Université de Montpellier, CNRS, Montpellier, France

GaInSb based QW lasers show great potential for on-silicon telecoms applications at 1.55 μm. Low temperature and high hydrostatic pressure techniques show that device performance is limited by carrier leakage with further potential for optimisation.

CB-6.5 THU 9:45

Dynamics of epitaxial quantum dot laser on silicon subject to chip-scale back-reflection for isolator-free photonics integrated circuits

•B. Dong[1], J.-D. Chen[2], J. Norman[3], J. Bowers[3], F.-Y. Lin[2], and F. Grillot[1,4]; [1]Télécom Paris, Palaiseau,

ROOM 5

Macquarie University, Sydney, Australia; [3]Molecular Chirality Research Center, Chiba, Japan

We have demonstrated the first demonstration of geometrical Laguerre-Gaussian modes laser operation in an annular beam pumped Nd:GdVO4 laser with an off-axis degenerate cavity configuration.

CA-8.5 THU 9:30

Radially polarized solid-state Raman laser

•Y. Nishigata[1], S. Sasaki[1], K. Miyamoto[1,2], and T. Omatsu[1,2]; [1]Chiba University, Chiba, Japan; [2]Molecular Chirality Research Center, Chiba, Japan

we demonstrate the generation of radially polarized Stokes beams from a solid-state Ba(NO3)2 Raman laser pumped by vector vortex light.In our setup, the 1st, 2nd and 3rd Stokes outputs were ganarated as vector vortex mode.

CA-8.6 THU 9:45

Experimental and numerical studies of thermal lensing and gain guiding effects in a high-power ZGP OPO

•M. Piotrowski[1], M.A. Medina[1,2], M. Schellhorn[1], C. Mueller[1], G. Spindler[3], and A. Hildenbrand-Dhollande[1]; [1]French-German

ROOM 6

and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China

A holographic encryption method in reduced graphene oxide (rGO) is introduced. Through laser direct writing, the information in the rGO hologram can be transformed, so as to achieve the effect of encryption of important information.

CM-4.4 THU 9:30

Changes in the Intensity Distribution of the Laser Pulse due to Non-linear Optical Interaction with Air and Its Effects on Laser Ablation

•R. Yamada, W. Komatsubara, H. Sakurai, K. Konishi, N. Mio, J. Yumoto, and M. Kuwata-Gonokami; The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 1130033, Japan

We numerically calculated the nonlinear propagation of a gaussian beam. We demonstrated the calculated modulation of the laser beam profile due to non-linear optical effects can be useful in predicting its effects on laser ablation.

CM-4.5 THU 9:45

Azo-polymer spiral surface relief formation with rotating Hermite-Gaussian beams

A. Tomita[1], •A. Vallés[1,2], K. Miyamoto[1,2], and T. Omatsu[1,2]; [1]Graduate School of Science and Engineering, Chiba University, Chiba, Japan; [2]Molecular Chirality

ROOM 7

S. Lemey[1], E. Peytavit[2], and B. Kuyken[1]; [1]Department of Information Technology (INTEC), Ghent University — imec, Ghent, Belgium; [2]Institute of Electronics, Microelectronics and Nanotechnology (IEMN), Université de Lille, Lille, France

Uni-travelling-carrier photodiodes (UTC PDs) are heterogeneously integrated on a silicon-nitride (SiN) platform using micro-transfer-printing (μTP). These waveguide-coupled photodiodes feature a high responsivity for a very small footprint and promise high-speed operation into the THz domain.

CK-4.4 THU 9:30

Exploration of the optical behavior of phase-change materials integrated in silicon photonics platforms

•C. Zrounba[1], S. Cueff[1], S. Le Beux[2], I. O'Connor[1], and F. Pavanello[1]; [1]Lyon Institute of Nanotechnologies, Écully, France; [2]Concordia University, Montréal, Canada

We demonstrate that, contrary to common assumptions, the absorption profile within waveguide-integrated phase-change material devices may not be exponential and that a non-negligible power fraction may be lost rather than absorbed.

CK-4.5 THU 9:45

Cavity modulator assisted nonreciprocal light transmission on Silicon

•A. Pandey[1], S. Dwivedi[2], and D. Van Thourhout[1]; [1]Ghent University-imec, Ghent, Belgium; [2]imec, Leuven, Belgium

We experimentally demonstrate op-

ROOM 8

EE-2.4 THU 9:30

Transition dipole moment structure revealed by high harmonic generation spectroscopy in thin layer black phosphorus

•K. Uchida[1], V. Pareek[2], K. Nagai[1], K. Dani[2], and K. Tanaka[1]; [1]Kyoto University, Kyoto, Japan; [2]Okinawa Institute of Science and Technology Graduate University, Okinawa, Japan

We observed high harmonic generation in thin layer black phosphorus. By measuring crystal orientation dependence with the resonant excitation condition, we succeeded in reconstructing the transition dipole moment structure in two-dimensional momentum space.

EE-2.5 THU 9:45

Ultrafast Single-Photon Detection based on Optical Kerr Gates

•A.M. Flatae[1], A.-H. Fattah[1], A. Farrag[1], and M. Agio[1,2]; [1]University of Siegen, Laboratory of Nano-Optics and Cμ, Siegen, Germany; [2]National Institute of Optics (INO), National Research Council (CNR), Florence,

ROOM 9

EF-5.4 THU 9:30

Features of spontaneous symmetry breaking of dissipative cavity solitons in passive Kerr resonators

•G. Xu[1], A. Nielsen[1], B. Garbin[1,2], L. Hill[3], G.-L. Oppo[3], J. Fatome[1,4], S. Murdoch[1], S. Coen[1], and M. Erkintalo[1]; [1]The University of Auckland, Auckland, New Zealand; [2]Université Paris-Saclay, Palaiseau, France; [3]University of Strathclyde, Glasgow, United Kingdom; [4]Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France

We report on theoretical and experimental investigations of spontaneous polarization symmetry breaking of temporal cavity solitons. Our findings represent the first observation of these dynamics for dissipative solitons in any two-component physical system.

EF-5.5 THU 9:45

Self-Stabilized Soliton Generation in a Microresonator Through Mode-Pulled Brillouin Lasing

•I.H. Do[1], D. Kim[2], D. Jeong[1], D. Suk[1], D. Kwon[3], J. Kim[3], J.H. Lee[4], and H. Lee[1,2]; [1]Graduated School of Nanoscience and Technology, Korea Advanced Institute of Science and

ROOM 10

damental importance for emerging photonic applications. We demonstrate 260-folds of photoluminescence enhancement along with tunable lifetime of fluorescent dye by integrating with MIM nanocavity

EH-4.5 THU 9:30

Near-field and far-field studies of single and double sub-wavelength sized infrared plasmonic nano-antennas

L. Abou Hamdan[1], L. Abou Hamdan[2], V. Krachmalnicoff[1], R. Haidar[2], P. Bouchon[2], and •Y. De Wilde[1]; [1]ESPCI Paris, Université PSL, CNRS, Institut Langevin, Paris, France; [2]DOTA, ONERA, Université Paris-Saclay, Palaiseau, France

The thermal radiation from single or double metal-insulator-metal nanoantennas is measured. The fundamental spatial mode can be excited at different wavelengths on single MIMs, and we observe the simultaneous thermal excitation of various hybrid modes on double MIMs.

EH-4.6 THU 9:45

Sensitive Determination of the Size and Dielectric Function of Plasmonic Nanoparticles using the Extinction-to-Absorption Ratio

•A. Djorović[1], S.J. Oldenburg[2], J. Grand[1,3], and E.C. Le Ru[1]; [1]The MacDiarmid Institute for Advanced

ROOM 11

I. Kinski[4], D. Dorosz[5], and M. Kochanowicz[6]; [1]Leibniz Institute of Photonic Technology, Jena, Germany; [2]University of Cantabria, Santander, Spain; [3]Fraunhofer Institute of Ceramic Technologies and Systems, Dresden, Germany; [4]Fraunhofer Institute of Ceramic Technologies and Systems, Hermsdorf, Germany; [5]AGH University of Science and Technology, Krakow, Poland; [6]Bialystok University of Technology, Bialystok, Poland

We investigate the introduction of laser-active nanocrystals (Ti:sapphire and Pr:yttria) into optical fibres using glass powder doping. The survival of crystalline material during fibre drawing is confirmed by fluorescence and nanostructure analysis.

CE-8.5 THU (Invited) 9:30

Novel concepts for fabrication and applications of fibers using high-index heavy metal oxide glasses

•H. Ebendorff-Heidepriem; Institute for Photonics and Advanced Sensing, The University of Adelaide, Adelaide, Australia; ARC Centre of Excellence for Nanoscale BioPhotonics (CNBP), Adelaide, Australia

This talk will review our recent advances in the fabrication of heavy metal oxide glass fibers and waveguides and our recent research on using these fibers to demonstrate new lasing, imaging, sensing and mode propagation concepts.

ROOM 12

Cavendish Laboratory, University of Cambridge, Cambridge, CB3 0HE, United Kingdom; [2]Department of Chemistry, King's College London, 7 Trinity Street, London, SE1 1DB, United Kingdom; [3]Department of Physics and Astronomy, University College London, London, WC1E 6BT, United Kingdom

Molecule-metal transient bonds underpin catalysis. Here we confine light to atomic scales for single-molecule probes utilising surface-enhanced Raman scattering. Our analysis of >800,000 spectra shows light-induced local polarization reduces energy barriers for molecule-metal bindings.

EG-5.4 THU 9:30

Thermal effects - an alternative mechanism for plasmon-assisted photocatalysis

Y. Dubi[1], J.H. Baraban[1], •I.W. Un[2], and Y. Sivan[2]; [1]Department of Chemistry, Ben Gurion University, Beer Sheva, Israel; [2]School of Electrical and Computer Engineering, Ben-Gurion University of the Negev, Beer Sheva, Israel

We show that the claims in some of the most famous papers on the topic of plasmon-assisted photocatalysis are extremely unlikely to be correct and that the faster reactions are likely the result of heating.

EG-5.5 THU 9:45

Super-Resolution Mapping of Light-Driven Reactions on Metal Nanostructures

•S. Ezendam[1], J. Gargiulo[1], A. Sousa-Castillo[1,2], L. Nan[1], M. Maier[1], S.A. Maier[1,3], and E. Cortés[1]; [1]Chair in Hybrid Nanosystems, Nanoinstitut, Fakultät für

ROOM 1

Korea

This article introduces an ultra-thin and near-unity selective emitter within long wave infrared region, which can be fabricated in simple and affordable process.

11:00 – 12:30

CA-9: Laser Materials

Chair: Thomas Mocek, HiLASE Center of Excellence, Dolní Břežany, Czech Republic

CA-9.1 THU 11:00

OFZ-growth of $Yb:(Sc,Y)_2O_3$ for 1 μm lasers

•A. Uvarova, S. Kalusniak, C. Guguschev, and C. Kränkel; Leibniz-Institut für Kristallzüchtung (IKZ), Berlin, Germany

We report on the growth of $Yb:(Sc,Y)_2O_3$ by the optical floating zone method. The up to 8 cm long, few-mm thick single crystals exhibit broad spectra and a relatively high thermal conductivity.

ROOM 2

Zürch[1,5,6,7], C. Ronning[3,8], C. Spielmann[1,2,8], and D. Kartashov[1,8]; [1]Institute of Optics and Quantum Electronics, Friedrich-Schiller-University Jena, Jena, Germany; [2]Helmholtz Institute Jena, Jena, Germany; [3]Institute for Solid State Physics, Friedrich-Schiller-University Jena, Jena, Germany; [4]Institute for Photonics, Technical University Vienna, Vienna, Austria; [5]Fritz Haber Institute, Berlin, Germany; [6]Department of Chemistry, University of California Berkeley, Berkeley, USA; [7]Lawrence Berkeley National Laboratory, Materials Sciences Division, Berkeley, USA; [8]Abbe Center of Photonics, Friedrich Schiller University, Jena, Jena, Germany

We experimentally investigated the ellipticity dependence of high harmonic generation (HHG) in ZnO as a function of the driving wavelength. The results reveal a different behaviour of the below and above band gap orders.

11:00 – 12:30

CB-7: Short Wavelength Sources and Applications

Chair: Boon Ooi, KAUST, Djeddah, Saudi Arabia

CB-7.1 THU (Keynote) 11:00

Advances towards deep-UV light emitting diode technologies

•M. Kneissl[1,2], G. Cardinali[1], J. Enslin[1], M. Guttmann[1], C. Kuhn[1], F. Mehnke[1], M. Schilling[1], L. Sulmoni[1], N. Susilo[1], T. Wernicke[1], H.K. Cho[2], J. Glaab[2], J. Ruschel[2], S. Hagedorn[2], N. Lobo-Ploch[2], C. Netzel[2], J. Rass[2], S. Walde[2], U. Winterwerber[2], S. Einfeldt[2], and M. Weyers[2]; [1]Institute of Solid State Physics, TU Berlin, Berlin, Germany; [2]Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

Recent advances in development of AlGaN-based deep UV-LED

ROOM 3

We demonstrate an optical magnetic field sensor based on a metamaterial-microcavity. Actuation of the microcavity by the magnetic Lorentz force controls its reflectivity. Such sensors promise microscale spatial, sub-millisecond temporal and microtesla magnetic field resolution.

11:00 – 12:30

CC-5: THz Imaging

CC-5.1 THU (Invited) 11:00

Real-time terahertz imaging with a single-pixel detector

R. Stantchev[1], K. Li[1], and •E. Pickwell-MacPherson[1,2]; [1]The Chinese university of Hong Kong, Hong Kong, China; [2]Warwick University, Coventry, United Kingdom

THz imaging is getting faster! We are getting very close to video rate THz imaging. Here I will explain the advances made recently by my group relating to compressed sensing approaches and spatial modulator design.

ROOM 4

France; [2]National Tsing Hua University, Hsinchu, Taiwan; [3]University of California, Santa Barbara, Santa Barbara, USA; [4]University of New-Mexico, Albuquerque, USA

This paper reports on a study on the pulsation dynamics of a 1.3 μm Si-based epitaxial quantum dot laser under strong chip-scale optical feedback. These results are paramount for photonics integration applications.

11:00 – 12:30

CD-7: Tunable Light Sources

Chair: Cornelia Denz, University of Münster, Münster, Germany

CD-7.1 THU 11:00

Proton radiation hardness of periodically poled Rb: KTiOPO4 for high-energy OPA at 2 μm

•K.M. Mølster[1], S. Duzellier[2], A. Zukauskas[1], M. Raybaut[3], and V. Pasiskevicius[1]; [1]Department of Applied Physics, Royal Institute of Technology, KTH, Stockholm, Sweden; [2]DPHY, ONERA, Université Paris-Saclay, Palaiseau, France; [3]ONERA/DPHY, Université de Toulouse, Toulouse, France

Linear and nonlinear properties of Rb: PPKTP subjected to proton irradiation equivalent to 5-year Low-Earth-orbit mission have been investigated. Together with gamma irradiation tests, this work validates

ROOM 5

Research Institute of Saint-Louis (ISL), Saint-Louis, France; [2]Aix-Marseille University, Marseille, France; [3]Untere Gaisäckerstr, 10, Waldshut-Tiengen, Germany

We investigate the influence of thermal effects on beam quality in high-power OPOs with ZnGeP2 nonlinear optical crystals. Our setup yields more than 30 W of output power in 3-5 μm region with M2>2.

11:00 – 12:30

CF-7: Nonlinear Spectral Broadening

Chair: Stefan Haessler, Laboratoire d'Optique Appliquée, Palaiseau, France

CF-7.1 THU 11:00

Octave-Spanning Supercontinuum Generated in As_2S_3-Silica Waveguides Pumped by Tm-doped All-fibre MOPA

•V. Voropaev[1], S. Xie[2], A. Donodin[3], D. Vlasov[1], D. Batov[1], M. Tarabrin[1,4], J. Troles[5], and V. Lazarev[1]; [1]Science and Education Center for Photonics and IR-Technology, Bauman Moscow State Technical University, Moscow, Russia; [2]Max Planck Institute for the Science of Light, Erlangen, Germany; [3]Aston Institute of Photonic Technologies, Aston University, Birmingham, United Kingdom; [4]P. N. Lebedev Physical Institute of the Russian Academy of

ROOM 6

Research Center, Chiba University, Chiba, Japan

We present the formation of spiral surface relief of azo-polymers by the irradiation of a rotating Hermite-Gaussian two-petal beam with zero orbital angular momentum.

11:00 – 12:30

CI-3: Microwave Photonics

Chair: Alessandro Tonello, Université de Limoges, Limoges, France

CI-3.1 THU 11:00

Low phase noise microwave generation from a direct-modulation optoelectronic oscillator (DM-OEO)

•B. Sinquin, M. Romanelli, S. Bouhier, M. Alouini, and M. Vallet; Univ. Rennes, CNRS, Institut FOTON UMR 6082, Rennes , France

A direct-modulation optoelectronic oscillator generates 10 and 20 GHz signals. It exhibits 15 dBm output power and -135dBc/Hz phase noise at 10 kHz from the carrier at 10 GHz; -5 dBm and -126dBc/Hz at 20GHz.

ROOM 7

tical non-reciprocal transmission in a compact cascaded microcavity modulator, achieving a 16dB extinction ratio between forward and backward propagating waves. Variation as a function of drive power is also reported.

11:00 – 12:30

CK-5: Beam Manipulation

Chair: Martin Frimmer, ETH, Zurich, Switzerland

CK-5.1 THU (Tutorial) 11:00

Photonic Crystal Devices for Sensing — Focusing on LiDAR Applications —

•*T. Baba; Yokohama National University, Yokohama, Japan*

Some photonic crystal devices are approaching to practical use. This presentation demonstrates an application to a nonmechanical optical beam scanner and FMCW LiDAR sensor system based on a Si photonics platform and slow light effect.

ROOM 8

Italy

Ultrafast single-photon detection at gigahertz rates based on optical Kerr gates under focused illumination is theoretically demonstrated. The technique provides sub-picosecond time resolution, while keeping a gate efficiency at around 85%.

11:00 – 12:30

EA-5: Quantum Light Sources

Chair: Dmitry S. Bykov, University of Innsbruck, Innsbruck, Austria

EA-5.1 THU 11:00

Controlling the symmetry of a quantum dot via remote electric potentials

•*M. Esmann, P. Priya, H. Ollivier, A. Harouri, I. Sagnes, A. Lemaitre, N.D. Lanzillotti-Kimura, and P. Senellart; Centre de Nanosciences et de Nanotechnologies (C2N), Université Paris-Saclay, CNRS, 10 Boulevard Thomas Gobert, 91120 Palaiseau, France*

We control the exciton fine-structure splitting of an epitaxial quantum dot via three electric potentials applied $50\mu m$ away. This approach is compatible with optical microcavities and enables efficient sources of entangled photon pairs.

ROOM 9

Technology (KAIST), Daejeon, South Korea; [2]Department of Physics, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea; [3]School of Mechanical and Aerospace Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea; [4]Korea Research Institute of Standards and Science (KRISS), Daejeon, South Korea

Here generating and self-stabilizing mechanism of Brillouin assisted soliton and its long-term stability is illustrated. The single-soliton pulses are sustained over several days with a phase noise of –137dBc/Hz at 100kHz without any feedback systems.

11:00 – 12:30

EB-8: Quantum Computation and Error Correction

Chair: Martin Ringbauer, University of Innsbruck, Austria

EB-8.1 THU (Invited) 11:00

Experimental deterministic correction of qubit loss

•*R. Stricker; University of Innsbruck, Innsbruck, Austria*

Qubit loss is a fundamental obstacle towards large-scale and fault-tolerant quantum computers. We demonstrate an experimental toolbox for ion-qubit control and implement a full cycle of qubit-loss detection and correction on the topological surface code.

ROOM 10

Materials and Nanotechnology, School of Chemical and Physical Sciences, Victoria University of Wellington, Wellington, New Zealand; [2]nanoComposix, San Diego, USA; [3]Université de Paris, Paris, France

We propose and demonstrate a method to significantly improve the accuracy of routine plasmonic nanoparticle size characterization by measuring the absorption-to-extinction ratio compared to the standard and widespread UV-Vis extinction method.

11:00 – 12:15

EC-5: Emerging Trends in Topology

Chair: Laura Pilozzi, CNR, Rome, Italy

EC-5.1 THU 11:00

Fractional Chern insulators of few photons: Hall plateaus from center-of-mass drifts and density profiles

C. Repellin[1], J. Leonard[2], and •N. Goldman[3]; [1] Univ. Grenoble-Alpes, CNRS, LPMMC, 38000 Grenoble, France, Grenoble, France; [2]Department of Physics, Harvard University, Cambridge, USA; [3]Université Libre de Bruxelles, Brussels, Belgium

We analyze the center-of-mass Hall drift of a small ensemble of hard-core bosons, initially prepared in the ground state of the Harper-Hofstadter-Hubbard model. An emergent Hall plateau compatible

ROOM 11

11:00 – 12:30

EF-6: Dissipative Solitons I

Chair: Vladimir Kalashnikov, Sapienza University of Rome, Italy

EF-6.1 THU 11:00

Parametric solitons in optical resonator

•*N. Englebert[1], F. De Lucia[1,2], P. Parra-Rivas[1], C. Mas Arabí[1], P.-J. Sazio[2], S.-P. Gorza[1], and F. Leo[1]; [1]Université libre de Bruxelles, Bruxelles, Belgium; [2]University of Southampton, Southampton, United Kingdom*

We experimentally demonstrate, for the first time, parametric driving of Kerr cavity solitons. As two different solitons, of opposite phase, exist for the same cavity parameters, we use them to generate random numbers.

ROOM 12

Physik, Ludwig Maximilians-Universität München, München, Germany; [2]CINBIO, Universidade de Vigo, Vigo, Spain; [3]Experimental Solid State Physics Group, Department of Physics, Imperial College London, London, United Kingdom

In this work, we investigate how both the wavelength and polarization of light allow the selection of different mechanisms for catalysis by mapping the reaction sites on individual nanoantennas.

11:00 – 12:30

CE-9: Nonlinear and Meta-materials

Chair: Katia Gallo, KTH – Royal Institute of Technology, Stockholm, Sweden

CE-9.1 THU (Invited) 11:00

Second Harmonic Generation by Silicon Metamaterial on a Fibre Tip

•*J. Xu[1], E. Plum[1], V. Savinov[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, SPMS, TPI, Nanyang Technological University, Singapore, Singapore*

Patterning of amorphous silicon with chevron grooves yields a metamaterial frequency converter with a resonant second harmonic conversion efficiency of about 10^(-11)/W, exceeding the previously achieved

ROOM 1

CA-9.2 THU 11:15

Sub-50-fs Kerr-lens mode-locked Yb:GdYCOB laser

H. Zeng[1], Z. Lin[1], H. Lin[1], L. Zhang[1], Z. Lin[1], G. Zhang[1], V. Petrov[2], L. Wang[2], and •W. Chen[1]; [1]Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, China; [2]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

We report on the first sub-50-fs Kerr-lens mode-locked solid-state laser using mixed Yb:GdYCOB crystal as a gain medium, to generate pulses as short as 43 fs at 1036.5 nm with a repetition rate of ~70 MHz.

CA-9.3 THU 11:30

Nanosecond Compact Eye-Safe Erbium Lasers with 190 kW Peak Power

V. Vitkin[1], A. Polishchuk[1], D. Zavirukha[1], V. Kurikova[1], O. Dymshits[2], I. Alekseeva[2], S. Zapalova[2], A. Zhilin[2], and •P. Loiko[3]; [1]ITMO University, Saint Petersburg, Russia; [2]NITIOM Vavilov State Optical Institute, Saint Petersburg, Russia; [3]Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France

Compact diode-side-pumped

ROOM 2

technologies and applications will be discussed including the performance characteristics of UV emitters in the 265 nm and 230 nm wavelength bands.

ROOM 3

CC-5.2 THU 11:30

High-resolution terahertz single-pixel imaging for 2D spectral analysis

•A. Vallés[1,2], S. Ohno[3], T. Omatsu[1,2], and K. Miyamoto[1,2]; [1]Graduate School of Science and Engineering, Chiba University, Chiba, Japan; [2]Molecular Chirality Research Center, Chiba University, Chiba, Japan; [3]Graduate School of Science, Tohoku University, Sendai, Japan

We present a single-pixel imaging system for the entire high-frequency terahertz region, producing high pixel resolution images (1200 x 1200 pixels). We employ a metallic ring with directly perforated pat-

ROOM 4

the suitability of this material for space-borne platforms.

CD-7.2 THU 11:15

Parametrically amplified backward-wave optical parametric oscillator for generation of narrowband high-energy ns-pulses in the mid-infrared

•K.M. Mølster[1], J. Negri Rubens[2], A. Zukauskas[1], C. Canalias[1], F. Laurell[1], and V. Pasiskevicius[1]; [1]Department of Applied Physics, Royal Institute of Technology, KTH, Stockholm, Sweden; [2]Dipartimento di Ingegneria Industriale e dell'Informazione, Università di Pavia, Pavia, Italy

We demonstrate a backward-wave optical parametric oscillator parametric power amplifier using PPRKTP. Single longitudinal mode pumping and amplifier seeding with the signal wave enables precision-tuned transform-limited nanosecond pulse generation with output energy scalability.

CD-7.3 THU 11:30

Tunable multi-structured-beam optical parametric oscillator

•V. Sharma[1,2], S.C. Kumar[3], G.K. Samanta[1], and M. Ebrahim-Zadeh[3,4]; [1]Photonic Sciences Lab., Physical Research Laboratory, Navarangpura, Ahmedabad, India; [2]Indian Institute of Technology-Gandhinagar, Ahmedabad, India; [3]ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels , Barcelona, Spain; [4]Institucio Catalana de Recerca i Estudis Avancats (ICREA), Passeig Lluis Companys 23, 08010, Barcelona, Spain

ROOM 5

Sciences, Moscow, Russia; [5]Institut des sciences chimiques de Rennes, université de Rennes 1, Rennes, France

We experimentally and numerically demonstrate octave spanning supercontinua generation in As_2S_3-silica dual nanospike waveguides pumped by a thulium-doped all-fiber MOPA centred at 1.9 μm with 78 fs pulse duration and 200 kW peak power.

CF-7.2 THU 11:15

GW Peak Power, sub-30-fs Pulses from Efficient Single-Stage Pulse Compressor at 400-kHz

•A. Omar, S. Ahmed, M. Hoffmann, and C. Saraceno; Ruhr-University Bochum, Bochum, Germany

We demonstrate pulse compression of 310-fs, 150 MW peak power pulses at 400 kHz repetition rate down to 27fs, >1 GW peak power using a single, dispersion-optimized Herriott-type multipass cell compressor with 92% overall efficiency.

CF-7.3 THU 11:30

Chirped Pulse Amplification of 1.6 GHz Ti:Sapphire Frequency Comb Using a Tapered Semiconductor Amplifier

•T. Sakamoto[1] and K. Yoshioka[1,2]; [1]Department of Applied Physics, School of Engineering, The University of Tokyo, Tokyo, Japan; [2]Photon Science Center, School of Engineering, The University of Tokyo, and PRESTO, JST, Tokyo, Japan

We demonstrate amplification of a 1.6 GHz Ti:Sapphire frequency comb using a tapered semiconductor amplifier. Stretched pulses at 855-865 nm were compactly ampli-

ROOM 6

CI-3.2 THU 11:15

Frequency-to-time mapping using a phase-modulated frequency-shifting loop.

•H. Yang[1,2], M. Brunel[3], M. Vallet[3], H. Zhang[1], and C. Zhao[1]; [1]Beijing Institute of Technology, Beijing, China; [2]Qian Xuesen Laboratory of Space Technology, Beijing, China; [3]Univ Rennes, CNRS, Rennes, France

A recirculating fiber loop comprising phase modulation and amplification, operated in the Talbot condition, is shown experimentally to map the optical input spectrum in the time domain, with original features like temporal reflection and nonlinear mapping.

CI-3.3 THU 11:30

Optical Frequency Comb and Active Demultiplexer-enabled 60 GHz mmW ARoF Transmission using Directly Modulated 64-QAM UF-OFDM signals

•S. Tajammul Ahmad[1], P.D. Lakshmijayasimha[1], C. Browning[2], P.M. Anandarajah[1,3], L.P. Barry[2], and A. Kaszubowska-Anandarajah[3,1]; [1]Photonics Systems and Sensing Lab., School of Electronic Engineering, Dublin City University, Dublin, Ireland; [2]Radio and Optical Communications Lab., School of Electronic Engineering, Dublin City University, Dublin, Ireland; [3]CONNECT Research

ROOM 7

ROOM 8

EA-5.2 THU 11:15

Photon pair generation in ultra-thin carbon nanotube films without phase-matching

•P. Jenke[1], I. Alonso Calafell[1], A. Trenti[1], K. Mustonen[2], L. Rozema[1], and P. Walther[1]; [1] VCQ-Vienna Center for Quantum Science and Technology, Faculty of Physics, University of Vienna, Vienna, Austria; [2] Faculty of Physics, University of Vienna, Vienna, Austria

In sufficiently thin nonlinear materials, the phase-matching condition of four-wave mixing relaxes. We characterize the resulting broadband biphoton states by stimulated emission tomography, and present progress towards photon pair generation in ultra-thin carbon nanotube films.

EA-5.3 THU 11:30

Quantum-Correlation-Preserving Single-Photon Conversion by Molecular Modulation in Gas-filled Hollow-Core Fibres

R. Tyumenev, J. Hammer, N. Joly, •D. Novoa, and P. Russell; Max-Planck Institute for the Science of Light, Erlangen, Germany

Raman coherence waves created in hydrogen-filled single-ring hollow-core PCF are used to efficiently frequency up-shift the idler photon from a biphoton pair. Quantum correlations are preserved between the signal photon and the up-shifted idler photon.

ROOM 9

EB-8.2 THU 11:30

Non-Clifford gate on Gottesman-Kitaev-Preskill encoded optical qubits with nonlinear feedforward

•S. Konno[1], W. Asavanant[1], K. Fukui[1], A. Sakaguchi[1], F. Hanamura[1], P. Marek[2], R. Filip[2], J.-i. Yoshikawa[1], and A. Furusawa[1]; [1] Department of Applied Physics, School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan; [2] Department of Optics, Palacký University, 17. listopadu 1192/12, 77146 Olomouc, Czech Republic

We propose an experimentally feasible implementation of a non-

ROOM 10

with a fractional Chern insulator is identified.

EC-5.2 THU 11:15

Topological protection versus degree of entanglement of two-photon edge states

K. Tschernig[1], K. Busch[2], and •A. Perez-Leija[1]; [1] Max-Born Institute, Berlin, Germany; [2] Humboldt University of Berlin, Berlin, Germany

We investigate theoretically the physical mechanisms that contribute to the vulnerability of highly entangled two-photon edge states propagating in topological insulator photonic lattices.

EC-5.3 THU 11:30

Characterizing Photonic Band Structures Using Topological Data Analysis

•D. Leykam[1] and D.G. Angelakis[1,2]; [1] Centre for Quantum Technologies, National University of Singapore, Singapore, Singapore; [2] School of Electrical and Computer Engineering, Technical University of Crete, Chania, Greece

We show how the topological data analysis technique of persistent homology may used to characterize topological properties of photonic band structures, from known topological phases to bands with novel multi-valley and looped dispersion

ROOM 11

EF-6.2 THU 11:15

Breathing Cavity Solitons and Polychromatic Dispersive Radiation in a Near-Zero Dispersion Kerr Resonator

•Z. Li[1,2], Y. Xu[1,2], S. Coen[1,2], S.G. Murdoch[1,2], and M. Erkintalo[1,2]; [1] University of Auckland , Auckland , New Zealand; [2] The Dodd-Walls Centre for Photonic and Quantum Technologies, Auckland, New Zealand

We report on experimental observations of polychromatic dispersive wave emission by breathing Kerr cavity solitons under conditions of near-zero-dispersion driving. We also experimentally study the impact of third-order dispersion on the solitons' existence and stability.

EF-6.3 THU 11:30

Zero-dispersion Kerr solitons in optical microresonators with octave-spanning dispersive wave formation

•M.H. Anderson, W. Weng, G. Lihachev, J. Liu, and T.J. Kippenberg; Institute of Physics (IPHYS), Swiss Federal Institute of Technology in Lausanne (EPFL), Lausanne, Switzerland

We generate a novel localised dissipative structure, the zero-dispersion soliton, in silicon nitride microresonators with vanishing group-velocity dispersion. The coherent frequency comb spans 135 THz, at 28 GHz line-spacing,

ROOM 12

value for silicon metamaterial by two orders of magnitude.

CE-9.2 THU 11:30

Suppression of scattering induced by tailored non-Hermiticity

•A. Steinfurth[1], I. Krešić[2], S. Weidemann[1], M. Kremer[1], K. Makris[3,4], M. Heinrich[1], S. Rotter[2], and A. Szameit[1]; [1] Institute of Physics, Universität Rostock, Rostock, Germany; [2] Institute of Theoretical Physics, Vienna University of Technology (TU Wien), Vienna, Austria; [3] Physics Department, University of Crete, Heraklion, Greece; [4] Institute of Electronic Structure and Laser, FORTH, Heraklion, Greece

Light waves passing through inhomogeneous media commonly are subject to scattering and subsequent

ROOM 1

eye-safe Er,Yb:glass laser is passively Q-switched by transparent glass-ceramics containing Co:Mg(Al,Ga)2O4 and γ-Co:Ga2O3 spinel nanophases. The laser generates 1.39 mJ/7.2 ns pulses (energy/duration) at 1535 nm in the fundamental transverse mode.

CA-9.4 THU 11:45

Growth, Spectroscopy and Laser Operation of Tm3+, Li+-Codoped Ca3Ta1.5Ga3.5O12-Type Disordered Garnet Crystal

•*A. Alles[1,2], Z. Pan[3,4], J.M. Serres[1,2], P. Loiko[5], K. Tang[3], S. Yingming[3], Y. Wang[4], Y. Zhao[4,6], E. Dunina[7], A. Kornienko[7], P. Camy[5], W. Chen[4,8], L. Wang[4], U. Griebner[4], V. Petrov[4], R.M. Solé[1], M. Aguiló[1], F. Díaz[1], and X. Mateos[1,9]*; *[1]Universitat Rovira i Virgili (URV), Tarragona, Spain*; *[2]Eurecat, Centre Tecnològic de Catalunya, Advanced Manufacturing Systems Unit (AMS), Tarragona, Spain*; *[3]Institute of Chemical Materials, Mianyang, China*; *[4]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany*; *[5]CIMAP, UMR 6252 CEA-CNRS-ENSICAEN, Université de Caen Normandie, Caen, France*; *[6]Jiangsu Key Laboratory of Advanced Laser Materials and Devices, Xuzhou, China*; *[7]Vitebsk State Technological University, Vitebsk, Belarus*; *[8]Key Laboratory of Optoelectronic Materials Chemistry and Physics, Fujian, China*; *[9]Serra Húnter Fellow, Tarragona, Spain*

Tm3+,Li+-codoped Ca3Ta1.5Ga3.5O12-type (Tm:CLTGG) disordered garnet is grown by the Czochralski method. Its structure, spectroscopic and laser properties are studied. A diode-pumped Tm:CLTGG laser generates 1.08 W at ~2.0 μm with a slope efficiency of 23.8%.

ROOM 2

CB-7.2 THU 11:45

Photonic VCSEL-neuron for spike-rate representation of digital image data

•*M. Hejda, J. Robertson, J. Bueno, J.A. Alanis, and A. Hurtado*; *Institute of Photonics, SUPA Department of Physics, University of Strathclyde, Glasgow, United Kingdom*

We demonstrate high-speed image data encoding with a VCSEL-based spiking photonic neuron. Pixels from the RGB channels of colour images are rate-coded into optical spike trains, showing very good agreement between reconstructed and source images.

ROOM 3

terns and a subpixel digitization technique.

CC-5.3 THU 11:45

Time-resolved, nonlinear control of terahertz waves in random media for spatiotemporal focusing

•*V. Cecconi, V. Kumar, A. Pasquazi, J.S. Totero Gongora, and M. Peccianti*; *University of Sussex, Brighton, Sussex, United Kingdom*

We theoretically investigate spatiotemporal refocusing of broadband THz waves in random media. Our nonlinear wavefront shaping methodology allows controlling the temporal and spatial properties of the THz pulse by acting on the spatial degrees-of-freedom.

ROOM 4

We report a coherent light source simultaneously producing tunable beam of various spatial structures. Based on a picosecond optical parametric oscillator, the source generates Gaussian, vortex, Airy, and vortex Airy beams tunable across 1457-1680 nm.

CD-7.4 THU 11:45

Domain dynamics in sub-μm Periodically Poled Rb-doped KTiOPO4 via coercive field engineering

•*P. Mutter, A. Zukauskas , V. Pasiskevicius, and C. Canalias*; *Royal Institute of Technology, Stockholm, Sweden, Stockholm, Sweden*

We demonstrate reliable periodic poling with periods down to 430 nm in 1mm-thick RKTP crystals by forming a coercive-field grating via ion exchange. The interplay between ion-exchange and domain dynamics is studied.

ROOM 5

fied to 215 mW and compressed by combining a chirped Bragg grating.

CF-7.4 THU 11:45

Compact 60 μJ, 60 fs, MHz-rate burst-mode laser for pump-probe experiments at the FLASH FEL facility

•*M. Seidel[1], F. Pressacco[1], O. Akcaalan[1], T. Binhammer[2], J. Darvill[1], M. Frede[2], U. Grosse-Wortmann[1], M. Heber[1], C.M. Heyl[1,3,4], D. Kutnyakhov[1], C. Li[1], C. Mohr[1], J. Müller[1], O. Puncken[2], H. Redlin[1], N. Schirmel[1], S. Schulz[1], A. Swiderski[1], H. Tavakol[1], H. Tünnermann[1], C. Vidoli[1], L. Wenthaus[1], N. Wind[1,5], L. Winkelmann[1], B. Manschwetus[1], and I. Hartl[1]*; *[1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; *[2]neoLASE GmbH, Hannover, Germany*; *[3]Helmholtz-Institute Jena, Jena, Germany*; *[4]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*; *[5]Institut für Experimentalphysik, Universität Hamburg, Hamburg, Germany*

A new burst-mode laser at the FLASH-FEL facility is presented. Multi-pass-cell spectral broadening enables compression of 900-fs pulses from Yb-amplifiers to 60-fs. Nonlinear-ellipse-rotation leads to significant pulse-contrast improvement. Excellent timing-, spectrum- and energy-stability is reported.

ROOM 6

Center, Trinity College Dublin, Dublin, Ireland

Active demultiplexer-enabled comb based mmW A-RoF transmission scheme is experimentally demonstrated. A BER below the HD-FEC limit of 3.8e-3 for 40 km fiber transmission of 60 GHz 64-QAM UF-OFDM RoF signal is achieved.

CI-3.4 THU 11:45

Transmission of 5G using Tunable Dual-Wavelength Fiber Laser

•*H. Kbashi, S. Vishal, and S. Sergeyev*; *1Aston Institute of Photonics Technologies, Aston University, Birmingham, United Kingdom*

In this work, we demonstrate the generation of the tunable mmW ranging from 12.5 GHz to 110 GHz using a dual-wavelength fiber laser and then validate the 5G transmission over a 500 m FSO wireless-link.

ROOM 7

ROOM 8

EA-5.4 THU 11:45

Cryogenic Parametric Down-Conversion in Titanium In-Diffused Lithium Niobate Waveguides

•N.A. Lange[1], J.P. Höpker[1], R. Ricken[2], V. Quiring[2], C. Eigner[2], C. Silberhorn[2], and T.J. Bartley[1]; [1]Mesoscopic Quantum Optics, Paderborn University, Paderborn, Germany; [2]Integrated Quantum Optics, Paderborn University, Paderborn, Germany

We demonstrate spontaneous parametric down-conversion (SPDC) in nonlinear waveguides down to 4.7 K. Thus, our work shows that SPDC is integrable with superconducting detectors, which paves the way for developing novel integrated quantum photonic circuits.

ROOM 9

Clifford gate on the Gottesman-Kitaev-Preskill qubits using nonlinear feedforward. Our result shows the versatility of nonlinear feedforward in a fault-tolerant optical universal quantum computation.

EB-8.3 THU 11:45

Optimal Control of a Large Ensemble of Nitrogen-Vacancy Centers in Diamond for Pulsed Magnetometry

•J.D. Clement[1], A.F.L. Poulsen[1], J.L. Webb[1], R.H. Jensen[1], K. Berg-Sørensen[2], A. Huck[1], and U.L. Andersen[1]; [1]Center for Macroscopic Quantum States (bigQ), Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]Department of Health Technology, Technical University of Denmark, Kgs. Lyngby, Denmark

Nitrogen-Vacancy (NV) centers in diamond can measure biophysical magnetic signals with high sensitivity. With optimal control, we demonstrate pulse fidelity improvement for a large ensemble, leading to improved sensitivity in this experimental regime.

ROOM 10

relations.

EC-5.4 THU 11:45

Supertoroidal Skyrmionic Light Pulses

•Y. Shen[1], Y. Hou[1], A. Zdagkas[1], N. Papasimakis[1], and N. Zheludev[1,2]; [1]University of Southampton, Southampton, United Kingdom; [2]Nanyang Technological University, Singapore, Singapore

We report on a family of supertoroidal pulses with skyrmion-like topology propagating at the speed of light.

ROOM 11

enabled by higher-order dispersive wave formation.

EF-6.4 THU 11:45

Dissipative Solitons in a Coherently Driven Active Fiber Ring Cavity

•C. Mas Arabi, N. Englebert, P. Parra-Rivas, S.P. Gorza, and F. Leo; Université libre de Bruxelles, Brussels, Belgium

We analyze the formation of solitons in a coherently driven Kerr resonator incorporating an intracavity amplifier. By means of bifurcation analysis, we study the impact of the gain saturation on soliton dynamics

ROOM 12

interference. We have optically implemented tailored non-Hermitian media in which scattering is suppressed for stationary as well as for time-dependent field distributions.

CE-9.3 THU 11:45

Phase-change Optical Nonlinearity as a Cellular Automaton

L. Zhang[1,2], •K.F. MacDonald[1], and N.I. Zheludev[1,3]; [1]University of Southampton, Southampton, United Kingdom; [2]Anqing Universtiy, Anqing, China; [3]Nanyang Technological University, Singapore, Singapore

We introduce a cellular automata methodology for studying photonics of light-induced phase transitions. Multiphysical complexity over disparate length/timescales is reduced to a simple, heuristic rule/parameter set in a model successfully describing several independent experimental datasets.

ROOM 1

CA-9.5 THU 12:00

Faraday Isolator with Composite Magnetooptical Elements

•A. Starobor[1], I. Kuznetsov[1], O. Palashov[1], A. Pestov[2], and N. Chkhalo[2]; [1]Federal Research Center Institute of Applied Physics of the Russian Academy of Sciences, Nizhny Novgorod, Russia; [2]Institute for Physics of Microstructures of the Russian Academy of Sciences, Nizhny Novgorod, Russia

Composite terbium gallium garnet/sapphire elements for Faraday isolators were produced by the SADB method. The resulting structures provided 34dB isolation ratio at laser power of 700W; the maximum operating power estimated to be over 2kW.

CA-9.6 THU 12:15

Thermal Expansion Coefficient of Garnet and Bixbyite Laser Crystals Evaluated by First Principles Calculation

•Y. Sato[1,2] and T. Taira[1,2]; [1]RIKEN SPring-8 Center, RIKEN, Sayo-gun, Japan; [2]Institute for Molecular Science, Okazaki, Japan

We evaluated thermal expansion coefficients for laser host crystals by first principles calculation, of which for Y3Al5O12, Lu3Al5O12, Y2O3, Sc2O3, and Lu2O3 were estimated to 7.26, 7.52, 7.95,7.18, and 6.95×10-6 K-1 at 300 K, respectively.

ROOM 2

CB-7.3 THU 12:00

How a ridge polariton laser is different from a standard ridge laser

•T. Guillet[1], H. Souissi[1], M. Gromovyi[4], T. Gueye[1], C. Brimont[1], L. Doyennette[1], G. Kreyder[2], F. Reveret[2], P. Disseix[2], F. Medard[2], J. Leymarie[2], G. Malpuech[2], D. Solnyshkov[2], B. Alloing[3], S. Rennesson[3], F. Semond[3], J. Zuniga-Perez[3], E. Cambril[4], and S. Bouchoule[4]; [1]Laboratoire Charles Coulomb (L2C), Université de Montpellier, CNRS, Montpellier, France; [2]Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, Clermont-Ferrand, France; [3]UCA, CRHEA-CNRS, Rue Bernard Gregory, Valbonne, France; [4]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France

We show how a ridge waveguide polariton laser is not governed by Bernard-Durrafourg condition (population inversion) as in standard ridge interband lasers. We discuss the case of GaN ridge polariton lasers operated up to 200K.

CB-7.4 THU 12:15

Room temperature operation of SiC-cooled and AlGaInP-based, red-emitting membrane external-cavity surface-emitting lasers (MECSELs)

•P. Tatar-Mathes, H.-M. Phung, A. Rogers, A. Tukiainen, P. Rajala, S. Ranta, H. Kahle, and M. Guina; Optoelectronics Research Centre (ORC), Physics Unit / Photonics, Faculty of Engineering and Natural Sciences, Tampere University, Tampere, Finland

MECSELS are laser-active gain membranes sandwiched between two transparent heat spreaders in transmission mode. We present the first 680 nm SiC-MECSEL operating at room temperature with an observed output power of above 480 mW.

ROOM 3

CC-5.4 THU 12:00

Terahertz Optical Machine Learning

•B. Limbacher[1,2], S. Schönhuber[1,2], M. Wenclawiak[1,2], M.A. Kainz[1,2], A.M. Andrews[2,3], G. Strasser[2,3], J. Darmo[1,2], and K. Unterrainer[1,2]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Center for Micro- and Nanostructures, TU Wien, Vienna, Austria; [3]Institute for Solid-State Electronics, TU Wien, Vienna, Austria

We present an optical implementation of machine learning in the terahertz domain, where we perform both the training as well as the predictions optically. We show that the system is accurate and noise resistant.

CC-5.5 THU 12:15

Dielectric phase hologram for frequency-diverse millimeter and submillimeter-wave imaging applications

•S.-V. Pälli, A. Tamminen, J. Ala-Laurinaho, and Z. Taylor; Department of Electronics and Nanoengineering, Millilab, Aalto University, Espoo, Finland

We present a dispersive, dielectric phase hologram capable of frequency-diverse beamforming in imaging applications at 220-330 GHz. Measured field patterns are computationally backpropagated onto hologram surface to compare the resulting phase modulation to simulations.

ROOM 4

CD-7.5 THU 12:00

Widely Tunable Polarization Modulation Instability in D2O-Filled Microstructured Optical Fiber

•A. Loredo-Trejo[1,2], A. Díez[1,2], E. Silvestre[1,3], and M. Andrés[1,2]; [1]Laboratory of Fiber Optics - ICMUV, Universidad de Valencia, Burjassot, Spain; [2]Departamento de Física Aplicada y Electromagnetismo - ICMUV, Universidad de Valencia, Burjassot, Spain; [3]Departamento de Óptica - ICMUV, Universidad de Valencia, Burjassot, Spain

Wide tuning of polarization modulation instability (PMI) in D2O-filled microstructured optical fiber is reported. Tuning of the PMI frequency shift from 1084 cm-1 to 2782 cm-1 was experimentally attained with 1064 nm pump.

CD-7.6 THU 12:15

Design and analysis of depolarized four-wave mixing in chalcogenide photonic crystal fibers

•A. Ayan, S. Kharitonov, and C.-S. Brès; École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

In this work, the effect of different depolarization schemes on the conversion efficiency of four-wave mixing in a chalcogenide photonic crystal fiber is calculated and experimentally analyzed for high-speed characterization of nonlinear fibers.

ROOM 5

CF-7.5 THU 12:00

A liquid-crystal based phase-shaper for multi-octave light sources

V. Di Pietro[1,2], S. Bux[2], L. Ramousse[1,2], C. Claudet[1], G. Cheriaux[1], N. Forget[2], and •A. Jullien[1]; [1]Université Côte d'Azur, CNRS, Institut de Physique de Nice, Valbonne, France; [2]FASTLITE, Antibes, France

A thermo-optically addressed liquid crystal device enables continuous spectral phase shaping over a spectral bandwidth spanning from 540nm to 2500nm (450Thz). The modulation dynamic is large enough to shape single-cycle pulses.

CF-7.6 THU 12:15

Generation of Coherent Extreme-Ultraviolet Vector-Vortex beams

•A. de las Heras[1], A.K. Pandey[2], J. San Román[1], L. Plaja[1], E. Baynard[2], G. Dovillaire[3], M. Pittman[2], C.G. Durfee[4], S. Kazamias[2], O. Guilbaud[1], and C. Hernández-García[1]; [1]Grupo de Investigación en Aplicaciones del Láser y Fotónica, Departamento de Física Aplicada, Universidad de Salamanca, E-37008, Salamanca, Spain; [2]Laboratoire Irène Joliot-Curie, Université Paris-Saclay, UMR CNRS, Rue Ampère, Bâtiment 200, F-91898, Orsay Cedex, France; [3]Imagine Optic, 18, rue Charles de Gaulle, 91400, Orsay, France; [4]Department of Physics, Colorado School of Mines, Golden, Colorado 80401, USA

We theoretically and experimentally introduce a novel structured EUV beam —a vector-vortex— which combines the helical phase and inhomogeneous polarization of vortex and vector beams. These beams are emitted as an azimuthally polarized attosecond light-spring.

ROOM 6

CI-3.5 THU 12:00

Optical-to-Wireless Carrier Frequency Down-Conversion by UTC-PD-Integrated HEMT: Dependence of Conversion Gain on UTC-PD Mesa Size

K. Nishimura[1,3], T. Hosotani[1,3], D. Nakajima[1,3], T. Suemitsu[2,3], K. Iwatsuki[3], T. Otsuji[1,3], and •A. Satou[1,3]; [1]Research Institute of Electrical Communication, Tohoku University, Sendai, Japan; [2]Center for Innovative Integrated Electronic Systems, Tohoku University, Sendai, Japan; [3]Research Organization of Electrical Communication, Tohoku University, Sendai, Japan

We developed the so-called UTC-PD-integrated HEMT as an optical-to-millimeter-wave carrier-frequency down-converter for the future optical-wireless convergent networks. We experimentally revealed the conversion gain increases with decreasing the UTC-PD mesa size up to the diffraction limit.

CI-3.6 THU 12:15

Highly Robust Optical Phase Decorrelation in Microwave Photonic Summation Systems Using Mode-Coupling Receiver

•H. Hallak Elwan, F. Saliou, G. Simon, and P. Chanclou; Orange Labs, Lannion, France

We propose a mode-coupling receiver (MCR) as a key component to achieve the optical combination structure with lower phase noise and insertion loss.

ROOM 7

CK-5.2 THU 12:00

Modulation of Cathodoluminescence Emission by Interference with External Light

•V. Di Giulio[1], *O. Kfir*[2,3], *C. Ropers*[2,3], *and F.J.G. de Abajo*[1,4]; [1]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels (Barcelona), Spain*; [2]*University of Göttingen, IV. Physical Institute, Göttingen, Germany*; [3]*Max Planck Institute for Biophysical Chemistry (MPIBPC), Göttingen, Germany*; [4]*ICREA-Institució Catalana de Recerca i Estudis Avançats, Barcelona, Spain*

We investigate the far-field emission produced by the synchronized interaction of a dimmed laser and a previously modulated electron. We find that a PINEM modulated electron leads to a strong suppression of the cathodoluminescence signal.

CK-5.3 THU 12:15

Phase-Change Tunable Laser

•J. Tian[1], *G. Adamo*[1], *B.K. Lakshmi*[2], *M. Wu*[2], *M. Klein*[1,3], *J. Deng*[2], *N.S.S. Ang*[2], *R. Paniagua-Domínguez*[2], *H. Liu*[2], *A.I. Kuznetsov*[2], *and C. Soci*[1,3]; [1]*Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, 21 Nanyang Link, Singapore, Singapore, Singapore*; [2]*Institute of Materials Research and Engineering, Agency for Science Technology and Research (A*STAR), Innovis, Singapore , Singapore, Singapore*; [3]*Energy Research Institute @ NTU (ERI@N), Research Techno Plaza, Nanyang Technological University, 50 Nanyang Drive, Singapore , Singapore, Singapore*

By combining high-refractive index, high optical gain and temperature-induced structural phase transitions of the hybrid perovskite films with scalable nanoimprint fabrication and all-dielectric metasurface design, we demonstrate the first phase-change tunable laser at optical region.

ROOM 8

EA-5.5 THU 12:00

Spectral compression of narrowband single photons with a resonant cavity

M.A. Seidler[1], *•X.J. Yeo*[2], *A. Cerè*[1], *and C. Kurtsiefer*[1,2]; [1]*Centre for Quantum Technologies, National University of Singapore, Singapore, Singapore*; [2]*Department of Physics, National University of Singapore, Singapore, Singapore*

We experimentally demonstrate a spectral compression scheme based on an asymmetric cavity and phase modulator, performed on heralded narrowband 795 nm single photons generated through a four-wave mixing process in cold Rubidium-87 atoms.

EA-5.6 THU 12:15

Waveguide resonators as squeezed light sources

•M. Stefszky, M. Santandrea, F. vom Bruch, C. Eigner, R. Ricken, V. Quiring, H. Herrmann, and C. Silberhorn; *Integrated Quantum Optics Group, Institute for Photonic Systems (PhoQS), Paderborn University, Paderborn, Germany*

Experiments have proven the usefulness of squeezed states in a wide range of applications. Here, we present squeezing results from our waveguide resonators and recent work towards incorporating an electro-optic modulator for length control.

ROOM 9

EB-8.4 THU 12:00

Observation of PT-Symmetry Breaking in Quantum Correlations

•F. Klauck, M. Heinrich, and A. Szameit; *Institute of Physics, University of Rostock, Rostock, Germany*

We experimentally study the influence of PT-symmetry breaking on two-photon correlations in quasi-PT-symmetric waveguide couplers. In the unbroken phase, quantum interference is preserved. Beyond the PT-breaking point, we observe a characteristic rise of off-diagonal terms.

EB-8.5 THU 12:15

Exploring complex graphs using 3D quantum walks of photon pairs

•M. Ehrhardt[1], *R. Keil*[2], *L. Maczewsky*[1], *C. Dittel*[3,4], *M. Heinrich*[1], *and A. Szameit*[1]; [1]*Universität Rostock, Institut für Physik, Rostock, Germany*; [2]*Universität Innsbruck, Innsbruck, Austria*; [3]*Albert-Ludwigs-Universität Freiburg, Physikalisches Institut, Freiburg, Germany*; [4]*EUCOR Centre for Quantum Science and Quantum Computing, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany*

We study three-dimensional quantum walks on complex graphs arising from the hybrid action of the spatial and polarization degrees of freedom for single photons in photonic waveguide circuits with tailored birefringence.

ROOM 10

EC-5.5 THU 12:00

Topologically structured singularity networks of light in three dimensions

•R. Droop, E. Otte, and C. Denz; *Institute of Applied Physics, Muenster, Germany*

We combine polarization modulation with established scalar 3d structured light fields to introduce its vectorial analogon, namely, discrete non-diffracting and self-imaging vectorial fields. Thereby we finally enable shaping singularity propagation behavior in 3d space.

ROOM 11

EF-6.5 THU 12:00

Self-Pulsing in Photonic Dimers

•J. Yelo-Sarrión, P. Parra-Rivas, N. Englebert, C. Mas-Arabí, F. Leo, and S.-P. Gorza; *OPERA-Photonics, Bruxelles, Belgium*

We theoretically and experimentally study the bifurcation diagram and the self-pulsing dynamics of photonic dimers with dissimilar detunings (Δ_1, Δ_2), made of fiber ring resonators. Our measurements agree with the driven dissipative Bose-Hubbard dimer model.

EF-6.6 THU 12:15

Kerr Enhancement of Optomechanics in Microresonators

•G.N. Ghalanos[1,2], *J.M. Silver*[3], *S. Zhang*[1], *L. Del Bino*[1], *T. Bi*[1,4], *and P. Del'Haye*[1,4]; [1]*Max Planck Institute for the Science of Light, Erlangen, Germany*; [2]*Imperial College London, London, United Kingdom*; [3]*National Physical Laboratory (NPL), Middlesex, United Kingdom*; [4]*Friedrich Alexander University Erlangen-Nuremberg, Erlangen, Germany*

Kerr-effect induced resonance splittings can be utilized to actively enhance or suppress optomechanical sidebands in silica microtoroid resonators. The interplay between Kerr-effect and cavity optomechanics shows a promising route to precisely control optomechanical coupling rates.

ROOM 12

CE-9.4 THU 12:00

Experimental investigation of optical feedback from periodically poled crystals for nonlinear frequency conversion

•N. Werner, S. Häuser, and K. Paschke; *Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany*

Optical feedback arising at the periodical poling structure of quasi phase matched crystals for nonlinear frequency conversion is investigated experimentally. The spatial and spectral emission characteristics of the feedback are analyzed and compared with calculations.

CE-9.5 THU 12:15

Study of Third Harmonic Generation From Thin Gradient $Hf_xAl_yO_z$ Layers

•D. Zuber[1,2], *S. Kleinert*[1,2], *A. Tajalli*[3], *M. Steinecke*[4], *M. Jupé*[2,4], *L. Jensen*[2,4], *D. Ristau*[1,2,4], *and U. Morgner*[1,2,4]; [1]*Institute of Quantum Optics, Leibniz Universitat Hannover, 30167 Hannover, Germany*; [2]*Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering-Innovation Across Disciplines), 30167 Hannover, Germany*; [3]*Deutsches Elektronen-Synchrotron DESY, 22607 Hamburg, Germany*; [4]*Laser Zentrum Hannover e.V., 30419 Hannover, Germany*

We present a study of the third harmonic generation from gradient layers of the amorphous dielectric ternary mixture material $Hf_xAl_yO_z$, which enables us to derive the third order nonlinear susceptibility of the ternary mixture material.

ROOM 1

14:30 – 15:45

CL + ECBO JS: Advances in Deep Tissue Imaging

Chair: Alexander Jesacher, Division of Biomedical Physics, Medical University, Innsbruck, Austria

CL + ECBO JS.1 THU (Invited) 14:30

Deep Brain Endo-microscopy Using Multimode Optical Fibre

•*R. Turcotte*; *NYU School of Medicine, New York, USA*

Combined with wavefront shaping, multimode optical fibre can serve as minimally invasive endo-microscopes for deep-brain imaging. Here, we demonstrate how wavefront shaping can further enhance the capability of such systems for volumetric and chronic imaging.

ROOM 2

14:30 – 16:00

CH-9: Hyperspectral Imaging

Chair: Sophie Brasselet, Director of the Institute Fresnel, CNRS, Marseille, France

CH-9.1 THU 14:30

Hyperspectral topography of the twisted, cholesteric patterns of an insect cuticle in the context of biomimicry

•*A. Jullien*[1], *M. Neradovskyi*[1], *A. Scarangella*[2], *and M. Mitov*[2]; [1]*Institut de Physique de Nice, Université Cote d'Azur, CNRS, Valbonne, France*; [2]*CEMES, Université de Toulouse, Toulouse, France*

By hyperspectral microscopy, a topographic study compares the textural, structural and spectral properties of the microcells of a scarab beetle with those of the polygonal texture formed in flat films of cholesteric liquid crystal oligomers.

CH-9.2 THU 14:45

Fast, Frugal Image Reconstruction with a Dual Disperser HyperspectralImager.

•*E. Hemsley*[1], *I. Ardi*[1,2], *S. Lacroix*[1], *H. Carfantan*[2], *and A. Monmayrant*[1]; [1]*LAAS-CNRS, Université de Toulouse, Toulouse, France*; [2]*IRAP, Université de Toulouse, Toulouse, France*

We demonstrate experimentally the fast reconstruction of a hyperspectral image, utilizing a small number of acquisitions with programmable masks. The algorithm relies on a spectral separability assumption, and reconstructs the compressed datacube near-instantaneously.

ROOM 3

14:30 – 16:00

CF-8: Ultrashort Pulse Characterization

Chair: Günter Steinmeyer, Max Born Institute, Berlin, Germany

CF-8.1 THU 14:30

Ultrashort laser pulse characterization by means of amplitude swing

•*B. Alonso, W. Holgado, and Í.J. Sola*; *University of Salamanca, Salamanca, Spain*

The amplitude swing, a new and versatile concept for ultrafast pulse measurement based on the amplitude variation of two delayed pulse replicas, is presented. We have studied its robustness at a broad range of parameters.

CF-8.2 THU 14:45

Temporal characterization of broadband, low-energy few-cycle pulses using surface third-harmonic generation dispersion-scan

•*T. Gomes, M. Canhota, and H. Crespo*; *Department of Physics and Astronomy, Faculty of Sciences, University of Porto, Porto, Portugal*

A dispersion-scan technique based on surface third-harmonic generation is presented, enabling the characterization of broadband, few-cycle, low-energy ultrashort pulses.

ROOM 4

14:30 – 16:00

CM-5: Temporal and Spatial Beam Shaping for Laser Processing II

Chair: Robert Thomson, Heriot-Watt University, Edinburgh, United Kingdom

CM-5.1 THU 14:30

Femtosecond laser micromachining and rocket propulsion of micro-particles optically trapped in hollow-core photonic crystal fibre

•*M.N. Romodina, S. Xie, A. Sharma, F. Tani, and P.S.J. Russell*; *Max Planck Institute for the Science of Light, Erlanden, Germany*

We report micromachining of silica microparticles, optically levitated inside hollow-core photonic crystal fibre, by guided fs pulses. An ablation-related plasma flume at the output side of the particle rocket-propels the particles backwards at high speed.

CM-5.2 THU 14:45

Tailored Sub-micrometer Periodic Surface Structures via Ultrashort Pulsed Direct Laser Interference Patterning

•*F. Fraggelakis*[1], *G. Tsibidis*[1], *and E. Stratakis*[1,2]; [1]*Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece*; [2]*Department of Physics, University of Crete, Heraklion, Greece*

In this work, an experimental and theoretical approach is presented to investigate the previously unexplored fundamental mechanisms for the formation of unprecedented laser-induced topographies on stainless steel following proper combinations of Direct Laser Inter-

ROOM 5

14:30 – 16:00

EG-6: Resonant Dielectric Nanostructures

Chair: Walter Pfeiffer, Universität Bielefeld, Bielefeld, Germany

EG-6.1 THU 14:30

Gallium Phopshide Nanostructures on Transparent Substrates for Nonlinear and Ultrafast Nanophotonics

•*B. Tilmann*[1], *G. Grinblat*[2], *Y. Li*[3], *R.B. Berte*[1], *M.P. Nielson*[4], *E. Cortes*[1], *A.I. Kuznetsov*[5], *and S.A. Maier*[1,6]; [1]*Chair in Hybrid Nanosystems, Nanoinstitut München, Ludwig-Maximilians-Universität München, München, Germany*; [2]*Departamento de Física, FCEN, IFIBA-CONICET, Universidad de Buenos Aires, Buenos Aires , Argentinia*; [3]*School of Microelectronics, MOE Engineering Research Center of Integrated Circuits for Next Generation Communications, Southern University of Science and Technology, Shenzen, China*; [4]*School of Photovoltaic and Renewable Energy Engineering, University of New South Wales, Sydney, Australia*; [5]*Institute of Materials Research and Engineering, A*STAR, Singapore, Singapore*; [6]*The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom*

We demonstrate outstanding optical properties of nanostructured Gallium Phosphide thin-films on low refractive index substrates. By exciting at anapole-like resonances, we show strongly enhanced all-optical switching and second harmonic generation.

EG-6.2 THU 14:45

Electro-optic lithium niobate metasurfaces in the visible

•*V.V. Vogler-Neuling, H. Weigand, M. Reig Escalé, F.U. Richter, D. Pohl, A. Karvounis, F. Timpu, and R. Grange*; *ETH Zurich, Zurich,*

ROOM 6

14:30 – 16:00

CE-10: Crystals, Glasses and Ceramics

Chair: Alessandro Chiasera, IFN-CNR CSMFO Laboratory and FBK Photonics Unit, Trento, Italy

CE-10.1 THU 14:30

All-Fiber Chalcogenide Saturable Absorber

•*A. Anjum and M. Rochette*; *McGill University, Montreal, Canada*

We present an all-fiber saturable absorber made of chalcogenide glass compatible over a broad range of wavelengths, from the telecommunication band to the mid-infrared. Results include nonlinear saturation and mode-locking of a thulium-doped fiber laser.

CE-10.2 THU 14:45

Microstructured optical fibers from 3D printed soft glass preforms: example of a mid-IR hollow core fiber

J. Carcreff[1], *F. Chevíré*[1], *E. Galdo*[1], *R. Lebullenger*[1], *A. Gautier*[1], *J.-L. Adam*[1], *D. Le Coq*[1], *R. Chahal*[1], *L. Brilland*[2], *J. Troles*[1], *and* •*G. Renversez*[3]; [1]*Univ Rennes, CNRS, ISCR-UMR 6226, 35000, Rennes, France*; [2]*SelenOptics, 263 Avenue Gal Leclerc, 35042, Rennes, France*; [3]*Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, 13013, Marseille, France*

We report the fabrication of the first microstructured optical fiber drawn from a soft glass 3D printed preform. The obtained negative curva-

ROOM 7

14:30 – 16:00

CJ-5: Pulsed Fiber Laser

Chair: Jörg Neumann, Laser Zentrum Hannover, Hannover, Germany

CJ-5.1 THU 14:30

High-energy fiber optical parametric chirped-pulse oscillator

•*R. Becheker[1], M. Touil[1], S. Idlahcen[1], M. Tang[1], A. Haboucha[2], B. Barviau[1], F. Grisch[1], P. Camy[3], T. Godin[1], and A. Hideur[1]; [1]CORIA - CNRS - Université de Rouen Normandie - INSA Rouen, Rouen, France; [2]Photonics Bretagne, Lannion, France; [3]CIMAP, ENSICAEN-CNRS-CEA-Université Caen Normandie, Caen, France*

We experimentally demonstrate a high-energy broadly-tunable fiber optical parametric chirped pulse oscillator (FOPCPO), numerically analyze its operation, and discuss its potential for further energy scaling beyond the μJ level.

CJ-5.2 THU 14:45

Amplification of a 1.03 μm optical frequency comb in the gain-managed nonlinear regime – measurements and simulations

•*D. Tomaszewska[1], R. Lindberg[2], V. Pasiskevicius[2], F. Laurell[2], and G. Soboń[1]; [1]Laser & Fiber Electronics Group, Wroclaw University of Science and Technology, Wroclaw, Poland; [2]Department of Applied Physics, Royal Institute of Technology, Stockholm, Sweden*

We demonstrate a measured and simulated data for amplification in gain-managed nonlinear regime. The setup, built using Ytterbium-doped fiber, provides 24 nJ pulses at 1068 nm with 50 nm width and 54 fs of duration.

ROOM 8

14:30 – 16:00

EF-7: Symmetry Breaking, Geometrical and Topological Effects

Chair: Alessia Pasquazi, University of Sussex, Brighton, United Kingdom

EF-7.1 THU (Invited) 14:30

Spontaneous symmetry breaking in coherently driven-dissipative coupled nanocavities

•*B. Garbin[1], A. Giraldo[2], N.G.R. Broderick[3], B. Krauskopf[2], A. Levenson[1], and A.M. Yacomotti[1]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, 91120 Palaiseau, France; [2]Dodd-Walls Centre, Mathematics Department, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand; [3]Dodd-Walls Centre, Physics Department, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand*

We report on the first experimental observation of mirror symmetry breaking in coherently driven-dissipative coupled nanocavities. Our results pave the way to the experimental study of symmetry breaking at low photon number.

ROOM 9

14:30 – 16:00

CB-8: Semiconductor-based Frequency Combs

Chair: Angel Valle, CSIC, University of Cantabria, Santander, Spain

CB-8.1 THU 14:30

Upconversion sampling of mid-infrared quantum cascade laser frequency combs

•*P. Taeschler, M. Singleton, R. Wang, M. Beck, and J. Faist; Institute of Quantum Electronics, Zürich, Switzerland*

We demonstrate the formation of mid-infrared quantum cascade laser pulses using an external grating compressor. Femtosecond optical sampling is employed to measure the intensity profile of the obtained pulses.

CB-8.2 THU 14:45

Coherently-Averaged Dual-Comb Spectrometer at 7.7 μm with Master and Follower Quantum Cascade Lasers

•*K. Komagata[1], A. Shehzad[1], G. Terrasanta[2], P. Brochard[1], R. Matthey[1], M. Gianella[3], P. Jouy[2], F. Kapsalidis[4], M. Shahmohammadi[4], M. Beck[4], V.J. Wittwer[1], J. Faist[4], L. Emmenegger[3], T. Südmeyer[1], A. Hugi[2], and S. Shilt[1]; [1]Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, CH-2000 Neuchâtel, Switzerland; [2]IRsweep AG, Laubisrütistrasse 44, CH-8712 Stäfa, Switzerland; [3]Empa, Laboratory for Air Pollution / Environmental Technology, CH-8600 Dübendorf, Switzerland; [4]Institute for Quantum Electronics, ETH Zurich, CH-8093 Zurich, Switzerland*

We demonstrate a mid-infrared dual comb spectrometer with fully

ROOM 10

14:30 – 16:00

CD-8: Quantum Technologies

Chair: Alessandro Alberucci, Friedrich-Schiller-Universität Jena, Germany

CD-8.1 THU (Invited) 14:30

Spontaneous Parametric Down-Conversion in Nonlinear Metasurfaces

•*A. Fedotova[1], T. Santiago-Cruz[2,3], V. Sultanov[2,3], M. Weissflog[1,4], M. Younesi[1], I. Staude[1,5], T. Pertsch[1,6], F. Setzpfandt[1], and M.V. Chekhova[2,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]Max Planck Institute for the Science of Light, Erlangen, Germany; [3]University of Erlangen-Nürnberg, Erlangen, Germany; [4]Max Planck School of Photonics, Jena, Germany; [5]Institute of Solid State Physics, Friedrich Schiller University Jena, Jena, Germany; [6]Fraunhofer Institute of Applied Optics and Precision Engineering, Jena, Germany*

We experimentally demonstrate biphoton generation by spontaneous parametric down-conversion in resonant metasurfaces. In our metasurfaces, Mie-type resonances enable more efficient biphoton generation compared to an unstructured thin film and allow shaping of the biphoton spectrum.

ROOM 11

14:30 – 16:00

JSIV-1: Optical Computing I

Chair: Demetri Psaltis, EPFL, Lausanne, Switzerland

JSIV-1.1 THU (Invited) 14:30

Complex Photonics for Large Scale Machine Learning

•*S. Gigan; Sorbonne University, Paris, France*

I will discuss how light propagation in complex media can be exploited for a variety of machine learning tasks, from classification to time-series predictions, to spin-glass simulations.

ROOM 12

14:30 – 16:00

EE-3: Ultrafast Molecular Dynamics

Chair: Lenard Vamos, ICFO - The Institute of Photonic Sciences, Castelldefels, Spain

EE-3.1 THU (Tutorial) 14:30

X-ray free-electron lasers: the attosecond - angström frontier for molecular dynamics

•*L. Young; Chemical Sciences and Engineering Division, Argonne National Laboratory, Lemont, USA*

This tutorial will describe how ultrashort x-ray pulses are generated using free-electron lasers, including their spectral, temporal, coherence properties, and, their application to study photo-initiated electronic and nuclear dynamics in gas and liquid phase.

Thursday – Orals

ROOM 1

CL + ECBO JS.2 THU 15:00

Fast holographic scattering compensation for deep tissue biological imaging

•M.A. May[1], K.K. Kummer[2], M. Kress[2], M. Ritsch-Marte[1], and A. Jesacher[1]; [1]Institute of Biomedical Physics, Medical University of Innsbruck, Innsbruck, Austria; [2]Institute of Physiology, Medical University of Innsbruck, Innsbruck, Austria

We develop a holographic phase-stepping interferometry algorithm for non-invasive scattering compensation that achieves >10x higher signal enhancement after one mode iteration than previous work and enables two-photon imaging in mouse hippocampal tissue down to 530 μm

CL + ECBO JS.3 THU 15:15

Information Analysis and Limits of Imaging Through Complex Media

•J. Radford and D. Faccio; University of Glasgow, Glasgow, United Kingdom

Using an information theoretical approach, we numerically show the existence of information for imaging through very thick scattering materials (beyond 100 transport mean free paths) using spatially-resolved time-of-flight detectors.

ROOM 2

CH-9.3 THU 15:00

Tailoring spatial entropy in extreme ultraviolet focused beams for multispectral ptychography

•X. Liu[1], L. Loetgering[1], A. de Beurs[1], M. Du[1], P. Konold[1], K. Eikema[2], and S. Witte[1]; [1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands; [2]Vrije Universiteit, Amsterdam, Netherlands

We demonstrate a computational approach to designing diffractive optical elements that can be used to focus multispectral extreme-ultraviolet radiation from a high-harmonic generation source. The polychromatic focusing properties are experimentally confirmed using ptychography.

CH-9.4 THU 15:15

Ultra-broadband few-cycle laser pulses for advanced multi-color FLIM microscopy

•C. Maibohm[1], R. Ferreira[1,2], O.F. Silvestre[1], R. Romero[2,3], H. Crespo[3], and J.B. Nieder[1]; [1]INL - International Iberian Nanotechnology Laboratory, Braga, Portugal; [2]Sphere Ultrafast Photonics, Porto, Portugal; [3]IFIMUP, University of Porto, Porto, Portugal

We report on using few-cycle ultra-broadband laser pulses for advanced fluorescence lifetime microscopy showing efficient excitation across the full visible spectral range and sufficient peak power to excite endogenous markers for tacking of drug delivery.

ROOM 3

CF-8.3 THU 15:00

Spatiotemporal and polarization full characterization of complex ultrafast beams

•Í.J. Sola[1], I. López-Quintás[1], W. Holgado[1], R. Drevinskas[2], P.G. Kazansky[2], C. Henández-García[1], and B. Alonso[1,3]; [1]University of Salamanca, Salamanca, Spain; [2]University of Southampton, Southampton, United Kingdom; [3]Sphere Ultrafast Photonics, Porto, Portugal

A technique for the complete characterization of ultrashort pulsed beams on space, time and polarization is presented. It is applied to ultrafast vector beams exhibiting polarization evolving on time and space and compared with simulations.

CF-8.4 THU 15:15

Broadband single-shot interferometric retrieval of spectral phase and amplitude

•M. Lippl[1,2], M.H. Frosz[1], D.R. Häupl[1,2], P. Roth[1,2], G.K.L. Wong[1], P.S.J. Russell[1,2], and N.Y. Joly[2,1,3]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany; [3]Interdisciplinary Centre for Nanostructured Films, Erlangen, Germany

The phase and amplitude of a single ultrashort pulse can be measured by interfering it with a circularly polarised supercontinuum generated in chirally twisted all-normal-dispersion PCF pumped by the same laser.

ROOM 4

ference Patterning with Ultrashort Pulses.

CM-5.3 THU 15:00

Direct writing of 100% fill-factor geometry-controllable microlens arrays with laser catapulting

•S. Surdo[1] and M. Duocastella[1,2]; [1]Istituto Italiano di Tecnologia, Genova, Italy; [2]University of Barcelona, Barcelona, Spain

Laser catapulting is a novel laser additive and direct-write method for the rapid fabrication of geometry-controllable microlenses array, with high fill-factor and user-selectable arrangements, on top of a large variety of substrates and devices

CM-5.4 THU 15:15

Experimental observation of Tornado Waves

D. Mansour[1,2], A. Brimis[1,3], K.G. Makris[1,3], and •D.G. Papazoglou[1,2]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece; [2]Department of Material Science and Technology, University of Crete, Heraklion, Greece; [3]ITCP, Department of Physics, University of Crete, Heraklion, Greece

We demonstrate that the recently introduced Tornado Waves, comprised by complex superimposing fields that carry orbital angular momentum of opposite handedness, can be efficiently generated using spatial multiplexing techniques on a single phase modulation device.

ROOM 5

Switzerland

We report active tuning of a LiNbO3 metasurface based on the electro-optic effect in the MHz-range by applying 1.5 V ac voltage and show enhancement of the electro-optic modulation at the transmission resonance around 774 nm.

EG-6.3 THU 15:00

Second-harmonic generation by resonance absorption on nanoplasmas in the bulk of dielectrics

•K. Ardaneh, M. Hassan, R. Meyer, R. Giust, and F. Courvoisier; FEMTO-ST Institute, Univ. Bourgogne Franche-Comte, UMR CNRS 6174, 15B avenue des Montboucons, Besancon, France

We report experimental and Particle in Cell simulation results of second harmonic generation from cylindrical nanoplasma created by a single femtosecond Bessel pulse inside the bulk of dielectrics.

EG-6.4 THU 15:15

Spatially shaping waves to access inside of a highly reflecting photonic crystal

•M. Adhikary[1], R. Uppu[1,2], T. Vreman[1], C.A.M. Harteveld[1], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Center for Hybrid Quantum Systems (Hy-Q), Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

We show the experimental demonstration of focussing light inside a photonic crystal within the photonic gap by using optical wavefront shaping.

ROOM 6

ture hollow core fiber shows several transmission bands in the 2-12 μm range that are reproduced numerically.

CE-10.3 THU 15:00

Novel Tm:(Y,Sc)2O3 Transparent Ceramics for Laser Applications

•A. Pirri[1], R.N. Maksimov[2,3], V.A. Shitov[2], V.V. Osipov[2], E.V. Tikhonov[2], G. Toci[4], B. Patrizi[4], and M. Vannini[4]; [1]Istituto di Fisica Applicata "N. Carrara", Consiglio Nazionale delle Ricerche, Sesto Fiorentino, Italy; [2]Institute of Electrophysics UrB RAS, Ekaterinburg, Russia; [3]Ural Federal University named after the first President of Russia B.N. Yeltsin, Ekaterinburg, Russia; [4]Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche, Sesto Fiorentino, Italy

Highly transparent Tm-doped (Y,Sc)2O3 ceramics with lasing quality were fabricated for the first time using vacuum sintering of mixed sesquioxide nanoparticles with various Y/Sc balances synthesized by laser ablation

CE-10.4 THU 15:15

Direct Imaging of Fractal-Dimensional Percolation in the 3D Cluster Dynamics of a Ferroelectric Super-Crystal

•L. Falsi[1,2], M. Aversa[1], F. Di Mei[1], D. Pierangeli[1], F. Xin[1,3], A.J. Agranat[4], and E. DelRe[1]; [1]Department of Physics, University of Rome "La Sapienza", 00185 Rome, Italy, Rome, Italy; [2]S.B.A.I. Department, Physics Section, University of Rome "La Sapienza", 00161 Rome, Italy, Rome, Italy; [3]College of Physics and Materials Science, Tianjin Normal University, Tianjin, China, 300387, Tianjin, China; [4]Applied Physics Department, Hebrew University of Jerusalem, Jerusalem 91904, Israel, Jerusalem, Israel

ROOM 7

CJ-5.3 THU (Invited) 15:00

Manufacturing 2D Material Based Saturable Absorbers: From Composites to Printing

•T. Hasan; Cambridge Graphene Centre, University of Cambridge, 9 JJ Thomson Avenue, CB3 0FA, Cambridge, United Kingdom

Two-dimensional (2D) crystals have long been exploited as saturable absorbers (SA) for pulse generation. I will present the evolution of laboratory-scale manufacturing pathways of fiber-integrated devices from these materials toward the aim of repeatable performance.

ROOM 8

EF-7.2 THU 15:00

Engineering a multimode coupling in doubly pumped parametric down-conversion: hot-spots and gain enhancement

•O. Jedrkiewicz[1], E. Invernizzi[2], E. Brambilla[2], and A. Gatti[1]; [1]Istituto di Fotonica e Nanotecnologie, CNR, Como, Italy; [2]Università dell'Insubria, Como, Italy

We investigate parametric down-conversion in a nonlinear bulk crystal, driven by two non-collinear pump modes. Hot-spots with local gain enhancement corresponding to a transition from a three-mode to a four-mode coupling is observed.

EF-7.3 THU 15:15

Interplay between geometric and dynamic phase in liquid crystals

•C.P. Jisha[1], J. Beeckman[2], S. Nolte[1,3], and A. Alberucci[1,3]; [1]Friedrich-Schiller University Jena, Jena, Germany; [2]Ghent University, Gent, Belgium; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We investigate light propagation in thick samples under the simultaneous influence of dynamic and geometric phase. Our experiments in liquid crystals show how the light self-trapping depends on the interplay of the two contributions.

ROOM 9

mutually-locked quantum cascade lasers frequency combs. This enables coherent averaging of the multiheterodyne beat, promising increased signal-to-noise ratio and reduced data processing for high-resolution mid-infrared spectroscopy.

CB-8.3 THU 15:00

Electrical injection-locking dynamics of a frequency-modulated comb

M. Ossiander[1], •D. Auth[2], J. Hillbrand[3,4], Q. Gaimard[5], D. Kazakov[1], M. Piccardo[1], A. Ramdane[5], F. Capasso[1], B. Schwarz[1,4], and S. Breuer[1,2]; [1]School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA; [2]Institute of Applied Physics, TU Darmstadt, 64289 Darmstadt, Germany; [3]Institute for Quantum Electronics, ETH Zurich, 8093 Zürich, Switzerland; [4]Institute of Solid State Electronics, TU Wien, 1040 Vienna, Austria; [5]Centre de Nanosciences et de Nanotechnologies, 91120 Palaiseau, France

Beat frequency tuning, stabilization and complete phase coherence of a quantum dash frequency-modulated comb by all-electrical injection locking is demonstrated experimentally and confirmed by simulations joining a stochastic with a coupled oscillator model.

CB-8.4 THU 15:15

Coherent Broadening and Tuning of QCL Frequency Combs via RF-Injection

•B. Schneider, F. Kapsalidis, M. Singleton, M. Bertrand, M. Beck, and J. Faist; ETH Zürich, Zürich, Switzerland

We present RF-injection as a means of tuning the spectral and temporal properties of QCL frequency combs. At high injection powers we show on-off switching behavior resembling active modelocking.

ROOM 10

CD-8.2 THU 15:00

Steering of Quantum Walks through Coherent Control of High-dimensional Bi-photon Quantum Frequency Combs

•R. Haldar[1,2], A. Khodadad Kashi [1,2], and M. Kues[1,2]; [1]Institute of Photonics, Leibniz University Hannover, Nienburger Straße 17, D-30167, Hannover, Germany; [2]Hannover Centre for Optical Technologies, Leibniz University Hannover, Nienburger Straße 17, D-30167, Hannover, Germany

We demonstrate the all-optical coherent-control of a directional quantum walk with an asymmetric energy transport, which is initiated from an high-dimensional bi-photon integrated quantum frequency comb with multiple joint spectral correlation lines.

CD-8.3 THU 15:15

Non-phase-matched spontaneous parametric down-conversion from lithium niobate thin films

•N.M.H. Duong, A. Maeder, G. Saerens, F. Kaufmann, and R. Grange; ETH Zurich, Zurich, Switzerland

We perform spontaneous parametric down-conversion process in lithium niobate thin film on quartz with subwavelength thickness of 200 nm at telecom wavelength. We obtained two-photon generation with strong correlation signal at zero delay time.

ROOM 11

JSIV-1.2 THU 15:00

Neural network computing using a large-area vertical-cavity surface-emitting laser

•X. Porte[1], A. Skalli[1], N. Haghighi[2], S. Reitzenstein[2], J.A. Lott[2], and D. Brunner[1]; [1]Institut FEMTO-ST, Université Bourgogne Franche-Comté, CNRS UMR 6174, Besançon, France; [2]Institut für Festkörperphysik, Technische Universität Berlin, Hardenbergstraße 36, 10623, Berlin, Germany

We implement a fully parallel photonic neural network based on the spatially distributed modes of a large-area semiconductor laser. All photonic connections are realized in hardware and the system is capable of autonomous operation.

JSIV-1.3 THU 15:15

Optical computing with spatiotemporal fiber nonlinearities

•U. Tegin[1,2], M. Yildirim[1], I. Oguz[1,2], C. Moser[1], and D. Psaltis[2]; [1]Laboratory of Applied Photonics Devices, Ecole polytechnique federale de Lausanne, Lausanne, Switzerland; [2]Optics Laboratory, Ecole polytechnique federale de Lausanne, Lausanne, Switzerland

A novel optical computing framework by harnessing spatiotemporal nonlinear effects of multimode fibers for machine learning is presented. With linear and nonlinear interactions of spatial fiber modes, a brain-inspired computation engine is experimentally realized.

ROOM 12

ROOM 1

CL + ECBO JS.4 THU 15:30

Entangled Two-Photon Absorption in Commercial Fluorophores

•*T.B. Gäbler, N. Jain, J.R. León Torres, P. Hendra, and M. Gräfe*; *Fraunhofer Institute of Applied Optics and Precision Engineering IOF, Jena, Germany*

Our study addresses the applicability of simple and common fluorophores for entangled two-photon fluorescence microscopy. Using CW-pumped SPDC waveguides, we can measure linear absorption rates of entangled photons in standard fluorophores in life science.

ROOM 2

CH-9.5 THU 15:30

Compressive Spectroscopic Long-Wave Infrared Imaging

•*J.M. Charsley[1], M. Rutkauskas[1], Y. Altmann[1], M. Smith[2], C. Young[2], and D.T. Reid[1]*; *[1]School of Engineering and Physical Sciences, Heriot–Watt University, Edinburgh, United Kingdom*; *[2]School of Culture and Creative Arts, College of Arts, University of Glasgow, Glasgow, United Kingdom*

We report compressive spectroscopic imaging from 7–12 μm with a 4 cm^{-1} optical resolution, sampled at 25% of the Nyquist rate. Compressed measurements of plastics are presented with 640×512 pixels observed and reconstructed simultaneously.

CH-9.6 THU 15:45

A Multimodal Label-Free Imaging Study of Zeolite Crystals

N. Omori[2], S. Mosca[3], I. Lezcano-Gonzalez[2], I.K. Robinson[2], L. Li[4], A.G. Greenaway[2], P. Collier[5], A.M. Beale[2], and •A. Candeo[1]; *[1]Politecnico di Milano, Milano, Italy*; *[2]University College London, London, United Kingdom*; *[3]Central Laser Facility, Didcot, United Kingdom*; *[4]Argonne National Laboratory, Lemont, USA*; *[5]Johnson Matthey Technology Centre, Reading, United Kingdom*

A multimodal label-free optical imaging approach incorporating 3D confocal multispectral imaging, FLIM, and Raman mapping is utilised to visualise the distribution of emissive organic deposits

ROOM 3

CF-8.5 THU 15:30

Intra-Burst Pulse Characterization of a High-Power Post-Compressed Yb:YAG Laser at 100 kHz Repetition Rate

•*A.-L. Viotti[1,2], S. Alisauskas[1], H. Tünnermann[1], E. Escoto[1], M. Seidel[1], K. Dudde[1], B. Manschwetus[1], I. Hartl[1], and C.M. Heyl[1,3,4]*; *[1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; *[2]Department of Physics, Lund University, Lund, Sweden*; *[3]Helmholtz-Institute Jena, Jena, Germany*; *[4]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*

We report on intra-burst characterization of a 55 fs post-compressed high-power Yb:YAG laser at 100 kHz repetition rate. Flat burst characteristics including spectral/temporal amplitude and phase, pulse duration and high temporal contrast are demonstrated.

CF-8.6 THU 15:45

Every single-shot CEP drift detection for near-infrared lasers with a modified TOUCAN method

•*M. Kurucz[1,2], S. Toth[1], J. Csontos[1], B. Kiss[1], and E. Cormier[3,4]*; *[1]ELI-ALPS, ELI-HU Non-Profit Ltd, Szeged, Hungary*; *[2]University of Szeged, Szeged, Hungary*; *[3]Laboratoire Photonique Numérique et Nanosciences, Talence, France*; *[4]Institut Universitaire de France, Paris, France*

The original TOUCAN device is capable of single-shot CEP drift measurement of ~3 μm lasers at arbitrary repetition rate. We have expanded this technique for near-infrared lasers and crosschecked results with a traditional measure-

ROOM 4

CM-5.5 THU 15:30

Femtosecond written phase-shifted-gratings and fiber Bragg gratings arrays using defocusing and phase-mask movement

•*A. Halstuch and A. Ishaaya*; *Ben-Gurion University of the Negev, Beer-Sheva, Israel*

Phase-shifted-gratings and arrays of fiber-Bragg-gratings are inscribed with a uniform phase-mask. These gratings are inscribed with 800 nm femtosecond pulses and a uniform phase-mask where the wavelength tube-ability is achieved by defocusing and phase-mask movement.

CM-5.6 THU 15:45

Micro-processing of transparent material by modified Bessel beams generated with spatially displaced axicons

•*E. Nacius[1,2], B. Stanionis[1,2], P. Gotovski[1,3], O. Ulčinas[1,2], S. Orlov[1], and V. Jukna[1,4]*; *[1]Center for Physical Sciences and Technology, Coherent Optics laboratory , Vilnius, Lithuania*; *[2]Workshop of Photonics, Vilnius, Lithuania*; *[3]Faculty of Electronics, Vilnius Gediminas Technical University, Vilnius, Lithuania*; *[4]Laser Research Center, Vilnius University, Vilnius, Lithuania*

In this work, we present novel Bessel-Gauss beams generated by displaced phase axicons manufactured as geometric phase optical elements. Practical applications

ROOM 5

EG-6.5 THU 15:30

Anapole-Assisted Absorption Engineering in Arrays of Coupled Amorphous GaP Nanodisks

•*L. Hüttenhofer[1], A. Tittl[1], and S.A. Maier[1,2]*; *[1]Nanoinstitut Ludwig-Maximilians-Unversität, München, Germany*; *[2]Department of Physics Imperial College, London, United Kingdom*

Anapole excitations in single dielectric nanoresonators enhance electromagnetic field confinement and absorption in the underlying material. Engineering the arrangement of a manifold of coupled particles enables strong amplification of this effect with large spectral tunability.

EG-6.6 THU 15:45

Multi-order Nonlinear Mixing in Dielectric Nanoparticles for Bio-Oriented Applications

•*L. La Volpe[1], G. Campargue[1], G. Gaulier[1], R. Le Dantec[2], Y. Mugnier[2], J.-P. Wolf[1], and L. Bonacina[1]*; *[1]Department of Applied Physics, Université de Genève, Genève, Switzerland*; *[2]Univ. Savoie Mont Blanc, SYMME, Annecy, France*

We report on the multiple order nonlinear response, spanning from deep ultraviolet to short-wave infrared, of dielectric nanoparticles of various metal oxides upon femtosecond two-color excitation. The nonlinear response is demonstrated for photo-triggering applications.

ROOM 6

We perform percolation analysis of crossed-polarizer transmission images in a biased nanodisordered bulk KTN:Li perovskite. Cluster imaging is achieved using high-resolution orthographic 3D projections based on giant refraction.

CE-10.5 THU 15:30

Fabricating diffractive elements for mid-IR optics using the hot embossing technology

•*R. Kasztelanic[1,2], I. Kujawa[2], R. Stepien[2], and R. Buczynski[1,2]*; *[1]Faculty of Physics, University of Warsaw, Pasteura 5, 02-093, Warsaw, Poland*; *[2]Lukasiewicz Research Network - Institute of Microelectronic and Photonics, Wolczynska 133, 01-919 , Warsaw, Poland*

We report on the cost-effective fabrication of glass diffractive optical elements (DOE) operating in the midIR range. We use the nickel shim produced using the electroforming method and the hot embossing process for DOE replication.

CE-10.6 THU 15:45

Longwave Infrared Photoresponse in Copper 7,7,8,8-tetracyano-2,3,5,6-tetraflouroquinodimethane (CuTCNQF4)

•*S. Balendhran[1], A. Ingle[2], W. Yan[3], N. Sefidmooye Azar[3], H. Kim[4,5], R. Ramanathan[2], J. Bullock[3], A. Javey[4,5], V. Bansal[2], and K. Crozier[1,3,6]*; *[1]School of Physics, The University of Melbourne, Parkville, Australia*; *[2]NanoBiotechnology Research Laboratory (NBRL), School of Science, RMIT University, Melbourne, Australia*; *[3]Department of Electrical and Electronic Engineering, The University of Melbourne, Parkville, Australia*; *[4]Electrical Engineering and Computer Sciences, University of California at Berkeley,*

ROOM 7

CJ-5.4 THU 15:30

Erbium Fiber Laser with 340 nJ, 63 fs Pulses from Standard Single Mode Telecom Fiber

•K.F. Lee[1], G. Zhou[2], J. Jiang[1], H.G. Winful[3], and M.E. Fermann[1]; [1]IMRA America, Inc., Ann Arbor, USA; [2]Dept. of Physics, University of Michigan, Ann Arbor, USA; [3]Dept. of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, USA

We greatly increase femtosecond Er fiber laser pulse energy by a simple phase shaping method with fiber Bragg gratings. We generate 110 nJ frequency comb pulses, and 340 nJ pulses at lower repetition rate.

CJ-5.5 THU 15:45

Tunable Actively Mode-locked Bi-doped O-band Fibre Laser

•N.k. Thipparapu, S.-u. Alam, Y. Wang, S. Pidishety, D.J. Richardson, and J. Sahu; University of Southampton, Southampton, United Kingdom

We present an all-fiberized tunable actively mode-locked Bismuth-doped fibre laser operating from 1300-1370nm. In a MOPA configuration, an average output power of 92.5mW and pulse width of 7.5ns with energy 56.8nJ were achieved at 1340nm.

ROOM 8

EF-7.4 THU 15:30

Two–membrane Cavity Optomechanics: Non–linear Dynamics And Measurement Of The Optomechanical Coupling

•P. Piergentili[1,2], W. Li[1], R. Natali[1,2], N. Malossi[1,2], D. Vitali[1,2,3], and G. Di Giuseppe[1,2]; [1]School of Science and Technology, Physics Division, University of Camerino, Camerino, Italy; [2]INFN, Sezione di Perugia, Perugia, Italy; [3]CNR-INO, Firenze, Italy

The non–linear dynamics of an optomechanical system of a two–membrane ethalon in a high–finesse Fabry–Pérot cavity is presented, and a novel procedure for the determination of the optomechanical single–photon coupling rate through Hopf–bifucartion introduced.

EF-7.5 THU 15:45

Nonlinear corner states observed in Kagome higher-order photonic topological insulators

•M.S. Kirsch[1], Y. Zhang[2], M. Kremer[1], L.J. Maczewsky[1], S.K. Ivanov[3], Y.V. Kartashov[3,4], L. Torner[4], D. Bauer[1], A. Szameit[1], and M. Heinrich[1]; [1]Institut für Physik, Universität Rostock, Rostock, Germany; [2]School of Electronic Science and Engineering, Xi'an Jiaotong University, Xi'an, China; [3]Institute of Spectroscopy, Russian Academy of Sciences, Moscow, Russia; [4]CFO, Barcelona Institute of Science and Technology, Castelldefels, Spain

We experimentally investigate nonlinear Kerr dynamics in higher-order photonic topological insulators. We excite nonlinear topo-

ROOM 9

CB-8.5 THU 15:30

Dynamics of Optical Frequency Combs in Ring and Fabry-Perot Quantum Cascade Lasers

•C. Silvestri[1], L.L. Columbo[1], M. Brambilla[2], and M. Gioannini[1]; [1]Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy; [2]Dipartimento Interateneo di Fisica, Politecnico ed Università degli Studi di Bari, Bari, Italy

We present a Time Domain Travelling Wave simulator to study the self-generation of Optical Frequency Combs (OFCs) in different Quantum Cascade Laser cavities. We demonstrate various dynamic scenarios from dense OFCs to solitons.

CB-8.6 THU 15:45

Low RF line width frequency-modulated and amplitude-modulated combs

•L. Wegert[1], D. Auth[1], C. Weber[1], D. Kazakov[2], M. Piccardo[2], J. Hillbrand[3,4], L.F. Lester[5], B. Schwarz[2,3], F. Capasso[2], and S. Breuer[1,2]; [1]Institute of Applied Physics, TU Darmstadt, 64289 Darmstadt, Germany; [2]School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA; [3]Institute of Solid State Electronics, TU Wien, 1040 Vienna, Austria; [4]Institute for Quantum Electronics, ETH Zürich, 8093 Zürich, Switzerland; [5]Department of Electrical and Computer Engineering, VTech, Blacksburg, Virginia 24061, USA

ROOM 10

CD-8.4 THU 15:30

Entangled photons through thick scattering media: experiments and comparison with simulations of the biphoton wave function

•G. Soro, E. Lantz, A. Mosset, and F. Devaux; Institut FEMTO-ST, Département d'Optique P. M. Duffieux, Besançon, France

We report experimentally and numerically quantum correlations imaging through thick random media. We demonstrated that spatial correlations between twin photon are still detected but no in form of two-photon speckle-like patterns.

CD-8.5 THU 15:45

Photon-Pair Generation in Mid-Infrared using $AgGaS_2$ Crystals

•M. Kumar, T. Pertsch, and F. Setzpfandt; Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University Jena, Albert-Einstein-Str. 15, 07745 , Jena, Germany

We demonstrate non-degenerate photon-pair generation by spontaneous parametric down conversion in silver gallium sulfide $AgGaS_2$. Idler photons in the mid-infrared spectral range above 6 μm wavelength are generated correlated to signal photons in the visible.

ROOM 11

JSIV-1.4 THU 15:30

High-Speed Neuromorphic Computing Using Spin-Controlled VCSELs

•K. Harkhoe, G. Verschaffelt, and G. Van der Sande; Applied Physics Research Group, Vrije Universiteit Brussel, Brussel, Belgium

We demonstrate a performant delay-based reservoir computing system using a spin-controlled VCSEL, with processing speeds 20 times faster than similar state-of-the-art systems. The fast polarization dynamics also enables us to drastically shorten the delay line.

JSIV-1.5 THU 15:45

Neuromorphic photoelectric elements based on metal oxides nanocrystallites

•A. Chezhegov[1], I. Balashov[1], A. Chizhov[2], A. Grunin[1], and A. Fedyanin[1]; [1]Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia; [2]Faculty of Chemistry, Lomonosov Moscow State University, , Moscow, Russia

Photoelectric synapses based on ZnO, In2O3, TiO2, WO3 nanocrystallites with a wide set of parameters, different STM and LTM temporal characteristics, additional gas composition and temperature control parameters acting as neuromodulators was demonstrated.

ROOM 12

EE-3.2 THU 15:30

Higher Order Trapped States of a Solitary-Wave Well

•O. Melchert[1,2,3], S. Willms[1,2], A. Yulin[4], I. Babushkin[1,2], U. Morgner[1,2,3], and A. Demircan[1,2,3]; [1]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering - Innovation Across Disciplines), Hannover, Germany; [3]Hannover Centre for Optical Technologies, Hannover, Germany; [4]Department of Nanophotonics and Metamaterials, ITMO University, St. Petersburg, Russia

We discuss trapping of radiation by an attractive, solitary-wave induced potential well. The supported trapped states are determined by a Schrödinger-type eigenproblem. They appear robust against perturbation and can be manipulated in various ways.

EE-3.3 THU 15:45

Alignment echoes in unidirectionally rotating molecules

•L. Xu[1], I. Tutunnikov[1], L. Zhou[2], K. Lin[2], J. Qiang[2], P. Lu[2], Y. Prior[1], I.S. Averbukh[1], and J. Wu[2,3]; [1]Weizmann Institute of Science, Rehovot, Israel; [2]East China Normal University, Shanghai, China; [3]Shanxi University, Taiyuan, China

Alignment echoes in unidirectionally rotating molecules are induced by a pair of time-delayed polarization-twisted ultrashort laser pulses and measured by the COLTRIMS apparatus. The results are supported by a detailed theoretical analysis.

ROOM 1

16:30 – 18:00

CM-6: Joint Session CM with LiM

Chair: Vassilia Zorba, Lawrence Berkeley National Laboratory, Berkeley, CA, USA

CM-6.1 THU 16:30

Mastering micro-filamentation for semiconductor–metal ultrafast laser welding

•*M. Chambonneau[1], Q. Li[1], V.Y. Fedorov[2], M. Blothe[1], S. Tzortzakis[2], and S. Nolte[1,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University Jena, Jena, Germany; [2]Science Program, Texas A&M University at Qatar, Doha, Qatar; [3]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*

We demonstrate the first semiconductor-metal ultrafast laser welding by determining and precompensating the nonlinear focal shift in the filamentation regime in silicon for optimizing the energy deposition at the interface with copper.

ROOM 2

generated during the detemplation process in catalytic zeolite crystals.

16:30 – 18:00

CD-9: Nonlinear Applications at Extreme Wavelengths

Chair: Majid Ebrahim-Zadeh, ICFO - The Institute of Photonic Sciences, Barcelona, Spain

CD-9.1 THU 16:30

Continuous Wavelength Tuning Across 3.9–12.0 μm From a 1040-nm-Pumped Optical Parametric Oscillator Based On Orientation-Patterned GaP Grown On GaAs

P. Schunemann[1], K. Johnson[2], C. Farrell[2], L. Maidment[3], Y. Shi[4], J. Charsley[5], M. Rutkauskas[5], and •D.T. Reid[5]; [1]BAE Systems, Nashua, USA; [2]Chromacity Ltd, Edinburgh, United Kingdom; [3]ICFO – Institut de Ciencies Fotoniques, Barcelona, Spain; [4]University of Electronic Science and Technology of China, Chengdu, China; [5]Heriot–Watt University, Edinburgh, United Kingdom

We report the first nonlinear frequency conversion—specifically optical parametric oscillation—in OPGaP layers grown by hydride vapor-phase epitaxy on OPGaAs templates. A fan-out grating provides continuously wavelength-tunable broadband pulses covering 3.9–12 μm.

ROOM 3

ment method.

16:30 – 18:00

CJ-6: Fiber Laser Components

Chair: Jörg Neumann, Laser Zentrum Hannover, Hannover, Germany

CJ-6.1 THU 16:30

Influence of Thermo-Mechanical Mismatch when Nanoimprinting Anti-Reflective Structures onto Small-core Mid-IR Chalcogenide Fibers

•*C.R. Petersen[1,3], M.B. Lotz[2], C. Markos[1,3], G. Woyessa[1], D. Furniss[4], A.B. Seddon[4], R.J. Taboryski[2], and O. Bang[1,3,5]; [1]DTU Fotonik, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]DTU Nanolab, Technical University of Denmark, Kgs. Lyngby, Denmark; [3]NORBLIS, Virum, Denmark; [4]Mid-Infrared Photonics Group, University of Nottingham, Nottingham, United Kingdom; [5]NKT Photonics, Birkerød, Denmark*

We present thermal nanoimprinting of both small-core and large-core chalcogenide optical fibers, achieving increased transmission by up to 32.4%. We also report and discuss the first observation of core protrusion/contraction in small-core fibers.

ROOM 4

of such beams in laser micromachining of transparent material are demonstrated.

16:30 – 18:00

CK-6: 3D Fabrication Techniques and Components

Chair: Olivier Gauthier-Lafaye, LAAS-CNRS, Toulouse, France

CK-6.1 THU 16:30

3D-printed core-cladding waveguides and adiabatic splitters for integrated photonic circuits

•*X. Porte, J. Moughames, L. Larger, M. Jacquot, M. Kadic, and D. Brunner; Institut FEMTO-ST, Université Bourgogne Franche-Comté, CNRS UMR 6174, Besançon, France*

We report single-step additive manufacturing of photonic waveguides for single-mode photonic interconnects. We 3D-printed waveguides with step-index and graded-index core-cladding transitions as well as efficient 1-to-4 single-mode beam splitters based on adiabatic coupling.

ROOM 5

16:30 – 18:00

EC-6: Topology in Driven-dissipative Systems

Chair: Alberto Amo, CNRS, Lille, France

EC-6.1 THU (Invited) 16:30

Topological Insulator Surface-Emitting Laser Array

A. Dikopoltsev[1], T.H. Harder[2], E. Lustig[1], O.A. Egorov[3], J. Beierlein[2], A. Wolf[2], M. Emmerling[2], C. Schneider[2], S. Höfling[2], M. Segev[1], and •S. Klembt[2]; [1]Physics Department, Technion, 32000 Haifa, Israel; [2]Technische Physik, Wilhelm-Conrad-Röntgen-Research Center for Complex Material Systems, and Würzburg-Dresden Cluster of Excellence ct.qmat, Universität Würzburg, 97074 Würzburg, Germany; [3]ITFO, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

We present the first experimental demonstration of a topological insulator VCSEL array. Using the crystalline topological insulator model, we implement a 30 vertical-emitter array displaying an extended coherent mode emitting at a single wavelength.

ROOM 6

Berkley, USA; [5]Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkley, USA; [6]ARC Centre of Excellence for Transformative Meta-Optical Systems, The University of Melbourne, Parkville, Australia

We demonstrate room-temperature long-wave infrared photoresponse in CuTCNQF4, a metal organic charge transfer complex. CuTCNQF4 based photoconductors are realized via simple wet chemical reactions followed by drop cast and dielectrophoretic alignment processes.

16:30 – 18:00

CH-10: Optical Metrology

Chair: Crina Cojocaru, Polytechnic University of Catalonia, Barcelona, Spain

CH-10.1 THU 16:30

Deeply Sub-Wavelength Non-Contact Optical Metrology of Sub-Wavelength Objects

•*C. Rendón-Barraza[1], E.A. Chan[1], G. Yuan[1], G. Adamo[1], T. Pu[2], and N.I. Zheludev[1,2]; [1]Centre for Disruptive Photonic Technologies, The Photonics Institute, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, Singapore; [2]Centre for Photonic Metamaterials and Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom*

We experimentally demonstrate that a linear dimension of a sub-wavelength nanoscale object can be measured with an accuracy of ~λ/260 by a deep-learning-enabled examination of its diffraction pattern.

ROOM 7

16:30 – 18:00

EA-6: Polaritons and Quantum Fluids of Light

Chair: Magdalena Stobinska, University of Warsaw, Warsaw, Poland

EA-6.1 THU (Invited) 16:30

Universal KPZ scaling in the coherence of a 1D polariton condensate

•*J. Bloch*; *Center for Nanoscience and Nanotechnology, CNRS-Paris Saclay University, Palaiseau, France*

We demonstrate KPZ universal scaling in the spatio-temporal decay of the first order coherence of a 1D polariton condensate. These results highlight the fundamental difference between such driven dissipative condensates and equilibrium systems.

ROOM 8

logical corner-modes that are robust against structural perturbations. Their localization demonstrates nontrivial nonmonotonic behavior as the input power is increased.

16:30 – 18:00

CL-3: Advanced Biological Microscopy

Chair: Chiara Stringari, Laboratory for Optics and Biosciences, Ecole Polytechnique, Palaiseau,France

CL-3.1 THU (Invited) 16:30

3D and parallelized RESOLFT for volumetric live cell imaging

•*I. Testa*; *KTH-SciLifeLab, Stockholm, Sweden*

we present a new RESOLFT microscope capable of delivering sub-80 nm 3D resolution in whole living cells with a new interference pattern applied to reversible photoswitching. Live cell volumetric imaging is demonstrated.

ROOM 9

Frequency- and amplitude-modulated combs are generated by a semiconductor quantum dot laser. Frequency-modulated comb beat note line widths of 950 Hz and amplitude-modulated comb line width of 200 Hz indicate low-phase noise comb generation.

16:30 – 18:00

EE-4: Ultrafast Characterisation and Manipulation at Nanoscale

Chair: Ayhan Demircan, Institute for Quantum Optics, Hannover, Germany

EE-4.1 THU 16:30

Ultrafast Detection and Manipulation of a Persistent Trion Coherence in a Single CdSe/ZnSe Quantum Dot

•*P. Henzler*[1], *M. Holtkemper*[2], *C. Traum*[1], *D.E. Reiter*[2], *T. Kuhn*[2], *D.V. Seletskiy*[1,3], *and A. Leitenstorfer*[1]; [1]*Department of Physics and Center for Applied Photonics, University of Konstanz, D-78457 Konstanz, Germany*; [2]*Institute of Solid State Theory, University of Münster, D-48149 Münster, Germany*; [3]*Department of Engineering Physics, Polytechnique Montréal, Montréal, Québec H3T 1J4, Canada*

Femtosecond microscopy reveals long-lived quantum beats between highly excited trion states probed via biexcitonic absorption. Pump-probe polarization provides control over phase and amplitude. Interesting processes of few-fermion quantum dynamics after single-electron excitation are reported.

ROOM 10

16:30 – 18:00

JSIV-2: Learning in Imaging and Metrology I

Chair: Christophe Moser, EPFL, Lausanne, Switzerland

JSIV-2.1 THU (Invited) 16:30

On the use of machine learning for computational imaging

•*G. Barbastathis*; *Massachusetts Institute of Technology, Cambridge, Massachusetts, USA*

I will discuss the use of machine learning with physics priors for imaging systems that heavily rely on computation to overcome ill-posedness and noise.

ROOM 11

16:30 – 18:00

CB-9: Dynamics and Novel Concepts in Semiconductor Lasers

Chair: Eric Tournié, University of Montpellier, France

CB-9.1 THU 16:30

Pseudo mode-locking

•*G. Steinmeyer*[1,2], *E. Escoto*[1,3], *and A. Demircan*[4]; [1]*Max-Born-Institut, Berlin, Germany*; [2]*Institut für Physik, Humboldt Universität zu Berlin,, Berlin, Germany*; [3]*Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany*; [4]*Cluster of Excellence PhoenixD and the Institute of Quantum Optics, Leibniz University, Hannover, Germany*

In the recent decade, numerous reports of self mode-locking met controversial reception. For the first time, we offer a theoretical explanation for those disputed experimental reports in the framework of the Haus Master Equation.

NOTES

ROOM 1

CM-6.2 THU 16:45

High-Speed Writing of Volume Gratings Inside of Transparent Materials

•*S. Ho, E. Alimohammadian, and P.R. Herman; Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada*

Nano-explosion of open-cavity voids were applied in combination with beam shaping and splitting by an SLM to enable high-speed nano-structuring of high resolution, 3D photonic crystals in glasses and polymer films for strong grating effects.

CM-6.3 THU 17:00

Airy beam enables single pass curved in-volume modifications and cutting of borosilicate glass

•*D. Sohr[1,2], J.U. Thomas[2], and S. Skupin[1]; [1]Institut Lumière Matière, UMR5306 - UCBL - CNRS, Lyon, France; [2]SCHOTT AG, Mainz, Germany*

We produced permanent laser modifications in borosilicate glass following an adjustable parabolic trajectory and used these for single pass cutting of a 500 μm glass sheet resulting in a well defined convex edge after etching.

ROOM 2

CD-9.2 THU 16:45

Raman Red-shift Compressor: A Simple Approach for Scaling the High Harmonic Generation Cut-off

•*K. Légaré[1], R. Safaei[1], G. Barette[1], L. Arias[1], P. Lassonde[1], H. Ibrahim[1], B. Vodungbo[2], E. Jal[2], J. Lüning[3], N. Jaouen[4], A. Baltuška[5], F. Légaré[1], and G. Fan[1]; [1]INRS-EMT, Varennes, Canada; [2]Sorbonne Université, Paris, France; [3]Helmholtz-Zentrum Berlin, Berlin, Germany; [4]Synchrotron SOLEIL, Gif-sur-Yvette, France; [5]Vienna University of Technology, Vienna, Austria*

Multidimensional solitary states brought by the Raman process in gas-filled hollow-core fibres are used to drive high harmonic generation, pushing the cut-off to higher photon energies and improving the conversion efficiency of extreme ultraviolet photons.

CD-9.3 THU 17:00

Mid-Infrared Supercontinuum Generation in Germanium Waveguides

•*A. Della Torre[1], M. Sinobad[1], R. Armand[1], B. Luther-Davies[2], P. Ma[2], S. Madden[2], D. Moss[3], A. Mitchell[4], J.-M. Hartmann[5], V. Reboud[5], J.-M. Fedeli[5], C. Monat[1], and C. Grillet[1]; [1]Université de Lyon, Institut des Nanotechnologies de Lyon , Ecully, France; [2]Laser Physics Centre, Australian National University, Canberra, Australia; [3]Optical Sciences Centre, Swinburne University of Technology, Hawthorn, Australia; [4]School of Engineering, RMIT University, Melbourne, Australia; [5]Université Grenoble Alpes,C EA-Leti,, Grenoble, France*

We report the first experimental demonstration of supercontinuum generation (from 3.53 to 5.83 μm at the -30 dB level) in a pure germanium waveguide. We attribute the long wavelength extension limit to free-carrier absorption.

ROOM 3

CJ-6.2 THU 16:45

Thermal Response Characterisation of First-order Fibre Bragg Gratings in Indium Fluoride Fibre

•*I. Chiamenti[1,2], T. Elsmann[1], A. Reupert[3], O. Kara[1], M. Becker[1], L. Wondraczek[3], and M. Chernysheva[1]; [1]Leibniz Institute of Photonic Technology, Leibniz-IPHT, Jena, Germany; [2]Federal University of Technology - Parana - UTFPR/DAELT, Curitiba, Brazil; [3]Otto Schott Institute of Materials Research, Friedrich Schiller University, Jena, Germany*

Vis-fs-laser was used to inscribed first-order Bragg gratings in indium fluoride fibres. They presented high reflectivity, thermal stability and high thermal sensitivity that will contribute to the development of Mid-IR fibre lasers and sensing technologies.

CJ-6.3 THU 17:00

Poling Optical Fibers with Electrical Corona Discharge

•*J.M. Barbosa Pereira[1,2], Å. Claesson[1], F. Laurell[2], O. Tarasenko[1], and W. Margulis[1,2]; [1]RISE Research Institutes of Sweden, Kista, Sweden; [2]KTH Royal Institute of Technology, Stockholm, Sweden*

Electric field created by electrical corona discharge is used to pole silicate fibers. The method explores a different configuration to enhance optical poling. An electrooptic coefficient of 0.086pm/V, and Vπ of 702V is obtained.

ROOM 4

CK-6.2 THU 16:45

Terahertz waves transmission in 3D printed photonic crystals

•*M. Missori[1], L. Pilozzi[1], and C. Conti[1,2]; [1]Institute for Complex Systems, National Research Council (ISC-CNR), Rome, Italy; [2]Department of Physics, University Sapienza, Rome, Italy*

We exploit 3D-printed components as a low-cost, rapid, and versatile tool for the fabrication of THz photonic crystals and carry out experiments and simulations of their spectral behaviour.

CK-6.3 THU 17:00

Scalable photonic splitters based on 3D laser lithography

•*J. Moughames, X. Porte, L. Larger, M. Jacquot, M. Kadic, and D. Brunner; Femto-st, University of Franche-Comté, Besançon, France*

We present scalable 3D photonic splitters fabricated using 3D laser lithography. Splitters comprise optical waveguide with 1.2μm diameter, and we characterize 1x9 I/O branching topology. Finally, we demonstrate a 225 input and 529 output interconnect.

ROOM 5

EC-6.2 THU 17:00

Topological optical and phononic interface modes by simultaneous band inversion

•*M. Esmann, O. Ortiz, P. Priya, A. Rodriguez, A. Lemaitre, and N.D. Lanzillotti-Kimura; Centre de Nanosciences et de Nanotechnologies (C2N), Université Paris-Saclay, CNRS, 10 Boulevard Thomas Gobert, 91120 Palaiseau, France*

We construct colocalized optical and phononic interface modes by simultaneous band inversion in a GaAs/AlAs heterostructure. The topological robustness manifests in a resilient Brillouin cross-section with potential applications for robust optomechanical resonators.

ROOM 6

CH-10.2 THU 16:45

Two-Color Interferometry in the Mid-Infrared based on Quantum Cascade Lasers for Absolute Distance Measurement with Nanometer-Scale Precision

•*R. Matthey[1], A. Shehzad[1], P. Giaccari[2], R. Maulini[3], T. Südmeyer[1], and S. Schilt[1]; [1]University of Neuchâtel, Neuchâtel, Switzerland; [2]Micos Engineering GmbH, Dübendorf, Switzerland; [3]Alpes Lasers SA, Saint-Blaise, Switzerland*

A frequency-stabilized quantum cascade laser source is used for two-color interferometry to measure absolute distances with nm-scale precision, achieved by fractional phase measurements at 10^-3 at the optical wavelength and 4·10^-4 at a synthetic wavelength

CH-10.3 THU 17:00

Laser ranging with analog all-optical coherent pulse compression using a frequency shifting loop

V. Billault[1,2], •V. Durán[3], C.R. Fernández-Pousa[4], V. Crozatier[2], and H. Guillet de Chatellus[1]; [1]University Grenoble Alpes, CNRS, LIPhy, Grenoble, France; [2]Thales Research & Technology, Palaiseau, France; [3]Universitat Jaume I, GROC-UJI, INIT, Castellón de la Plana , Spain; [4]Universitat Miguel Hernández, Engineering Research Center (I3E), Elche, Spain

We perform laser ranging using a dual-comb system that generates trains of chirped optical waveforms with slightly different periods. This provides analog pulse compression with low-frequency electronics and the possibility of expanding the ambiguity range.

ROOM 7

EA-6.2 THU 17:00

Interplay between polarization and quantum correlations in a coherently driven polariton pillar cavity

•O. Bleu[1,2], J. Levinsen[1,2], and M.M. Parish[1,2]; [1] School of Physics and Astronomy, Monash University,, Clayton, Australia; [2] ARC Centre of Excellence in Future Low-Energy Electronics Technologies, Monash University, Clayton, Australia

We revisit the problem of a polariton pillar cavity driven by a low intensity coherent pump accounting for the polarization degree of freedom. Our results are of relevance for the experimental pursuit of polariton blockade effects.

ROOM 8

CL-3.2 THU 17:00

Time-Resolved STED Microscopy with Single-Photon Detector Array: a Perfect Synergy

•G. Tortarolo[1], S. Piazza[1,2], A. Bucci[1,3], P. Bianchini[4], C.J.R. Sheppard[4,5], A. Diaspro[4,6], E. Slenders[1], S. Koho[1], M. Castello[1,2], and G. Vicidomini[1]; [1] Molecular Microscopy and Spectroscopy, Istituto Italiano di Tecnologia, Genoa, Italy; [2] Genoa Instruments, Genoa, Italy; [3] DIBRIS, University of Genoa, Genoa, Italy; [4] Optical Nanoscopy & NIC@IIT, Istituto Italiano di Tecnologia, Genoa, Italy; [5] School of Chemistry, University of Wollongong, Wollongong, Australia; [6] DIFI, University of Genoa, Genoa, Italy

We introduce a versatile time-resolved microscopy platform based on the SPAD array detector, enabling dual-color background-free STED-ISM imaging.

ROOM 9

EE-4.2 THU (Keynote) 16:45

High-field physics in nanostructures

•M. Kling; Physics Department, Ludwig-Maximilians-Universität Munich, Garching, Germany; Max Planck Institute of Quantum Optics, Garching, Germany

The talk will highlight recent research results and show perspectives for studies of high-field physics in nanostructures.

ROOM 10

JSIV-2.2 THU 17:00

Deeply Subwavelength Topological Microscopy

T. Pu[1], J.-Y. Ou[1], E. Rogers[1,2], N. Papasimakis[1], P.J. Smith[2,3,4], and •N.I. Zheludev[1,5]; [1] Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2] Institute for Life Sciences, University of Southampton, Southampton, United Kingdom; [3] Biological Sciences, Faculty of Natural and Environmental Sciences, University of Southampton, Southampton, United Kingdom; [4] Marine Biological Laboratory, Woods Hole, Massachusetts , USA; [5] Centre for Disruptive Photonic Technologies & TPI, SPMS, Nanyang Technological University, Singapore, Singapore

We report on far-field imaging of subwavelength objects at resolution exceeding $\lambda/20$ by employing topologically structured light and artificial intelligence.

ROOM 11

CB-9.2 THU 16:45

Highly parallel ultra-fast random number generation from a stable-cavity broad-area semiconductor laser

K. Kim[1], •S. Bittner[1,2], Y. Zeng[3], S. Guazzotti[4], O. Hess[4], Q.J. Wang[3], and H. Cao[1]; [1] Department of Applied Physics, Yale University, New Haven, USA; [2] Chaire in Photonics, LMOPS, CentraleSupélec and Université de Lorraine, Metz, France; [3] Center for OptoElectronics and Biophotonics, Nanyang Technological University, Singapore, Singapore; [4] School of Physics and CRANN Institute, Trinity College Dublin, Dublin, Ireland

We use spatio-temporal interference of many lasing modes and spontaneous emission in a specially designed stable cavity for parallel random number generation. With 127 spatial channels, a total bit rate of 250 Tbit/s is reached.

CB-9.3 THU 17:00

Experimental study of the randomness of the dynamics of a laser diode under stimulated Brillouin scattering optical feedback

•L.J. Quintero-Rodríguez[1], I.E. Zaldívar-Huerta[1], Y. Hong[2], C. Masoller[3], and M.W. Lee[4]; [1] Instituto Nacional de Astrofísica, Óptica y Electrónica, Puebla, Mexico; [2] Bangor University, Bangor , United Kingdom; [3] Universitat Politècnica de Catalunya, Terrassa, Spain; [4] Université Sorbonne Paris Nord, Villetaneuse, France

We study two optical feedback configurations and quantify the randomness of the diode laser output. We show that the light from stimulated Brillouin backscattering feedback generates a more random signal, as compared to conventional feedback.

NOTES

ROOM 1

CM-6.4 THU 17:15

Design and Fabrication of Straight Waveguides, Tapers and S-Bends with Two-Photon Direct Laser Writing

•*T. Baghdasaryan, K. Vanmol, F. Berghmans, H. Thienpont, T. Geernaert, and J. Van Erps*; *Vrije Universiteit Brussel and Flanders Make, Brussels, Belgium*

We have developed a special approach for numerical and experimental optimization of 3D-printed waveguiding components, which we used to demonstrate low-loss fiber-coupled waveguides, parabolic shape tapers and spline shape S-bends.

CM-6.5 THU 17:30

Femtosecond Fabrication of 3D Free-Form Functional Glass Microdevices: Burst-Mode Ablation and Selective Etching Solutions

•*D. Andriukaitis[1,2], A. Butkutė[1,2], T. Baravykas[1], R. Vargalis[1], J. Stančikas[1,2], T. Tičkūnas[1], V. Sirutkaitis[2], and L. Jonušauskas[1,2]*; [1]*Femtika Ltd., Vilnius, Lithuania*; [2]*Faculty of Physics, Vilnius, Lithuania*

ROOM 2

CD-9.4 THU 17:15

Towards plasmonic-enhanced optical nonlinearities in graphene metal-heterostructures

•*A. Trenti[1], I. Alonso Calafell[1], L.A. Rozema[1], D. Alcaraz Iranzo[2], P.K. Jenke[1], J.D. Cox[3,4], A. Kumar[2], H. Bieliaiev[1], S. Nanot[2,5], C. Peng[6], D.K. Efetov[2], J.-Y. Hong[6], J. Kong[6], D.R. Englund[6], F.J. García de Abajo[2,7], F.H.L. Koppens[2,7], and P. Walther[1]*; [1]*Vienna Center for Quantum Science and Technology (VCQ), Faculty of Physics, University of Vienna, Vienna, Austria*; [2]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain*; [3]*Center for Nano Optics, University of Southern Denmark, Odense, Denmark*; [4]*Danish Institute for Advanced Study, University of Southern Denmark, Odense, Denmark*; [5]*Laboratoire Charles Coulomb (L2C), Université de Montpellier, CNRS, Montpellier, France*; [6]*Quantum Photonics Group, RLE, Massachusetts Institute of Technology, Cambridge, MA, USA*; [7]*ICREA-Institucio Catalana de Recerca i Estudis Avancats, Barcelona, Spain*

Gate-tunable huge optical nonlinearities in graphene-metal heterostructures are reported. Moreover, plasmonic-mediated nonlinear enhancement is expected in the range 6-9 μm, which can be addressed by efficient spectral translation of mid-infrared photons into the visible.

CD-9.5 THU 17:30

A Stabilized Doubly Resonant OPO for THz Applications

•*H. Rao[1,2], C. Markus Dietrich[1,2], J. Ricardo Cardoso de Andrade[3], A. Demircan[1,2], I. Babushkin[1,2,3], and U. Morgner[1,2]*; [1]*Leibniz University Hannover, Institute of Quantum Optics, Hannover, Germany*; [2]*Cluster of Excellence PhoenixD, Hannover, Germany*; [3]*Max Born Institute, Berlin, Germany*

We demonstrate that the self-

ROOM 3

CJ-6.4 THU 17:15

Simplified, athermal fiber designs for high power laser applications

•*G. Palma-Vega[1,2], S. Kuhn[1], T. Walbaum[1], N. Haarlammert[1], and T. Schreiber[1]*; [1]*Fraunhofer Institute for Applied Optics and Precision Engineering, Albert-Einstein-Str. 7 , Jena, Germany*; [2]*Institute of Applied Physics, Friedrich-Schiller-University Jena, Albert-Einstein-Str. 15, Jena, Germany*

We present numerical simulations towards an athermal fiber design. We discuss how to adjust the thermo-optical coefficient to mitigate thermal effects such as mode shrinking and transversal mode instabilities in high power fiber lasers.

CJ-6.5 THU 17:30

Optimization of Chirp and Tilt of Fiber Bragg gratings for Raman Emission Suppression

•*W. Lin[1,2], M. Desjardins-Carriere[2], B. Sevigny[2], and M. Rochette[1]*; [1]*McGill University, Montreal, Canada*; [2]*ITF Technologies, Montreal, Canada*

Fiber Bragg gratings with a tilt of controlled angle and a chirp of controlled direction are analyzed for Raman suppression in a kW fiber

ROOM 4

CK-6.4 THU 17:15

Fiber-connected 3D Printed Hollow-core Light Cage for Gas Detection

•*B. Jang[1], J. Gargiulo[2], J. Kim[1], J. Bürger[2], H. Lehmann[1], T. Wieduwilt[1], S.A. Maier[2,3], and M.A. Schmidt[1,4,5]*; [1]*Leibniz Institute of Photonic Technology, Jena, Germany*; [2]*Faculty of Physics, Ludwig-Maximilians-Universität München, München, Germany*; [3]*The Blackett Laboratory, Department of Physics, Imperial College London, London, United Kingdom*; [4]*Otto Schott Institute of Materials Research (OSIM), Friedrich Schiller University of Jena, Jena, Germany*; [5]*Abbe Center of Photonics and Faculty of Physics, Jena, Germany*

The light cage is a 3D nanoprinted hollow-core waveguide which can be used as a light-matter interaction platform. Here we present the fiber-connected light cage and demonstrate ammonia sensing using tunable diode laser absorption spectroscopy.

CK-6.5 THU 17:30

3D printed photonic structure for generation to zeroth- and high-order Bessel beams from a single-mode optical fiber

•*I. Reddy[1,2], A. Bertoncini[1], and C. Liberale[1,3]*; [1]*Biological and Environmental Science and Engineering Division, King Abdullah University of Science and Technology, Saudi Arabia, Thuwal, Saudi Arabia*; [2]*Department of Electrical Engineering, University at Buffalo, NY*

ROOM 5

EC-6.3 THU 17:15

Role of the bus waveguide in the nonlinear reciprocity breaking in a Taiji microresonator

•*R. Franchi[1], A. Muñoz de las Heras[2], S. Biasi[1], M. Ghulinyan[3], I. Carusotto[2], and L. Pavesi[1]*; [1]*Nanoscience Laboratory, Department of Physics, University of Trento, Trento, Italy*; [2]*INO-CNR BEC Center and Department of Physics, University of Trento, Trento, Italy*; [3]*Sensors and Devices, Fondazione Bruno Kessler, Trento, Italy*

We demonstrated how an asymmetric microresonator in the nonlinear regime behaves as a nonreciprocal system and we discussed the role of the bus waveguide asymmetry and its Fabry-Pérot oscillations.

EC-6.4 THU 17:30

Topological edge solitons in χ^2 media

•*S. Ivanov[1,2], Y. Kartashov[2,3], A. Szameit[4], L. Torner[3], and V. Konotop[5]*; [1]*Moscow Institute of Physics and Technology, Dolgoprudny, Moscow region, Russia*; [2]*Institute of Spectroscopy, Russian Academy of Sciences, Troitsk, Moscow, Russia*; [3]*ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology,*

ROOM 6

CH-10.4 THU 17:15

Long-distance laser positioning system by using acousto-optic deflector

•*M. Musha, M. Tajiri, and Y. Takeuchi*; *Institute for Laser Science, University of Electro-communications, Tokyo, Japan*

We have developed novel satellite positioning system by using acousto-optic deflectors which measures two-dimensional angle and the distance between satellites which would be utilized for a precision formation flying in space

CH-10.5 THU 17:30

Robust and High-Speed Cavity-Enhanced Vernier Spectrometer

•*C. Lu[1], F. Senna Vieira[1], A. Głuszek[2], I. Silander[1], G. Soboń[2], and A. Foltynowicz[1]*; [1]*Department of Physics, Umeå University, Umeå, Sweden*; [2]*Laser and Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland*

We demonstrate a new robust

ROOM 7

EA-6.3 THU 17:15

Stimulated cooling of Frenkel exciton-polariton gas in a non-equilibrium Bose-Einstein condensate

•A.V. Zasedatelev[1,2], E.S. Andrianov[3,4], V.Y. Shishkov[3,4], A.V. Baranikov[1], Y.E. Lozovik[5,6], and P.G. Lagoudakis[1,2]; [1]Skolkovo Institute of Science and Technology, Moscow, Russia; [2]Department of Physics and Astronomy, University of Southampton, Southampton, United Kingdom; [3]Dukhov Research Institute of Automatics (VNIIA), Moscow, Russia; [4]Moscow Institute of Physics and Technology, Moscow, Russia; [5]Institute for Spectroscopy RAS, Moscow, Russia; [6]Moscow Institute of Electronics and Mathematics, National Research University Higher School of Economics, Moscow, Russia

We explored non-equilibrium thermodynamics of Frenkel exciton-polaritons in organic microcavities bearing strong light-matter interaction. Our experimental study demonstrates stimulated cooling of polariton gas down to ~ 40K above the Bose-Einstein condensation threshold at ambient conditions.

EA-6.4 THU 17:30

Steady-state superfluidity of light in a tunable cavity at room temperature

•G. Keijsers[1], Z. Geng[1], K.J.H. Peters[1], M. Wouters[2], and S.R.K. Rodriguez[1]; [1]AMOLF, Amsterdam, Netherlands; [2]University of Antwerp, Antwerp, Belgium

We report the first observation of superfluid cavity photons. Remarkably, the superfluid state emerges in a steady state and at room tem-

ROOM 8

CL-3.3 THU 17:15

Circular-dichroism SHG microscopy probes the polarity distribution of out-of-plane collagen fibril assemblies

•M. Schmeltz[1], C. Teulon[1], M. Pinsard[2], U. Hansen[3], M. Alnawaiseh[4], D. Ghoubay[5], V. Borderie[5], G. Mosser[6], C. Aimé[6], F. Légaré[2], G. Latour[1,7], and M.-C. Schanne-Klein[1]; [1]Laboratoire d'Optique et Biosciences, Ecole polytechnique, CNRS, Inserm, Institut Polytechnique de Paris, Palaiseau, France; [2]Institut National de la Recherche Scientifique, Centre Energie Matériaux et Télécommunications, Varenne, Canada; [3]Institute for Musculoskeletal Medicine, University Hospital Münster, Münster, Germany; [4]Department of Ophthalmology, University of Münster Medical Center, Münster, Germany; [5]Sorbonne Université, CHNO des Quinze Vingt, INSERM, Institut de la Vision, GRC32, CIC1423, Paris, France; [6]Sorbonne Université, CNRS, Laboratoire de Chimie de la Matière Condensée de Paris (LCMCP), Paris, France; [7]Université Paris-Saclay, Saint-Aubin, France

Experiments on human corneas and theoretical analysis of the chiral SHG response including magnetic contributions show that circular-dichroism SHG microscopy specifically reveals assemblies of out-of-plane collagen fibrils and probes their sub-micrometer scale polarity distribution.

CL-3.4 THU 17:30

Structural imaging of keratoconic human corneas using polarization-resolved Second Harmonic Generation microscopy

•C. Raoux[1], M. Schmeltz[1], M. Bied[1], M. Alnawaiseh[2], U. Hansen[3], G. Latour[1,4], and M.-C. Schanne-Klein[1]; [1]Laboratory for Optics and Biosciences, Ecole polytechnique, CNRS, INSERM, Institut Polytechnique de Paris, Palaiseau, France; [2]Department of Ophthalmology,

ROOM 9

EE-4.3 THU 17:30

Aggregation Dependent Light-Heat Conversion Dynamics in Gold Nanoparticles Loaded Agarose Gel

A. Mazzanti[1], L. Moretti[1], A. Rossetti[2], •A. Schirato[1,3], L. Polito[4], F. Pizzetti[2], A. Sacchetti[2], P. Laporta[1,5], G. Cerullo[1,5], F. Rossi[2], M. Maiuri[1], and G. Della Valle[1,5]; [1]Dipartimento di Fisica, Politecnico di Milano, Milan, Italy; [2]Dipartimento di Chimica, Mate-

ROOM 10

JSIV-2.3 THU 17:15

Full characterization of partially measured systems with neural networks

•B. Rahmani[1], D. Loterie[1], E. Kakkava[2], N. Borhani[2], U. Tegin [2], D. Psaltis[2], and C. Moser[1]; [1]Laboratory of applied photonics devices, EPFL, Lausanne, Switzerland; [2]Laboratory of optics, EPFL, Lausanne, Switzerland

We propose a method based on neural networks to characterize a complex optical system from intensity-only measurements. The characterization involves learning the forward and backward mappings of the system that can be subsequently used to project or image arbitrary patterns.

JSIV-2.4 THU 17:30

Time-efficient object recognition in quantum ghost imaging

•V. Rodríguez-Fajardo, C. Moodley, J. Pinnell, B. Sephton, and A. Forbes; School of Physics, University of the Witwatersrand, Johannesburg, South Africa

Ghost imaging is a promising imaging technique with time-efficiency as its main limitation. We optimised experimental parameters and introduced deep-learning for image en-

ROOM 11

CB-9.4 THU 17:15

Gain-Switched Semiconductor Laser Driven Soliton Microcombs

•W. Weng[1], A. Kaszubowska-Anandarajah[2], J. He[1], P. Lakshmijayasimha[3], E. Lucas[1], J. Liu[1], P. Anandarajah[3], and T. Kippenberg[1]; [1]Swiss Federal Institute of Technology in Lausanne, Lausanne, Switzerland; [2]Trinity College Dublin, Dublin, Ireland; [3]Dublin City University, Dublin, Ireland

Using phase-engineered coherent laser pulses produced by gain-switched semiconductor lasers, we generate low-power-threshold soliton microcombs whose repetition frequencies are in the X-band and K-band microwave ranges.

CB-9.5 THU 17:30

High-Power Quasi-CW Diode-Pumped 750 nm VECSEL Emitting a Peak Power of 29.6 W and an Average Power of 8.5 W

•P.J. Weinert[1], M. Grossmann[2], U. Brauch[1], M. Jetter[2], P. Michler[2], T. Graf[1], and M. Abdou Ahmed[1]; [1]Institut für Strahlwerkzeuge (IFSW), University of Stuttgart, Stuttgart, Germany; [2]Institut für Halbleiteroptik und Funktionelle Grenzflächen (IHFG), Center for

NOTES

ROOM 1

We investigate and compare the advantages and drawbacks of two advanced femtosecond direct laser writing methods (direct ablation using burst mode fabrication and selective glass etching) for potential applications in microfluidics, micromechanics and microoptics.

CM-6.6 THU 17:45

Femtosecond UV laser lift-off technique for GaN coatings

•D. Paipulas, S. Butkus, and V. Sirutkaitis; Laser Research Center, Vilnius University, Vilnius, Lithuania

We present a rapid laser lift-off technique for thin GaN coating separation from sapphire utilizing femtosecond UV pulses and demonstrate that raster patterning can produce high-quality coatings without any stitching artifacts at an industrial processing rate.

ROOM 2

locking region of doubly resonant parametric oscillators can be significantly increased by introducing higher order dispersion into cavity and we show a possibility of its stabilization using sum-frequency generation-based scheme.

CD-9.6 THU 17:45

Strong optoacoustic interaction in hot CS_2-filled liquid-core optical fiber

•A. Geilen[1,2,3], A. Popp[1,2,4], D. Walter[1,2], M. Chemnitz[5], S. Junaid[6,7], C.G. Poulton[8], C. Marquardt[1,2,4], M.A. Schmidt[6,7], and B. Stiller[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, University of Erlangen-Nuremberg, Erlangen, Germany; [3]IMPRS, International Max Planck Research School - Physics of Light, Erlangen, Germany; [4]SAOT, Graduate School in Advanced Optical Technologies, Erlangen, Germany; [5]INRS-EMT, Qqébec, Canada; [6]Leibniz Institute of Photonic Technology, Jena, Germany; [7]Otto Schott Institute of Materials Research (OSIM), Jena, Germany; [8]School of Mathematical and Physical Sciences, University of Technology Sydney, Sydney, Australia

We present temperature dependent integrated Brillouin measurements inside a fully sealed, CS_2-filled liquid-core optical fiber. We demonstrate the influence of the temperature and pressure on two acoustic modes at temperatures up to 136 °C.

ROOM 3

laser. Results include laser output spectra and power conversion efficiency.

CJ-6.6 THU 17:45

Raman fiber laser based on a 7-core fiber with fs-inscribed regular and random structures

•A. Dostovalov[1], M. Skvortsov[1], A. Wolf[1], V. Labuntsov[1,2], O. Egorova[3], S. Semjonov[4], S. Wabnitz[2,5], and S. Babin[1,2]; [1]Institute of Automation and Electrometry of the SB RAS, Novosibirsk, Russia; [2]Novosibirsk State University, Novosibirsk, Russia; [3]Prokhorov General Physics Institute, Russian Academy of Sciences, Moscow, Russia; [4]Dianov Fiber Optics Research Center, Prokhorov General Physics Institute, Russian Academy of Sciences, Moscow, Russia; [5]Sapienza University of Rome, Rome, Italy

The results of Raman laser generating at the wavelength of ~1090 nm with output power up to 2.5 W based on the 7-core passive fiber with fs-inscribed regular and random structures in individual cores are presented.

ROOM 4

USA, Buffalo, USA; [3]Computer, Electrical and Mathematical Science and Engineering Division, King Abdullah University of Science and Technology, Saudi Arabia, Thuwal, Saudi Arabia

We present a 3D micro-printed structure based on photonic crystal fiber design to transform the beam output from a single-mode fiber into zeroth- and higher-order Bessel beams.

CK-6.6 THU 17:45

Möbius strip microlasers

•S. Bittner[1], Y. Song[2,3], Y. Monceaux[2], K. Chao[2], H.M. Reynoso de la Cruz[2,4], C. Lafargue[2], D. Decanini[5], B. Dietz[3], J. Zyss[2], A. Grigis[6], X. Checoury[5], and M. Lebental[2]; [1]Chair in Photonics, LMOPS, CentraleSupélec, Université de Lorraine, Metz, France; [2]Laboratoire Lumière, Matiére et Interfaces (LuMIn), CNRS, ENS Paris-Saclay, CentraleSupélec, Gif-sur-Yvette, France; [3]School of Physical Science and Technology, Lanzhou University, Lanzhou, China; [4]Science and Engineering Division, University of Guanajuato, Léon, Mexico; [5]Centre de Nanosciences et de Nanotechnologies, CNRS, Université Paris-Saclay, Palaiseau, France; [6]Laboratoire d'Analyse, Géométrie et Applications, CNRS, Université Sorbonne Paris Cité, Université Paris 13, Villetaneuse, France

We fabricate organic Möbius strip microlasers by direct laser writing. Experiments, FDTD mode calculations and ray tracing calculations indicate that the lasing modes confined in a 1 μm-thick Möbius strip are localized on periodic geodesics.

ROOM 5

Castelldefels (Barcelona), Spain; [4]Institute for Physics, University of Rostock, Rostock, Germany; [5]Departamento de Física and Centro de Física Teórica e Computacional, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal

We present the first example of the Floquet topological edge soliton supported by parametric interactions in quadratic nonlinear media with inscribed arrays of helical waveguides.

EC-6.5 THU 17:45

Implementation of a non-Hermitian phase transition in quasicrystals based on a Floquet Aubry-André-Harper model

M. Kremer[1], •S. Weidemann[1], S. Longhi[2], M. Wimmer[3], U. Peschel[3], and A. Szameit[1]; [1]Institut für Physik, Universität Rostock, Rostock, Germany; [2]Dipartimento di Fisica, Politecnico di Milano and Istituto di Fotonica e Nanotecnologie del Consiglio Nazionale delle Ricerche, Milano, Italy; [3]Institute of Solid State Theory and Optics, Friedrich Schiller University Jena, Jena, Germany

We propose and experimentally demonstrate a novel Floquet Aubry-André-Harper model, where we measure the Harper-Hofstadter Butterfly and the localization phase transition. Furthermore, a non-Hermitian extension is studied, measuring a simultaneous PT and localization phase transition.

ROOM 6

design of a continuous-filtering Vernier spectrometer based on a compact femtosecond Er:fiber laser. It allows detection of CO_2 at 1570 nm and CH_4 at 1650 nm with acquisition rates up to 100 Hz.

CH-10.6 THU 17:45

Frequency-Comb-Assisted Swept-Wavelength Interferometry

•K. TWAYANA, Z. Ye, Ó.B. Helgason, M. Karlsson , and V. Torres-Company; Chalmers University of Technology, Gothenburg, Sweden

We use a frequency comb to calibrate the frequency axis in swept-wavelength interferometry. We apply the technique to laser spectroscopy of microresonators and demonstrate it can disentangle intrinsic from extrinsic Q in loaded Q measurements.

ROOM 7

perature, due to the strong thermo-optical nonlinearity of our oil-filled cavity.

EA-6.5 THU 17:45

Photon Pair Correlations in Semiconductor-Superconductor Light Sources

•S. Bouscher[1], D. Panna[1], K. Balasubramanian[1,2], R. Jacovi[1], A. Kumar[1], C. Schneider[3], S. Hoefling[3], and A. Hayat[1]; [1]Department of Electrical Engineering, Technion – Israel Institute of Technology, Haifa, Israel; [2]Electrical Engineering Faculty, Indian institute of technology, Kanpur, India; [3]Technische Physik, Physikalisches Institut and Wilhelm Conrad Röntgen Research Center for Complex Material Systems, Universität Würzburg, Wurzburg, Germany

We demonstrate evidence of photon pair correlations, resulting from injected Cooper-pairs in superconductor-semiconductor structures. Such structures can be utilized for multiple applications including enhanced two-photon gain, electrically-driven entangled-photon generation and Bell-state analyzers.

ROOM 8

Hospital Fulda, University of Marburg, Campus Fulda, Fulda, Germany; [3]Institute for Musculoskeletal Medicine, University Hospital Münster, Münster, Germany; [4]Université Paris-Saclay, Saint-Aubin, France

We implement polarization-resolved second harmonic generation microscopy to characterize the orientation distribution of collagen lamellae in human cornea. We evidence a less ordered distribution in keratoconic corneas, in agreement with their deteriorated mechanical behaviour.

CL-3.5 THU 17:45

Fundamental Bounds on the Precision of Classical Interferometric Imaging Techniques

D. Bouchet[1,2], J. Dong[3], D. Maestre[4,5], C. Conrad-Billroth[4,5], and •T. Juffmann[4,5]; [1]Debye Institute for Nanomaterials Science, Utrecht, Netherlands; [2]Université Grenoble Alpes, CNRS, LIPhy, Grenobles, France; [3]Laboratoire Kastler Brossel, Ecole Normale Supérieure, Université PSL,CNRS, Sorbonne Université, Collège de France, Paris, France; [4]University of Vienna, Faculty of Physics, VCQ, Vienna, Austria; [5]Max Perutz Laboratories,Department of Structural and Computational Biology, Vienna, Austria

Interferometric imaging is a widely used in physics, biology, and in clinical applications. Here we derive and discuss bounds on the achievable phase measurement precision that can be obtained using classical linear optical systems.

ROOM 9

riali e Ingegneria Chimica ”Giulio Natta”, Politecnico di Milano, Milan, Italy; [3]Istituto Italiano di Tecnologia, Genoa, Italy; [4]Consiglio Nazionale delle Ricerche, CNR-SCITEC, Milan, Italy; [5]Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche, Milan, Italy

We investigate, through a combination of ultrafast pump-probe spectroscopy and numerical modeling, the phototermal properties of Au nanoparticles loaded hydrogels. Drug delivery experiments demonstrate increased release efficiency in aggregates with respect to coated nanoparticles.

EE-4.4 THU 17:45

Probing Free Carrier and Exciton Dynamics in a Bulk Semiconductor with Two-Dimensional Electronic Spectroscopy

•J. Allerbeck[1,2], T. Deckert[1,2], L. Spitzner[2], and D. Brida[1,2]; [1]Université du Luxembourg, Luxembourg, Luxembourg; [2]University of Konstanz, Konstanz, Germany

Ultrafast spectroscopy employing a sequence of phase-locked pump pulses provides a unique method to precisely track the exciton dynamics in bulk gallium selenide with sub-10 fs temporal and 4 meV (1 THz) spectral resolution.

ROOM 10

hancement and object recognition offering an 80% improvement in the image reconstruction time.

JSIV-2.5 THU 17:45

Optical Counting of Particles Too Small to See

•E.A. Chan[1], C. Rendón-Barraza[1], G. Yuan[1], T. Pu[2], J.-Y. Ou[2], N. Papasimakis[2], and N. I. Zheludev[1,2]; [1]Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore, Singapore; [2]Centre for Photonic Metamaterials and Optoelectronics Research Centre, University of Southampton, Southampton , United Kingdom

Artificial intelligence analysis of the light scattered on groups of particles of different sizes allows counting of them and classifying them by size, even if they are too small($\lambda/7$) to be resolved by the microscope.

ROOM 11

Integrated Quantum Science and Technology (IQST), and Stuttgart Research Center of Photonic Engineering (SCoPE), University of Stuttgart, Stuttgart, Germany

We present a quasi-CW diode-pumped AlGaAs-based VECSEL emitting a maximum peak power of 29.6 W and an average power of 8.52 W around 750 nm. Power scaling was achieved by scaling both pump area and pump duty cycle.

CB-9.6 THU 17:45

Ultrawide-band chaotic breathing in semiconductor laser

•T. Malica[1,2], G. Bouchez[1,2], D. Wolfersberger[1,2], and M. Sciamanna[1,2]; [1]Chaire Photonique, LMOPS, CentraleSupélec,2 Rue Edouard Belin , 57070 Metz, France; [2]. Université de Lorraine, LMOPS, 2 Rue Edouard Belin , 57070 Metz, France

An optical delay system with phase-conjugate feedback is shown to operate as a three timescale superharmonic system and consistently exhibit novel, nonlinear, and spatiotemporally complex dynamics with state-of-the-art chaos bandwidth values of ~35 GHz.

NOTES

ROOM 1

18:30 – 20:00

PD-1: CLEO/Europe Postdeadline Session

Chair: Marian Marciniak, National Institute of Telecommunications, Warsaw, Poland

PD-1.1 THU 18:30

Evidence for spin memory in photoluminescence of room temperature vertical-cavity quantum dot gain structure

J. Doogan[1,2], S. Phutthaprasartporn[1], E. Clarke[3], and •T. Ackemann[1]; [1]SUPA and Department of Physics, University of Strathclyde, Glasgow, United Kingdom; [2]M Squared Lasers Ltd, Glasgow, United Kingdom; [3]EPSRC National Epitaxy Facility, University of Sheffield, Sheffield, United Kingdom

We demonstrate spin memory in the photoluminescence of InAs dot-in-a-well structures at room temperature providing a basis for spintronic applications in vertical-external cavity laser schemes with increased power and flexibility compared to better established spin-VCSELs.

PD-1.2 THU 18:40

Broadband microcomb generation from a zero-dispersion fiber Fabry-Pérot microresonator

•Z. Xiao, T. Li, M. Cai, H. Zhang, Y. Huang, K. Wu, and J. Chen; Shanghai Jiao Tong University, Shanghai, China

Microcomb with over 8000 comb lines and 10-GHz comb line spacing has been achieved from a zero-dispersion high-Q fiber Fabry-Pérot microresonator. The microcomb is stabilized for more than 15 hours of continue operation.

PD-1.3 THU 18:50

Third-order nonlinear optics in KTP ridge waveguides

A. Vernay[1], V. Boutou[1], C. Felix[1], D. Jegouso[1], F. Bassignot[2], M. Chauvet[3], and •B. Boulanger[1]; [1]University Grenoble-Alpes, Institut Néel-CNRS, Grenoble, France; [2]Femto-Engineering, Besançon, France; [3]FEMTO-ST Institute, Université de Franche-Comté, Besançon, France

Third-Harmonic Generation at 1594 nm was performed in a KTiOPO4 micrometric ridge waveguide. Strong agreements between theory and experiments are obtained for the phase-matching and generated intensity, which prepares further Triple Photons Generation quantum experiments.

PD-1.4 THU 19:00

388 W multipass cell broadening supporting few-cycle pulse duration

•M. Müller[1], J. Buldt[1], H. Stark[1], C. Grebing[1,2], and J. Limpert[1,2,3]; [1]Friedrich Schiller University Jena, Institute of Applied Physics, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [3]Helmholtz-Institute Jena, Jena, Germany

We present a multipass cell based on reflectivity-enhanced silver mirrors on silicon substrates allowing for degradation-free nonlinear spectral broadening (M2<1.2, Homogeneity=97.5%) at an unprecedented average power of 388W compressible to 6.9fs pulse duration.

PD-1.5 THU 19:10

Bright, Tuneable and Compact Source of Few-Femtosecond Pulses in the Deep Ultraviolet

•C. Brahms and J.C. Travers; Heriot-Watt University, Edinburgh, United Kingdom

We demonstrate a bright and compact source of wavelength-tuneable few-femtosecond deep ultraviolet laser pulses based on resonant dispersive wave emission in gas-filled hollow capillary fibre.

PD-1.6 THU 19:20

1.5-W diode-pumped femtosecond Cr:ZnS amplifier

•S. Qu[1,2,3], M. Pötzlberger[3], A. Sebesta[1,2,3], V. Pervak[2], F. Krausz[1,2,3], A. Weigel[1,2,3], and K.F. Mak[3]; [1]Molekuláris-Ujjlenyomat Kutató Közhasznú Nonprofit Kft (CMF), Budapest, Hungary; [2]Ludwig-Maximilians-Universität München, Garching, Germany; [3]Max Planck Institute of Quantum Optics, Garching, Germany

We report the first Cr:ZnS amplifier directly pumped by laser diodes, providing 1.5W of average output power with gain factor of 4.2 and the spectrum covering 2-2.6 μm which supports a 40fs transform-limited pulse duration.

PD-1.7 THU 19:30

Time-resolved X-ray holographic imaging of the light-induced phase transition in vanadium dioxide

•A.S. Johnson[1], D. Perez Salinas[1], K. Siddiqui[2], K. Volckaert[2], P. Majchrzak[2], S. Kim[3], S. Choi[3], C. Gunther[4], K. Hallman[5], R. Haglund[5], M. Valvidares[6], S. Ulstrup[2], S. Han Park[7], H. Kim[3], and S. Wall[1,2]; [1]ICFO - The Institute of Photonic Sciences, Castelldefels (Barcelona), Spain; [2]Department of Physics and Astronomy, Aarhus University, Aarhus, Denmark; [3]Department of Physics, Sogang University, Seoul, South Korea; [4]Institut für Optik und Atomare Physik, Technische Universität Berlin, Berlin, Germany; [5]Department of Physics and Astronomy, Vanderbilt University, Nashville, USA; [6]ALBA Synchrotron Light Source, Cerdanyola del Vallès, Spain; [7]Pohang Accelerator Laboratory, Pohang, South Korea

We use time-resolved resonant X-ray holography at an X-ray free electron laser to perform the first femtosecond-temporal and nanometer-spatial resolution measurements of domain growth in a light-induced phase transition.

PD-1.8 THU 19:40

Attosecond optical and Ramsey-type interference

•T. Matsubara[1,2], Y. Nabekawa[1], K.L. Ishikawa[3], K. Yamanouchi[2], and K. Midorikawa[1]; [1]RIKEN center for Advanced Photonics, 2-1 Hirosawa, Wako-shi, Saitama 351-0198, Japan; [2]Department of Chemistry, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113-0033, Japan; [3]Graduate School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113-8656, Japan

We demonstrated Ramsey-type interference of the 1s2p state in a He atom by scanning the delay of two XUV high-harmonic pulses from the 0-attosecond delay. We utilized angularly-resolved photoelectron spectra as the interference signals.

PD-1.9 THU 19:50

Optomechanical quantum teleportation

•N. Fiaschi[1], B. Hensen[1], A. Wallucks[1], R. Benevides[1,2], J. Li[1,3], T.P.M. Alegre[2], and S. Groblacher[1]; [1]Kavli Institute of Nanoscience, Delft, Netherlands; [2]Photonics Research Center, Campinas, Brazil; [3]Zhejiang Province Key Laboratory of Quantum Technology and Device, Hangzhou, China

Quantum teleportation is a key component in long distance quantum communication protocols. Here we demonstrate quantum teleportation of a polarization-encoded optical input state onto the joint state of a pair of nanomechanical resonators.

ROOM 2

18:30 – 20:00

PD-2: EQEC Postdeadline Session

Chair: Alexander Holleitner, Technische Universität München, Garching, Germany

PD-2.1 THU 18:30

Quantum non-Gaussianity of multi-phonon states of a single atom

L. Podhora[1], L. Lachman[1], T. Pham[1], A. Lešundák[2], O. Číp[2], •L. Slodička[2], and R. Filip[1]; [1]Department of Optics, Palacky University, Olomouc, Czech Republic; [2]Institute of Scientific Instruments of the Czech Academy of Sciences, Brno, Czech Republic

We derive a hierarchy of QNG criteria suitable for mechanical systems. We experimentally verify this hierarchy for up to 10-phonon states for a single motional mode of a trapped-ion oscillator.

PD-2.2 THU 18:40

Capillary assembly of large arrays of hBN single-photon emitters

•J.A. Preuß, E. Rudi, J. Kern, R. Schmidt, R. Bratschitsch, and S. Michaelis de Vasconcellos; Institute of Physics and Center for Nanotechnology, University of Münster, Münster, Germany

We fabricate rectangular arrays of thousands of hBN nanoplatelets hosting single-photon emitters using a capillary assembly method. Positioning yields of >95 % are achieved.

PD-2.3 THU 18:50

On-chip Electrothermal Switching of Low-loss Phase Change Materials for Nonvolatile Programmable Photonic Circuits

•C. Ríos[1], Q. Du[1], Y. Zhang[1], M. Shalaginov[1], P. Miller[2], C. Roberts[2], M. Kang[3], K.A. Richardson[3], T. Gu[1], S. Vitale[2], and J. Hu[1]; [1]Department of Materials Science & Engineering, Massachusetts Institute of Technology, Cambridge, MA, USA; [2]Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA, USA; [3]The College of Optics & Photonics, Department of Materials Science and Engineering, University of Central Florida, , Orlando, FL, USA

We demonstrate a nonvolatile, ultra-compact, and electrically-driven phase shifter based on the low-loss phase-change material Sb2Se3 on SOI. We achieve continuous phase modulation of up to $0.09\pi/\mu$m and demonstrate reconfigurable MZIs, micro-rings, and 2×2 switches.

PD-2.4 THU 19:00

Quantum Surface-Response of Metals Probed by Graphene Plasmons

•P.A.D. Gonçalves[1,2,3], T. Christensen[2], N. Peres[4], A. Pekka-Jauho[5], I. Epstein[6], F. Koppens[1], M. Soljacic[2], and N.A. Mortensen[3]; [1]ICFO — The Institute of Photonic Sciences, Barcelona, Spain; [2]Massachusetts Institute of Technology, Cambridge, USA; [3]University of Southern Denmark, Odense, Denmark; [4]University of Minho, Braga, Portugal; [5]Technical University of Denmark, Kongens Lyngby, Denmark; [6]Tel Aviv University, Tel Aviv, Israel

ROOM 2

Acoustic graphene plasmons supported in graphene–metal structures are capable of record-high light confinement. Here, we show how this can be exploited to probe the quantum surface-response of metals and infer it from experimental data.

PD-2.5 THU 19:10

Demonstration of Generalized Multi-path Wave-particle Duality on a Quantum Nanophotonic Chip

•X. Chen[1], Y. Deng[1], S. Liu[1], T. Pramanik[1,2], J. Mao[1], J. Bao[1], C. Zhai[1], T. Dai[1], H. Yuan[1], J. Guo[1], S.-M. Fei[3], M. Marcus[4,5], B. Tang[6], Y. Yang[6], Z. Li[6], Q. He[1,2,7,8,9], Q. Gong[1,2,7,8,9], and J. Wang[1,2,7,8,9]; [1]State Key Laboratory for Mesoscopic Physics, School of Physics, Peking University, Beijing, China; [2]Beijing Academy of Quantum Information Sciences, Beijing, China; [3]School of Mathematical Sciences, Capital Normal University, Beijing, China; [4]Institute for Quantum Optics and Quantum Information – IQOQI, Austrian Academy of Sciences, Vienna, Austria; [5]Vienna Center for Quantum Science and Technology, Vienna, Austria; [6]Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China; [7]Frontiers Science Center for Nano-optoelectronics & Collaborative Innovation Center of Quantum Matter, Peking University, Beijing, China; [8]Collaborative Innovation Center of Extreme Optics, Shanxi University, Taiyuan, China; [9]Peking University Yangtze Delta Institute of Optoelectronics, Nantong, China

We report a generalized multi-path delayed-choice experiment on a large-scale integrated silicon nanophotonic quantum chip. Wave- and particle-nature in the generalized multi-path framework are experimentally verified and the generalization of Bohr's multi-path duality relation is demonstrated.

PD-2.6 THU 19:20

Strongly correlated electronic states in a MoSe$_2$/WSe$_2$ moiré superlattice

•A. Campbell[1], M. Brotons-i-Gisbert[1], H. Baek[1], K. Watanabe[2], T. Taniguchi[2], and B.D. Gerardot[1]; [1]Heriot-Watt University, Edinburgh, United Kingdom; [2]National Institute of Materials Science, Tsukuba, Japan

We observe the formation of moiré intralayer excitons and correlated electronic states in a gate-tunable H-stacked MoSe$_2$/WSe$_2$ moiré heterostructure. Filling factor dependent extraordinary exciton landé g-factors are observed for hole doping.

PD-2.7 THU 19:30

Observation of temporal cavity solitons in a synthetic photonic lattice

•N. Englebert[1], S.-P. Gorza[1], F. Leo[1], M. Erkintalo[2], and J. Fatome[2,3]; [1]OPERA-Photonique, Université libre de Bruxelles, Bruxelles, Belgium; [2]The Dodd-Walls Centre, Department of Physics, The University of Auckland, Auckland, New Zealand; [3]Laboratoire Interdisciplinaire Carnot de Bourgogne, Dijon, France

We experimentally demonstrate the generation of temporal cavity solitons in a one-dimensional synthetic photonic lattice. We use a fibre resonator incorporating a phase modulator and investigate the dynamics as a function of the frequency detuning.

PD-2.8 THU 19:40

Ground-state cooling of a levitated nanoparticle

F. Tebbenjohanns, M.L. Mattana, M. Rossi, •M. Frimmer, and L. Novotny; Photonics Laboratory, ETH Zürich, Zürich, Switzerland

We optically levitate a dielectric nanoparticle and cool its center-of-mass motion to the motional ground state using measurement-based feedback. Our techniques reaches a phonon population of 0.65.

PD-2.9 THU 19:50

Nondestructive detection of photonic qubits

D. Niemietz[1], •P. Farrera[1,2], S. Langenfeld[1], and G. Rempe[1]; [1]Max-Planck-Institut für Quantenoptik, Garching, Germany; [2]ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain

The qubit loss problem in quantum communication can be mitigated by nondestructive photonic qubit detectors that track the qubit transmission. We implemented such a detector with a single atom coupled to two crossed optical cavities.

ROOM 1

10:00 – 11:00

CG-P: CG Poster Session

CG-P.1 THU

Double-Foci Beamline for Attosecond Transient Reflection Spectroscopy

•G. Inzani[1], G.D. Lucarelli[1,2], B. Moio[1,2], N. Fabris[3], L. Moscardi[4], G.L. Dolso[1], N. Di Palo[1], F. Frassetto[3], L. Poletto[3], M. Nisoli[1,2], and M. Lucchini[1,2]; [1]Department of Physics, Politecnico di Milano, Milano, Italy; [2]Institute for Photonics and Nanotechnologies, IFN-CNR, Milano, Italy; [3]Institute for Photonics and Nanotechnologies, IFN-CNR, Padova, Italy; [4]Center for Nano Science and Technology@PoliMi, Istituto Italiano di Tecnologia, Milano, Italy

We present a novel beamline for attosecond IR-XUV pump-probe reflection spectroscopy in solids. The actively stabilized delay line and the simultaneous characterization of pulses in a sequential double-foci geometry paves the way for innovative experiments.

CG-P.2 THU

Controlling polarization of attosecond pulses with plasmonic-enhanced bichromatic counter-rotating circularly polarized fields

I.N. Ansari[1], •C. Hofmann[2,3], L. Medišauskas[2], M. Lewenstein[4,5], M.F. Ciappina[4,6,7,8], and G. Dixit[1]; [1]Indian Institute of Technology Bombay, Mumbay, India; [2]Max Planck Institute for the Physics of Complex Systems, Dresden, Germany; [3]University College London, London, United Kingdom; [4]ICFO - Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, Barcelona, Spain; [5]ICREA, Barcelona, Spain; [6]Institute of Physics of the ASCR, ELI Beamlines Project, Prague, Czech Republic; [7]Guangdong Technion–Israel Institute of Technology, Shantou, China; [8]Technion–Israel Institute of Technology, Haifa, Israel

We apply a bichromatic counter-rotating laser field with spatially inhomogeneous enhancement. The direction and the strength of the plasmonic field enhance or suppress certain recombining electron trajectories, thus modifying the ellipticity of attosecond pulses.

CG-P.3 THU

12.9 mW high harmonic generation at 26.5 eV enabled by a sub-20 fs visible laser

•R. Klas[1,2], A. Kirsche[1,2], J. Buldt[1], H. Stark[1], S. Hädrich[3], J. Rothhardt[1,2,4], and J. Limpert[1,2,4]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University Jena, 07745 Jena, Germany; [2]Helmholtz Institute Jena, 07743 Jena, Germany; [3]Active Fiber Systems GmbH, 07745 Jena, Germany; [4]Fraunhofer Institute of Applied Optics and Precission Engeneering, 07745 Jena, Germany

High harmonic generation driven by a 515 nm, 18.6 fs pulses at 50 W average power, resulting in a record average power of 12.9 mW in a single harmonic line at 26.5 eV is presented.

CG-P.4 THU

In Situ Measurement of the Cooper Minimum in Argon

•G. Brown, C. Zhang, D.H. Ko, and P.B. Corkum; University of Ottawa, Ottawa, Canada

We simulate a collinear two-color attosecond in situ measurement in argon and show that in situ techniques measure a variation of the electron group delay around the Cooper minimum.

CG-P.5 THU

Angle-resolved Photoelectron Spectroscopy of large Water Clusters ionized by an XUV Comb

•L. Colaizzi[1,2], L. Ban[3], A. Trabattoni[1], V. Wanie[1,4], K. Saraswathula[1], E.P. Månsson[1], P. Rupp[5,6], Q. Liu[5,6], L. Seiffert[7], E.A. Herzig[7], A. Cartella[1,8], B.L. Yoder[3], F. Légaré[4], M.F. Kling[5,6], T. Fennel[7], R. Signorell[3], and F. Calegari[1,2,8,9]; [1]Center for Free-Electron Laser Science, Hamburg, Germany; [2]Physics Department, University of Hamburg, Hamburg, Germany; [3]Department of Chemistry and Applied Biosciences, Laboratory of Physical Chemistry, ETH Zürich, Zürich, Switzerland; [4]Institut National de la Recherche Scientifique, Varennes (Qc), Canada; [5]Max Planck Institute of Quantum Optics, Garching, Germany; [6]Department of Physics, Ludwig-Maximilians-Universität München, Garching, Germany; [7]Institute of Physics, University of Rostock, Rostock, Germany; [8]The Hamburg Centre for Ultrafast Imaging, Universität Hamburg, , Hamburg, Germany; [9]Institute for Photonics and Nanotechnologies CNR-IFN, , Milano, Italy

We performed angle-resolved photoelectron spectroscopy of water clusters ionized by an extreme-ultraviolet attosecond pulse train. A clean signature of the clusters was isolated from the water monomer contribution, to be used for time-resolved attosecond spectroscopy.

CG-P.6 THU

Capillary-Based High-Harmonic Generation Driven by Different Laser Systems

•S.M. Senior, W.S. Brocklesby, and P. Horak; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

We compare the performance of different pump laser systems for coherent high-energy radiation generation in argon-filled capillaries by full-scale numerical simulations including pump pulse propagation, electron wavefunction dynamics, and harmonic radiation propagation.

CG-P.7 THU

High-average-power and high-pulse-energy CEP-stable few-cycle pulses: Status of the ELI-ALPS HR2 laser system

•S. Hädrich[1], E. Shestaev[2], N. Walther[1], T. Nagy[3], P. Simon[4], A. Blumenstein[4], A. Klenke[2,5], R. Klas[2,5], J. Buldt[2], H. Stark[2], M. Gebhardt[2], S. Breitkopf[1], P. Jojart[6], I. Seres[6], Z. Varallyay[6], A. Börzsönyi[6], T.

ROOM 1

Eidam[1], and J. Limpert[1,2,5,7]; [1]Active Fiber Systems GmbH, Jena, Germany; [2]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [3]Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany; [4]Laser-Laboratorium Göttingen, Göttingen, Germany; [5]Helmholtz-Institute Jena, Jena, Germany; [6]ELI-ALPS, Szeged, Hungary; [7]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We present progress on pulse compression and CEP stabilization of the ELI-ALPS HR2 system. It delivers >1 kW, 10 mJ, 300 fs pulses with excellent power stability of 0.3% RMS over 9 hours.

CG-P.8 THU

Compression of Single-Cycle Optical Pulses Based on Self-Induced Transparency Soliton Attraction

•*R. Arkhipov[1,2], M. Arkhipov[1], I. Babushkin[3], A. Demircan[3], U. Morgner[3], and N. Rosanov[2]; [1]St. Petersburg State University, St. Petersburg, Russia; [2]Ioffe Institute, St. Petersburg, Russia; [3]Institute of Quantum Optics, Leibniz University Hannover and Cluster of Excellence PhoenixD, Hannover, Germany*

We study theoretically a novel robust way of single-cycle pulse compression via attraction of subcycle SIT-like components of incident pulse.

CG-P.9 THU

Vision for Terahertz Electric Field Driven Chemistry: Exploring photodissociation dynamics from Coulomb Explosion processes via time resolved FT-VIS spectroscopy

•*V. Chikan, K. Mogyorosi, and K. Sarosi; ELI-ALPS, Szeged, Hungary*

Time -resolved FT-VIS emission spectroscopy allows investigating the neutral photodissociation processes from Coulomb explosion or XUV/attosecond pump experiments. The high-resolution FT-VIS detection scheme approach facilitates studies of reaction control from in the intense THz pulses.

CG-P.10 THU

Towards High-Order Harmonic Generation in Laser Produced Plasmas

•*J. Mathijssen[1], S. Witte[1,2], and K.S.E. Eikema[1,2]; [1]Advanced Research Center for Nanolithography, Amsterdam, Netherlands; [2]LaserLab, Vrije Universiteit, Amsterdam, Netherlands*

We have developed a pump-probe experiment that allows us to investigate the spatial and temporal characteristics of laser-produced plasmas by means of analysing high-order harmonic generation spectra produced in those plasmas.

CG-P.11 THU

Dalitz Plots in Classical Electrodynamics of Light-Matter Interactions

•*H. Nieto-Chaupis; Universidad Autónoma del Perú, Lima, Peru*

The Dalitz's technique commonly applied at High-Energy Physics to identify new particles, is employed in this paper with the Hartemann-Kerman theory in shifted-frequency versus laser intensity plots to explore emission of laser-photons by a free-electron.

CG-P.12 THU

Light-induced valleytronics in pristine graphene

•*M. Muraleedharan Shylaja[1], G. Dixit[1], A. Jimenez-Galan[2], and M. Ivanov[2]; [1]Indian Institute of Technology Bombay, Mumbai, India; [2]Max Born Institute , Berlin, Germany*

It is assumed that achieving light-induced valley-polarisation in graphene is impossible. Here we demonstrate valley-selective excitation and high-harmonic generation in graphene by using the combination of two counter-rotating circularly polarized fields.

CG-P.13 THU

Fingerprints of Majorana fermions in high harmonic spetroscopy

•*A. Pattanayak, S. Pujari, and G. Dixit; Indian Institute of Technology Bombay, Mumbai, India*

We simulate HHG from 1D Kitaev model that hosts Majorana edge modes in its topological phase. HHG is sensitive to phase transition. The population dynamics of Majorana edge modes are different from bulk modes.

CG-P.14 THU

Quantum bridges in phase space – Interference and non-classicality in enhanced ionisation

•*H. Chomet, D. Sarkar, and C. Figueira de Morisson Faria; University College London, London, United Kingdom*

We perform a phase-space analysis of strong-field enhanced ionisation in molecules. Optimal conditions require minimising population trapping and using a quantum-interference induced bridging mechanism to feed into ionisation pathways along the field gradient.

CG-P.15 THU

Angular dependence of non-perturbative VUV harmonics in silicon

•*P. Suthar and M. Kozák; Faculty of Mathematics and Physics, Charles University, Ke Karlovu 3, 12116, Prague 2, Czech Republic*

Non-perturbative high harmonics up to 8.1eV in silicon in reflection geometry have been observed. The dependence of harmonics on crystal orientation has been studied and compared with TDDFT calculations to elucidate the role of interband and intraband polarizations.

CG-P.16 THU

Angle-Resolved Attosecond Streaking of Twisted Attosecond Pulses

•*I. Ansari, D. Jadoun, and G. Dixit; Indian Institute of Technology Bombay, Mumbai, India*

The present work investigates the amount of orbital angular momentum encoded in Laguerre-Gaussian modes of twisted attosecond pulses via energy- and angle-resolved attosecond streaking in pump-probe setup.

CG-P.17 THU

Effects of Pulse Pesdetal in High-Contrast Laser-Foil Interactions

•*Z. Lécz[1,2], A. Necas[3], and S. Ter-Avetisyan[1]; [1]National Laser-Initiated Transmutation Laboratory, University of Szeged, Szeged, Hungary; [2]ELI-ALPS, ELI-HU Non-Profit Ltd., Wolfgang Sandner Str. 3., Szeged, Hungary; [3]TAE Technologies, Pauling 19631, Foothill Ranch, California, USA*

The laser-solid interaction at low intensities involves highly collisional effects, because the collision frequency is close to the plasma frequency. We discuss this regime and present kinetic simulations revealing some unusual effects observed in the case of ultra-thin foils.

CG-P.18 THU

The Inbetweeners - Beyond Born-Type Methods

•*A.C. Bray, A. Maxwell, and C. Figueira De Morisson Faria; University College London , London, United Kingdom*

We use the Coulomb Quantum Orbit Strong-Field Approximation to probe excited states, revealing rescattering is no longer confined to the polarisation axis and identify the orbits responsible for a non-vanishing photoelectron signal.

CG-P.19 THU

Investigation of Electron Acceleration using Chirped Radially Polarized Pulsed Bessel-X Beams

•*K. Laurinavičius, S. Orlov, and G. Braždžiūnas; State research institute Center for Physical Sciences and Technology , Vilnius, Lithuania*

We use subluminal and superluminal group velocities of non-diffracting Bessel-X beams for electron acceleration. Single electron dynamics in a pulsed laser beam shows that it is possible to counteract Doppler effect by using temporal chirp.

CG-P.20 THU

Plasma-filled optical microcavity

B. Bathish[1], I. Hyams[1], S. Kreps[1], •M. Douvidzon[1], F. Lei[2], J. Ward[2], S. Kasumie[2], S.N. Chormaic[2], O. Cohen[1], R. Gad[3], and T. Carmon[4]; [1]Technion, Israel Institute of Technology, Haife, Israel; [2]Okinawa Institute of Science, Okinawa, Japan; [3]Hebrew University of Jerusalem, Jerusalem, Israel; [4]Tel Aviv University, Tel Aviv, Israel

We design and fabricate a plasma containing micro-resonator, and then experimentally demonstrate a continuous in time [CW] resonantly enhanced light plasma interaction. Optical refraction smaller than one is measured in the resonator.

CG-P.21 THU

First-principles calculations for determining the thickness to maximize HHG efficiency of laser-irradiated nano films

•*S. Yamada and K. Yabana; University of Tsukuba, Tsukuba, Japan*

We present first-principles calculations based on TDDFT for HHG in reflection and transmission from Si nano films. We show that the HHG is the strongest when the thickness of Si nano film is 2-15 nm.

ROOM 2

10:00 – 11:00

EE-P: EE Poster Session

EE-P.1 THU

Real-Time Study of Coexisting States in Laser Cavity Solitons

•*P.-H. Hanzard[1], M. Rowley[1], A. Cutrona[1], S. Chu[2], B. Little[3], R. Morandotti[4,5], D. Moss[6], B. Wetzel[7], J. Sebastian Totero Gongora[1], M. Peccianti[1], and A. Pasquazi[1]; [1]University of Sussex, Falmer, United Kingdom; [2]University of Hong Kong, Hong Kong, China; [3]Xi'an Institute of Optics and Precision Mechanics, Xi'an,*

ROOM 2

China; [4]INRS-EMT, Varennes, Canada; [5]University of Electronic Science and Technology, Chengdu, China; [6]Swinburne University of Technology, Hawthorn, Australia; [7]Université de Limoges, Limoges, France

We experimentally demonstrate the presence of two coexisting states in Laser Cavity Solitons (LCS) Microcombs. By using the Dispersive Fourier Transform technique, we show the simultaneous presence of both LCS and a background modulation.

EE-P.2 THU

Long-lasting Molecular Orientation Induced by a Single THz Pulse

•*L. Xu, I. Tutunnikov, E. Gershnabel, Y. Prior, and I.S. Averbukh; Weizmann Institute of Science, Rehovot, Israel*

We present a novel phenomenon of the long-lasting orientation of symmetric- and asymmetric-top polar molecules by a single short THz pulse.

EE-P.3 THU

Angular Distribution of Different Spectral Components of THz Radiation from Femtosecond Laser Filament in Static Electric Field

•*G. Rizaev[1,2], A. Koribut[2], Y. Grudtsyn[2], D. Pushkarev[2], D. Mokrousova[2], D. Shipilo[2,3], N. Panov[2,3], I. Nikolaeva[2,3], L. Seleznev[2], O. Kosareva[2,3], and A. Ionin[2]; [1]Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russia; [2]P.N. Lebedev Physical Institute of RAS, Moscow, Russia; [3]M.V. Lomonosov Moscow State University, Moscow, Russia*

Angular distributions of the THz radiation generated in a single-color filament in external electric field are studied. It is shown that for low-frequency and high-frequency components of THz radiation the angular distrubutions differ significantly.

EE-P.4 THU

Ultrafast radially-polarized laser beams having spatio-temporal couplings and broken symmetry

•*S. Jolly; Brussels Photonics (B-PHOT), Dept. Of Applied Physics and Photonics, Vrije Universiteit Brussel, Brussels, Belgium*

We present a model showing the properties of tightly-focused ultrashort radially-polarized laser pulses with spatio-temporal couplings and broken cylindrical symmetry. Implications are on strong-field laser-matter interaction including electron acceleration.

EE-P.5 THU

Nonlinear propagation of necklace-shaped beams through gas-filled capillaries to generate few-cycle energetic pulses in the visible

•*A. Crego, J. San Roman, and E. Conejero Jarque; University of Salamanca, Salamanca, Spain*

We obtain numerically 50 μJ ultrashort visible necklace beams by self-phase modulation together with soliton self-compression for different constant pressures in a gas-filled capillary. The robustness of the process to non-ideal beam profiles is discussed.

EE-P.6 THU

Fast response of dual-pulse supercontinuum generation

•*Y. Chu, T. Liu, and H. Guo; Shanghai University, Shanghai, China*

we experimently investigate dual-comb supercontinuum generation in nonlinear waveguides, where a radio frequency comb is introduced and is demonstrated being transferred to the entire continuum, indicating the effect of radio broadcasting in optical frequency domain.

EE-P.7 THU

Valley-dependent Bloch-Siegert shift in monolayer WSe2: transition to the strong-field regime

•*M. Kozák, P. Koutenský, F. Trojánek, and P. Malý; Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic*

Valley-dependent Bloch-Siegert shift of the excitonic resonance in WSe2 monolayer induced by few-cycle midinfrared pulses is observed. We study the transition to the strong-field regime, in which the ponderomotive energy approaches the driving photon energy.

EE-P.8 THU

Optimization of terahertz radiation generation in air by adjusting time delay between the pump pulses

•*D. Buozius, V. Tamuliene, and V. Vaicaitis; Vilnius university laser research center, Vilnius, Lithuania*

Terahertz radiation generation by focused femtosecond laser pulses in air was investigated experimentally and theoretically. The optimal timing between bichromatic pump pulses is shown to strongly depend on the pulse energy.

EE-P.9 THU

Transfer of Direct to Indirect Bound Excitons by Electron Intervalley Scattering in Cs2AgBiBr6 Double Perovskite Nanocrystals

•*A. Dey, A. Richter, T. Debnath, H. Huang, L. Polavarapu, and J. Feldmann; 1Chair for Photonics and Optoelectronics, Nano-Institute, Ludwig Maximilian University , Munich, Germany*

The strong absorption resonance at the optical band edge of Cs2AgBiBr6 nanocrystals originates due to direct bound exciton. The electrons undergo intervalley scattering resulting in the transfer of direct bound exciton to indirect bound exciton.

EE-P.10 THU

Dissection of multipulse laser damage with time resolved digital holography

•*B. Momgaudis, M. Vengris, and A. Melninkaitis; Vilnius University Laser research Center, Vilnius, Lithuania*

In this work experimental study of multipulse optical damage formation is presented. Using time resolved digital holography the response of fused quartz to 20-2500 pulses is mapped in the range of 0-5ps at intermediate energies.

EE-P.11 THU

Instabilities and time dependent polarization in ultrafast erbium doped fiber laser

•*M. López-Ripa[1], B. Alonso[1], S. Jarabo[2], F.J. Salgado-Remacha[2], J.C. Aguado[3], and Í.J. Sola[1]; [1]Grupo de Aplicaciones del Láser y Fotónica (ALF), Departamento de Física Aplicada, University of Salamanca, Salamanca, Spain; [2]Departamento de Física Aplicada, Facultad de Ciencias, Universidad de Zaragoza, Zaragoza, Spain; [3]Grupo de Comunicaciones Ópticas, Escuela Técnica Superior de Ingenieros de Telecomunicación, University of Valladolid, Valladolid, Spain*

We study experimentally a mode-locked pulsed erbium doped fiber laser with an outer amplification stage presenting different regimes of unstable shot-to-shot emission of pulses. In addition, the pulses show time-evolving polarization, which is experimentally characterized.

ROOM 3

10:00 – 11:00

EF-P: EF Poster Session

EF-P.1 THU

Experimental observation of self-symmetrization of two-component localized structures in coherently driven passive Kerr resonators

•*J. Fatome[1,2], G. Xu[2], B. Garbin[3], N. Berti[1], G.-L. Oppo[4], S.G. Murdoch[2], M. Erkintalo[2], and S. Coen[2]; [1]CNRS-Université Bourgogne-Franche-Comté, Dijon, France; [2]The University of Auckland, Auckland, New-Zealand; [3]Université Paris-Saclay C2N, Palaiseau, France; [4]University of Strathclyde, Glasgow, United Kingdom*

We demonstrate how a π-phase shift birefringent defect introduced within a two-component coherently driven passive Kerr resonator leads to flip-flopping dynamics and self-symmetrization, enabling the emergence of spontaneous symmetry-broken localized vectorial structures with unprecedented robustness.

EF-P.2 THU

Spatio-temporal nonlinear dynamics in array of coupled multimode microresonators

•*A. Tusnin, A. Tikan, and T. Kippenberg; Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland*

We theoretically investigate pattern formation and nonlinear dynamics in arrays of coupled multimode optical microresonators. We show the effective two-dimensional nature of the system and examine the arising spatio-temporal modelocking mechanism.

EF-P.3 THU

Mode dynamics during transition into Kerr self-cleaning regime for laser beams propagated in a multimode GRIN fiber

•*M.D. Gervaziev[1,2], I. Zhdanov[1,2], D.S. Kharenko[1,2], E.V. Podivilov[1,2], S.A. Babin[1,2], and S. Wabnitz[1,3]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Institute of Automation and Electrometry SB RAS, Novosibirsk, Russia; [3]DIET, Sapienza University of Rome, Rome, Italy*

Mode decomposition method realized by phase only SLM was investigated numerically to reveal the most critical factors and succesfully applied for the beams emerging from the GRIN multimode fiber in linear and nonlinear regimes.

EF-P.4 THU

Wavelength correlations in a fiber optical parametric oscillator

M. Touil, •R. Becheker, T. Godin, and A. Hideur; CORIA - CNRS - Université de Rouen Normandie - INSA Rouen, Rouen, France

We explore the spectral correlations in a fiber optical parametric oscillator using an original combination of statistical tools including mutual information analysis. We demonstrate, among other results, that such correla-

ROOM 3

tions can be shaped.

EF-P.5 THU

Bichromatic synchronized chaos in driven coupled electro-optomechanical nanoresonators

G. Madiot[1], F. Correia[1], S. Barbay[1], and •R. Braive[2]; [1]Centre de Nanosciences et Nanotechnologies, Palaiseau, France; [2]Université de Paris, Paris, France

In mechanically coupled electrooptomechanical nanocavities, we present an experimental and theoretical investigation of synchronization on the route to chaos and in the chaotic regime at two distinct carrier frequencies referred to as bichromatic chaos.

EF-P.6 THU

New light-matter phase: Asymmetric nonlinear self-consistent grating in alow-Q CW superradiant laser with symmetric Fabry-Perot cavity

•V. Kocharovsky[1], A. Mishin[1], E. Kocharovskaya[1], V. Kukushkin[1], and V. Kocharovsky[1,2]; [1]Institute of Applied Physics, Russian Academy of Science, Nizhny Novgorod, Russia; [2]Department of Physics and Astronomy, Texas A\& M University, College Station, USA

Numerical solution to Maxwell-Bloch equations for a low-Q CW superradiant laser with symmetric Fabry-Perot cavity shows a highly asymmetric grating of polarization and population inversion of active centers accompanied by counter-propagating waves with different amplitudes.

EF-P.7 THU

Spatiotemporal Wave Pattern Stabilization by Graded Dissipation in Multimode Fibers

•V. Kalashnikov[1,2] and S. Wabnitz[1,3]; [1]Dipartimento di Ingegneria dell'Informazione, Elettronica e Telecomunicazioni, Sapienza Universita di Roma, Roma, Italy; [2]Institute of Photonics, Vienna University of Technology, Vienna, Austria; [3]Novosibirsk State University, Novosibirsk, Russia

The dissipation-enhanced mode-cleaning concept is proposed, which could provide a spatiotemporal soliton generation in a multimode fiber laser, mode control in fiber amplifiers, spatial-multiplexing informational networks, and metaphorical modeling of weakly-dissipative quantum systems.

EF-P.8 THU

Coherence study of DSR-like pulses in passively mode-locked fiber lasers

•M. Kemel[1], M. Salhi[1], C. Ciret[1], G. Semaan[1], A. Nady[1,2], and F. Sanchez[1]; [1]Laboratoire de Photonique d'Angers, Université d'Angers, 2 Bd Lavoisier, 49045, Angers, France; [2]Department of Physics, Faculty of science, Beni-Suef University, Beni-Suef, Egypt

To be considered as dissipative soliton resonance (DSR), the square pulses in passively mode-locked fiber lasers must be temporally coherent. Here we study the coherence of ns pulses with Mach-Zehnder and dispersive Fourier transform methods.

EF-P.9 THU

Temporal analogue of the Fresnel diffraction by a phase plate in linear and nonlinear optical fibers

•A. SHEVELEVA and C. FINOT; Laboratoire Interdisciplinaire CARNOT de Bourgogne, DIJON Cedex, France

We investigate evolution of a continuous wave modulated by abrupt temporal phase jumps. Numerical and analytical study of linear propagation replicates near-field diffraction patterns, whereas Kerr nonlinearity stimulates emergence of coherent structures.

EF-P.10 THU

Combinatorial Optimization using the Optical Potts Machine

•M. Honari Latifpour[1,2] and M.-A. Miri[1,2]; [1]Queens College, The City University of New York, New York, USA; [2]Physics Program, The Graduate Center of the City University of New York, New York, USA

We show that networks of phase-tristable optical parametric oscillators simulate the three-state Potts model. A direct simulation of the underlying nonlinear dynamical model provides an efficient path toward combinatorial optimization.

EF-P.11 THU

Statistics of SPM rogue waves

•R.E. Hansen[1], C.R. Petersen[1,2], and O. Bang[1,2,3]; [1]DTU Fotonik, Department of Photonics Engineering, Kgs. Lyngby, Denmark; [2]NORBLIS IVS, Virum, Denmark; [3]NKT Photonics A/S, Birkerød, Denmark

We present the dynamics of the novel normal dispersion SPM rogue wave, including a statistical analysis of it. The SPM rogue wave has interesting applications in mid-IR supercontinuum generation.

EF-P.12 THU

Polarization instabilities in mode-locked Er-doped fiber laser

•S. Sergeyev, H. Kbashi, and V. Sharma; Aston Institute of Photonic Technologies, Birmingham, United Kingdom

For Er-doped fiber laser mode-locked by Nonlinear Polarization Rotation, we present a theoretical analysis of complex polarization dynamics driven by polarization instabilities tunable by changing the synchronization scenario between orthogonal states of polarization.

EF-P.13 THU

Noise suppression through extreme self-phase modulation in cascaded mid-IR supercontinuum generation

•R.E. Hansen[1], C.R. Petersen[1,2], and O. Bang[1,2,3]; [1]DTU Fotonik, Department of Photonics Engineering, Kgs. Lyngby, Denmark; [2]NORBLIS IVS, Virum, Denmark; [3]NKT Photonics A/S, Birkerød, Denmark

Coupling a modulational instability based supercontinuum from a ZBLAN fibre into a highly nonlinear chalcogenide fibre leads to extreme SPM and resulting noise suppression through spectral averaging.

EF-P.14 THU

Stable non-equidistant pulsing patterns in an excitable micropillar laser with delayed optical feedback

•S. Terrien[1], V.A. Pammi[2], B. Krauskopf[1], N.G.R. Broderick[1], and S. Barbay[2]; [1] The Dodd-Walls Centre for Photonic and Quantum Technologies, The University of Auckland, Auckland, Australia; [2]Universite Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, UMR9001, Palaiseau, France

We consider a model of an excitable microlaser with delayed optical feedback, and demonstrate that periodic pulsing solutions corresponding to non-equidistant pulses in the feedback cavity exist and are stable in large regions of the parameters.

EF-P.15 THU

Slow-Light Enhanced Second-Harmonic Generation Using a π-Phase Shifted Moiré Grating in a Quasi-Phased-Matched Medium

•T.E. Maybour, D.H. Smith, and P. Horak; University of Southampton, Southampton, United Kingdom

We investigate the use of a superstructure refractive index grating to enhance nonlinear wavelength conversion in a quasi-phase matched crystal. Our coupled-mode theory predicts significantly increased conversion efficiency in short crystals.

EF-P.16 THU

Optical Bistability Induced by Free Carrier Dispersion in the Silicon Micro-Ring Resonators

•A. Nikitin[1], A. Kondrashov[1], V. Vitko[1], I. Ryabcev[1], G. Zaretskaya[1], A. Ershov[1], D. Konkin[2], A. Kokolov[2], L. Babak[2], and A. Ustinov[1]; [1]St. Petersburg Electrotechnical University "LETI", St. Petersburg, Russia; [2]Tomsk State University of Control Systems and Radioelectronics "TUSUR", Tomsk, Russia

We report on the observation of the carrier-induced optical bistability in the CW silicon micro-ring resonators. The dominant role of the free-carrier effect is confirmed in the framework of an original theory.

ROOM 1

13:30 – 14:30

CJ-P: CJ Poster Session

CJ-P.1 THU

Self-Healing Properties of Fibre Laser Petal-like Beams

•J. Chan[1], N. Vukovic[1], C. Codemard[2], and M. Zervas[1]; [1]Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom; [2]TRUMPF Laser UK, Hedge End, Southampton, United Kingdom

We report on the experimental investigation of self-healing properties of petal-like beams from a kW-class singlemode output from a multimode delivery fibre with adjustable beam profile. The degree of self-healing depends on the blocking arrangement.

CJ-P.2 THU

Highly efficient watt-level single frequency 461 nm laser

•S. Vidal[1], C.-H. Feng[2], B. Desruelle[3], G. Santarelli[2], P. Bouyer[2], A. Bertoldi[2], and J. Boullet[1]; [1]ALPhANOV, TALENCE, France; [2]LP2N, TALENCE, France; [3]MUQUANS, TALENCE, France

A CW laser at 461 nm is generated by frequency doubling an amplified diode laser with a resonant cavity. The best conversion efficiency achieved is 87% which gives more than 1 W at 461 nm.

CJ-P.3 THU

Analytical Modelling of Nested-Ring Thulium-Doped Fibre Lasers

•M.J. Barber, P.C. Shardlow, and W.A. Clarkson; Opto-

electronics Research Centre, Southampton, United Kingdom

An analytical model is presented for exploring nested-ring Tm fibre laser dopant profiles that are able to reduce the gain differential between short and long wavelengths and allow greater access to the short wavelength regime.

CJ-P.4 THU

Experimental study of the pump configuration's impact on gain-managed nonlinear amplification in an Yb-doped fiber amplifier

•*C. Krook, R. Lindberg, and V. Pasiskevicius; 1. Department of Applied Physics, Royal Institute of Technology, 10691 Stockholm, Sweden*

We present an experimental comparison of a gain-managed nonlinear amplifier operated under co- and counter-pumped configurations. Our results indicate that compressed pulses from co-/counter-pumped configurations are shorter/have more energy contained in the main peak.

CJ-P.5 THU

Self-Selection of the Out-of-Phase Supermode in an All-Solid Large Mode Area Multicore Fiber Laser

•*Y. Greenberg*[1], *A. Ishaaya*[1], *and S. Yoo*[2]; [1]*Ben-Gurion University of the Negev, Beer Sheva, Israel*; [2]*Nanyang Technological University, Singapore, Singapore*

We present the detailed numerical analysis and design, as well as an experimental demonstration of out-of-phase mode selection and its power scaling in an all-solid 6-core Yb-doped large-mode-area multi-core fiber laser.

CJ-P.6 THU

Dispersion Compensating Ring Fibre in the C-Band for OAM Mode

•*W. Zhao*[1], *X. Han*[1], *W. Geng*[1], *Y. Wang*[1], *Y. Fang*[1], *C. Bao*[2], *Z. Wang*[1], *Y.-g. Liu*[1], *Y. Ren*[2], *Z. Pan*[3], *and Y. Yue*[1]; [1]*Institute of Modern Optics, Nankai University, Tianjin, China*; [2]*Department of Electrical Engineering, University of Southern California, Los Angeles, USA*; [3]*Department of Electrical & Computer Engineering, University of Louisiana at Lafayette, Lafayette, USA*

We propose and design a ring-shaped polycyclic dispersion compensating fiber for OAM mode. At 1550 nm, a -18.248-ps/(nm·km) negative dispersion with a slope of -0.1635 ps/(nm2·km) for OAM1,1 mode is achieved within the C band.

CJ-P.7 THU

Control of multi-soliton generation in fiber 8-figure laser by tunable spectral filtering

A. Kokhanovskiy[1], •*E. Kuprikov*[1], *K. Serebrennikov*[1], *and S. Turitsyn*[1,2]; [1]*Novosibirsk State University, Novosibirsk, Russia*; [2]*Aston Institute of Photonic Technologies, Birmingham, United Kingdom*

We demonstrate switching between different multi-solitons regimes in figure of eight laser with tunable spectral filtration. Laser provides adjustment a number of bounded solitons up to 18, conditions of soliton molecules generation is also considered.

CJ-P.8 THU

Distributed temperature measurements in holmium-doped fiber lasers

V. Kamynin[1], *A. Wolf*[2], *M. Skvortsov*[2], •*S. Filatova*[1], *M. Kopyeva*[1,3], *V. Tsvetkov*[1], *and S. Babin*[2]; [1]*Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia*; [2]*Institute of Automation and Electrometry of the SB RAS, Novosibirsk, Russia*; [3]*Peoples' Friendship University of Russia, RUDN University, Moscow, Russia*

Distributed temperature measurements in holmium fiber lasers are demonstrated. It is shown that in Ho-doped fiber lasers pumped at 1.125 μm, temperature difference at different parts of fiber reached more than 30 $^{\circ}$C.

CJ-P.9 THU

The contribution has been withdrawn.

CJ-P.10 THU

Selective Excitation of Fundamental Mode in Fusion Spliced Antiresonant Hollow-Core Fiber

C. Goel[1], *M.R.A. Hassan*[2], *W. Chang*[2], *and* •*S. Yoo*[2]; [1]*The Photonics Institute, Nanyang Technological University, Singapore, Singapore*; [2]*School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, Singapore*

We demonstrate selective excitation of fundamental mode with 90.8% coupling efficiency, in a tapered antiresonant hollow-core fiber fusion spliced with a large mode area commercial solid core fiber at 1 μm wavelength.

CJ-P.11 THU

A triple cladding fiber for pulse stretching

•*K. Bobkov and M. Likhachev; Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Moscow, Russia*

We demonstrate an optimized triple cladding fiber for ultrashort pulses stretching. Optimization allowed a reduction of a complexity of the fiber production and an increase of the nonlinear effects threshold.

CJ-P.12 THU

Extrinsic Fabry-Perot interferometer with supermode interference

•*M.d.C. Alonso-Murias*[1], *D. Monzón-Hernandez*[1], *E. Antonio-Lopez*[2], *A. Schülzgen*[2], *R. Amezcua-Correa*[2], *and J. Villatoro*[3,4]; [1]*Centro de Investigaciones en Óptica A. C., Loma del Bosque 115 C. P. 37150, León, México*; [2]*CREOL The College of Optics and Photonics, University of Central Florida, Orlando, 162700, Florida, USA*; [3]*Department of Communications Engineering, University of the Basque Country, 48013, Bilbao, Spain*; [4]*Ikerbasque-Basque Foundation for Science, E-48011, Bilbao, Spain*

We proposed and demonstrated a novel extrinsic fiber Fabry Perot interferometer build with a strongly coupled multicore fiber. The extrinsic Fabry Perot can exhibit an interference pattern with a cavity length up to 20 mm.

CJ-P.13 THU

New Method for Generation of a Specific Number of Pulses per Bunch in Yb-doped All-PM-Fibre Laser

A. Ivanenko[1], *B. Nyushkov*[1,2], *S. Smirnov*[1], *and* •*S. Kobtsev*[1]; [1]*Novosibirsk State University, Novosibirsk, Russia*; [2]*Novosibirsk State Technical University, Novosibirsk, Russia*

We present a new method for obtaining variable pulse bunches in synchronously-pumped Yb-fibre lasers by controlling small detuning between rates of pumping and output pulses. We show its advantages, prospects, and possibilities of electronic control.

CJ-P.14 THU

Dispersion-tailoring of a NALM-based all-PM Er-doped femtosecond fiber laser

•*Z. Łaszczych and G. Soboń; Laser & Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland*

In this work, dispersion management of a NALM-based Er-doped fiber laser is experimentally investigated. Continuously adjustable net dispersion and flexible phase bias support the usefulness of demonstrated setup as an optimization testbed of ultrafast laser systems.

CJ-P.15 THU

125 μJ ultra-short pulses delivered by a PM Yb-doped tapered fiber amplifier

•*S. Boivinet*[1], *A. Gognau*[1], *A. Baylón-Fuentes*[2], *Y. Hernandez*[1], *and J.-B. Lecourt*[1]; [1]*Multitel, Mons, Belgium*; [2]*Euro-Multitel, Mons, Belgium*

A chirped pulse amplification architecture using a PM Yb-doped tapered fiber with an output diameter of 56 μm is reported. This fiber laser delivers pulses with 125 μJ energy and 1 ps duration.

CJ-P.16 THU

Pulsed operation of Random Distributed Feedback Raman Fiber Laser with Varying Repetition Rate Through Self-gain-modulation

N. Tarasov[1], *L. Melnikov*[2], •*I. Vatnik*[3], *Y. Mazhirina*[2], *and D. Churkin*[3]; [1]*Aston University, Birmingham, United Kingdom*; [2]*Saratov State Technical University, Saratov, Russia*; [3]*Novosibirsk State University, Novosibirsk, Russia*

We experimentally demonstrate that random fiber laser can be operated in pulsed regime via self-gain-switching with varying repetition rate depening on power and laser length and being proportional to an odd integer number.

CJ-P.17 THU

Side Pump Combiner Fabrication on a Photonic Crystal Fiber in (1 + 1) x 1 Configuration

•*Y. Midilli, B. Şimşek, and B. Ortaç; Bilkent University – UNAM National Nanotechnology Research Center and Institute of Materials Science and Nanotechnology, Ankara, Turkey*

A side pump combiner has been fabricated in a (1 + 1) x 1 configuration for the first time on a photonic crystal fiber with a pump efficiency of 84%.

CJ-P.18 THU

Demonstration of a Novel Cladding Light Stripper Fabrication Method Based On Poly (Chloro-P-Xylene) Polymer Material

•*Y. Midilli*[1], *G. Liman*[2], *G. Demirel*[2], *and B. Ortaç*[1]; [1]*Bilkent University – UNAM National Nanotechnology Research Center and Institute of Materials Science and Nanotechnology, Ankara, Turkey*; [2]*Bio-inspired Materials Research Laboratory (BIMREL), Department of Chemistry, Faculty of Science, Gazi University, Ankara, Turkey*

Poly (chloro-p-xylene) [PPX] polymer material has been coated onto the fiber samples in a controlled manner on the order of nm scale to fabricate cladding light stripper by chemical vapor deposition technique.

CJ-P.19 THU

Bend Insensitive W-type Single Mode Fiber with 30μm Mode Field Diameter

•*V. Ustimchik*[1], *D. Saharovs*[2], *A. Grishchenko*[2], *Y. Chamorovskii*[3], *and V. Filippov*[1]; [1]*Ampliconyx Ltd, Tampere, Finland*; [2]*Ceram Optec SIA, Livani, Latvia*; [3]*Fryazino branch of Kotel'nikov Institute of Radio Engineering and Electronics, Fryazino, Moscow region, Russia*

Bend insensitive LMA W-fiber was manufactured with 40 μm core diameter (NA=0.03, M2=1.11). Transfer efficiency of the fundamental mode reached 88% through 5 m of the fiber. Attenuation, measured using cut-back method is <0.023 dB/m.

CJ-P.20 THU

The contribution has been withdrawn.

13:30 – 14:30

CK-P: CK Poster Session

CK-P.1 THU

Fabricating WSi based superconducting mircowire single photon detectors with laser lithography

•*M. Protte[1], V.B. Verma[2], J.P. Höpker[1], R.P. Mirin[2], S.W. Nam[2], and T.J. Bartley[1]; [1]Department of Physics, Paderborn University, Paderborn, Germany; [2]National Institute of Standards and Technology, Boulder, USA*

Laser lithography is a versatile tool for developing large-scale integrated optical structures. We show that it is also capable of structuring SNSPDs with saturated internal detection efficiency.

CK-P.2 THU

Fabrication tolerance impact on BIC metasurface resonances

•*J. Kühne[1], T. Weber[1], L. Kühner[1], J. Wang[1], S.A. Maier[1,2], and A. Tittl[1]; [1]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Munich, Germany; [2]The Blackett Laboratory, London, United Kingdom*

We numerically and experimentally investigate the impact of fabrication tolerance on the resonance quality of different bound state in the continuum resonator geometries, revealing crucial design guidelines for robust and high-performance BIC-based metasurface applications.

CK-P.3 THU

Fano Resonances in Nanostructured Thin Films

L. Grineviciute[1,2], C. Babayigit[2,3], J. Nikitina[1,2], and •*K. Staliunas[2,4,5]; [1]Center for Physical Sciences and Technology, Vilnius, Lithuania; [2]Laser Research Center, Vilnius University, Vilnius, Lithuania; [3]Department of Electrical and Electronic Engineering, TOBB University of Economics and Technology, Ankara, Turkey; [4]Institució Catalana de Recerca i Estudis Avancats (ICREA), Barcelona, Spain; [5]Universitat Politècnica de Catalunya (UPC), Barcelona, Spain*

We design and fabricate nano-modulated thin films, which, due to Fano resonances with its planar modes, show sharp (angle, wavelength) dependences of transmission. Ideal for a compact spatial and frequency filtering.

CK-P.4 THU

Adiabatic Waveguide Taper Profile Optimization on Al2O3/Si Platform for Polarization Insensitive Fiber-to-Chip Light Coupling

•*C. Ozcan, J.S. Aitchison, and M. Mojahedi; Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada*

Optimization of inverse taper profiles were performed on an augmented low index waveguide for fiber-to-chip light coupling. The optimized polynomial taper profiles yielded only 0.3 dB loss at 250 μm length with no polarization dependence.

CK-P.5 THU

Fast laser induced phase change of Bismuth based random metasurfaces for tunable photonics

M. Alvarez, M. García-Pardo, F. Cabello, J. Toudert, E. Haro-Poniatowski, •*R. Serna, and J. Siegel; Laser Processing Group, Instituto de Óptica, IO-CSIC, Madrid, Spain*

We characterize the dynamic visible optical response of a bismuth-based metasurface in the visible upon nanosecond laser excitation. We demonstrate a tunable switching window in the 10-100ns range and its stability for >10.000 cycles.

CK-P.6 THU

Tunable Polarization Insensitive CMOS Compatible Graphene/Si Guided Mode Resonance Active Filter

•*P. Sharma[1], E. Lampadariou[2], S. Doukas[2], E. Lidorikis[2], and I. Goykhman[1]; [1]Technion-Israel Institute of Technology, Haifa, Israel; [2]University of Ioannina, Ioannina, Greece*

We propose and investigate polarization insensitive graphene/Si tunable guided-mode resonance filters operating at telecom wavelengths, which offers narrow resonances of 1nm and an extinction ratio of (>10 dB) for reflection and spectral tuning respectively.

CK-P.7 THU

Effect of Thermal Crosstalk on Travelling-wave Mach-Zehnder Modulator

•*S. De[1,2], R. Das[1], T. Kleine-Ostmann[2], and T. Schneider[1]; [1]Technische Universität Braunschweig, Braunschweig, Germany; [2]PTB Braunschweig, Braunschweig, Germany*

A deep trench assisted travelling wave Mach-Zehnder modulator with improved bandwidth is proposed for effective shielding from the thermal crosstalk. Subsequently, we obtained a better bit error rate performance for the modified design.

CK-P.8 THU

Gap solitons supported by mode hybridisation in Lithium Niobate nano-waveguides

•*W.R. Rowe[1], A.V. Gorbach[1], H. Fergestad[2], K. Gallo[2], and D.V. Skryabin[1]; [1]Centre for Photonics and Photonic Materials, Department of Physics, University of Bath, Bath, United Kingdom; [2]Department of Applied Physics, KTH Royal Institute of Technology, Stockholm, Sweden*

We investigate a system of one fundamental frequency and two hybridised second harmonic modes in Lithium Niobate nano-waveguides. We find three-component solitons exist with their spectrum in the gap of the hybridised second harmonic modes.

CK-P.9 THU

Toward optical circuits using tweezers position-control.

S. Kreps[1], M. Douvidzon[1], B. Bathish[1], T. Lekiewicz Abudi[1], V. Shuvayev[2], L. Deych[2], and •*T. Carmon[3]; [1]Technion Institute of Technology, Haifa, Israel; [2]City University of New York, New York, USA; [3]Tel Aviv University, Tel Aviv, Israel*

We experimentally demonstrate optical circuits composed of several spherical-resonators that their position is controlled with optical tweezers. The resonance structure and spectral distribution are measured and compared with the numerical and analytical Mie theory.

CK-P.10 THU

Modeling and Fabrication of an Antireflection Microstructure on an AgClBr Fiber by Single-pulse Femtosecond Laser Ablation

M. Tarabrin[1,2,3], •*A. Bushunov[1,3], A. Teslenko[1,3], V. Lazarev[1], T. Sakharova[4], J. Hinkel[4,5], I. Usenov[4,6], T. Doehler[5], U. Geissler[5], and V. Artyushenko[4]; [1]Bauman Moscow State Technical University, Moscow, Russia; [2]P. N. Lebedev Physical Institute of the Russian Academy of Sciences, Novosibirsk, Russia; [3]Novosibirsk State University, Novosibirsk, Russia; [4]Art Photonics GmbH, Berlin, Germany; [5]Technical University of Applied Science Wildau, Wildau, Germany; [6]Technische Universität Berlin, Berlin, Germany*

AgClBr fiber end face transmittance of 92.8% at 10.6 um and an average transmittance of 91.8% in the 7-14 um range were achieved by single-pulse femtosecond laser ablation.

CK-P.11 THU

Thermal Self-stabilisation of a Microcavity on the Surface of an Optical Fibre with Active Core

•*D. Kudashkin[1], D. Krisanov[1], S. Khorev[2], D. Churkin[1], and I. Vatnik[1]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Zecotek Photonics, Inc., Richmond, Canada*

We propose a technique for thermal tuning and thermal self-stabilisation of cylindrical microresonators formed on the surface of optical fibres. The method is based on launching light into the fiber core with strong absorption.

CK-P.12 THU

Stimulated Brillouin Scattering on AlGaAs on Sapphire platform

•*H.K. Sahoo, Y. Zheng, C. Kim, M. Galili, K. Yvind, L.K. Oxenløwe, M. Pu, and H. Hu; Department of Photonics Engineering, Technical University of Denmark, Kongens Lyngby, Denmark*

We propose and demonstrate on-chip stimulated Brillouin scattering (SBS) on the AlGaAs on sapphire platform, which can simultaneously confine optical and acoustic waves. High Brillouin gain is achieved using longitudinal acoustic mode without suspended structures.

CK-P.13 THU

Position dependence of local density of states in 3D band gap of a finite photonic crystal

•*C.P. Mavidis[1,2], A.C. Tasolamprou[2], S.B. Hasan[3,6], T. Koschny[4], E.N. Economou[2,5], M. Kafesaki[1,2], C.M. Soukoulis[2,4], and W.L. Vos[3]; [1]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [2]Institute of Electronic Structure and Laser, Foundation for Research and Technology Hellas, Heraklion, Greece; [3]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [4]Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa, USA; [5]Department of Physics, University of Crete, Heraklion, Greece; [6]Current address: ASML Netherlands B.V., , Veldhoven, Netherlands*

We investigate the local density of states in 3D woodpile finite photonic crystals. We find exponential decay of the LDOS from the crystal's surface to the center and show large inhibitions for small crystals.

CK-P.14 THU

Study of dye local photo-bleaching obtained by UV lithography for photonics applications

•*A. Gassenq, K. Chevrier, A. Bard, J.-M. Benoit, C. Symonds, and J. Bellessa; Univ Lyon, Institut Lumière Matière, UMR5306, LYON, France*

In this work, we have studied local photo-bleaching to modulate the refractive index of TDBC dye layers only over a limited wavelength range and spatial region for wavelength selective optical grating fabrication.

CK-P.15 THU

Thermally reconfigurable loss in a passive optical cavity

•*A. Dash, V. Mere, S.K. Selvaraja, and A.K. Naik; Indian Institute of Science, Bangalore, India*

We demonstrate thermo-optic tuning of the quality factor from 3000 to 10000 and extinction ratio from ≈ 0 dB to 25 dB in a passive silicon micro-ring resonator. This work opens several possibilities for reconfigurable photonics.

CK-P.16 THU

Nanostructured multilayer optical coatings for angular filtering of light

•*L. Grineviciute[1], C. Babayigit[2], D. Gailevičius[3,4], M.*

ROOM 2

Peckus[3,4], M. Turduev[5], T. Tolenis[1], M. Vengris[3], H. Kurt[2], and K. Staliunas[3,6,7]; [1]Center for Physical Sciences and Technology, Vilnius, Lithuania; [2]TOBB University of Economics and Technology, Ankara, Turkey; [3]Vilnius University, Vilnius, Lithuania; [4]Femtika, Vilnius, Lithuania; [5]TED University, Ankara, Turkey; [6]ICREA, Barcelona, Spain; [7]UPC, Dep. de Fisica, Barcelona, Spain

In this study, we propose a possibility to create 2D photonic crystal based on nanostructured multilayer coating and demonstrate a conceptually novel mechanism of spatial filtering in the near-field domain.

CK-P.17 THU

Generalized Lorenz-Mie theory of complex source vortex beams

•*J. Berškys and S. Orlov*; *State research institute Center for Physical Sciences and Technology, Vilnius, Lithuania*

We present a generalized Lorenz-Mie theory of complex source vector vortex beams and employ it to investigate the interaction with nanoparticles and a cluster made out of them.

CK-P.18 THU

The contribution has been withdrawn.

CK-P.19 THU

Design and control of NxN microphotonics switch array based on non-adiabatic theory

•*A. Sheveleva, C. Finot, and P. Colman*; *Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR CNRS 6303, Universite de Bourgogne Franche-Comte, Dijon, France*

Weak modulation of the propagation parameters is sufficient to control the flow of light within a densely packed array of waveguides. The modulation must obey strict selection rules that make this non-adiabatic technique robust.

CK-P.20 THU

High performance optical interference filters fabrication using automatically optimized optical monitoring strategy

•*J. Zideluns[1], F. Lemarchand[1], D. Arhilger[2], H. Hagedorn[2], and J. Lumeau[1]; [1]Institut Fresnel, Marseille, France; [2]Bühler Leybold Optics, Alzenau, Germany*

The fabrication of high performance optical interference filters is demonstrated. We present a novel optical monitoring method based on optimized optical monitoring wavelength. Various filters are used to illustrate the method.

CK-P.21 THU

Optical spatial differentiation with suspended subwavelength gratings

•*A.A. Darki[1], A. Parthenopoulos[1], B.R. Jeppesen[2], J.V. Nygaard[3], and A. Dantan[1]; [1]Department of Physics and Astronomy, Aarhus University, Aarhus, Denmark; [2]Interdisciplinary Nanoscience Center (iNano), Aarhus University, Aarhus, Denmark; [3]Department of Engineering, Aarhus University, Aarhus, Denmark*

We noninvasively characterize the profile of large-area subwavelength gratings directly patterned on suspended silicon nitride membranes and demonstrate high-quality first- and second-order spatial differentiation of the transverse profile of an optical beam using guided-mode resonance.

CK-P.22 THU

The contribution has been withdrawn.

ROOM 3

13:30 – 14:30

CL-P: CL Poster Session

CL-P.1 THU

Ultrafast laser induced cavitation bubbles in water in the presence of optical aberrations

A. Aguilar[1], A. Bernard[1], A. De Saint-Jean[1], E. Baubeau[1], D. Decq[1], A. Bertail[1], and •C. Mauclair[1,2]; [1]Keranova, Saint Etienne, France; [2]Laboratoire Hubert Curien, UMR 5516 CNRS, Université de Lyon, Université Jean Monnet, Saint Etienne, France

We study ultrafast laser induced cavitation bubbles in water in the presence of controlled aberrations. Deterioration of the laser intensity distribution and the cavitation amplitude is observed and compared for different aberrations via time-resolved imaging.

CL-P.2 THU

Comparison of Continuous Wave and Ultrashort Pulsed Holmium-doped Fiber Lasers Exposure on Ex-vivo Tissue

•*M.S. Kopyeva[1,2], S.A. Filatova[1], V.A. Kamynin[1], T.K. Chekhlova[1,2], and V.B. Tsvetkov[1]; [1]Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow, Russia; [2]Peoples' Friendship University of Russia, Moscow, Russia*

We compared the ablation of ex-vivo tissues by holmium-doped fiber lasers operating in continuous wave and ultrashort pulsed modes. The relation between the laser systems parameters and ablation results was considered.

CL-P.3 THU

Technologies for microfluidic devices fabrication: laser ablation vs stereolithography

•*B. Carnero, A.I. Gomez-Varela, C. Bao-Varela, and M.T. Flores-Arias*; *Faculty of Physics, Universidade de Santiago de Compostela, Santiago de Compostela, Spain*

Optical technologies have proven their versatility to manufacture microfluidic devices . Laser-based techniques have recently appeared, capable of overcoming the complexity and waste production of photolithography. We analyse two laser-based technologies for microfluidics applications: laser ablation and stereolithography.

CL-P.4 THU

Biocompatibility analysis of thermal and UV-curable polydimethylsiloxane for semi blood vessel-like model fabrication

A.I. Gómez-Varela[1], •B. Carnero[1], E. Álvarez[2,3], M.T. Flores-Arias[1], and M.d.C. Bao-Varela[1]; [1]Universidade de Santiago de Compostela, Facultade de Física e Facultade de Óptica e OPtometría , Santiago de Compostela, Spain; [2]Universidade de Santiago de Compostela, Facultade de Farmacia, Santiago de Compostela, Spain; [3]Centro de Investigacion Biomedica en Red de Enfermedades Cardiovasculares (CIBERCV), Madrid, Spain

UV-curable PDMS as an alternative to thermal curing PDMS for fabricating blood vessel-like devices is presented. Its biocompatibility is analyzed seeding human umbilical vein endothelial cells (HUVECs). Results close to thermal curing PDMS are obtained.

CL-P.5 THU

Theoretical and experimental study of the vector beams generated with an axicon pair and uniaxial crystals

•*A. Craciun[1,2], O. Grigore[1], and T. Dascalu[1]; [1]National Institute for Laser, Plasma and Radiation Physics, Laboratory of Solid-State Quantum Electronics, Atomistilor 409, Magurele 077125, Romania; [2]Doctoral School of Physics, University of Bucharest, Atomistilor 405, Magurele 077125, Romania*

We analyze the polarization state and the transversal distribution in the focal plane for various configurations of vector beams. The set-up presented herein allows the modification of the focal shape by changing the input polarization.

CL-P.6 THU

Density Functional Theory Modelled Absorption and Raman Spectra Applicable to Ergocalciferol (Vitamin D2) and Cholecalciferol (D3)

•*O. Balcers[1], U. Miranda[2], and R. Veilande[2]; [1]Vidzeme University of Applied Sciences, Valmiera, Latvia; [2]Institute of Atomic Physics and Spectroscopy, University of Latvia, Riga, Latvia*

The modelled spectrum of vitamin D2 and D3 using the density functional theory of absorption and Raman spectra are presented and the comparison with measurement of commercially obtained vitamin D2 and D3 are done.

CL-P.7 THU

Assessment of the diagnostic effectiveness of terahertz radiation in oral soft tissue lesions

•*A. Atalar[1], M. Gelgeç[1], H. Altan[1], E. Barış[2], K. Kamburoğlu[3], E.E. Çakmak[3], and N. Eratam[3]; [1]Middle East Technical University, Ankara, Turkey; [2]Gazi University, Ankara, Turkey; [3]Ankara University, Ankara, Turkey*

Measurements show that the utilization of THz attenuated total internal reflection spectroscopy can be more advantageous in detecting oral soft tissue lesions as a non-invasive diagnostic tool. The effectiveness of this system will be investigated.

CL-P.8 THU

Correlating microbial bioluminescence to the different phases of growth using a 2004 nm VCSEL-based 2f wavelength modulation spectroscopy

Z. A S, •A.L. Chakraborty, and S. Khatua; *IIT Gandhinagar, Gandhinagar, India*

Microbial bioluminescence from Photobacterium leiognathi is recorded simultaneously with the mole fraction of metabolic carbon dioxide that was extracted using a VCSEL-based 2f WMS technique to reveal strong correlation between bioluminescence and cell concentration.

ROOM 1

8:30 – 10:00

JSI-4: Optophononic and Optothermal Characterization and Techniques

Chair: Jose Ordonez, The University of Tokyo, Japan

JSI-4.1 FRI (Invited) 8:30

Surface phonon polariton: the 4th heat carrier in SiN nanofilms

•M. Nomura, Y. Wu, J. Ordonez-Miranda, R. Anufriev, and S. Volz; The University of Tokyo, Tokyo, Japan

We demonstrate that surface phonon polaritons can be the dominant thermal energy carriers in SiN nanofilms. Their contribution becomes larger in thinner films and at higher temperatures, where phonons' contribution becomes less.

ROOM 2

8:30 – 10:00

CC-6: THz Devices and Communications

Chair: Karl Unterrainer, Technical University Vienna, Austria

CC-6.1 FRI (Invited) 8:30

Towards 6G communications with terahertz on-chip topological photonics

Y. Yang[1], Y. Yamagami[2], X. Yu[2], P. Pitchappa[1], J. Webber[2], B. Zhang[1], G. Docournou[3], M. Fujita[2], T. Nagatsuma[2], and •R. Singh[1]; [1]Nanyang Technological University, Singapore, Singapore; [2]Osaka University, Osaka, Japan; [3]University of Lille, Lille, France

We present Valley Hall topological waveguides that support the transport of terahertz waves through sharp corners without any loss. Such interconnects are ideal for the realization of sixth-generation (6G) communication which will rely heavily on terahertz on/ off-chip wave management.

ROOM 3

8:30 – 10:00

CG-6: Lasers and High-Order Harmonic Generation

Chair: Laszlo Veisz, Umeå University, Umeå, Sweden

CG-6.1 FRI 8:30

Wavelength-tunable few-cycle mid-infrared laser pulses from frequency domain optical parametric amplification

•G. Dalla-Barba[1,2], P. Lassonde[1], G. Jargot[1], E. Haddad[1], A. Laramée[1], A. Leblanc[3], H. Ibrahim[1], E. Cormier[2,4], and F. Légaré[1]; [1]Institut National de la Recherche Scientifique, centre EMT, Varennes, Canada; [2]Laboratoire Photonique Numérique et Nanosciences, UMR 5298, Talence, France; [3]Laboratoire d'Optique Appliquée, UMR 7639, Palaiseau, France; [4]Institut Universitaire de France, Paris, France

We report on a toolbox for both generation and characterization of 20 μJ mid-infrared few-cycle pulses tunable from 5.6 μm to 13.5 μm with pulse durations ranging from 6.4 to 1.3 optical cycles.

CG-6.2 FRI 8:45

Optimization of Optical Parametric Chirped-pulse Amplification

•P. Fischer[1], A. Muschet[1], T. Lang[2], R. Salh[1], and L. Veisz[1]; [1]Department of Physics, Umeå University, Umea, Sweden; [2]2. Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

ROOM 4

8:30 – 10:00

CJ-7: Mid-IR Fiber Laser Sources and Components

Chair: Bülend Ortaç, Bilkent University - UNAM, Bilkent, Turkey

CJ-7.1 FRI 8:30

Picosecond Pulse Generation from a Wavelength Tunable Er:ZBLAN Mid-Infrared Fiber Laser

•M. Pawliszewska[1,2], M.R. Majewski[2], and S.D. Jackson[2]; [1]Laser & Fiber Electronics Group, Faculty of Electronics, Wrocław University of Science and Technology, Wrocław, Poland; [2]MQ Photonics Research Centre, Faculty of Science and Engineering, Macquarie University, Sydney, Australia

We report on a mid-infrared erbium ZBLAN fiber laser mode-locked with frequency shifted feedback. The generated pulses exhibited a minimum pulse duration of 21 ps in 2.7 - 2.8 μm wavelength range.

CJ-7.2 FRI 8:45

1725nm all-fiber SWIR CW laser using W-type Tm:Ge doped fiber

R. Sidharthan, S. Chen, Y. Chen, C.J. Chang, and •S. Yoo; Nanyang Technological University, Singapore, Singapore

We report a all-fiber CW laser operating at 1725nm using a W-type Tm:Ge fiber, where wavelength se-

ROOM 5

8:30 – 10:00

EA-7: Quantum Interferences

Chair: Nina Amelie Lange, Paderborn University, Paderborn, Germany

EA-7.1 FRI 8:30

Quantum optical coherence: From linear to nonlinear interferometers

•K.-H. Luo[1], M. Santandrea[1], M. Stefszky[1], J. Sperling[1], M. Massaro[1], A. Ferreri[2], P.R. Sharapova[2], H. Herrmann[1], and C. Silberhorn[1]; [1]Integrated Quantum Optics Group, Institute for Photonic Quantum Systems (PhoQS), Paderborn University, Paderborn, Germany; [2]Department of Physics and CeOPP, Paderborn University, Paderborn, Germany

We report on results from linear, semi-nonlinear and nonlinear interferometric systems, elucidating the unique first-order classical and second-order quantum coherence properties between them.

EA-7.2 FRI 8:45

Anti Hong-Ou-Mandel Interference with a Dissipative Beamsplitter

•A.N. Vetlugin[1], R. Guo[1], C. Soci[1], and N.I. Zheludev[1,2]; [1]Nanyang Technological University, Singapore, Singapore; [2]University of Southampton, Southampton, United Kingdom

We experimentally demonstrate for

ROOM 6

8:30 – 10:00

EB-9: Quantum Tomography and State Estimation

Chair: Fabio Sciarrino, Sapienza Università di Roma, Rome, Italy

EB-9.1 FRI 8:30

Robust and Efficient High-Dimensional Quantum State Tomography

•M. Rambach[1,2], M. Qaryan[1,2], M. Kewming[1,2], C. Ferrie[3], A.G. White[1,2], and J. Romero[1,2]; [1]Australian Research Council Centre of Excellence for Engineered Quantum Systems, Brisbane, Australia; [2]School of Mathematics and Physics, University of Queensland, Brisbane, Australia; [3]Centre for Quantum Software and Information, University of Technology Sydney, Sydney, Australia

We experimentally demonstrate self-guided quantum tomography, a technique that is robust, precise, and efficient, overcoming limitations of standard tomography. It works naturally on multiple qubits and qudits, pure and mixed states, and any physical system.

EB-9.2 FRI 8:45

Randomized Compressive State Tomography with No A-priori Information Using a Quantum Pulse Gate in Time and Frequency

•J. Gil-Lopez[1], S. De[1], B. Brecht[1], Y.S. Teo[2], H. Jeong[2], L.L. Sanchez-Soto[3,4], and C. Silberhorn[1]; [1]Integrated Quantum Optics Group, Institute for Photonic Quantum

ROOM 7

8:30 – 10:00

EF-8: Dissipative Solitons II

Chair: Svetlana Gurevich, University of Münster, Münster, Germany

EF-8.1 FRI 8:30

Spectral soliton complex with asymmetric dispersion

J.P. Lourdesamy[1], J. Widjadja[1], •A.F.J. Runge[1], T.J. Alexander[1], and C.M. de Sterke[1,2]; [1]Institute of Photonics and Optical Science, School of Physics, The University of Sydney, Sydney, Australia; [2]The University of Sydney Nano Institute , Sydney, Australia

We experimentally observe soliton complexes formed by two fundamental solitons centred at different frequencies, but with identical group velocities, from a dispersion-managed fibre laser. An asymmetric dispersion leads to spectral asymmetry and non-trivial phase ramps.

EF-8.2 FRI 8:45

Higher dimensional oscillations of soliton molecules in ultrafast fiber laser

•P. Colman, A. Coillet, S. Hamdi, P. Tchofo-Dinda, and P. Grelu; ICB Laboratory, Universite Bourgogne-Franche-Comte, Dijon, France

We observed experimentally a periodic energy exchange between soli-

ROOM 8

8:30 – 10:00

CK-7: Photonic Crystals

Chair: Giovanna Calo, Politecnico di Bari, Bari, Italy

CK-7.1 FRI 8:30

Design and Realization of a Three-dimensional Dielectric Zero-Index Metamaterial based on Steiner Tree Networks

•H. Yu, Q. Zhang, and M. Gu; University of Shanghai for Science and Technology, Shanghai, China

A 3D dielectric Zero-Index-Medium (ZIM) based on Steiner tree networks is proposed and demonstrated, which provides a 3D platform to study properties of Dirac-like cone and realization of ZIM with ultra-low loss at optical frequency.

CK-7.2 FRI 8:45

Enhanced design strategy for Mesoscopic Self-Collimation

•S.I. Flores Esparza, A. Monmayrant, O. Gauthier-Lafaye, and D. Gauchard; C.N.R.S; LAAS, Toulouse, France

Mesoscopic photonic crystals combine reflectivity control and self-collimation. We show that pri-

ROOM 9

8:30 – 10:00

EG-7: Electron-light Interactions

Chair: Kirsten Moselund, IBM Research Europe, Zurich, Switzerland

EG-7.1 FRI 8:30

Continuous-wave electron-light interaction in high-Q whispering gallery microresonators

•J.-W. Henke[1], A.S. Raja[2], A. Feist[1], J. Liu[2], G. Arend[1], G. Huang[2], F.J. Kappert[1], R.N. Wang[2], J. Pan[2], O. Kfir[1,3], C. Ropers[1,3], and T.J. Kippenberg[2]; [1]4th Physical Institute - Solids and Nanostructures, University of Göttingen, 37077 Göttingen, Germany; [2]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), CH-1015 Lausanne, Switzerland; [3]Max Planck Institute for Biophysical Chemistry, 37077 Göttingen, Germany

We observe CW-driven inelastic electron-photon scattering at a fiber-integrated high-Q Si_3N_4 microresonator. The interaction is enabled by the strong, resonantly enhanced coupling between the electrons and the confined optical whispering gallery mode.

EG-7.2 FRI 8:45

THz photon-assisted tunneling in hBN encapsulated graphene quantum dot

•S. Messelot[1], E. Riccardi[1], S. Massabeau[1], M. Rosticher[1], K. Watanabe[2], T. Taniguchi[2], J. Tignon[1], S. Dhillon[1], R. Ferreira[1], S. Balibar[1], T. Kontos[1], and J. Mangeney[1]; [1]Laboratoire de

ROOM 10

8:30 – 10:00

EI-4: Many Body States and Non-linear Dynamics

Chair: Polina Plochocka, CNRS Toulouse, France

EI-4.1 FRI 8:30

Condensation and spatial coherence of Exciton-Polaritons in a MoSe2 monolayer - microcavity

•C. Anton-Solanas[1,2], M. Waldherr[1], M. Klaas[1], H. Suchomel[1], T.H. Harder[1], H. Cai[3], E. Sedov[4,5,6], S. Klembt[1], A.V. Kavokin[4,5,7], S. Tongay[8], K. Watanabe[9], T. Taniguchi[10], S. Höfling[1,11], and C. Schneider[1,2]; [1]Universität Würzburg, Würzburg, Germany; [2]Carl von Ossietzky University, Oldenburg, Germany; [3]University of California, Merced, USA; [4]Westlake University, Hangzhou, China; [5]Westlake Institute for Advanced Study, Hangzhou, China; [6]Vladimir State University, Vladimir, Russia; [7]St. Petersburg State University, St. Petersburg, Russia; [8]Arizona State University, Tempe, USA; [9]Research Center for Functional Materials, Tsukuba, Japan; [10]International Center for Materials Nanoarchitectonics, Tsukuba, Japan; [11]University of St. Andrews, St. Andrews, United Kingdom

Our experiments demonstrate the strong light-matter coupling and the bosonic condensation of exciton-polaritons in an atomically thin layer of MoSe2 coupled to a hybrid micro-cavity.

EI-4.2 FRI 8:45

Condensation signatures of a degenerate many-body state of interlayer excitons in a van der Waals MoSe2–WSe2 heterostack

L. Sigl[1], F. Sigger[1], M. Troue[1], K. Watanabe[2], T. Taniguchi[2], U. Wurstbauer[3], and •A. Holleitner[1]; [1]1. Walter Schottky Institut and Physics Department, TUM, Munich,

ROOM 11

8:30 – 10:00

CM-7: Surface and Volume Processing

Chair: Johannes Heitz, Johannes Kepler University, Linz, Austria

CM-7.1 FRI 8:30

Femtosecond Laser Written Mechanical Micro-Resonators for Integrated Switching and Modulation of Optical Signals

•R. Memeo[1,2], M. Spagnolo[1], R. Motta[1], A. Crespi[1,2], and R. Osellame[2,1]; [1]Dipartimento di Fisica - Politecnico di Milano, Milano, Italy; [2]Istituto di Fotonica e Nanotecnologie - Consiglio Nazionale delle Ricerche (IFN - CNR), Milano, Italy

Here we present micro-mechanical resonating structures for integrated photonic applications. These micro-resonators are written by Femtosecond Laser Micromachining and coupled to optical waveguides to act as switches or modulators.

CM-7.2 FRI 8:45

High Damage Threshold Ultrafast Laser Nanostructuring in Silica Glass

X. Chang, Y. Lei, H. Wang, •G. Shayeganrad, C. Deng, and P. Kazansky; Optoelectronics Research Centre, University of Southampton, Southampton, United Kingdom

The damage threshold

NOTES

ROOM 1

JSI-4.2 FRI 9:00

Experimental Study of Anisotropic Mean Free Path of Phonon and Micro-scale Thermal Diffusivity of Liquid Crystals and Polymers

•J. Morikawa[1], S. Kurose[1], and M. Ryu[2]; [1]Tokyo Institute of Technology, Tokyo, Japan; [2]Advanced Industrial Science and Technology, Tsukuba, Japan

The anisotropies of phonon group velocity and thermal diffusivity of liquid crystals and polymers were experimentally determined. The origin of the anisotropy in the bulk thermophysical properties are discussed, considering the phonon current correlation spectrum.

JSI-4.3 FRI 9:15

Optical wavelength dependence of photoacoustic signal of gold nanofluid

•M. Gandolfi[1], F. Banfi[2], and C. Glorieux[3]; [1]CNR-INO and Department of Information Engineering, University of Brescia, Brescia, Italy; [2]FemtoNanoOptics group Université

ROOM 2

CC-6.2 FRI 9:00

1-THz plasmonic double-mixing in a dual-grating-gate high-electron-mobility transistor

T. Hosotani[1,2,3], A. Satou[1,3], Y. Takida[4], H. Ito[4], H. Minamide[4], and •T. Otsuji[1,3]; [1]Research Institute of Electrical Communication, Tohoku University, Sendai, Japan; [2]JSPS, Tokyo, Japan; [3]Research Organization of Electrical Communication, Tohoku University, Sendai, Japan; [4]RIKEN Center for Advanced Photonics, RIKEN, Sendai, Japan

We demonstrate the 1-THz band photonic double-mixing operation by using plasmonic technology. The operating frequency range is much higher than the electron transit time limitation of the device thanks to the plasmonic operation mechanisms.

CC-6.3 FRI 9:15

Observation of Ultrafast THz Self-actions in Graphene Based Modulators

•A.D. Koulouklidis[1], E. Kyriakou[1,2], C. Daskalaki[1], M.S. Ergoktas[3,4], A.C. Tasolamprou[1], M. Kafesaki[1,2], C. Kocabas[3,4,5], and S. Tzortzakis[1,2,6]; [1]Institute of Electronic Structure and

ROOM 3

Saturation in optical parametric chirped-pulse amplification enhances system performance. However, various spectral components saturate differently. We numerically and experimentally demonstrate control of saturation for a broad spectral range and optimize overall gain and conversion efficiency.

CG-6.3 FRI 9:00

A wavelength-tunable few-cycle, millijoule-level short-wavelength infrared source for strong-field XAS/ATAS

•P. Rupprecht, L. Aufleger, A. Magunia, S. Amberg, N. Mollov, F. Henrich, C. Ott, and T. Pfeifer; Max-Planck-Institut für Kernphysik, Heidelberg, Germany

We present a few-cycle laser pulse source with a center wavelength tunability from 1-2 μm for strong-field XAS/ATAS. Millijoule-level pulses are provided at a 1 kHz repetition rate with <1.2% stability over >160 hours.

CG-6.4 FRI 9:15

70mJ nonlinear compression and scaling route for Yb amplifier using large-core hollow fibers

•G. Fan[1,2], P. Carpeggiani[1], Z. Tao[3], G. Coccia[1], R. Safaei[2], E. Kaksis[1], A. Pugzlys[1], F. Légaré[2], B. Schmidt[4], and A. Baltuška[1]; [1]Institute of Photonics, TU Wien, Vienna, Austria;

ROOM 4

lection is done by bending technique, operating at an output power of >1W at a slope efficiency of 37%.

CJ-7.3 FRI (Invited) 9:00

Mid-IR gas-filled hollow-core fiber lasers based on Raman gases

•Y. Wang[1], M. Dasa[1], A. Adamu[1], J.E. Antonio-Lopez[2], M.S. Habib[3], R. Amezcua-Correa[2], O. Bang[1], and C. Markos[1]; [1]DTU Fotonik, Technical University of Denmark, Kgs. Lyngby, Denmark; [2]CREOL, The College of Optics and Photonics, University of Central Florida, Orlando, USA; [3]Department of Electrical and Computer Engineering, Florida Polytechnic University, Lakeland, USA

We present an overview of our activities on the emerging mid-infrared gas-filled fiber Raman laser technology in terms of wavelength, pulse energy, quantum efficiency, and stability. These results provide important reference for future spectroscopic applications.

ROOM 5

the first time that, in contrast to classical Hong-Ou-Mandel experiment performed with a dissipation-free beamsplitter, bosons anti-coalesce while fermions 'coalesce' on a dissipative beamsplitter.

EA-7.3 FRI 9:00

Demonstration of Lossy Linear Transformations and Two-Photon Interference via Singular Value Decomposition

•S. White[1], K. Wang[2,3], A. Szameit[4], A.A. Sukhorukov[2,5], and A. Solntsev[1]; [1]School of Mathematical and Physical Sciences, University of Technology Sydney, Ultimo, Australia; [2]Nonlinear Physics Centre, Research School of Physics, The Australian National University, Canberra, Australia; [3]Ginzton Laboratory and Department of Electrical Engineering, Stanford University, Stanford, USA; [4]Institut für Physik, Universität Rostock, Rostock, Germany; [5]ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Canberra, Australia

We experimentally demonstrate a method based on singular value decomposition, designed for non-unitary transformations of photon states. We show how this approach enables the control of photon-pair correlations in a system of coupled waveguides.

EA-7.4 FRI 9:15

2 photons interference in twin images

•F. Devaux, A. Mosset, and E. Lantz; Insitut Femto-st, UMR 6174 CNRS, Besançon, France

We report the experimental obser-

ROOM 6

Systems (PhoQS), Paderborn, Germany; [2]Department of Physics and Astronomy, Seoul, South Korea; [3]Max-Planck-Institut f¨ur die Physik des Lichts, Erlangen, Germany; [4]Departamento de Óptica, Facultad de Física, Madrid, Spain

We consider a randomized compressive tomography technique to reconstruct low rank near-coherent signals in the time-frequency domain using extremely few measurements and no a priori knowledge. We present results on reconstructed random high-dimensional states.

EB-9.3 FRI 9:00

Detector Tomography of Superconducting-Nanowire Photon-Number-Resolving Detector

•T. Sonoyama[1], M. Endo[1], M. Matsuyama[1], F. Okamoto[1], S. Miki[2,3], H. Terai[2], M. Yabuno[2], F. China[2], and A. Furusawa[2]; [1]Department of Applied Physics, School of Engineering, The University of Tokyo, Tokyo, Japan; [2]Advanced ICT Research Institute, National Institute of Information and Communications Technology, Kobe, Japan; [3]Graduate School of Engineering, Kobe University, Kobe, Japan

We improved photon number resolving performance of superconducting nanowire photon detector without multiplexing by waveform pattern matching. Furthermore, we evaluated the performance by detector tomography and confirmed the detector can discriminate up to five photons.

EB-9.4 FRI 9:15

Cross-verification of independent quantum devices

•M. Ringbauer; University of Innsbruck, Innsbruck, Austria

Today's noisy quantum computers are pushing the limits of classical computation. We present a scalable cross-check procedure to verify

ROOM 7

tons bound into a molecule, confirming recent numerical predictions. The classification of soliton molecules dynamics requires extra dimensions beyond the usual pulses' relative temporal separations and phases.

EF-8.3 FRI 9:00

Symmetry protection against mode crossings for dissipative Kerr soliton generation in microresonator chains

•A. Tikan[1], A. Tusnin[1], J. Riemensberger[1], M. Churaev[1], K. Komagata[1,2], X. Ji[1], R.N. Wang[1], J. Liu[1], and T.J. Kippenberg[1]; [1]Institute of Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne , Switzerland; [2]Laboratoire Temps-Fréquence, Neuchâtel, Switzerland

The accessibility of solitons in driven-dissipative photonic dimers drastically varies for different supermode families. We explain the origin of this phenomenon and show its crucial influence on any soliton lattice configuration including topological arrangements.

EF-8.4 FRI 9:15

Bright and dark localized states in doubly resonant optical parametric oscillators

•P. Parra-Rivas[1], C. Mas-Arabí[1], L. Gelens[2], and F. Leo[1]; [1]Université Libre de Bruxelles, Bruxelles, Belgium; [2]KU Leuven, Leuven, Belgium

We analyze the bifurcation structure

ROOM 8

oritizing antireflectivity allows to easily design and parametrize efficient mesoscopic self-collimation structures, without having to resort to impedance matching complex structures between PhC slabs.

CK-7.3 FRI 9:00

Embedded InP-on-Si 1D photonic crystal emitting in the topological mode

•M. Scherrer[1], S. Kim[2], H.J. Choi[2], C.-W. Lee[2], and K. Moselund[1]; [1]IBM Research - Europe, Rüschlikon, Switzerland; [2]Hanbat National University, Daejeon, South Korea

We demonstrate for the first time an embedded one-dimensional topological photonic structure based on a III-V photonic crystal on silicon, which shows localized single mode emission from the topological state located in the bandgap center.

CK-7.4 FRI 9:15

Light transport by a 3D cavity superlattice in a photonic band gap

•M. Adhikary[1], M. Kozon[1,2], R. Uppu[1,3], C.A.M. Harteveld[1], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of

ROOM 9

Physique de l'Ecole normale supérieure, ENS, Université PSL, CNRS, Sorbonne Université, Université Paris-Diderot, Sorbonne Paris Cité, Paris, France; [2]National Institute for Materials Science, Tsukuba, Japan

We investigate the quantum response of hBN encapsulated graphene quantum dot (GQD) to coherent THz illumination. We demonstrate photon-assisted tunneling induced by THz illumination, showing light-matter interaction between THz radiation and GQD electronic levels.

EG-7.3 FRI 9:00

Single-Mode, Broadband, Near Infrared Light Emission from Metal-Oxide-Semiconductor Tunnel Junctions in Silicon Photonics

•M. Doderer[1], K. Keller[1], J. Winiger[1], M. Baumann[1], A. Messner[1], D. Moor[1], D. Chelladurai[1], Y. Fedoryshyn[1], J. Strait[2], A. Agrawal[2], M. Parzefall[3], L. Novotny[3], H. Lezec[2], J. Leuthold[1], and C. Haffner[1,2]; [1]Institute of Electromagnetic Fields, ETH Zurich, Zurich, Switzerland; [2]Physical Measurement Laboratory, National Institute of Standards and Technology, Gaithersburg, USA; [3]Photonics Laboratory, ETH Zurich, Zurich, Switzerland

We demonstrate electroluminescence from inelastic electron tunnelling directly coupled into a single-mode silicon waveguide. The near-infrared emission into a resonator with $Q_{max} = 47$ achieves narrowest emission observed to date for light emitting tunnel junctions.

EG-7.4 FRI 9:15

Control of Photogalvanic Currents in Topological Insulator Metamaterials

X. Sun[1], G. Adamo[1], M. Eginligil[2,4], H.N.S. Krishnamoorthy[1], N.I. Zheludev[1,2,3], and •C. Soci[1,2]; [1]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang

ROOM 10

Germany; [2]2. National Institute for Materials Science, Tsukuba, Ibaraki, Japan; [3]3. Institute of Physics, University of Münster, Münster, Germany

We observe several condensation criticalities in photogenerated exciton ensembles hosted in MoSe2–WSe2 heterostacks with respect to photoluminescence intensity, linewidth, and temporal coherence pointing towards a coherent many-body quantum state below 10 K.

EI-4.3 FRI 9:00

Twist-Tailoring Hybrid Excitons In Van Der Waals Homobilayers

•F. Mooshammer[1], P. Merkl[1], S. Ovesen[2], S. Brem[2], A. Girnghuber[1], K.-Q. Lin[1], M. Liebich[1], C.-K. Yong[1], R. Gillen[3], J. Maultzsch[3], J. Lupton[1], E. Malic[2], and R. Huber[2]; [1]Department of Physics, University of Regensburg, Regensburg, Germany; [2]Department of Physics, Chalmers University of Technology, Gothenburg, Sweden; [3]Institute of Condensed Matter Physics, Friedrich-Alexander University Erlangen-Nürnberg, Erlangen-Nürnberg, Germany

By probing internal 1s–2p transitions with phase-locked mid-infrared pulses, we trace how the twist angle precisely controls the binding energy and lifetime of hybrid excitons in transition metal dichalcogenide bilayers.

EI-4.4 FRI 9:15

Exciton Diffusion in Strained Atomically Thin Semiconductors

•R. Schmidt[1], R. Rosati[2], S. Brem[2], R. Perea-Causín[3], I. Niehues[1], S. Michaelis de Vasconcellos[1], E. Malic[2,3], and R. Bratschitsch[1]; [1]Institute of Physics and Center for Nanotechnology, University

ROOM 11

of femtosecond laser-induced nanoporous modification comparable to pristine silica glass was demonstrated, enabling high-performance geometric phase optical elements for high-power applications.

CM-7.3 FRI 9:00

High-resolution microfabrication through a graded-index multimode optical fiber

•G. Konstantinou[1], D. Loterie[1,2], E. Kakkava[3], D. Psaltis[3], and C. Moser[1]; [1]École Polytechnique Fédérale de Lausanne, Laboratory of Applied Photonics Devices, CH-1015, Lausanne, Switzerland; [2]Readily3D SA EPFL Innovation Park, Bâtiment C CH-1015 , Lausanne, Switzerland; [3]École Polytechnique Fédérale de Lausanne, Laboratory of Optics, CH-1015, Lausanne, Switzerland

A fiber-based 3D printing system based on the Transmission Matrix method and wavefront shaping is used for the fabrication of smooth micro-structures by two-photon polymerization. The focused spot is scanned digitally and initiates photo-polymerization.

CM-7.4 FRI 9:15

Laser Induced Dielectric Material Modifications Using Burst Of Spatio-Temporally Focused Laser Pulses

•P. Quinoman, B. Chimier, and G. Duchateau; University of Bordeaux-CNRS-CEA, Centre Lasers Intenses et Applications, Talence, France

NOTES

ROOM 1

de Lyon, Institut Lumière Matière (iLM), Université Lyon 1 and CNRS, Villeurbanne, France; [3]Laboratory of Soft Matter and Biophysics, Department of Physics and Astronomy, KU Leuven, Leuven, Belgium

We introduce a numerical opto-thermo-mechanical model to analyse the photoacoustic signal generated by gold nanospheres immersed in water. We discuss how the light wavelength and the temperature dependent water thermal expansion coefficient affect the results.

JSI-4.4 FRI 9:30

Photothermal Characterization at a Nanoscopic Scale

•R. Li Voti; Dipartimento SBAI, Sapienza Università di Roma, Rome, Italy

Recent advances for the optothermal characterization of chiral materials, ordered/disordered nanowires/spheres by Photothermal techniques are summarized. IR radiometry is introduced to measure the thermal property at a nanoscopic scale.

ROOM 2

Laser, FORTH, Heraklion, Greece; [2]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [3]Department of Materials, University of Manchester , Manchester, United Kingdom; [4]National Graphene Institute, University of Manchester, Manchester, United Kingdom; [5]Henry Royce Institute for Advanced Materials, University of Manchester, Manchester, United Kingdom; [6]Science Program, Texas A\&M University at Qatar, Doha, Qatar

We demonstrate an ultrafast self-induced terahertz absorption modulator operating at 2.3 THz. A modulation of 50 dB is observed in the absorption when the THz field strength increases from 145 to 654 kV/cm.

CC-6.4 FRI 9:30

Sub-picosecond broadband frequency modulation of terahertz three-dimensional meta-atoms

•P. Goulain[1], A. Koulouklidis[2], J.-M. Manceau[1], C. Daskalaki[2], B. Paulillo[1], K. Maussang[3], S. Dhillon[3], J. Freeman[4], L. Li[4], E. Linfield[4], S. Tzortzakis[2,5,6], and R. Colombelli[1]; [1]Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Institute of Electronic Structure and Laser, Foundation for Research and Technology – Hellas (FORTH), Heraklion, Greece; [3]Laboratoire de Physique de l'Ecole normales supérieure, Paris, France; [4]School of Electronic and Electrical Engineering, Leeds, United Kingdom; [5]Department of Materials Science and Technology, Heraklion, Greece; [6]Science Program, Texas A&M University at Qatar, Doha, Qatar

Ultra-fast modulation of 3D THz LC resonators is presented with a 280 GHz frequency shift obtained in 200fs. The overall modulation cycle of the device takes 2 ps, yet convoluted by the probing technique.

ROOM 3

[2]Institut National de la Recherche Scientifique, Centre Énergie Matériaux et Télécommunications, Montreal, Canada; [3]State Key Laboratory of Surface Physics, Department of Physics, Fudan University, Shanghai, China; [4]few-cycle Inc., Montreal, Canada

We illustrate the energy scaling rules of hollow-core fiber nonlinear compression for high energy Yb technologies. As a demonstration, 70 mJ 230 fs pulses were compressed down to 25 fs with 1.3 TW peak power.

CG-6.5 FRI 9:30

Generation of high harmonics in silicon metasurfaces boosted by bound states in the continuum

•K. Koshelev[1,2], G. Zograf[2], V. Korolev[3], A. Zalogina[1,2], D.-Y. Choi[4], R. Hollinger[3], B. Luther-Davies[4], M. Zürch[3,5], D. Kartashov[3], C. Spielmann[3], S. Makarov[2], S. Kruk[1,6], and Y. Kivshar[1,2]; [1]Nonlinear Physics Center, Australian National University, Canberra, Australia; [2]Department of Physics and Engineering, ITMO University, St. Petersburg, Russia; [3]Institute of Optics and Quantum Electronics, Friedrich-Schiller University Jena, Jena, Germany; [4]Laser Physics Centre, Australian National University, Canberra, Australia; [5]University of California, Berkeley, USA; [6]Ultrafast Nanophotonics Group, Paderborn University, Paderborn, Germany

By utilizing optical bound states in the continuum supported by resonant asymmetric silicon metasurfaces in the mid-IR spectral range we demonstrate generation of odd optical harmonics, from the 3rd to the 11th order

ROOM 4

CJ-7.4 FRI 9:30

Widely-Tunable Operation of a Thulium Doped Fibre Laser Between 1654 nm and 2025 nm

M. Burns, P. Shardlow, and •W. Clarkson; University of Southampton, Southampton, United Kingdom

A widely tunable thulium-doped alumino-silicate fibre laser is reported. The laser was core-pumped by an erbium-doped fibre laser at 1580nm and was continuously tunable over a 371 nm tuning range, from 1654-2025 nm.

ROOM 5

vation of Two-photon interference of 1500 spatial modes by measuring momentum spatial coincidences between the pixels of the far-field images of two strongly multimode SPDC beams propagating through a HOM interferometer.

EA-7.5 FRI 9:30

Quantum Walks of Photon Pairs in Su-Schrieffer-Heeger Lattices

•F. Klauck, M. Heinrich, and A. Szameit; Institute of Physics, University of Rostock, Rostock, Germany

We experimentally study quantum correlations in a two-photon quantum walk at the topological and trivial edge of Su-Schrieffer-Heeger waveguide lattices. Topological protection leads to a wider spreading of the state compared to the trivial edge.

ROOM 6

their performance in a hardware agnostic way and without relying on classical simulation.

EB-9.5 FRI 9:30

Certification of Non-Gaussian States using Double Homodyne Detection

•G. Roeland[1], U. Chabaud[2,3], M. Walschaers[1], F. Grosshans[3], V. Parigi[1], D. Markham[3,4], and N. Treps[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, ENS-PSL Université, Collège de France, Centre National de la Recherche Scientifique, Paris, France; [2]Université de Paris, IRIF, CNRS, Paris, France; [3]Sorbonne Université, LIP6, CNRS, Paris, France; [4]JFLI, CNRS, National Institute of Informatics, University of Tokyo, Tokyo, Japan

We show that non-Gaussian properties of quantum states, such as Wigner negativity, can be efficiently and experimentally certified using double homodyne detection, without the need of full tomography.

ROOM 7

of bright and dark localized states arising in doubly resonant dispersive optical parametric oscillators. We show that bright states undergo collapsed snaking, while dark ones experience homoclinic snaking.

EF-8.5 FRI 9:30

Supercontinuum Generation by Polychromatic Soliton Molecules

•S. Willms[1,2], O. Melchert[1,2,3], S. Bose[2], A. Yulin[4], U. Morgner[1,2,3], I. Babushkin[1,2], and A. Demircan[1,2,3]; [1]Cluster of Excellence PhoenixD, Hannover, Germany; [2]Institute of Quantum Optics, Leibniz University Hannover, Hannover, Germany; [3]Hannover Centre for Optical Technologies, Hannover, Germany; [4]Department of Nanophotonics and Metamaterials, ITMO University, Saint Petersburg, Russia

We investigate the propagation dynamics of polychromatic soliton molecules regarding their ability to generate a bright coherent supercontinuum. An efficient scheme is presented and analogies to the quantum mechanical dissociation process are highlighted.

ROOM 8

Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [3]Center for Hybrid Quantum Systems (Hy-Q), Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

We show the first experimental evidence of light transport within the band gap of a 3D photonic crystal that is functionalized with a superlattice of point defects that act as resonant cavities.

CK-7.5 FRI 9:30

Scaling method for identification of confined states of light in arbitrary dimension

•M. Kozon[1,2], M. Schlottbom[2], J.J.W. van der Vegt[2], and W.L. Vos[1]; [1]Complex Photonic Systems (COPS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Mathematics of Computational Science (MACS), MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands

Identification and classification of confined light states is crucial for photonic crystals with defects, but so far only indirect methods exist. We propose a direct scaling-based classification method and apply it to realistic structures.

ROOM 9

Technological University, Singapore, Singapore; [2]Division of Physics and Applied Physics, Nanyang Technological University, Singapore, Singapore; [3]Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [4]Nanjing Tech University (Nanjing Tech), Nanjing, China

Patterning of topological insulator with mirror-symmetric forms of planar chiral design yields photogalvanic currents with opposite directions due to the interplay between the spin-momentum locking and polarization conversion in the pattern.

EG-7.5 FRI 9:30

High-purity free-electron momentum states prepared by three-dimensional optical phase modulation

•A. Feist[1,2], S.V. Yalunin[1], S. Schäfer[3], and C. Ropers[1,2]; [1]4th Physical Institute, University of Göttingen, Göttingen, Germany; [2]Max Planck Institute for Biophysical Chemistry, Göttingen, Germany; [3]Institute of Physics, University of Oldenburg, Oldenburg, Germany

We demonstrate a laser-based and femtosecond-switchable inelastic electron beam splitter. Coherent optical phase modulation of 200-keV electrons at a thin electron-transparent membrane prepares a high-purity three-dimensional momentum superposition state, characterized in energy and momentum space.

ROOM 10

of Münster, Münster, Germany; [2]Department of Physics, Philipps-Universität Marburg, Marburg, Germany; [3]Department of Physics, Chalmers University of Technology, Gothenburg, Sweden

We measure and calculate the strain-dependent exciton diffusion coefficient in atomically thin transition metal dichalcogenides, which is governed by relative changes of the energies of bright and momentum-dark excitons.

EI-4.5 FRI 9:30

Polarization-Resolved Second Harmonic Generation Imaging microscopy of 2D Materials

•S. Psilodimitrakopoulos[1], L. Mouchliadis[1], G.M. Maragkakis[1,2], G. Kourmoulakis[1,3], I. Demeridou[1,2], A. Lemonis[1], G. Kioseoglou[1,3], and E. Stratakis[1,2]; [1]Institute of Electronic Structure and Laser-Foundation for Research and Technology-Hellas, GR-711 10, Heraklion, Greece; [2]Physics Department, University of Crete, GR-700 13, Heraklion, Greece; [3]Department of Materials Science and Technology, University of Crete, GR-700 13, Heraklion, Greece

All optical, large area polarization-resolved SHG imaging microscopy in 2D materials, reveals lattice imperfections, probes valley population imbalance and measures twist angle in stacked layers, in real-time, pixel-by-pixel and in the same substrate that those materials are produced.

ROOM 11

The spatio-temporal focusing of a train of femtosecond laser pulses in fused silica is numerically investigated.The absorbing region geometry is controlled through the pulse-to-pulse increase in lattice temperature and energy absorption.

CM-7.5 FRI 9:30

Femtosecond Laser Surface-structuring for Cell-repellent Functionalization of Medical Implants

•M. Muck[1], B. Wolfsjäger[1], K. Seibert[2], C. Maier[2], A.W. Hassel[3], W. Baumgartner[4], and J. Heitz[1]; [1]Institute of Applied Physics, Johannes Kepler University Linz, Linz, Austria; [2]Hofer GmbH & Co KG, Fürstenfeld, Austria; [3]Institute of Chemical Technology of Inorganic Materials, Johannes Kepler University Linz, Linz, Austria; [4]Institute of Biomedical Mechatronics, Johannes Kepler University Linz, Linz, Austria

Femtosecond laser-induced micro- and nanostructures at anodized Ti bone screws result in repellence of osteoblasts. This shall enable removal of these implants when the bone is healed without destruction of the newly grown bone matrix.

NOTES

ROOM 1

JSI-4.5 FRI 9:45

Brillouin spectroscopy in optophononic micropillars in the 18-350 GHz range

•A. Rodriguez, E. Cardozo de Oliveira, P. Priya, F.-R. Lamberti, A. Harouri, I. Sagnes, C. Gomez-Carbonell, M. Morassi, A. Lemaître, L. Lanco, P. Senellart, M. Esmann, and N.D. Lanzillotti-Kimura; Centre de nanosciences et de nanotechnologies, Palaiseau, France

We present two filtering technique based respectiely on the match/mismatch of the laser and pillar optical modes to measure Brillouin scattering in 3D optophononic resonators.

ROOM 2

CC-6.5 FRI 9:45

Terahertz Amplifier with Optical Threshold

M.A. Kainz[1,2], •M. Jaidl[1,2], B. Limbacher[1,2], D. Theiner[1,2], M. Giparakis[2,3], M. Beiser[2,3], A.M. Andrews[2,3], G. Strasser[2,3], and K. Unterrainer[1,2]; [1]Photonics Institute, Wien, Austria; [2]Center for Micro- and Nanostructures, Wien, Austria; [3]Institute of Solid State Electronics, Wien, Austria

A Terahertz optical amplifier based on a Quantum Cascade laser structure with a lossy double-metal cavity is demonstrated. Amplification appears only above a certain threshold and an amplification of 17 dB is achieved.

ROOM 3

CG-6.6 FRI 9:45

7th harmonic generation in gases for coherent 150 nm light production

•A. Schönberg[1,2,3], H.S. Salman[1,2,3], A. Tajalli[1], I. Hartl[1], and C.M. Heyl[1,2,3]; [1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Helmholtz-Institut Jena, Jena, Germany; [3]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

We investigate the 7th harmonic generation conversion efficiency and pulse energy output of a 1025 nm source in rare gases. The measurements yield 5×10^{-6} maximum efficiency, limited by collective effects from a phase-mismatched generation process.

ROOM 4

CJ-7.5 FRI 9:45

Mid- and Near-Infrared Spectral Broadening in Deuterium-Filled Gas Fiber Raman Laser

•A. Gladyshev, Y. Yatsenko, A. Kolyadin, I. Pritulenko, and I. Bufetov; Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Moscow, Russia

Two-cascade Raman conversion (1.03→1.49→2.68 μm) of ultrashort pulses in a D2-filled revolver fiber is investigated. By controlling the pump duration and the gas pressure, we demonstrate nonlinear spectral broadening in both near-IR and mid-IR range.

ROOM 5

EA-7.6 FRI 9:45

Generation of Schrödinger cat states by generalized photon subtraction

•K. Takase, J.-i. Yoshikawa, W. Asavanant, M. Endo, and A. Furusawa; Department of Applied Physics, School of Engineering, The University of Tokyo, Tokyo, Japan

We propose a method that improves the generation rate of optical Schrödinger cat states by multiple orders from the conventional method. Our method would open a way for practical quantum computing and quantum communication.

ROOM 6

EB-9.6 FRI 9:45

Photonic angular super-resolution using twisted N00N-states

•M. Hiekkamäki[1], F. Bouchard[2], and R. Fickler[1]; [1]Tampere University, Tampere, Finland; [2]National Research Council of Canada, Ottawa, Canada

The increased phase sensitivity of N00N-states encoded in orbital angular momentum (OAM) modes can be harnessed in estimating rotations with an increased sensitivity. We experimentally demonstrate this with two-photon OAM N00N-states in a single beam.

ROOM 1

11:00 – 12:30

CH-11: Quantum Sensing and Imaging

Chair: Alejandro Turpin, University of Glasgow, Glasgow, United Kingdom

CH-11.1 FRI (Invited) 11:00

Enhanced Quantum Imaging SPAD arrays

•F. Villa, F. Severini, F. Madonini, and F. Zappa; Politecnico di Milano - Dipartimento di Elettronica, Informazione e Bioingegneria, Milano, Italy

Quantum imaging demands challenging detector requirements: single-photon sensitivity, sub-ns timing, and photon coincidences spatial resolution. We discuss pros and cons of different SPAD sensors suitable as quantum imagers and we provide guidelines for next-generation ones.

ROOM 2

11:00 – 12:30

CI-4: Emerging Technologies for Telecommunications

Chair: Peter Horak, ORC Southampton, Southampton, United Kingdom

CI-4.1 FRI (Keynote) 11:00

Practical Quantum Communication and Processing

•F. Bovino; Dept. SBAI SAPIENZA University of Rome, ROMA, Italy

Multirail Architecture encode the whole state space in a complex optical circuit, and it provides a novel class of small or intermediate-scale processors that allow "quantum supremacy" and practical implementation of quantum communication and authentication.

ROOM 3

11:00 – 12:30

CF-9: Sources for Dual Comb Spectroscopy

Chair: Oleg Pronin, Helmut-Schmidt-University, Hamburg, Germany

CF-9.1 FRI 11:00

Comb-Line-Resolved Spectroscopy of Acetylene Driven by a Free-Running Dual-Comb Thin-Disk Laser

•N. Modsching, J. Drs, P. Brochard, J. Fischer, S. Schilt, V.J. Wittwer, and T. Südmeyer; Laboratoire Temps-Fréquence (LTF), Institut de Physique, Université de Neuchâtel, Avenue de Bellevaux 51, Neuchâtel, Switzerland

We demonstrate that dual-comb thin-disk lasers are suitable for fast high-resolution spectroscopy in the near-infrared. Operating with 240-fs, 6-8 W and 97-MHz, these are highly attractive sources for nonlin-

ROOM 4

11:00 – 12:30

CM-8: Modelling and In-situ Diagnostics

Chair: Jan Siegel, Instituto de Optica, CSIC, Madrid, Spain

CM-8.1 FRI 11:00

Predictive Visualisation of Fibre Laser Machining via Deep Learning

•A.F. Courtier[1], M. McDonnell[1], M. Praeger[1], J.A. Jacob Grant[1], C. Codemard[1,2], P. Harrison[2], B. Mills[1], and M. Zervas[1]; [1]Optoelectronics Research Centre, Southampton, United Kingdom; [2]TRUMPF Laser UK, Southampton, United Kingdom

Deep learning was used to produce a visual prediction for the appearance of stainless steel when machined via a 2kW fibre laser for different laser scan speeds, hence demonstrating the potential for modelling light-

ROOM 5

11:00 – 12:30

CD-10: Nonlinear Spectroscopy and Microscopy

Chair: Derryck Reid, Heriot-Watt University, Edinburgh, United Kingdom

CD-10.1 FRI 11:00

Precisely Targeting Molecular Absorption Lines in 2 μm Region by Optical Parametric Oscillator using Type-II PPRKTP

•Y. Liu, K.M. Mølster, A. Zukauskas, C. Lee, and V. Pasiskevicius; Royal Institute of Technology, Stockholm, Sweden

Precise refractive index dispersion and thermooptic expansions experimentally verified here, allow harnessing distinct advantages of 2μm type-II PPRKTP OPOs for targeting absorption lines in greenhouse gasses. Specific design examples employing temperature and pump-tuning are provided.

ROOM 6

11:00 – 12:15

CL-4: Spectroscopy, Label-Free Imaging and Sensing

Chair: Guiseppe Vicidomini, Molecular Microscopy and Spectroscopy, Center for Human Technologies, Istituto Italiano di Tecnologia, Genoa, Italy

CL-4.1 FRI 11:00

Detecting Protein Alteration within an Exosome by Means of a Coated Dielectric Microsphere Resonator

•M. Jalali[1], N. Benson[2], and D. Erni[1]; [1]General and Theoretical Electrical Engineering (ATE), Faculty of Engineering, University of Duisburg-Essen, and CENIDE – Center for Nanointegration Duisburg-Essen, Duisburg, Germany; [2]Institute of Technology for Nanostructures (NST), Faculty of Engineering, University of Duisburg-Essen, and CENIDE – Center for Nanointegration Duisburg-Essen, Duisburg, Germany

ROOM 7

EF-8.6 FRI 9:45

Rotating and Spiralling Optomechanical Cavity Solitons

•G. Baio, G. Robb, T. Ackemann, A. Yao, and G.-L. Oppo; Department of Physics, University of Strathclyde, Glasgow, Scotland, United Kingdom

Stable spatial solitons due to self-structuring in a cloud of cold atoms in a cavity can rotate or spiral under the action of laser light with optical angular momentum, leading to controllable atomic transport

ROOM 8

CK-7.6 FRI 9:45

Floquet dynamics in photonic crystal optomechanical nanoresonator

•G. Madiot[1], K. Pelka[2], A. Xuereb[2], and R. Braive[1,3]; [1]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France; [2]Department of Physics, University of Malta, Malta, Malta; [3]Université de Paris, Paris, France

We explore the interaction between a mechanical resonator and a modulated thermo-optic cavity, using an integrated photonic crystal nanomembrane. These results open perspectives in the realization of logic gates using multimode optomechanical devices.

ROOM 9

EG-7.6 FRI 9:45

Unidirectional currents in asymmetric nanojunctions and electronic wavepacket interference

•I. Babushkin[1], L. Shi[2], A. Husakou[3], O. Melchert[1], A. Demircan[1], C. Lienau[4], M. Ivanov[3], U. Morgner[1], and M. Kovacev[1]; [1]Institute of Quantum Optics, Leibniz University, Welfengarten 1, 30167, Hannover, Germany; [2]Westlake University, 18 Shilongshan Road 310024, Hangzhou, China; [3]Max Born Institute, Max Born Str. 2a, 12489, Berlin, Germany; [4]Carl von Ossietzky University, Oldenburg, Germany

CW currents in asymmetric nanojunctions in strong optical fields can be created. Here we discuss the mechanism and show that it is rooted in the inter-cycle interference of the electronic wavepackets in the nanogap.

ROOM 10

EI-4.6 FRI 9:45

Signature of 2p exciton in hBN-encapsulated monolayer MoSe2 revealed by sum frequency generation spectroscopy

•S. Takahashi[1], S. Kusaba[1], and K. Tanaka[1,2]; [1]Department of Physics, Kyoto University, Kyoto, Japan; [2]Institute for Integrated Cell-Material Sciences, Kyoto University, Kyoto, Japan

Excitons in monolayer MoSe2 have unique properties due to low dimensional environment. Here, 2p excitons were directly observed by sum frequency generation spectroscopy and this has potency for more accurate determination of fundamental optical parameters.

ROOM 11

CM-7.6 FRI 9:45

Electrically conductive porous carbon structures fabricated by laser direct carbonization of bamboo

•R. Miyakoshi[1], F. Morosawa[1], S. Hayashi[1], and M. Terakawa[1,2]; [1]School of Integrated Design Engineering, Keio University, Yokohama, Japan; [2]Department of Electronics and Electrical Engineering, Keio University, Yokohama, Japan

Electrically conductive structures composed of highly crystalline graphitic carbon were fabricated by the femtosecond-laser carbonization of bamboo. Owing to the naturally-porous structure of bamboo, the fabricated structures were highly porous and attractive for capacitive applications.

NOTES

ROOM 7

11:00 – 12:30

CJ-8: High Power Fiber Lasers

Chair: Mikhail Likhachev, Dianov Fiber Optics Research Center, Moscow, Russia

CJ-8.1 FRI (Invited) 11:00

Transverse Mode Instability in High-Power Fiber Laser Systems: a "Hot Topic"

•C. Jauregui[1], C. Stihler[1,3], S. Kholaif[1,2], Y. Tu[1,2], and J. Limpert[1,2,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany; [2]Helmholtz-Institute Jena, Jena, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We review the current understanding of TMI as well as present the most promising strategies and fiber designs proposed to enable a further

ROOM 8

11:00 – 12:30

CK-8: Non-Linear Integrated Photonics

Chair: Stéphane Clemmen, Université Libre de Bruxelles / Ghent University, Belgium

CK-8.1 FRI 11:00

Long-term Stability of Lithium Niobate on Insulator PICs for Metrological Applications

•E. Obrzud[1], H. Sattari[1], T. Voumard[2], G. Choong[1], S. Denis[1], J. Leo[1], T. Wildi[2], O. Dubochet[1], M. Despont[1], S. Lecomte[1], T. Herr[2], A. Ghadimi[1], and V. Brasch[1]; [1]Swiss Center for Electronics and Microtechnology (CSEM), Neuchatel, Switzerland; [2]Center for Free-Electron Laser Science, Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany

We demonstrate that lithium niobate integrated photonics allows for reliable nonlinear applications

ROOM 9

11:00 – 12:30

EE-5: Novel Ultrafast Sources

Chair: John Travers, Heriot-Watt University, Glasgow, United Kingdom

EE-5.1 FRI 11:00

Terahertz pulse generation by multi-color laser fields with linear vs. circular polarization

•A. Stathopulos[1,2], C. Tailliez[1,2], D. Buožius[4], I. Babushkin[4,5], V. Vaičaitis[4], S. Skupin[3], and L. Bergé[1,2]; [1]CEA-DAM, DIF, 91297 Arpajon, France; [2]Université Paris-Saclay, CEA, LMCE, 91680 Bruyères-le-Châtel, France; [3]Institut Lumière-Matière, UMR 5306 Université Lyon 1 - CNRS, Université de Lyon, 69622 Villeurbanne, France; [4]Institute of Quantum Optics, Leibniz University Hannover, Welfengarten 1, 30167 Hannover, Germany; [5]Cluster of Excellence

ROOM 10

11:00 – 12:30

EH-5: Hybrid, Tunable and Nonlinear Metasurfaces

Chair: Alexey Krasavin, King's College London and London Centre for Nanotechnology, London, United Kingdom

EH-5.1 FRI 11:00

Graphene-Based Metasurfaces for Efficient Third Harmonic Generation

•A. Theodosi[1,2], O. Tsilipakos[2], C.M. Soukoulis[2,3], E.N. Economou[2], and M. Kafesaki[1,2]; [1]Department of Materials Science and Technology, University of Crete, Heraklion, Greece; [2]Institute of Electronic Structure and Laser, Foundation for Research and Technology Hellas, Heraklion, Greece; [3]Ames Laboratory—U.S. DOE and Department of Physics and Astronomy, Iowa State University , Ames, USA

Graphene-based metasurfaces are investigated for efficient third-

ROOM 11

11:00 – 12:30

CC-7: THz QCL

Chair: Heinz-Wilhelm Huebers, DLR, Berlin, Germany

CC-7.1 FRI 11:00

Millimeter Wave Photonics with Terahertz Semiconductor Lasers

V. Pistore[1], H. Nong[1], P.-B. Vigneron[2], K. Garrasi[3], S. Houver[4], L. Li[5], G. Davies[5], E. Linfield[5], J. Tignon[1], J. Mangeney[1], R. Colombelli[2], M. Vitiello[3], and •S. Dhillon[1]; [1]Laboratoire de Physique de l'Ecole Normale Supérieure, Paris, France; [2]Centre de Nanosciences et de Nanotechnologies , Palaiseau, France; [3]NEST, CNR - Istituto Nanoscienze and Scuola Normale Superiore , Pisa, Italy; [4]ONERA, Palaiseau, France; [5]University of Leeds, Leeds, United Kingdom

Photonic solutions for generating

ROOM 12

11:00 – 12:15

JSIV-3: Optical Computing II

Chair: Daniel Brunner, FEMTO-ST, Besançon, France

JSIV-3.1 FRI 11:00

Exploiting a Distributed Nonlinearity in a Photonic Coherent Fiber-Based Reservoir Computer

•J. Pauwels[1,2], G. Verschaffelt[1], S. Massar[2], and G. Van der Sande[1]; [1]Applied Physics Research Group, Vrije Universiteit Brussel, B-1050 Brussels, Belgium; [2]Laboratoire d'Information Quantique, Université libre de Bruxelles, B-1050 Brussels, Belgium

We have used a reservoir computer to investigate, both numerically and experimentally, the exploitation of a distributed optical nonlinearity. We demonstrate the importance of bulk

CH-11.2 FRI 11:30

Mid-infrared microscopy with undetected photons

•I. Kviatkovsky[1], H.M. Chrzanowski[1], and S. Ramelow[1,2]; [1]Institut für Physik, Humboldt-Universität zu Berlin, Berlin, Germany; [2]IRIS Adlershof, Humboldt-Universität zu Berlin, Berlin, Germany

We demonstrate that nonlinear interferometry with entangled photons provides a powerful and cost-effective technique for microscopy in the mid-IR, harnessing the maturity of silicon-based detection technology to allow wide-field imaging of biological samples at room-temperature.

ear frequency-conversion for dual-comb mid-infrared applications.

CF-9.2 FRI 11:15

Single-Mode Laser Diode Pumped Yb:CaF$_2$ Dual-Comb Oscillator

D. Koenen, B. Willenberg, J. Pupeikis, S. Camenzind, •C.R. Phillips, and U. Keller; Department of Physics, Institute of Quantum Electronics, ETH Zurich, Zurich, Switzerland

We demonstrate a free-running, polarization-multiplexed Yb:CaF2 dual-comb laser with 100-fs pulses at 161-MHz repetition-rate and 115-mW average power per comb pumped by a single-mode laser diode. The tunable repetition-rate difference was set to 1.15-kHz.

CF-9.3 FRI 11:30

Simple Approach for Ambiguity-Free Dual-Comb Ranging Using an Intrinsically Modulated Single-Cavity Laser Source

•J. Fellinger[1], G. Winkler[1], A.S. Mayer[1], V. Shumakova[1], L.W. Perner[1], P.E.C. Aldia[1], V.F. Pecile[1], T. Martynkien[2], P. Mergo[3], G. Soboń[4], and O.H. Heckl[1]; [1]1. University of Vienna, Faculty of Physics, Faculty Center for Nano Structure Research, Christian Doppler Laboratory for Mid-IR Spectroscopy and Semiconductor Optics, Vienna, Austria; [2]2. Faculty of Fundamental Problems of Technology, Wrocław University of Science and Technology, Wroclaw, Poland; [3]3. Laboratory of Optical Fiber Technology, M. Curie-Skłodowska University, Lublin, Poland; [4]4. Laser & Fiber Electronics Group, Wroclaw University of Technology, Wroclaw, Poland

We present a simple approach for ambiguity-free dual-comb ranging.

matter interactions.

CM-8.2 FRI 11:15

A benchmarked vectorial model and flexible software-tool for in-bulk laser processing

•Q. Li[1], M. Chambonneau[1], M. Blothe[1], H. Gross[1,2], and S. Nolte[1,2]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University Jena, Albert-Einstein-Str. 15, 07745, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering, Albert-Einstein-Str. 7, 07745, Jena, Germany

We introduce a flexible, fast, and benchmarked vectorial model for focused laser beams. By taking the aberrations induced by the focusing elements and the planar interface into account, the in-bulk intensity distributions are precisely described.

CM-8.3 FRI 11:30

Time-Resolved Digital Holography System with High Phase Precision for Detail Observation in Laser Ablation Dynamics

•S. Kawano, M. Tamamitsu, H. Sakurai, K. Konishi, T. Ideguchi, J. Yumoto, and M. Kuwata-Gonokami; The University of Tokyo, Hongo, Bunkyo-ku, Tokyo, Japan

To observe slight thermodynamical changes in materials in laser ablation, we constructed a coaxial time-resolved digital holography optical system with a novel interferometer, which realizes high spatial resolution and high optical-phase-delay precision.

CD-10.2 FRI 11:15

Low-Threshold Fully-Stabilized Mid-Infrared Frequency Comb Generation

•M. Roiz[1], J.-Y. Lai[2], J. Karhu[1,3], and M. Vainio[1,4]; [1]University of Helsinki, Helsinki, Finland; [2]HC Photonics Corp., Hsinchu, Taiwan; [3]Aalto University, Espoo, Finland; [4]Tampere University, Tampere, Finland

We demonstrate a method for mid-infrared frequency comb generation featuring extremely low threshold (30 pJ) and high conversion efficiency (63.5%). The method is based on continuous wave seeded optical parametric generation in nonlinear waveguides.

CD-10.3 FRI 11:30

Spectral Narrowing and Wavelength Tuning in Injection-Seeded Pulsed Optical Parametric Oscillator for Photoacoustic Methane Analyzer

E. Erushin[1,2], B. Nyushkov[1,2], A. Ivanenko[1], I. Korel[2], A. Boyko[1], N. Kostyukova[1,2], and •D. Kolker[1,2]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]Novosibirsk State Technical University, Novosibirsk, Russia

We demonstrate possibility to enhance spectroscopic capabilities of mid-IR pulsed optical parametric oscillators based on fan-out PPLN by combining their wavelength tunability with injection-seeding technique providing spectral narrowing. This approach allows advanced photoacoustic gas analysis.

The fraction of protein content in an exosome is sensed in a label free manner by means of a coated microsphere resonator as a technique for early stage cancer diagnosis and fundamental cancer studies.

CL-4.2 FRI 11:15

Towards Broadband Mid-Infrared Fully Integrated Protein Sensor employing a Quantum Cascade Laser and Quantum Cascade Detector

•A. Dabrowska[1], M. David[2], A. Schwaighofer[1], B. Hinkov[2], A. Harrer[2], G. Strasser[2], and B. Lendl[1]; [1]Institute of Chemical Technologies and Analytics,Technische Universität Wien,, Vienna, Austria; [2]Institute of Solid State Electronics & Center for Micro- and Nanostructures,Technische Universität Wien, Vienna, Austria

We present a combination of quantum cascade laser and quantum cascade detectors for broadband mid-IR spectroscopy sensing of bovine milk proteins in aqueous solution.

CL-4.3 FRI 11:30

Excited State Decay Pathways Of Epigenetic DNA Nucleosides Tracked With Sub-20-fs UV Pulses

•P. Kabacinski[1], M. Romanelli[2], E. Ponkkonen[3], I. Conti[2], T. Carell[3], M. Garavelli[2], and G. Cerullo[1]; [1]Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [2]Dipartimento di Chimica Industriale, Universita degli Studi di Bologna, Bologna, Italy; [3]Department of Chemistry, Ludwig-Maximilians Universitat Munchen, Munchen, Germany

Modified nucleosides establish a second layer of information in DNA. We characterized all four epigenetic nucleosides via the combination of sub-30-fs transient absorption spec-

ROOM 7

scaling of the output average power of fiber laser systems.

CJ-8.2 FRI 11:30

Towards CEP-stable single-cycle pulses with microjoule-level energy at 8 MHz repetition rate

•F. Tani[1], J. Lampen[2], D. Schade[1,3], J. Jiang[2], M.E. Fermann[2], and P.S.J. Russell[1,3]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]IMRA America, Inc., Ann Arbor, USA; [3]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany

A 20 cm long Kr-filled single-ring hollow core PCF, pumped by 36 fs pulses from a low-noise Yb fibre laser at 8 MHz, produces 7.3 fs pulses with microjoule-level energy.

ROOM 8

under continuous femtosecond laser irradiation. Over >400 hours, a stable octave-spanning supercontinuum plus second-harmonic generation allows for direct self-referencing of a frequency comb.

CK-8.2 FRI 11:15

Supermode-based second harmonic generation in a nonlinear interferometer

•D. Barral[1], V. D'Auria[2], F. Doutre[2], T. Lunghi[2], S. Tanzilli[2], A.P. Rambu[3], S. Tascu[3], J.A. Levenson[1], N. Belabas[1], and K. Bencheikh[1]; [1]Centre de Nanosciences et de Nanotechnologies C2N, Palaiseau, France; [2]Université Côte d'Azur, CNRS, Institut de Physique de Nice (INPHYNI), Nice , France; [3]Research Center on Advanced Materials and Technologies, Alexandru Ioan Cuza University of Iasi, Iasi, Romania

We experimentally demonstrate supermode-based SHG through a specifically-designed integrated LiNbO3 nonlinear interferometer made of linear and nonlinear directional couplers with a fully-fibered pump paving the way for the demonstration of on-chip supermode-based entanglement.

CK-8.3 FRI 11:30

High-yield, wafer-scale fabrication of ultralow-loss, dispersion-engineered silicon nitride photonic circuits

•J. Liu, G. Huang, R.N. Wang, J. He, A. Raja, J. Riemensberger, G. Lihachev, N. Engelsen, and T. Kippenberg; Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland

For widespread applications of nonlinear photonic integrated circuits, ultralow optical losses and high fabrication throughput are required. Here, we present a CMOS fabrication technique for photonic microresonators with mean quality

ROOM 9

PhoenixD (Photonics, Optics, and Engineering-Innovation Across Disciplines), 30167 Hannover, Germany

We report that, for both linear and circularly polarized femtosecond multi-color laser pulses, the infrared to terahertz conversion efficiency increases with the number of laser harmonics.

EE-5.2 FRI 11:15

Dispersion Management of Mid-Infrared Filamentation in Dense Gases

•O. Kosareva[1,2], N. Panov[1,2], D. Shipilo[1,2], and I. Nikolaeva[1,2]; [1]Faculty of Physics, M. V. Lomonosov Moscow State University, MOSCOW, Russia; [2]P. N. Lebedev Physical Institute of the Russian Academy of Sciences, MOSCOW, Russia

In 3D+t numerical simulations, we propose an experiment, where a mixture of gases (nitrogen and water vapor) is used for the continuous transition from X- to O-shaped angle-wavelength spectrum of a femtosecond infrared filament.

EE-5.3 FRI 11:30

High-Energy Pulse Compression in the Mid-Wave Infrared

•T. Nagy, L. von Grafenstein, D. Ueberschaer, and U. Griebner; Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy, Berlin, Germany

We compress 45mJ, 2.4ps pulses of a 1kHz holmium laser emitting at $2.05\mu m$ wavelength to 90fs duration in a stretched hollow-core fiber. The pulses comprise >20mJ energy at >20W average power, setting a new milestone.

ROOM 10

harmonic generation in the THz regime. By exploiting 2D-patterned graphene patches and aligning the fundamental and third-harmonic frequencies with metasurface resonances, we achieve conversion efficiencies up to -19dB.

EH-5.2 FRI 11:15

Programmable Huygens' metasurfaces for active optical phase control

•A. Leitis[1], A. Heßler[2], S. Wahl[2], M. Wuttig[2], T. Taubner[2], A. Tittl[1], and H. Altug[1]; [1]Institute of Bioengineering, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland; [2]Institute of Physics (IA), RWTH Aachen University, Aachen, Germany

We present tunable metasurfaces with incorporated phase change materials for optical phase control in transmission mode. The versatility of these metasurfaces is demonstrated by optically programming spatial light phase distributions with single meta–unit precision and retrieving high–resolution phase–encoded images.

EH-5.3 FRI 11:30

Nanomechanical Bistability in Photonic Metamaterial

•D. Papas[1], J.-Y. Ou[1], E. Plum[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, SPMS, TPI, Nanyang Technological University, Singapore, Singapore

A nanowire array decorated with plasmonic resonators acts as optically bistable device. The optical properties of this metamaterial exhibit hysteresis and bistability when it is driven by a piezo actuator across its mechanical resonance frequency.

ROOM 11

free space millimeter radiation is a fast developing field that combines optoelectronics and RF domains. Here we present a quantum-cascade-laser based solution for THz laser emission and millimeter wave generation in a single device.

CC-7.2 FRI 11:15

Demonstration of a Resonantly Amplified Terahertz Quantum Cascade Detector

•P. Micheletti, J. Faist, T. Olariu, M. Beck, and G. Scalari; ETH Zurich, Zürich, Switzerland

The photon-driven nature of the transport in terahertz quantum cascade laser can be exploited to detect light. Fast tunable detectors are demonstrated with responsivities higher then 17 V/W and working temperature up to 100 K.

CC-7.3 FRI 11:30

THz electroluminescence from non-polar ZnO quantum cascade structures

•B. Hinkov[1], B. Meng[2], H.T. Hoang[1], N. Le Biavan[3], D. Lefebvre[3], D. Stark[2], M. Franckié[2], A. Torres-Pardo[4], J. Tamayo-Arriola[5], M.M. Bajo[5], A. Hierro[5], J. Faist[2], J.-M. Chauveau[3], and G. Strasser[1]; [1]TU Wien, Institute of Solid State Electronics, Vienna, Austria; [2]ETH Zürich, Institute for Quantum Electronics, Zurich, Switzerland; [3]CNRS-CRHEA and Universite Cote d'Azur, Valbonne, France; [4]Universidad Complutense de Madrid, Departamento de Ouimica Inorganica, Madrid, Spain; [5]Universidad Politecnica de Madrid, ISOM, Madrid, Spain

Non-polar m-ZnO is a new material in THz-intersubband optoelectronics for overcoming previous LO-phonon-energy-based limitations as

ROOM 12

nonlinearities for future all-optical operation of larger reservoir computers.

JSIV-3.2 FRI 11:15

Noise-Resistant Optical Implementation of Analogue Neural Networks

•D. Arguello Ron, M. Kamalian-Kopae, and S. Turitsyn; Aston University, Birmingham, United Kingdom

Optical implementations of analogue artificial neural networks are susceptible to the inevitable fabrication and environment noise. Here we show how robustness of such networks can be enchanced by the noise injection during the training stage.

JSIV-3.3 FRI 11:30

Mutually coupled random lasers in complex photonic networks

•A. Consoli[1,3], N. Caselli[1,2], and C. López[3]; [1]ETSI de Telecomunicación, Universidad Rey Juan Carlos, Madrid, Spain; [2]Departamento de Química Física, Universidad Complutense de Madrid, Madrid, Spain; [3]Instituto de Ciencia de Materiales de Madrid (ICMM), Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain

Random lasers are studied in networks where mutual coupling is demonstrated by detecting unique spectral signatures from compound cavities. Proposed experiments and simulations provide the basis for larger networks and use in complex computational tasks.

ROOM 1

CH-11.3 FRI 11:45

Analysis of a quantum imaging system based on SPAD detection

•F. Severini, F. Madonini, and F. Villa; Dipartimento di Elettronica, Informazione e Biongegneria, Politecnico di Milano, Milano, Italy

Classical imaging boundaries can be surpassed exploiting quantum correlations in twin-beams coupled to detectors revealing temporal correlations with maximized signal-to-noise ratio. Measurement errors affecting SPAD-arrays with on-chip coincidence detection are analyzed and presented.

CH-11.4 FRI 12:00

Polarization entanglement-enabled quantum holography

•H. Defienne, B. Ndagano, A. Lyons, and D. Faccio; School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom

By exploiting polarization entanglement between photons, we demonstrate a quantum holography approach that circumvents the need for first-order coherence that is vital to classical holography, with potential for biological imaging and high-dimensional quantum states characterization.

ROOM 2

CI-4.2 FRI 11:45

Improvement in orbital angular momentum mode sorting of optical vortices by using polarization gratings

•K. Yamane[1], K. Iitsuka[1], M. Sakamoto[2], H. Ono[2], K. Oka[3], Y. Toda[1], and R. Morita[1]; [1]Hokkaido University, Sapporo, Japan; [2]Nagaoka University of Technology, Nagaoka, Japan; [3]Hirosaki University, Hirosaki, Japan

The detection accuracy in orbital angular momentum (OAM) decomposition of optical vortices was remarkably improved by use of beam duplication technique based on polarization gratings, together with our newly developed sidelobe reduction filter.

CI-4.3 FRI 12:00

Direct visualization of bimodal-propagation-induced spatial self-imaging

•M. Ferraro[1], F. Mangini[2], M. Zitelli[1], A. Niang[2], A. Tonello[3], V. Couderc[3], F. Frezza[1], and S. Wabnitz[1]; [1]Department of Information Engineering, Electronics and Telecommunications (DIET), Sapienza University of Rome, Rome, Italy; [2]Department of Information Engineering (DII), University of Brescia, Brescia, Italy; [3]Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France

ROOM 3

We exploit the intrinsic Intensity modulation of a single-cavity dual-color dual-comb for simultaneous time-of-flight and dual-comb distance measurements enabling us to overcome ambiguity limitations.

CF-9.4 FRI 11:45

Towards fully passive deep UV Dual-Comb Spectroscopy.

•T. Hofer[1], K. Fritsch[1], N. Picqué[2], and O. Pronin[1]; [1]Helmut Schmidt University, Hamburg, Germany; [2]Max-Planck-Institute of Quantum Optics, Munich, Germany

Passive high power dual frequency comb thin-disk oscillator operating at 1030 nm wavelength was extended in green preserving its performance. This holds promise towards performing first Dual-Comb Spectroscopy in UV and deep UV regions.

CF-9.5 FRI 12:00

Attosecond-Precision Dual-Oscillator Infrared Field-Resolved Spectroscopy Employing Electro-Optic Delay Tracking

•A. Weigel[1,2,3], T. Buberl[1,2], P. Jacob[1,2], T. Amotchkina[1,2], C. Hofer[1,2,3], M. Trubetskov[1], P. Sulzer[1,2,4,5], S.A. Hussain[2,3], W. Schweinberger[1,2], V. Pervak[1,2], F. Krausz[1,2], and I. Pupeza[1,2]; [1]Max-Planck Institute of Quantum Optics, Garching, Germany; [2]Ludwig Maximilians University Munich, Garching, Germany; [3]Center for Molecular Fingerprinting (CMF), Molekuláris- Ujjlenyomat Kutató

ROOM 4

CM-8.4 FRI 11:45

Vlasov Simulation of Electron Dynamics in Solids Under Intense Laser Fields

•M. Tani[1,2], T. Otobe[2], Y. Shinohara[1,3], and K.L. Ishikawa[1,3,4]; [1]Department of Nuclear Engineering and Management, School of Engineering, The University of Tokyo, Tokyo, Japan; [2]Kansai Photon Science Institute, National Institutes for Quantum and Radiological Science and Technology, Kyoto, Japan; [3]Photon Science Center, Graduate School of Engineering, The University of Tokyo, Tokyo, Japan; [4]Research Institute for Photon Science and Laser Technology, The University of Tokyo, Tokyo, Japan

We propose a Vlasov-LDA-based semi-classical approach for laser-driven electron dynamics in solids. We extend the pseudo particle method to periodic systems. The computation results agree excellently with the time-dependent density functional theory and experimental results.

CM-8.5 FRI 12:00

Time-Resolved Ablation Dynamics of Indium Tin Oxide

•G.E. Hallum[1], D. Kürschner[2], H.P. Huber[1], and W. Schulz[2]; [1]Munich University of Applied Sciences, Munich, Germany; [2]RWTH Aachen University, Aachen, Germany

We utilize a pump-probe microscopy setup in order to observe the dynamic reflectivity of indium tin oxide ablation irradiated with ultrashort laser pulses with a near-infrared central wavelength of 1056 nm and sub-ps pulse durations.

ROOM 5

CD-10.4 FRI 11:45

High-Power Fiber-Pumped Continuous-Wave Difference-Frequency-Generation at 2.26 μm

•. Sukeert[1], C.K. Suddapalli[1], and M. Ebrahim-Zadeh[1,2]; [1]ICFO—Institut de Ciències Fotòniques, The Barcelona Institute of Science and Technology, Castelldefels, Spain; [2]Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain

We report high-power single-pass continuous-wave difference-frequency-mixing of Yb and Tm-fiber lasers in MgO:PPLN, generating ~4 W of output power at 2262 nm, with excellent power stability of 0.5%rms over 1.5 hours, in high beam quality.

CD-10.5 FRI 12:00

Waveguide-based optical parametric amplification for coherent Raman imaging

•N.M. Lüpken[1], T. Würthwein[1], K.-J. Boller[2,1], and C. Fallnich[1,2,3]; [1]Institute of Applied Physics, University of Münster, Münster, Germany; [2]MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [3]Cells in Motion Interfaculty Centre, University of Münster, Münster, Germany

We present a light source for narrowband coherent Raman imaging, with the potential to be set up as

ROOM 6

troscopy and molecular electronic structure calculations.

CL-4.4 FRI 11:45

Tracking Conical Intersection Dynamics Of Tryptophan With Sub-20-fs UV Pulses

•P. Kabacinski[1], V.K. Jaiswal[2], R. Borrego-Varillas[1], B.E. Nogueira de Faria[3], M.G. Gentile[2], I. Conti[2], S. De Silvestri[1], M. Garavelli[2], A.M. De Paula[3], and G. Cerullo[1]; [1]IFN-CNR, Dipartimento di Fisica, Politecnio di Milano, Milano, Italy; [2]Dipartimento di Chimica Industriale, Universita degli Studi di Bologna, Bologna, Italy; [3]Departamento de Fisica, Universidade Federal de Minas Gerais, Belo Horizonte-MG, Brazil

Tryptophan can serve as a local probe of UV-excited protein dynamics. We track primary photoinduced processes in tryptophan using sub-30-fs transient absorption spectroscopy and QM/MM computations to reveal its conical intersections.

CL-4.5 FRI 12:00

Single Cell Elastography using Optical Tweezers and Optical Coherence Tomography

•M. Sirotin[1], M. Romodina[1], E. Lyubin[1], I. Soboleva[1,2], and A. Fedyanin[1]; [1]Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia; [2]Frumkin Institute of Physical Chemistry and Electrochemistry, Russian Academy of Sciences, Moscow, Russia

We report on the development of a single cell elastography method based on optical tweezers and optical coherence tomography. This all-

ROOM 7

CJ-8.3 FRI 11:45

Q-Switched Rod-Type Multicore Fibre Laser Delivering 3.1 mJ Pulses

•C. Aleshire[1], A. Steinkopff[1], M. Karst[1,2], A. Klenke[1,2], C. Jauregui[1], S. Kuhn[3], J. Nold[3], N. Haarlammert[3], T. Schreiber[3], and J. Limpert[1,2,3]; [1]Institute of Applied Physics, Friedrich-Schiller-University Jena, Jena, Germany; [2]Helmholtz-Institute Jena, Jena, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

A custom rod-type multicore Yb-doped fibre is used in Q-switched operation, achieving 3.1 mJ pulse energy. The fibre design, laser performance, and prospects for further power scaling in multistage MCF amplifiers will be discussed.

CJ-8.4 FRI 12:00

The contribution has been withdrawn.

ROOM 8

factors exceeding 30 millions and wafer-level yield.

CK-8.4 FRI 11:45

AlGaAs-on-insulator Waveguides for Highly Efficient Photon Pair Generation

•H. Mahmudlu[1,2,3], S. May[4], A. Angulo[1,2,3], M. Sorel[4,5], and M. Kues[1,2,3]; [1]Institute of Photonics, Leibniz University Hannover, Hannover, Germany; [2]Hannover Centre for Optical Technologies, Leibniz University Hannover, Hannover, Germany; [3]Cluster of Excellence PhoenixD (Photonic, Optics, and Engineering – Innovation Across Disciplines), Leibniz University Hannover, Hannover, Germany; [4]School of Engineering, University of Glasgow, Glasgow, United Kingdom; [5]Institute of Technologies for Communication, Information and Perception (TeCIP), Sant'Anna School of Advanced Studies, Pisa, Italy

We demonstrate the generation of correlated photon pairs in AlGaAs-on-insulator waveguides through spontaneous four-wave mixing at telecom wavelengths with a generation efficiency of 0.096 × 10^12 pairs/(s×W^2), one of the highest achieved in integrated structures.

CK-8.5 FRI 12:00

Gallium phosphide transfer printing for integrated nonlinear photonics

•M. Billet[1,2,3], N. Poulvellarie[1,2,3], C. Op de Beeck[1,2], L. Reis[1,2,3], Y. Léger[4], C. Cornet[4], F. Raineri[5], I. Sagnes[5], K. Pantzas[5], G. Beaudoin[5], G. Roelkens[1,2], F. Leo[3], and B. Kuyken[1,2]; [1]Photonics Research Group, Ghent University-IMEC, Ghent, Belgium; [2]Center for Nano and Biophotonics (NB-Photonics), Ghent, Belgium; [3]OPERA-Photonique, Université libre de Bruxelles, Bruxelles, Belgium;

ROOM 9

EE-5.4 FRI 11:45

Role of dispersion and compression ratio on the temporal contrast of SPM-broadened post-compressed pulses

•E. Escoto[1], A.-L. Viotti[1,2], S. Alisauskas[1], H. Tünnermann[1], M. Seidel[1], K. Dudde[1], B. Manschwetus[1], I. Hartl[1], and C.M. Heyl[1,3,4]; [1]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [2]Department of Physics, Lund University, Lund, Sweden; [3]Helmholtz-Institute Jena, Jena, Germany; [4]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

We explore the effects of dispersion and compression ratio on pulse post-compression. We show by numerical simulations, supported by experimental data, that ultrashort pulses with high temporal contrast can be produced at high compression ratios.

EE-5.5 FRI 12:00

Efficient tunable UV pulse generation from a green pumped fs-OPCPA

•T. Lang, S. Alisauskas, M. Kazemi, A. Tajalli, and I. Hartl; Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

We present highly efficient up-conversion schemes for broadband SH-pumped OPCPAs. Utilizing the Yb-pump in a cascaded-SFG, 69% conversion efficiencies to 300nm were obtained without degradation. The tunable UV pulses are compressed in glass to 75fs.

ROOM 10

EH-5.4 FRI 11:45

Overcoming optical performance and diffusion issues in thermally tunable phase-change metasurfaces

•J. Shields, C. Ruiz de Galarreta, J. Bertolotti, and C.D. Wright; College of Engineering Mathematics and Physical Sciences, Exeter, United Kingdom

We experimentally demonstrate how thermally activated diffusion can irreversibly degrade the optical performance of thermally tunable phase-change material based metasurfaces to unacceptable levels, and validate a way to address such a fundamental issue via incorporating ultrathin Si3N4 barrier layers.

EH-5.5 FRI 12:00

Anomalous Resonance Frequency Shift in Liquid Crystal-Loaded Metamaterials

•E. Perivolari[1], V. Apostolopoulos[1], M. Kaczmarek[1], and V.A. Fedotov[2]; [1]Physics and Astronomy, University of Southampton, Southampton, United Kingdom; [2]Optoelectronics Research Centre & Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom

We show that Babinet complementary patterns of metamaterials may not exhibit the same frequency tun-

ROOM 11

in GaAs-based THz-QCLs. We present a novel fabrication-scheme for $ZnO/Zn_{0.88}Mg_{0.12}O$ THz-QCL structures, yielding the first observation of THz-electroluminescence in ZnO.

CC-7.4 FRI 11:45

Terahertz intersubband electroluminescence from n-type germanium quantum wells

•D. Stark[1], M. Mirza[2], L. Persichetti[3], M. Montanari[3], S. Markmann[1], M. Beck[1], T. Grange[4], S. Birner[4], M. Virgilio[5], C. Ciano[3], M. Ortolani[6], C. Corley[7], G. Capellini[3,7], L. Di Gaspare[3], M. De Seta[3], D.J. Paul[2], J. Faist[1], and G. Scalari[1]; [1]Institute for Quantum Electronics, Department of Physics, ETH Zürich, Zürich, Switzerland; [2]James Watt School of Engineering, University of Glasgow, Glasgow, United Kingdom; [3]Dipartimento di Scienze, Universita Roma Tre, Roma, Italy; [4]nextnano GmbH, München, Germany; [5]Dipartimento di Fisica "E. Fermi," Universita di Pisa, Pisa, Italy; [6]Sapienza University of Rome, Department of Physics, Rome, Italy; [7]IHP - Leibniz-Institut für innovative Mikroelektronik, Frankfurt (Oder), Germany

We report the observation of intersubband electroluminescence from n-type Ge/SiGe quantum cascade structures at THz frequencies. This is an important step towards an integrated THz quantum cascade laser on silicon.

CC-7.5 FRI 12:00

All-Optical Control of Quantum Cascade Random Lasers Enhanced by Deep Learning

•B. Limbacher[1,2], S. Schönhuber[1,2], N. Bachelard[3], M.A. Kainz[1,2], A.M. Andrews[2,4], H. Detz[5], G. Strasser[2,4], J. Darmo[1,2], S. Rotter[3], and K. Unterrainer[1,2]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Center for Micro-and Nanostructures, TU Wien, Vienna, Austria; [3]Institute for Theoretical Physics, TU Wien, Vienna, Austria; [4]Institute for Solid-

ROOM 12

JSIV-3.4 FRI 11:45

Forecasting turbulence in a passive resonator with supervised machine learning

•S. Coulibaly[1], F. Bessin[3], M. Clerc[2], and A. Mussot[1]; [1]Université de Lille, Lille, France; [2]Universidad de Chile, Santiago, Chile; [3]Aston University , Birmingham, United Kingdom

Chaotic dynamics implies an exponential magnification of any inaccuracy in the initial conditions. Consequently, long-term forecasting becomes an elusive task. Here, we address the predictability of experimental extreme events through the machine learning.

JSIV-3.5 FRI 12:00

Metasurface-based Polarization-insensitive Beam Splitter with Deep Learning

•F.C. Savas[1], Y.A. Yilmaz[1], I.A. Atalay[1], and H. Kurt[1,2]; [1]TOBB University of Economics and Technology, Ankara, Turkey; [2]Korea Advanced Institute of Science and Technology, Daejeon, South Korea

In this study, all-dielectric metasurface-based beam splitter is realized by a deep neural network to split the beam at the angle of ±46.8° and achieve more than 0.97 transmission value for TE and TM polarizations.

ROOM 1

CH-11.5 FRI 12:15

Single photon holography with undetected light

•*M. Gilaberte Basset*[1], *S. Töpfer*[1], *J..P. Torres*[2], *J. Fuenzalida*[1], *F. Steinlechner*[1], *and M. Gräfe*[1]; [1]*Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany*; [2]*ICFO-Institut de Ciencies Fotoniques, Castelldefels, Spain*

We experimentally implement phase shifting holography in a nonlinear interferometer. This allows fast and convenient holographic phase and transmission sensing of samples with spectral separation of illumination and detection.

ROOM 2

We exploit silica defects photoluminescence for directly visualizing the self-imaging arising from the interference of LP01 and LP11 modes of a bimodal optical fiber. This provides a length-independent method to determine the fiber cut-off.

CI-4.4 FRI 12:15

Photonics-Based Cholesky Decomposition

•*M. Salmani, E. Luan, S. Saha, B. Semnani, and A. Eshaghi*; *Huawei Technologies Canada, Markham, Canada*

In this paper, a photonic computing architecture for Cholesky decomposition implementation is proposed. By exploiting the bandwidth and lossless light propagation, the proposed architecture provides a significant improvement in time efficiency as compared to GPUs.

ROOM 3

Közhasznú Nonprofit Kft., Budapest, Hungary; [4]*Department of Physics and Astronomy, University of British Columbia, Vancouver, Canada*; [5]*Quantum Matter Institute, University of British Columbia, Vancouver, Canada*

The delay between ultrashort light pulses emitted by two mode-locked oscillators is monitored via second-order nonlinear processes. Modulating their detuned repetition frequencies at >1 kHz enables attosecond-precision mid-infrared electric-field-resolved measurement of a 7-ps time window.

CF-9.6 FRI 12:15

Superposition of two independent FDML lasers

•*C. Grill*[1], *S. Lotz*[1], *T. Blömker*[1], *M. Schmidt*[2], *W. Draxinger*[1], *J.P. Kolb*[1], *C. Jirauschek*[2], *and R. Huber*[1]; [1]*Institute of Biomedical Optics, University of Lübeck, Lübeck, Germany*; [2]*Department of Electrical and Computer Engineering, Technical University of Munich, Munich, Germany*

Coherence properties are crucial for applications of Fourier domain mode locking but cannot be measured with conventional methods. Beating of two independent FDML lasers gives novel in-sights in its linewidth and carrier envelope phase slip.

ROOM 4

CM-8.6 FRI 12:15

All multimode smart endoscopic cleaning system monitored by LIBS spectroscopy

B. Shalaby[1,2], •*Y. Leventoux*[1], *M. Fabert*[1], *T. Manduryan*[1], *S. Février*[1], *D. Pagnoux*[1], *and V. Couderc*[1]; [1]*Université de Limoges, XLIM, UMR CNRS 7252, Limoges, France*; [2]*Physics Department, Faculty of Science, Tanta University, Tanta, Egypt*

We demonstrate a new dual Q-switched laser based on a Nd:YAG crystal pumped by a Q-switched laser diode. We can clean and determine a sample composition using multimode smart endoscopic system monitored by LIBS spectroscopy.

ROOM 5

an all-integrated device, based on four-wave mixing in silicon nitride waveguides.

CD-10.6 FRI 12:15

Speckle-assited structured illumination stimulated Raman scattering microscopy

•*J. Guilbert*[1], *A. Negash*[1], *S. Labouesse*[2], *S. Gigan*[1], *A. Sentenac*[3], *and H. Barbosa de Aguiar*[1]; [1]*Laboratoire Kastler Brossel, ENS-Université PSL, CNRS, Sorbonne Université, Collège de France, Paris, France*; [2]*Department of Electrical, Computer, and Energy Engineering, University of Colorado, Boulder, USA*; [3]*Aix Marseille Univ, CNRS, Centrale Marseille, Institut Fresnel, Marseille, France*

We present a far-field computational microscopy technique, using speckle-based structured illumination, enabling stimulated Raman scattering super resolution imaging of biological specimens at high speed.

ROOM 6

optical method makes it possible to evaluate cellular mechanical properties without applying any probes.

ROOM 1

14:30 – 16:00

CD-11: All-optical Control and Wavelength Conversion

Chair: Uwe Morgner, Leibniz Universität Hannover, Hannover, Germany

CD-11.1 FRI (Invited) 14:30

Applications for interferometry and sub-millisecond phase modulation with liquid crystal light valves

ROOM 2

14:30 – 15:45

CL-5: Dynamic and Advanced Light Shaping

Chair: Ilaria Testa, KTH-SciLifeLab, Stockholm, Sweden

CL-5.1 FRI 14:30

Photon-efficient three-dimensional simultaneous multicolor particle tracking by multiplexed PSF engineering

ROOM 3

14:30 – 16:00

EH-6: Applications of Metamaterials and Metasurfaces

Chair: Kosmas Tsakmakidis, National and Kapodistrian University of Athens, Athens, Greece

EH-6.1 FRI 14:30

Molecular Optomechanical Springs for Infrared Metasurface Detectors

•*A. Xomalis*[1], *X. Zheng*[2], *R. Chikkaraddy*[1],

ROOM 4

14:30 – 16:00

CJ-9: Speciality Fiber Lasers

Chair: Bülend Ortaç, Bilkent University - UNAM, Bilkent, Turkey

CJ-9.1 FRI 14:30

Single-Mode All-Chalcogenide Brillouin Fiber Laser

•*M. Rezaei and M. Rochette*; *McGill Univer-*

ROOM 5

14:30 – 16:00

CK-9: Novel Technologies and Materials for Micro-photonics

Chair: Anna Lena Giesecke, Group Leader Nanophotonics, AMO GmbH, Aachen, Germany

CK-9.1 FRI 14:30

Qualification of Femtosecond Laser-Written Waveguides for Space Environment

ROOM 7

CJ-8.5 FRI 12:15

High-Power Cladding Light Stripper with Vapor Deposition of Polyethersulfone

•B. Şimşek, O. Aktaş, A. Karatutlu, A. Başaran, E. Yapar Yıldırım, Y. Midilli, and B. Ortaç; National Nanotechnology Research Center, Ankara, Turkey

Vapor deposition of high index engineered polymer over fiber cladding was presented. Performance of device was tested with 171.3 W launched cladding light and it was reduced by 17.72 dB at the output.

ROOM 8

[4]Université Rennes, INSA Rennes, CNRS, Institut FOTON – UMR 6082, Rennes, France; [5]Centre de Nanosciences et de Nanotechnologies (C2N), CNRS, Université. Paris Sud. Paris Saclay, Palaiseau, France

Recently, gallium phosphide-on-insulator (GaP-OI) has been proposed as an efficient platform for second and third order nonlinear applications. Here we show GaP transfer printing as a novel versatile integration technique allowing for decent resonators building and second harmonic generation (SHG).

CK-8.6 FRI 12:15

Extreme localisation of light in driven-dissipative photonic lattices

O. Jamadi[1], B. Real[1], K. Sawicki[2], N. Pernet[3], I. Sagnes[3], A. Lemaître[3], L. Le Gratiet[3], A. Harouri[3], S. Ravets[3], J. Bloch[3], and •A. Amo[1]; [1]Université de Lille, CNRS, UMR 8523 – PhLAM – Physique des Lasers, Atomes et Molécules, Lille, France; [2]Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland; [3]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, Palaiseau, France

We demonstrate a new way to engineer localised modes in photonic lattices, based on the driven dissipative nature of our polariton resonators and the chiral symmetry of the honeycomb lattice.

ROOM 9

EE-5.6 FRI 12:15

Field-resolved interference among dark waves

•L. Vamos[1], I. Tyulnev[1], L. Maidment[1], C. Hensel[1], U. Elu[1], M. Enders[1], and J. Biegert[1,2]; [1]ICFO - Institut de Ciencies Fotoniques, Castelldefels, Barcelona, Spain; [2]ICREA, Castelldefels, Barcelona, Spain

Frequency-time analysis of field-resolved measurements provides a direct insight and deeper understanding of the temporal decay process of individual lines in a complex absorption spectrum.

ROOM 10

ing range when integrated with liquid crystals due to anisotropy of local fields and strong orientational optical nonlinearity of liquid crystals.

EH-5.6 FRI 12:15

Temperature-tunable Surface Lattice Resonances in Plasmonic Metasurfaces

•T. Stolt[1], J. Kelavuori[1], V. Vanyukov[2], H. Rekola[2], J. Reuna[1], T.K. Hakala[2], and M.J. Huttunen[1]; [1]Tampere University, Tampere, Finland; [2]University of Eastern Finland, Joensuu, Finland

We demonstrate post-fabrication tuning of the spectral properties of plasmonic surface lattice resonances by controlling the ambient temperature. Our method opens interesting pathways towards actively tunable metamaterial devices.

ROOM 11

State Electronics, TU Wien, Vienna, Austria; [5]Central European Institute of Technology, Brno, Czech Republic

We show that the emission spectra of quantum cascade random lasers can be controlled by optically exciting electron-hole pairs. State of the art machine learning allows us to generate desired spectra almost instantaneously.

CC-7.6 FRI 12:15

Systematic search for single mode QCL at 4.7THz and post-process frequency tuning

•T. Olariu, M. Beck, G. Scalari, and J. Faist; Institute for Quantum Electronics, ETH Zurich, Zurich, Switzerland

A systematic search of THz QCL operating at 4.745 THz is performed by tracking the measured against the designed frequency, and frequency tuned post-process by changing the local geometry and therefore the effective refractive index.

ROOM 12

ROOM 6

14:30 – 16:00

CC-8: THz QCL-combs and Imaging

Chair: Sukhdeep Dhillon, LPENS/CNRS, Paris, France

CC-8.1 FRI 14:30

Pure and Self-starting Harmonic Combs in THz Quantum Cascade Lasers: Theory and Experiments

ROOM 7

14:30 – 16:00

JSIV-4: Learning in Imaging and Metrology II

Chair: Sylvain Gigan, University of Sorbonne, Paris, France

JSIV-4.1 FRI (Invited) 14:30

Inferring spatial scenes from their time-resolved multipath echoes

•V. Kapitany[1], A. Turpin[2], J. Radford[1], D.

ROOM 8

14:30 – 16:00

CH-12: Fiber-based Sensors I

Chair: Robert Halir, University of Málaga, BIONAND - Centro Andaluz de Nanomedicina y Biotecnología, Málaga, Spain

CH-12.1 FRI 14:30

Hollow-Core-Fiber Delivery of Broadband Mid-Infrared Light for Remote Multi-Species Spectroscopy

ROOM 9

14:30 – 16:00

CG-7: High-Repetition XUV and X-ray Sources

Chair: Matthias Kübel, University of Jena, Germany

CG-7.1 FRI 14:30

A high-repetition rate attosecond pulse source for coincidence spectroscopy

•C.L. Arnold, S. Mikaelsson, J. Vogelsang, C.

NOTES

ROOM 1

•S. Residori[1], U. Bortolozzo[1], and J.-P. Huignard[2]; [1]HOASYS, Valbonne, France; [2]Jphopto, Paris, France

Liquid crystal light valves are optically addressed spatial light modulators combining liquid crystals with a photosensitive material. Sub-millisecond response times are obtained in small index modulation regimes, useful for dynamic holography, imaging and lidar applications.

CD-11.2 FRI 15:00

Monolithic LiNbO$_3$ Metasurface for Steering and Polarization-Encoding of Second-Harmonic Generation in the Visible

•L. Carletti[1], A. Zilli[2], F. Moia[3], A. Toma[3], M. Finazzi[2], C. De Angelis[1], D. Neshev[4], and M. Celebrano[2]; [1]Department of Information Engineering, University of Brescia, Brescia, Italy; [2]Physics Department, Politecnico di Milano, Milano, Italy; [3]Istituto Italiano di Tecnologia, Genova, Italy; [4]ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Research School of Physics, Australian National University, Canberra, Australia

We demonstrate monolithic lithium niobate metasurfaces for spatial and polarization encoding of second-harmonic generation in

ROOM 2

•N. Opatovski[1], Y. Shalev-Ezra[2], L.E. Weiss[2], B. Ferdman[1], R. Orange[1], and Y. Shechtman[1,2]; [1]Russel Berrie Nanotechnology Institute, Technion - Israel Institute of Technology, Haifa, Israel; [2]Department of biomedical engineering, Technion - Israel Institute of Technology, Haifa, Israel

Spectral information is encoded into shape of the PSF, using spectrally-dependent PSF engineering. By multiplexing spectrally-defined PSFs, we obtain multicolor, large FOV 3D localization microscopy with high spatiotemporal resolution, all on a single camera sensor.

CL-5.2 FRI 14:45

Adaptive glasses wavefront sensorless Full-Field OCT for high-resolution in vivo retinal imaging over a wide FOV

•Y. Cai[1,2], J. Scholler[1], K. Groux[1], O. Thouvenin[1], C. Boccara[1], P. Mecê[1], and K. Grieve[2]; [1]Institut Langevin, ESPCI Paris, CNRS, PSL University, Paris, France; [2]Quinze-Vingts National Eye Hospital, Paris, France

We propose a compact full-field OCT assisted by an adaptive lens positioned in front of the eye for wavefront correction, enabling to ally high resolution (2μm×2μm×8μm) with a wide field-of-view (5°×5°) for in vivo retinal imaging.

CL-5.3 FRI 15:00

3D micro-printed hybrid photonic structure for single-fiber Optical Tweezers

•I. Reddy[1,2], A. Bertoncini[1], and C. Liberale[1,3]; [1]Biological and Environmental Science and Engineering Division, King Abdullah University of Science and Technology, Saudi Arabia, Thuwal, Saudi Arabia; [2]Department of Electrical Engineering, University at Buffalo, NY USA, Buffalo, USA; [3]Computer, Electrical and Mathematical Science and Engineering Division, King Abdullah University of Science and Technology, Saudi Arabia, Thuwal, Saudi Arabia

We present an on-fiber 3D micro-printed structure to create customizable single-fiber optical tweezers. It contains waveguiding, reflecting, and refracting micro-optical ele-

ROOM 3

and J.J. Baumberg[1]; [1]NanoPhotonics Centre, Cavendish Laboratory, Department of Physics, University of Cambridge, Cambridge, United Kingdom; [2]Department of Electrical Engineering (ESAT-TELEMIC), KU Leuven, Leuven, Belgium

Molecular optomechanical springs self-assembled in nanometre-scale metallic cavities allow extreme optomechanical coupling and single mid-infrared photon sensitivity. Here we achieve frequency upconversion of 9-10μm mid-infrared incoming photons to visible photons via SERS in doubly-resonant metasurfaces.

EH-6.2 FRI 14:45

Asymmetric Transmission in Nano-opto-mechanical Metamaterials at μW Power Levels

•J. Li[1], K.F. MacDonald[1], and N.I. Zheludev[1,2]; [1]Optoelectronics Research Centre and Centre for Photonic Metamaterials, University of Southampton, Southampton, United Kingdom; [2]Centre for Disruptive Photonic Technologies, TPI, SPMS, Nanyang Technological University, Singapore, Singapore

In linear optics, reciprocity dictates that transmission of (conventional) absorbers is identical in forward and backward propagation directions. We present an optomechanically nonlinear metamaterial providing intensity-dependent transmission asymmetry reaching 60% at microwatt power levels.

EH-6.3 FRI 15:00

Nonlinear THz metasurface and metagrating emitters utilizing C3 meta-atoms

•C. McDonnell[1], J. Deng[2], S. Sideris[1], G. Li[2], and T. Ellenbogen[1]; [1]Tel Aviv University, Tel Aviv, Israel; [2]University of Science and Technology Shenzen, Shenzen, China

We utilize nanostructured meta-atoms with C3 symmetry to develop plasmonic THz metagrating emitters which result in the generation of broadband THz pulses with full polarization and phase control

ROOM 4

sity, Montreal, Canada

We propose the first all-chalcogenide Brillouin fiber laser, as well as the first all-chalcogenide ring cavity. The resulting single-mode laser increases the coherence length of the pump by a factor of >7.

CJ-9.2 FRI 14:45

Al2O3-P2O5-SiO2 fibers doped with an ultra-high Yb2O3 concentration

D. Lipatov[1], A. Abramov[1], A. Guryanov[1], K. Bobkov[2], T. Zaushitsyna[2], M. Bubnov[2], and •M. Likhachev[2]; [1]G.G. Devyatykh Institute of Chemistry of High-Purity Substances of the Russian Academy of Sciences, Nizhny Novgorod, Russia; [2]Prokhorov General Physics Institute of the Russian Academy of Sciences, E.M. Dianov Fiber Optics Research Center, Moscow, Russia

Ultra-highly-Yb-doped aluminophosphorosilicate fibers has been studied. Ultra-short (3.7 cm in length) 1030-nm-signal amplifier with pump-to-signal convention efficiency of 65% relative to input pump at 976 nm was demonstrated using developed fiber.

CJ-9.3 FRI 15:00

Spectral Properties of Optical Discharge in Hollow-Core Optical Fibers

•I. Bufetov, A. Kolyadin, Y. Yatsenko, and A. Kosolapov; Prokhorov General Physics Institute of the Russian Academy of Sciences, Dianov Fiber Optics Research Center, Moscow, Russia

Emission spectra of an optical discharge propagating along a hollow-core fiber under the action of pulsed laser radiation were measured. The averaged spectrum of the discharge plasma corresponds to the black body radiation at~15kK.

ROOM 5

•S. Piacentini[1,2], T. Vogl[3,4,5], G. Corrielli[2,1], P.K. Lam[5], and R. Osellame[2,1]; [1]Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [2]Istituto di Fotonica e Nanotecnologie, Consiglio Nazionale delle Ricerche, Milano, Italy; [3]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universitat Jena, Jena, Germany; [4]Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom; [5]Centre for Quantum Computation and Communication Technology, Department of Quantum Science, Research School of Physics and Engineering, The Australian National University, Acton ACT, Australia

After exposure to the doses of protons and gamma-rays expected in a Low Earth Orbit environment, we show that femtosecond laser-written photonic circuits in glass are space compatible and can be employed in satellite-based experiments

CK-9.2 FRI 14:45

Nonlinear formation of photonic microresonators by slow optical cooking

•G. Gardosi and M. Sumetsky; Aston university, Birmingham, United Kingdom

The recently discovered method for slow optical cooking of microresonators at water-filled silica microcapillaries is characterised by the spectral evolution of the WGM cut-off wavelength, which can be positive linear, nonlinear and, even negative.

CK-9.3 FRI 15:00

Lithography-Free Fabrication of Extraordinary Transmission Plasmonic Metasurfaces Over Large Areas Employing Ultrafast Lasers

N. Casquero[1], •C. Ruiz de Galarreta[1,2], E. Humphreys[2], J. Bertolotti[2], J. Solis[1], C.D. Wright[2], and J. Siegel[1]; [1]Laser Processing Group, Instituto de Optica, IO-CSIC, Madrid, Spain; [2]College of Engineering Mathematics and Physical Sciences, University of Exeter, Exeter, United Kingdom

We present a direct writing technique using ultrafast lasers towards high throughput, large area, lithography free and energy efficient fabrication of plasmonic optical metasurfaces based on the extraordinary transmission effect.

ROOM 6

•*A. Forrer*[1], *Y. Wang*[2], *M. Beck*[1], *A. Belyanin*[2], *J. Faist*[1], *and G. Scalari*[1]; [1]*ETH Zürich, Zürich, Switzerland*; [2]*Texas A & M University, College Station, USA*

We present experimental results of self-starting harmonic combs in THz Quantum Cascade Lasers with a single, sub-kHz linewidth beatnote. The coherence between optical modes is verified and our theoretical model explains the experiments.

CC-8.2 FRI 14:45

Comb Operation In Terahertz Quantum Cascade Ring Lasers

•*M. Jaidl*[1,2], *N. Opacak*[3], *M.A. Kainz*[1,2], *S. Schönhuber*[1,2], *D. Theiner*[1,2], *B. Limbacher*[1,2], *M. Beiser*[2,3], *M. Giparakis*[2,3], *A.M. Andrews*[2,3], *G. Strasser*[2,3], *B. Schwarz*[2,3], *J. Darmo*[1,2], *and K. Unterrainer*[1,2]; [1]*Photonics Institute, Vienna, Austria*; [2]*Center for Micro- and Nanostructures, Vienna, Austria*; [3]*Institute of Solid State Electronics, Vienna, Austria*

We present comb formation in ring-shaped THz quantum cascade lasers. Devices are self-starting operating in a harmonic state transitioning into a dense comb regime exhibiting over 30 equidistant modes covering a bandwidth of 622 GHz.

CC-8.3 FRI 15:00

Reshaping the emission of a THz quantum cascade laser frequency comb through an on-chip graphene modulator

•*A. Di Gaspare*[1], *E.A.A. Pogna*[1], *O. Balci*[2], *S.M. Shinde*[2], *L. Li*[3], *C. di Franco*[4], *A.G. Davies*[3], *E. Linfield*[3], *A.C. Ferrari*[2], *G. Scamarcio*[4], *and M.S. Vitiello*[1]; [1]*NEST, CNR-NANO and Scuola Normale Superiore, Pisa, Italy*; [2]*Cambridge Graphene Centre, Cambridge , United Kingdom*; [3]*School of Electronic and Electrical Engineering, University of Leeds, Leeds, United Kingdom*; [4]*CNR-IFN and Dipartimento Interateneo di Fisica, Università degli Studi di Bari, Bari, Italy*

We present a graphene-on-polyimide THz modulator with a tunable-by-design optical bandwidth. By coupling the modulator with a THz quantum cascade laser frequency

ROOM 7

Rovelli[1], *A. Lyons*[1], *I. Starshynov*[1], *and D. Faccio*[1]; [1]*University of Glasgow, School of Physics and Astronomy, Glasgow, United Kingdom*; [2]*University of Glasgow, School of Computing Science, Glasgow, United Kingdom*

We show that measuring multipath temporal echoes of 3D scenes, instead of just direct reflections, provides sufficient information to reconstruct the scenes with a single-pixel detector. We demonstrate this experimentally using radio-frequency and acoustic data.

JSIV-4.2 FRI 15:00

Convolutional Neural Network for Self Mixing Interferometry

•*S. Barland*[1] *and F. Gustave*[2]; [1]*Université Côte d'Azur, Institut de Physique de Nice, Valbonne, France*; [2]*ONERA - Université Paris Saclay, Palaiseau, France*

We design and train a convolutional neural network to reconstruct the complex displacement of a target from a self-mixing interferometric signal. The network's prediction is robust against noise, alignment configurations and even across experimental setups.

ROOM 8

K. Johnson[1], *P. Castro-Marin*[2], *C. Farrell*[1], *I. Davidson*[3], *G. Jasion*[3], *N. Wheeler*[3], *F. Poletti*[3], *D. Richardson*[3], *and* •*D.T. Reid*[2]; [1]*Chromacity Ltd, Edinburgh, United Kingdom*; [2]*Heriot–Watt University, Edinburgh, United Kingdom*; [3]*Univ. of Southampton, Southampton, United Kingdom*

High-resolution multi-species spectroscopy is achieved by delivering mid-infrared light through a hollow-core silica fiber. Concentrations of H37Cl, H35Cl, H2O, CH4, C3H6O and C3H8O are simultaneously obtained by a multi-parameter fit with up to 5-ppb precision.

CH-12.2 FRI 14:45

Impact of Pressure-Induced Differential Refractive Index in Raman Spectroscopy using Hollow-Core Fibres

•*T. Kelly*[1], *I. Davidson*[1], *S. Rikimi*[1], *G. Jasion*[1], *M. Partridge*[1], *W. Brooks*[2], *M. Foster* [2], *F. Poletti*[1], *D. Richardson*[1], *P. Horak*[1], *and N. Wheeler*[1]; [1]*University of Southampton, Southampton, United Kingdom*; [2]*Is-Instruments Ltd., Tonbridge, United Kingdom*

Here we report an improvement in the performance of a hollow core microstructured optical fibre Raman gas sensor by 80% through loading gas into the core, raising the refractive index, and reducing the fibre attenuation.

CH-12.3 FRI 15:00

Localized temperature and pressure measurements inside CS2-filled fiber using stimulated Brillouin scattering

•*A. Popp*[1,2,3], *A. Geilen*[1,2,4], *D. Walter*[1,2], *M. Chemnitz*[5], *S. Junaid*[6,7], *C.G. Poulton*[8], *C. Marquardt*[1,2,3], *M.A. Schmidt*[6,7], *and B. Stiller*[1,2]; [1]*Max Planck Institute for the Science of Light, Erlangen, Germany*; [2]*Department of Physics, University of Erlangen-Nuremberg, Erlangen, Germany*; [3]*SAOT, Graduate School in Advanced Optical Technologies, Erlangen, Germany*; [4]*IMPRS, International Max Planck Research School - Physics of Light, Erlangen, Germany*; [5]*INRS-EMT, Qubec, Canada*; [6]*Leibniz Institute of Photonic Technology, Jena, Germany*; [7]*Otto Schott Institute of Materials Research (OSIM), Jena, Germany*; [8]*School of Mathematical and Physical Sciences, University of Technology Sydney, Sydney, Australia*

ROOM 9

Guo, I. Sytcevich, A.-L. Viotti, F. Langer, Y.-C. Cheng, S. Nandi, A. Olofsson, R. Weissenbilder, J. Mauritsson, A. L'Huillier, and M. Gisselbrecht; *Department of Physics, Lund University, Lund, Sweden*

We present a high-repetition rate, attosecond light source, emitting controlled short trains of attosecond pulses. We study one-photon double-ionization of He by detecting He^{2+} and the two correlated photoelectrons in coincidence with full angular resolution.

CG-7.2 FRI 14:45

Comparison of 100-kHz Near-IR and Mid-IR Driven High-Harmonic Generation in the Water Window

•*P.-A. Chevreuil, S. Hrisafov, F. Brunner, J. Pupeikis, C.R. Phillips, L. Gallmann, and U. Keller*; *ETH Zürich, Zürich, Switzerland*

We report the generation of water window harmonics (283-543 eV) with a 0.8-μm driver at 100 kHz repetition rate, and compare the results with high-harmonic generation at 2.2 μm.

CG-7.3 FRI 15:00

100 kHz water window soft X-ray high-order harmonic generation through pulse self-compression in an antiresonant hollow-core fiber

•*M. Gebhardt*[1,2], *T. Heuermann*[1,2], *R. Klas*[1,2], *C. Liu*[1,2], *A. Kirsche*[1,2], *M. Lenski*[1], *Z. Wang*[1], *C. Gaida*[1,5], *J.E. Antonio-Lopez*[3], *A. Schülzgen*[3], *R. Amezcua-Correa*[3], *J. Rothhardt*[1,2,4], *and J. Limpert*[1,2,4]; [1]*Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Jena, Germany*; [2]*Helmholtz-Institute Jena, Jena, Germany*; [3]*CREOL, College of Optics and Photonics, University of Central Florida, Orlando, FL, USA*; [4]*Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany*; [5]*Active Fiber Systems GmbH, Jena, Germany*

NOTES

ROOM 1

the visible spectrum with a conversion efficiency of 2.4×10^{-8} at a pump intensity as low as 0.5 GW/cm^2.

CD-11.3 FRI 15:15

Opto-thermally controlled beam steering in nonlinear all-dielectric metasurfaces

•*D. Rocco[1,2], M. Gandolfi[2,1], A. Tognazzi[1,2], O. Pashina[3], K. Frizyuk[3], G. Zograf[3], S. Makarov[3], C. Gigli[4], G. Leo[4], M. Petrov[3], and C. De Angelis[1,2]; [1] University of Brescia, Brescia, Italy; [2] National Institute of Optics CNR – INO, Brescia, Italy; [3] ITMO University, St Petersburg, Russia; [4] Université de Paris, Paris, France*

We design an all-dielectric nonlinear metasurface where the generated second harmonic signal can be steered by means of an optical control beam of moderate power in the visible range.

CD-11.4 FRI 15:30

Constraint-free wavelength conversion supported by giant refraction in a 3D perovskite Super-Crystal

•*L. Falsi[1,2], L. Tartara[3], F. Di Mei[1], M. Flammini[1], J. Parravicini[4,5], D. Pierangeli[1], G. Parravicini[6], P. Di Porto[1], F. Xin[1,7], A.J. Agranat[8], and E. DelRe[1]; [1] Department of Physics, University of Rome ”La Sapienza”, 00185 Rome, Italy, Rome, Italy; [2] S.B.A.I. Department, Physics Section, University of Rome ”La Sapienza”, 00161 Rome, Italy, Rome, Italy; [3] Dipartimento di Ingegneria Industriale e dell'Informazione, Università di Pavia, I-27100 Pavia, Italy, Pavia, Italy; [4] Dipartimento di Scienza dei Materiali, Università di Milano-Bicocca, I-20125 Milano, Italy, Milano, Italy; [5] Erasmus Centre for Innovation, Erasmus University Rotterdam, Rotterdam, Netherlands, Rotterdam, Netherlands; [6] Dipartimento di Fisica, Università di Pavia, I-27100 Pavia, Italy, Pavia, Italy; [7] College of Physics and Materials Science, Tianjin Normal University, Tianjin, China, 300387, Tianjin, China; [8] Applied Physics Department, Hebrew University of Jerusalem, Jerusalem 91904, Israel, Jerusalem, Israel*

We perform second-harmonic-generation experiments in KTN:Li in conditions of giant broadband refraction. The process occurs with a wide spectral acceptance, an ultra-wide angular acceptance and with no polarization selectivity.

ROOM 2

ments stacked to generate a high-NA focal spot.

CL-5.4 FRI 15:15

Au-Capped Si Nanowhiskers for Size-Dependent Improved Fluorescence of Fluorophores

•*A. Karatutlu[1], İ. Şeker[2], M. Karakız[3], K. Gölcük[4], and B. Ortaç[1]; [1] Bilkent University UNAM - Institute of Materials Science and Nanotechnology, Ankara, Turkey; [2] Alyse Built-in Appliances, Organized Industrial Zone, Amasya, Turkey; [3] Cumhuriyet University, Department of Mechatronics Engineering, Sivas, Turkey; [4] Institute of Experimental Epileptology and Cognition Research, Life and Brain Center, University of Bonn Medical Center, Bonn, Germany*

Numerical simulations using the finite element method support the Si NWs size-dependent fluorescence enhancement factors with a signal amplification factor from 2 to 7 demonstrating the optimum position of the fluorophore within the hot spot.

CL-5.5 FRI 15:30

Metalens-based Particle Routing in Continuous-flow Microchannels

•*S. Yin, F. He, N.G. Green , and X. Fang; School of Electronics and Computer Science, University of Southampton, Southampton, United Kingdom*

We demonstrate dielectric metalenses with phase profiles that respond to changes in two input control light beams, resulting in a steerable focal line. We further show their application of particle routing in continuous-flow microchannels.

ROOM 3

EH-6.4 FRI 15:15

All-dielectric Metasurfaces Enabling Imaging-based Real-time Biosensing

•*y. jahani[1], E.R. Arvelo[1], F. Yesilkoy[2], K. Koshelev[3,4], C. Cianciaruso[5], M. De Palma[5], Y. Kivshar[3], and H. Altug[1]; [1] Institute of Bioengineering, École Polytechnique Fédérale de Lausanne (EPFL), lausanne, Switzerland; [2] Department of Biomedical Engineering, University of Wisconsin–Madison, Madison, USA; [3] Nonlinear Physics Center, Australian National University, Canberra , Australia; [4] Department of Physics and Engineering, ITMO University, St Petersburg, St Petersburg, Russia; [5] School of Life Sciences, École Polytechnique Fédérale de Lausanne (EPFL), lausanne, Switzerland*

We present an in-flow label-free biosensor supporting high-quality-factor resonances based on bound-states-in-the-continuum and novel data-processing. The biosensor is integrated with an imaging platform offering solutions to eliminate sophisticated and bulky spectroscopy requirements for point-of-care applications.

EH-6.5 FRI 15:30

Novel Metal Oxide Metasurface-based Optical Solar Reflectors

•*K. Sun[1], W. Xiao[1], I. Zeimpekis[1], M. Simeoni[2], A. Urbani[2], M. Gaspari[2], S. Mengali[2], I. Indiveri[3], B. Alpat[3], L. Kildebro[4], J. Aizpurua[5], D. Hawak[1], C.H.(. de Groot[1], and O.L. Muskens[1]; [1] University Southampton, Southampton, United Kingdom; [2] Consorzio C.R.E.O., L'Aquila, Italy; [3] Maprad S.r.l., Perugia, Italy; [4] NIL Technology, Kongens Lyngby, Denmark; [5] Centro de Física de Materiales - Materials Physics Center, Centro Mixto CSIC-UPV/EHU, San Sebastian, Spain*

Optical solar reflectors (OSRs) play a crucial role in the spacecraft thermal control. Through a novel plasma patterning technique, we present novel Al:ZnO based meta-OSRs with a planar topological surface but an optical metasurface.

ROOM 4

CJ-9.4 FRI 15:15

Gamma Radiation Effect on Ytterbium-Doped Optical Fibers: Investigation of Color Centers

•*E. Kendir, Y. Midilli, H.C. Çamiçi, A. Karatutlu, E. Yapar Yıldırım, and B. Ortaç; Bilkent University UNAM—Institute of Materials Science and Nanotechnology, Ankara, Turkey*

Our research findings indicate that the color centers related to Al, P, and Si elements occur with the gamma radiation in the Yb-doped optical fibers, resulting in the fibers' performance decreasing with these color centers.

CJ-9.5 FRI 15:30

Free-running and imposed-wavelength cavities for high power continuous-wave Tm3+, Ho3+ codoped single-oscillator fiber laser

•*A. Motard[1,2], C. Louot[1], T. Robin[3], B. Cadier[3], N. Dalloz[1], A. Hildenbrand-Dhollande[1], and I. Manek-Hönninger[2]; [1] French-German research Institute of Saint-Louis, F-68300 Saint-Louis, France; [2] Université Bordeaux, CNRS CEA, CELIA UMR5107, F-33405 Talence, France; [3] IXBLUE PHOTONICS, F-22300 Lannion, France*

We demonstrate a monolithic high efficiency (45%) single-oscillator Tm3+, Ho3+-codoped fiber laser providing an output power of up to 195 W at 2.09 μm in continuous regime with an excellent beam quality (M2 < 1.1).

ROOM 5

CK-9.4 FRI 15:15

Reflection and transmission effects of surface plasmon polaritons at dielectric microstructure boundaries

•*L. Zheng[1,2], C. Reinhardt[3], and B. Roth[1,2]; [1] Leibniz University Hannover, Hannover, Germany; [2] Cluster of Excellence PhoenixD (Photonics, Optics, and Enigineering-Innovation Across Disciplines), Hannover, Germany; [3] Hochschule Bremen, Hannover, Germany*

In this work, Special plasmonic structures were designed and realized for the on-chip light manipulation. The reflection and transmission effects of surface plasmon polaritons at dielectric microstructure boundaries were investigated.

CK-9.5 FRI 15:30

Rabi Splitting using Gold Nano-Bipyramids and Monolayer MoS2

•*J. Lawless[1], C. Hrelescu[1], C. Elliott[1,3], L. Peters[2], N. McEvoy[2], and L. Bradley[1,3]; [1] School of Physics and AMBER, Trinity College Dublin, Dublin, Ireland; [2] School of Chemistry and AMBER, Trinity College Dublin, Dublin, Ireland; [3] IPIC, Tyndall National Institute, Cork, Ireland*

Bipyramids were investigated as a nanoresonator to achieve strong coupling with monolayer MoS2. It was shown that larger bipyramids could couple more strongly, even without increasing the number of coupled excitons, contrasting to other nanostructures.

ROOM 6

comb, we show it can fully compensate the cavity dispersion.

CC-8.4 FRI 15:15

Synthetized Terahertz Frequency Combs

•*D. Theiner[1,2], B. Limbacher[1,2], K. Unterrainer[1,2], and J. Darmo[1]; [1]Photonics Institute, TU Wien, Vienna, Austria; [2]Center for Micro- and Nanostructures, TU Wien, Vienna, Austria*

A synthesized tunable Terahertz frequency comb (FC) source with center frequencies up to 3.6 THz exhibiting linewidths below 10 MHz is presented that is based on commercially available fiber integrated optical components.

CC-8.5 FRI 15:30

THz Quantum Cascade Laser Frequency Comb based on a Y-coupled Planarized Waveguide

•*U. Senica, T. Olariu, P. Micheletti, M. Beck, J. Faist, and G. Scalari; ETH Zurich, Zurich, Switzerland*

We present a Y-coupled planarized THz Quantum Cascade Laser, operating as a frequency comb with a THz emission spanning over 500 GHz. Broadband phase locking is indicated by far-field interference patterns throughout the whole operating range of the laser.

ROOM 7

JSIV-4.3 FRI 15:15

Intelligent imaging sensor out of two-photon polymerized microcavities with self-sensing boosting

•*A. Saetchnikov[1], E. Tcherniavskaia[2], V. Saetchnikov[2], and A. Ostendorf[1]; [1]Ruhr University Bochum, Bochum, Germany; [2]Belarusian State University, Minsk, Belarus*

In this work we report on realization of the microresonator-based imaging sensor with self-sensing boosting fabricated with two-photon polymerization and supplemented by machine learning for highly accurate predictions of the variations in the ambient environment.

JSIV-4.4 FRI 15:30

100 laser beam array phase-locked in a neural network loop

•*A. Boju[1,2], M. Shpakovych[2], G. Maulion[2], V. Kermene[2], P. Armand[2], A. Desfarges-Berthelemot[2], and A. Barthelemy[2]; [1]CILAS Ariane Group, Orléans, France; [2]XLIM Research Institute, Limoges, France*

We report on fast phase control of large laser array with quasi-reinforcement learning of a neural network in an error reduction loop. We demonstrate the experimental phase-locking of 100 beams with a lambda/30 residual error.

ROOM 8

We present localized Brillouin measurements inside a CS2-filled liquid-core optical fiber. Local temperature and pressure changes can be discriminated using Brillouin Optical Correlation Domain Analysis with a resolution of 4cm.

CH-12.4 FRI 15:15

Modelling of pressure-driven gas flow in a nodeless Anti-Resonant Hollow Core Fiber for laser absorption spectroscopy

•*P. Bojęś[1], K. Krzempek[1], P. Jaworski[1], P. Kozioł[1], Z. Malecha[2], G. Dudzik[1], F. Yu[3], D. Wu[3], K. Malecha[4], M. Liao[3], and K. Abramski[1]; [1]Faculty of Electronics, Wroclaw University of Science and Technology, Wrocław, Poland; [2]Faculty of Mechanical and Power Engineering, Wroclaw University of Science and Technology, Wrocław, Poland; [3]Shanghai Institute of Optics and Fine Mechanics, Shanghai, China; [4]Faculty of Microsystem of Electronics and Photonics , Wroclaw University of Science and Technology, Wrocław, Poland*

We present the results of modelling of pressure-driven gas flow in a 15 meter long nodeless Antiresonant Hollow Core Fiber allowing for predicting the gas exchange time in the fiber-aided laser absorption spectroscopy-based gas sensors.

CH-12.5 FRI 15:30

Accurate measurement of Poisson ratio in optical fibers based on forward-stimulated Brillouin scattering

•*L.A. Sánchez[1], A. Díez[1,2], J.L. Cruz[1,2], and M.V. Andrés[1,2]; [1]Laboratory of Fiber Optics, ICMUV, Universidad de Valencia, Burjassot, Spain; [2]Departamento de Física Aplicada y Electromagnetismo, Universidad de Valencia, Burjassot, Spain*

We report the high-accuracy measurement of the Poisson's ratio of an optical fiber over a range of temperatures of one hundred degrees based on the forward-stimulated Brillouin scattering effect.

ROOM 9

We present pulse self-compression and soft X-ray HHG in a single gas-filled hollow-core fiber resulting in a flux >10^6 Photons/s/eV at 300 eV. The source is driven by a thulium-doped fiber-laser at 98 kHz repetition rate.

CG-7.4 FRI 15:15

High-flux Attosecond Source at 100 kHz Repetition Rate

P. Ye[1], L. Gulyás Oldal[1,2], T. Csizmadia[1], Z. Filus[1], T. Grósz[1], M. De Marco[1], P. Jójárt[1], I. Seres[1], Z. Bengery[1], Z. Várallyay[1], B. Gilicze[1], S. Kahaly[1,2], K. Varjú[1,3], and •B. Major[1]; [1]ELI-ALPS, ELI-HU Non-Profit Ltd., Wolfgang Sandner utca 3., Szeged, H-6728, Hungary, Szeged, Hungary; [2]Institute of Physics, University of Szeged, Dóm tér 9, Szeged 6720, Hungary, Szeged, Hungary; [3]Department of Optics and Quantum Electronics, University of Szeged, Dóm tér 9, Szeged 6720, Hungary, Szeged, Hungary

We report the generation of 50 pJ attosecond pulse trains at 100-kHz using an annular laser beam, which is the highest one until now among systems of repetition rate higher than 10 kHz.

CG-7.5 FRI 15:30

Integrated Filter for the Separation between XUV and IR Beam in High-order Harmonic Generation in a chip

•*A.G. Ciriolo[1], R. Martínez Vázquez[1], G. Crippa[2], V. Tosa[3], A. Frezzotti[4], M. Devetta[1], R. Osellame[1,2], C. Vozzi[1], and S. Stagira[2,1]; [1]Institute for Photonics and Nanotechnologies, National Research Council, Milano, Italy; [2]Politecnico di Milano, Dipartimento di Fisica, Milano, Italy; [3]National Institute for R&D of Isotopic and Molecular Technologies, Cluj-Napoca, Romania; [4]Politecnico di Milano, Department of Aerospace Science and Technology, Milano, Italy*

We demonstrate the spatial separation of a considerable portion of the XUV from the fundamental IR driving beam in high-order harmonic generation by an integrated system of microchannels realized through Femtosecond Laser Micromachining.

NOTES

ROOM 1

CD-11.5 FRI 15:45

Large, Electric-Field Induced Tunable and Reversible $\chi(2)$ in PZT Thin Films for on-chip second-order nonlinearities

•*G.F. Feutmba[1,2,3], A. Hermans[2,3], J.P. George[1,3], I. Ansari[1,2,3], D.V. Thourhout[1,3], and J. Beeckman[2,3]; [1]Liquid Crystals and Photonics Group, Ghent University, Ghent, Belgium; [2]Photonics Research Group, Ghent University-imec, Ghent, Belgium; [3]Center for Nano- and Biophotonics (NB-Photonics), Ghent University, Ghent, Belgium*

We demonstrate strong optical nonlinearity in PZT thin films grown on glass substrates. We report a $\chi(2)$ of 128 pmV-1. Hysteresis measurements demonstrate the reversibility of the $\chi(2)$ with DC field.

ROOM 2

ROOM 3

EH-6.6 FRI 15:45

Passive radiative cooler for solar cells' temperature and efficiency control

•*G. Perrakis[1,2], A.C. Tasolamprou[1], G. Kenanakis[1], E.N. Economou[1,3], S. Tzortzakis[1,2,4], and M. Kafesaki[1,2]; [1]Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (FORTH), 70013 Heraklion, Heraklion, Greece; [2]Dept. of Materials Science and Technology, Univ. of Crete, Heraklion, Greece; [3]Dept. of Physics, University of Crete GR-71003, Heraklion, Greece; [4]Science Program, Texas A&M University at Qatar, P.O. Box 23874, Doha, Qatar*

We present a radiative cooling approach for photovoltaic cells' temperature and efficiency evaluation. We derive the maximum temperature-drop requirements and apply the approach in a nano-micro-grating remarkably enhancing both thermal radiation emission and solar absorption.

ROOM 4

CJ-9.6 FRI 15:45

Simple CW-UV generator by SHG technique with double-clad Pr-doped waterproof fluoro-aluminate glass fiber laser

•*Y. Fujimoto[1,5], M. Nakahara[2], P. Binun[2], S. Motokoshi[3], O. Ishii[4], M. Watanabe[4], M. Yamazaki[4], T. Shinozaki[2], T. Sato[2], and M. Fukagawa[2]; [1]Chiba Institute of Technology, Narashino, Japan; [2]Kimmon Koha Co., Ltd., Itabashi-ku, Japan; [3]Institute for Laser Technology, Nishi-ku, Japan; [4]Sumita Optical Glass, Inc., Saitama City, Japan; [5]Institute of Laser Engineering, Suita, Japan*

We demonstrated a CW-UV output over 500 mW using a single-mode double-clad structured Pr-doped waterproof fluoride glass fiber laser by a SHG technique and suggest this system produces a very unique and simple CW-UV generator.

ROOM 5

CK-9.6 FRI 15:45

Semi-Dirac transport and localization in polaritonic graphene

•*B. Real[1], O. Jamadi[1], M. Milićević[2], N. Pernet[2], P. St-Jean[2], T. Ozawa[3], G. Montambaux[4], I. Sagnes[2], A. Lamaître[2], L. Le Gratiet[2], A. Harouri[2], S. Ravets[2], J. Bloch[2], and A. Amo[2]; [1]Univ. Lille, CNRS, UMR 8523—PhLAM—Physique des Lasers Atomes et Molécules, F-59000 Lille, France; [2]Université Paris-Saclay, CNRS, Centre de Nanosciences et de Nanotechnologies, 91120, Palaiseau, France; [3]Advanced Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan; [4]Université Paris-Saclay, CNRS, Laboratoire de Physique des Solides, 91405, Orsay, France*

Strain strongly affects the transport and localization properties of graphene. Here we implement compressed polariton honeycomb lattices to evidence the highly anisotropic transport of polaritons and to observe directional vacancy states with chiral symmetry.

ROOM 1

16:30 – 18:00

CD-12: Raman Amplification and Nonlinear Media

Chair: Tal Ellenbogen, Tel Aviv University, Tel Aviv, Israel

CD-12.1 FRI (Keynote) 16:30

Cascaded Raman lasing with single molecular monolayers

•*A. Armani, A. Kovach, A. Gallegos, J. He, and H. Choi; University of Southern California, Los Angeles, USA*

By combining organic small molecules with exceptionally high optical nonlinearities with silica integrated resonators, ultra-low threshold cascaded Raman lasing and anti-Stokes generation with mW thresholds has been demonstrated.

ROOM 2

16:30 – 18:00

CJ-10: Fiber Optical Techniques and Applications

Chair: William Wadsworth, University of Bath, Bath, United Kingdom

CJ-10.1 FRI 16:30

Soliton detuning of 68.5 THz corresponding to a wavelength shift from 1560 nm to 2400 nm in a highly nonlinear suspended core tellurite fiber

•*T. Karpate[1,2], G. Stepniewski[1,2], D. Pysz[2], A. Rampur[3], Y. Stepanenko[4], R. Buczynski[1,2], and M. Klimczak[1,2]; [1]Faculty of Physics, University of Warsaw, Pasteura 7, 02-093 , Warsaw, Poland; [2]Łukasiewicz Research Network - Institute of Electronic Materials Technology, Wólczyńska 133, 01-919 , Warsaw, Poland; [3]Institute of Applied Physics, University of Bern, Sidlerstrasse 5, 3012 , Bern, Switzerland; [4]Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224 , Warsaw, Poland*

We investigate soliton self-frequency shift in suspended core tellurite fibers. Owing to high nonlinearity, detuning exceeding 68 THz is observed upon injecting 90 fs, 1560 nm laser pulses in just 5 cm long fiber sample.

ROOM 3

16:30 – 18:00

CK-10: Micro and Nano Resonators

Chair: Stefano Pelli, CNR-IFAC "Nello Carrara", Sesto Fiorentino, Italy

CK-10.1 FRI 16:30

Bound states in the continuum in symmetry broken resonator rings

•*L. Kühner[1,2], H. Ren[1,2], R. Berté[1,2], S.A. Maier[1,2,3], Y.S. Kivshar[4,5], and A. Tittl[1,2]; [1]Chair in Hybrid Nanosystems, Ludwig-Maximilians-University , Munich, Germany; [2]Center for NanoScience, Ludwig-Maximilians-University , Munich, Germany; [3]The Blackett Laboratory, Imperial College, London, United Kingdom; [4]Nonlinear Physics Center, Australian National University , Canberra, Australia; [5]Department of Nanophotonics and Metamaterials, ITMO University , St. Petersburg, Russia*

We demonstrate a novel ring-shaped nanophotonic platform based on bound states in the continuum with substantially smaller footprint while keeping straightforward tunability via the asymmetry of the constituent blocks.

ROOM 4

16:30 – 18:00

CH-13: Temporally and Spatially Structured Beams and Microscopy

Chair: Marco Grande, Polytechnic University of Bari, Bari, Italy

CH-13.1 FRI 16:30

Adaptive optics of temporal focusing microscopy by utilizing structured illumination

•*T. Ishikawa[1,2], K. Isobe[1,3], K. Inazawa[1,2], F. Kannari[2], and K. Midorikawa[2]; [1]RIKEN Center for Advanced Photonics, 2-1 Hirosawa, Wako, Saitama, Japan; [2]Department of Electronics and Electrical Engineering, Keio University, 3-14-1 Hiyoshi, Kohoku-ku, Yokohama, Japan; [3]Department of Advanced Imaging, Graduate School of Biostudies, Kyoto University, Kyoto, Japan*

We presernt adaptive optics of wide-field temporal focusing microscopy by utilizing structured illumination, which works well even if strong out-of-focus fluorescence exists or a sample is thick.

ROOM 6

CC-8.6 FRI 15:45

Terahertz Near-field Nanoscopy Based on Self-mixing Interferometry with Quantum Cascade Resonators

•E.A.A. Pogna[1], K. Reichel[1], C. Silvestri[2], S. Biasco[1], L. Viti[1], A. di Gaspare[1], L.L. Columbo[2], M. Brambilla[3], G. Scamarcio[4], and M.S. Vitiello[1]; [1]NEST, CNR-Istituto Nanoscienze and Scuola Normale Superiore, Pisa, Italy; [2]Dipartimento di Elettronica e Telecomunicazioni, Politecnico di Torino, Torino, Italy; [3]Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom; [4]Dipartimento Interateneo di Fisica, Università degli Studi e Politecnico di Bari, Bari, Italy

We discuss the performances of innovative THz near-field nanoscopy systems based on self-mixing interferometry with THz quantum cascade resonators endowed with different degrees of spatial and temporal coherence

ROOM 7

JSIV-4.5 FRI 15:45

Deep Reinforcement Learning Control of White-Light Continuum Generation

•C.M. Valensise[1], F. Vernuccio[1], A. Giuseppi[2], G. Cerullo[1], and D. Polli[1]; [1]IFN-CNR, Dipartimento di Fisica, Politecnico di Milano, Milano, Italy; [2]DIAG, University of Rome "La Sapienza", Roma, Italy

An actor-critic Deep Reinforcement-Learning architecture is used to generate long-term-stable white-light continuum without a-priori knowledge of the system acting on the crystal position and on the power and numerical aperture of the driving beam.

ROOM 8

CH-12.6 FRI 15:45

Towards Multimode-fiber-based Two-photon Endoscopy

•M.C. Velsink[1,2], L.V. Amitonova[2,3], and P.W.H. Pinkse[1]; [1]MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; [2]Advanced Research Center for Nanolithography (ARCNL), Amsterdam, Netherlands; [3]Department of Physics and Astronomy, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

We demonstrate a method towards two-photon endoscopy based on time-domain wavefront shaping through a multimode fiber. This allows grid scanning of an ultrashort pulse over the output facet of the fiber with a perturbation-insensitive input.

ROOM 9

CG-7.6 FRI 15:45

Continuously tunable high photon flux high harmonic source at 50-70 eV

•A. Kirsche[1,2], R. Klas[1,2], M. Gebhardt[1,2], L. Eisenbach[1], W. Eschen[1], J. Buldt[1], H. Stark[1], J. Rothhardt[1,2,3], and J. Limpert[1,2,3]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-University, Jena, Germany; [2]Helmholtz-Institute, Jena, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

A fast and fully tunable table-top extreme ultraviolet high harmonic source with record-high photon flux at energies of 50-70 eV based on blueshift in a capillary is presented.

NOTES

ROOM 5

16:30 – 18:00

CI-5: Transmission Devices

Chair: Benjamin Wetzel, CNRS - XLIM Research Institute, Université de Limoges, France

CI-5.1 FRI 16:30

2x4 Spatial Switch Exploiting On-Chip Beam Steering

•T. Blatter[1], A. Finck[1], Y. Horst[1], Y. Fedoryshyn[1], E. De Leo[2], B.I. Bitachon[1], W. Heni[2], U. Koch[1], A. Messner[1], M. Burla[1], R. Bonjour[1], and J. Leuthold[2]; [1]Institue of Electromagnetic Fields (IEF), Zürich, Switzerland; [2]Polariton Technologies AG, Rüschlikon, Switzerland

We present a 2x4 spatial switch capable of steering 72 GBd/s NRZ signals freely to multiple outputs determined by their carrier wavelength. Insertion losses and footprint is <5 dB and 0.7 sqmm, respectively.

ROOM 6

16:30 – 18:00

JSIV-5: Learning Metasurfaces - Nanostructures - Spectroscopy

Chair: George Barbastathis, Massachusetts Institute of Technology, Cambridge, USA

JSIV-5.1 FRI 16:30

Infrared Metasurfaces Augmented by Artificial Intelligence for Monitoring Dynamics between All Major Classes of Biomolecules

•A. John-Herpin, D. Kavungal, L. von Mücke, and H. Altug; École Polytechnique Fédérale de Lausanne (EPFL), Institute of Bioengineering, Lausanne, Switzerland

Highly sensitive, broadband mid-IR metasurfaces for spectroscopy are augmented with artificial intelligence to allow the label-free monitoring of biomolecules from all major classes. This pioneering bioanalytical technology offers unprecedented opportunities for unravelling complex biomolecular processes.

ROOM 7

16:30 – 18:00

CM-9: 3D Laser Structuring of Transparent Materials

Chair: Razvan Stoian, Université Jean Monnet, St-Etienne, France

CM-9.1 FRI (Invited) 16:30

3D laser nanolithography of crystals

•A. Ródenas[1,2], P. Paie[2], G. Corrielli[2], and R. Osellame[2]; [1]Universidad de La Laguna (ULL), San Cristobal de La Laguna, Spain; [2]Istituto di Fotonica e Nanotecnologie (IFN), Milan, Italy

We will present details on how femtosecond pulse direct laser writing combined with wet etching can produce nanophotonic lattices with sufficiently well controlled feature sizes to develop a 3D nanolithography protocol.

ROOM 8

16:30 – 18:00

CF-10: Strong Field and Ultrafast Phenomena

Chair: Daniele Brida, University of Luxembourg, Luxembourg

CF-10.1 FRI (Invited) 16:30

Controlling condensed matter with lightwave fields and forces

C.P. Schmid[1], L.Z. Kastner[1], C. Roelcke[1], S. Schlauderer[1], C. Lange[1], J. Repp[1], J. Reimann[2], J. Güdde[2], U. Höfer[2], S.W. Koch[2], M. Kira[3], and •R. Huber[1]; [1]Department of Physics, University of Regensburg, 93040 Regensburg, Germany; [2]Department of Physics, University of Marburg, 35032 Marburg, Germany; [3]Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA

Atomically strong multi-terahertz waves drive novel subcycle quantum dynamics, including spin and pseudospin switching, high-harmonics from topological Dirac currents, and superresolution band-structure mapping. Lightwave STM allows for the first femtosecond atomic force control of molecules.

ROOM 1

CD-12.2 FRI 17:15

Spectrum Synthesizer Based on Two-Stage Transient Stimulated Raman Chirped-Pulse Amplification in KGW crystal

•*A. Petrulėnas, P. Mackonis, A. Rodin, and V. Girdauskas; Solid State Laser laboratory, Center for Physicsal Science and Technology, Vilnius, Lithuania*

A spectrum synthesizer based on two-stage Transient Stimulated Raman Chirped-Pulse Amplification in KGd(WO4)2 crystals provides a tailored bandwidth ~38nm of amplified supercontinuum pulses with a positive chirp sufficient for transform-limited pulsewidth of ~50fs after compression.

ROOM 2

CJ-10.2 FRI 16:45

Importance of Topological Charge Preservation in Vectorial Modulational Instability in Chiral Three-Core PCF

•*P. Roth[1,2], M.H. Frosz[1], P.S.J. Russell[1,2], and G.K.L. Wong[1]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, Friedrich-Alexander-Universität, Erlangen, Germany*

The presence of polarisation modulational instability gain in circularly birefringent chiral PCF is critically dependent on preserving the total topological charge of the fields. Experiments on a PCF with a threefold symmetric core confirm this.

CJ-10.3 FRI 17:00

Frenet-Serret analysis of helical Bloch modes in N-fold rotationally symmetric rings of coupled spiralling optical waveguides

•*Y. Chen[1] and P. Russell[1,2]; [1]Max Planck Institute for the Science of Light, Erlangen, Germany; [2]Department of Physics, University of Erlangen-Nuremberg , Erlangen, Germany*

Frenet-Serret theory is generalised to the case of a chiral ring of N coupled birefringent cores. The dispersion and polarisation of the helical Bloch modes are derived, for the first time properly including torsion effects.

CJ-10.4 FRI 17:15

Ultrafast gyroscopic measurements in passive Mach-Zehnder interferometer via time-stretch technique

•*I. Kudelin[1], S. Sugavanam[2], and M. Chernysheva[3]; [1]Aston Institute of Photonic Technologies, Birmingham, United Kingdom; [2]IIT Mandi, Kamand, India; [3]Leibniz Institute of Photonic Technology, Jena, Germany*

We demonstrate a phase-based method to detect rotation in a passive all-fibre Mach-Zehnder interferometer via the Dispersive Fourier Transformation. The resolution of the angular velocity measurements is 5.78 μrad/s at acquisition rate of 15 MHz.

ROOM 3

CK-10.2 FRI 16:45

Optical Microring Resonance Split Removal via Localized Photolytic Refractive Index Modifications

•*T. Lipka and H.K. Trieu; Institute of Microsystems Technology, Hamburg University of Technology, Hamburg, Germany*

Random backscattering phenomena in microrings can result in modal splitting, degrading integrated photonic systems. We present a novel correction technique for silicon resonators for in-situ removal of resonance splits caused by backreflected waves at sidewalls.

CK-10.3 FRI 17:00

Experimental demonstration of a bat microresonator

•*Y. Yang, M. Crespo-Ballesteros, and M. Sumetsky; Aston Institute of Photonics Technology, Aston University, Aston Triangle, Birmingham, United Kingdom*

We experimentally demonstrate an optical microresonator fabricated at the 125-micron diameter optical fiber having an eigenmode which amplitude is uniform along the more than 100 microns of the fiber length with 7% accuracy.

CK-10.4 FRI 17:15

Resonant Mode Tuning of Ge2Sb2Te5 Coated Silica Microresonators

•*E. Huseyinoglu[1], E. Özgür[1], G. Bakan[2], B. Ortaç[1], and A. Dana[3]; [1]Institute of Materials Science and Nanotechnology, National Nanotechnology Research Center, Bilkent University, Ankara, Türkiye; [2]National Graphene Institute, University of Manchester, Manchester, United Kingdom; [3]E.L. Ginzton Laboratory, Stanford University, California, USA*

The large scale utilization of the optical microresonators was hindered by obstacles originated from fabrication errors. By using chalcogenide coating, a method to tune resonant modes permanently was demonstrated to correct deviations from designed parameters.

ROOM 4

CH-13.2 FRI 16:45

Parallelized Light-sheet Microscopy with Flexible and Encoded Illumination

•*A. Zunino[1,2], F. Garzella[1,3], A. Trianni[1,2], P. Saggau[1,4], P. Bianchini[1], A. Diaspro[1,2], and M. Duocastella[1,5]; [1]Istituto Italiano di Tecnologia, Genoa, Italy; [2]University of Genoa, Genoa, Italy; [3]University of Parma, Parma, Italy; [4]Baylor College of Medicine, Houston, USA; [5]University of Barcelona, Barcelona, Spain*

We present an innovative parallelized light-sheet microscope for high-speed volumetric imaging at high signal-to-background and signal-to-noise ratios. The idea is to encode/decode illumination sequences of multiple planes acquired with extended depth-of-field detection.

CH-13.3 FRI 17:00

Contrast enhancement in volumetric two-photon microscopy using multiple orders of Bessel beam

•*H. He[1], Y.-X. Ren[1], R.K.Y. Chan[1], W.L. So[2], H.K. Fok[2], C.S.W. Lai[2,3], K.K. Tsia[1,3], and K.K.Y. Wong[1,3]; [1]Department of Electrical and Electronic Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong, China; [2]School of Biomedical Science, The University of Hong Kong, Pokfulam Road, Hong Kong, China; [3]Advanced Biomedical Instrumentation Centre, Hong Kong Science Park, Shatin, New Territories, Hong Kong, China*

We demonstrate a contrast-enhanced volumetric two-photon microscopy by cancelling the side lobes of the fundamental 0th-order Bessel beam using the 3rd-order Bessel beam based on the well-matched ring patterns.

CH-13.4 FRI 17:15

Single-beam high-accuracy longitudinal position measurement using spiralling beams

•*S. Prabhakar, S. Plachta, M. Ornigotti, and R. Fickler; Tampere University, Tampere, Finland*

By harnessing the property of radially self-accelerating light, we achieved a measurement accuracy in longitudinal position of about 2~μm over a range of more than 2~mm using a single beam and a quadrant detector.

ROOM 5

CI-5.2 FRI 16:45

Directional Radiated Emission From Converging Waveguide Arrays

•P.D. Knefeli[1], M. Heinrich[1], L.J. Maczewsky[1], A.A. Sukhorukov[2], and A. Szameit[1]; [1]Institute of physics, Universität Rostock, Rostock, Germany; [2]ARC Centre of Excellence for Transformative Meta-Optical Systems (TMOS), Nonlinear Physics Centre, Research School of Physics, Australian National University, Canberra, Australia

We experimentally explore the leaky mode dynamics in evanescently coupled arrays of optical single-mode waveguides with variable spacing and show how judiciously designed tapered arrays may give rise to directed emissions within the lattice plane.

CI-5.3 FRI 17:00

Electroabsorption Modulated Laser Based on Identical Epitaxial Layer and Transmission Line Technology

•A. Al-Moathin[1], S. Ye[1], S. Watson[1], E.D. Gaetano[1], Q.R.A. Al-Taai[1], I. Eddie[2], C. Li[1], L. Hou[1], A. Kelly[1], and J.H. Marsh[1]; [1]University of Glasgow , Glasgow, United Kingdom; [2]Sivers Photonics Ltd., Glasgow, United Kingdom

An electroabsorption modulated DFB laser has been fabricated based on an identical epitaxial layer design, HSQ planarization, and transmission line technology. It operates at a wavelength of 1572 nm with 18 GHz bandwidth.

CI-5.4 FRI 17:15

Traveling-Wave Electroabsorption Modulated Laser Based on Identical Epitaxial Layer Scheme and HSQ Planarization

•A. Al-Moathin[1], C. Li[1], J. Wang[1], Q.R.A. Al-Taai[1], I. Eddie[2], S. Ye[1], L. Hou[1], S. Thoms[1], A. Kelly[1], and J.H. Marsh[1]; [1]University of Glasgow , Glasgow, United Kingdom; [2]Sivers Photonics Ltd., Glasgow, United Kingdom

We present a travelling-wave electroabsorption modulated laser based on the identical epitaxial layer scheme and HSQ planarization. The extinction ratio was 22 dB and the modulator circuit shows good electrical matching around 39 GHz.

ROOM 6

JSIV-5.2 FRI 16:45

Metasurface design platform for highly efficient wavefront engineering

•M. Makarenko, A. Burguete-Lopez, F. Getman, and A. Fratalocchi; King Abdullah University of Science And Technology, Thuwal, Saudi Arabia

In this work, we propose a universal design platform for the development of wavefront engineering structures. We demonstrate this approach's efficiency by producing a series of highly efficient common optical devices.

JSIV-5.3 FRI 17:00

Removing Non-Resonant Background from CARS spectra via Deep Learning

C. Valensise[1], A. Giuseppi[2], •F. Vernuccio[1], A. De la Cadena[1], G. Cerullo[1], and D. Polli[1]; [1]Physics Department, Politecnico di Milano, Milano, Italy; [2]DIAG, University of Rome "La Sapienza", Roma, Italy

We present a novel approach to remove the spurious non-resonant background from broadband coherent anti-Stokes Raman scattering spectra in real time based on deep learning, without requiring the measurement of reference spectra.

JSIV-5.4 FRI 17:15

Sample-efficient dataset generation for Deep Learning based inverse design of photonic nanostructures

S.S. Panda, H. Tandan, and •R.S. Hegde; Indian Institute of Technology , Gandhinagar, India

We find that unsupervised clustering techniques can be exploited for creating training datasets to reduce the burden of model training. This has implications for broadening applicability of Deep-learning to complicated structures requiring lengthy computations.

ROOM 7

CM-9.2 FRI 17:00

Towards 5D Optical Data Storage with High Writing Speed

•H. Wang, Y. Lei, X. Chang, C. Deng, G. Shayeganrad, and P. Kazansky; University of Southampton, Southampton, United Kingdom

5D optical data storage with high writing speed of 8 kB/s and nearly 100% readout accuracy of multilayer data is demonstrated by ultralow-loss ultrafast laser nanostructuring in silica glass

CM-9.3 FRI 17:15

Nanoscale energy deposition in glass by double ultrashort Gauss-Bessel pulses

•J. del Hoyo[1,2], R. Meyer[1], L. Furfaro[1], and F. Courvoisier[1]; [1]FEMTO-ST Institute, Univ. Bourgogne Franche-Comté, CNRS, 15B Avenue des Montboucons, 25030, Besançon, France; [2]Applied Optics Complutense Group, Optics Department, Universidad Complutense de Madrid, Facultad de Ciencias Físicas, Plaza de las Ciencias, 1, 28040 , Madrid, Spain

Ultrashort laser Bessel pulses create semi-metallic Warm Dense Matter, that efficiently absorbs a second pulse. This increases energy confinement, and thus channel drilling efficiency. This opens new routes for laser processing of transparent materials.

ROOM 8

CF-10.2 FRI 17:00

Light-Field-Driven Current Control in Dielectrics with pJ-Level Laser Pulses at 80 MHz Repetition Rate

V. Hanus[1], •V. Csajbók[1], Z. Pápa[1,2], J. Budai[2], Z. Márton[2], G. Kiss[1], P. Sándor[1], P. Paul[3], A. Szeghalmi[3,4], Z. Wang[5], B. Bergues[5,6], M. Kling[5,6], G. Molnár[7], J. Volk[7], and P. Dombi[1,2]; [1]Wigner Research Centre for Physics, Budapest, Hungary; [2]ELI-ALPs Research Institute, Szeged, Hungary; [3]Institute of Applied Physics, Abbe Center of Photonics, Jena, Germany; [4]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany; [5]Physics Department, Ludwig-Maximilians-Universität Munich, Garching, Germany; [6]Max Planck Institute of Quantum Optics, Garching, Germany; [7]Centre for Energy Research, Institute of Technical Physics and Materials Science, Budapest, Hungary

We demonstrate transient metallization and lightwave-driven current control with 300-pJ pulses at 80 MHz repetition rate in dielectrics (SiO_2 and HfO_2), and semiconductor GaN. This will permit to move current control toward GHz repetition rate.

CF-10.3 FRI 17:15

Extreme polarization dependent infrared supercontinuum generation in uncladded silicon nitride waveguide

•E. Tagkoudi[1], C.G. Amiot[2], G. Genty[2], and C.-S. Brès[1]; [1]École polytechnique fédérale de Lausanne – EPFL, Lausanne , Switzerland; [2]Tampere University, Tampere, Finland

We demonstrate fiber-pumped short-wave infrared supercontinuum generation in an uncladded Si3N4 waveguide exhibiting extreme polarization sensitivity. Leveraging TM/TE dispersion engineering we can switch from flat SPM-dominated all-normal dispersion regime to octave spanning solitonic regime.

ROOM 1

CD-12.3 FRI 17:30

Interacting Ring-Airy Beams in Nonlinear Media

•*C.W. Robson and M. Ornigotti*; *Tampere University, Tampere, Finland*

The interactions between overlapping ring-Airy beams in a local Kerr medium are numerically investigated, predicting controllable regions of low intensity during propagation. This may prove useful for optical tweezing applications in nonlinear media.

CD-12.4 FRI 17:45

Second Harmonic Generation in Spliced Poled Fibers

•*W.A. Gemechu[1,2], U. Minoni[1], D. Modotto[1], A. Tonello[3], and V. Couderc[3]*; *[1] Dipartimento di Ingegneria dell'Informazione, Università di Brescia, via Branze 38, 25123 Brescia, Italy*; *[2] Ethiopian Space Science and Technology Institute, Addis Ababa, Ethiopia*; *[3] Université de Limoges, XLIM, UMR CNRS 7252, 123 Av. A. Thomas, 87060 Limoges, France*

The saturation length of the nonlinear region induced in a fiber by optical poling has been studied and a significant enhancement of second harmonic generation efficiency by splicing segments of independently poled fibers is shown.

ROOM 2

CJ-10.5 FRI 17:30

Influencing Unidirectionality Threshold and Final Direction by Loss Management in a Reciprocal Fiber Ring Laser

•*M.A. Arshad, A. Hartung, and M. Jäger*; *Leibniz-Institut für Photonische Technologien e. V, Jena, Germany*

We present an isolator free unidirectional all fiber ring laser. The unidirectionality is triggered far above the lasing threshold. The directional preference and the required pump power are influenced through loss management in the ring.

CJ-10.6 FRI 17:45

Arbitrary Waveform Generation by Cavity Dumping of Hybrid Fibre Laser with Two Active Media

•*B. Nyushkov[1,2], A. Ivanenko[1], S. Smirnov[1], and S. Kobtsev[1]*; *[1] Novosibirsk State University, Novosibirsk, Russia*; *[2] Novosibirsk State Technical University, Novosibirsk, Russia*

We present a new method for the direct laser synthesis of nanosecond-scale optical waveforms with freely-tunable repetition rate and relatively high energy by digitally-controlled cavity dumping of a hybrid fiber laser with two active media.

ROOM 3

CK-10.5 FRI 17:30

Coupled non-Hermitian nanoresonators for meta-optics design

•*V. Vinel, Z. Li, C. Gigli, A. Bensemhoun, A. Borne, C. Ciuti, and G. Leo*; *Matériaux et Phénomènes Quantiques, Université de Paris, Paris, France*

We report on a systematic study of the coupling between nanoresonators, aimed at proposing and assessing an analytical non-Hermitian tight-binding Hamiltonian formalism for advanced nanophotonics meta-systems.

CK-10.6 FRI 17:45

Continuum- Coupled Microcavities

•*T. Lenkiewicz Abudi[1], M. Douvidzon[1], B. Bathish[1], and T. Carmon[2]*; *[1] Technion-Israel Institute of Technology, Haifa, Israel*; *[2] Tel-Aviv University, Tel-Aviv, Israel*

We present a hybrid-resonator made of a continuous-membrane nearby to a dialectic disk. We control the membrane position to tune resonance frequency, bring nanoparticles to the optical mode, remove them, and bring new ones

ROOM 4

CH-13.5 FRI 17:30

Temporal light control with the time-gated transmission matrix

•*L. Devaud[1], B. Rauer[1], J. Melchard[2], M. Mounaix[3], M. Kühmayer[2], S. Rotter[2], and S. Gigan[1]*; *[1] Laboratoire Kastler Brossel, Sorbonne Université, École Normale Supérieure, Paris Sciences et Lettres (PSL) Research University, CNRS, Collège de France, Paris, France*; *[2] Institute for Theoretical Physics, Vienna University of Technology (TU Wien), Vienna, Austria*; *[3] School of Information Technology and Electrical Engineering, Brisbane, Australia*

A short pulse of light gets elongated passing through a scattering medium. A coherence-gating measurement enables us to measure the transmission matrix at a certain delay and use its singular vectors to redistribute temporally the energy delivery behind the medium.

CH-13.6 FRI 17:45

Vectorial structures of light with acceleration and deceleration

•*W. Buono, K. Singh, A. Dudley, and A. Forbes*; *University of the Witwatersrand, Johannesburg, South Africa*

We show for the first time a global polarization structure that rotates with periodic acceleration and deceleration in free space. The evolutions of the transverse vector structure and the local State of Polarization are characterized.

ROOM 1

10:00 – 11:00

CH-P: CH Poster Session

CH-P.1 FRI

Antiresonant Hollow Core Fiber-assisted Photothermal Spectroscopy of Nitric Oxide at 5.26 μm

•*K. Krzempek[1], P. Kozioł[1], P. Jaworski[1], G. Dudzik[1], and W. Belardi[2]*; *[1] Laser & Fiber Electronics Group, Faculty of Electronics, Wroclaw University of Science and Technology, Wroclaw, Poland*; *[2] Université de Lille, CNRS, UMR 8523—PhLAM—Physique des Lasers, Atomes et Molécules, Lille, France*

In this work we present a Photothermal Spectroscopy-based gas sensor utilizing a 25 cm-long side-drilled borosilicate Antiresonant Hollow-Core Fiber forming an absorption cell for sensitive detection of nitric oxide molecules at 5.26 μm wavelength range.

CH-P.2 FRI

Investigation of In-Gap Field Enhancement at Terahertz Frequencies for a Metasurface Enhanced Sensor

•*H. Tugay[1], H. Altan[1], Y. Demirhan[2], L. Ozyuzer[2], and C. Sabah[3]*; *[1] dapartment of physics, metu, ankara, Turkey*; *[2] iztech, izmir, Turkey*; *[3] northern cyprus campus, metu, mersin, Turkey*

In this work by utilizing the non-linear gap enhancement effect we designed and analyzed a metasurface sensor structure that utilizes the phase transition in a VO2 thin film layer.

CH-P.3 FRI

Raman Gas Analyzer of Carbon Isotopologues with 50 ppm Level Sensitivity

I. Chubchenko[1], •E. Popov[1], K. Grigorenko[1], V. Kurikova[1], L. Konopelko[1], P. Loiko[2], and V. Vitkin[1]; *[1] ITMO University, St. Petersburg, Russia*; *[2] Centre de Recherche sur les Ions, les Matériaux et la Photonique (CIMAP), Caen, France*

We describe the results on calibration of a Raman gas analyzer in terms of gas volume fraction measurements, as well as determine the limit of detection for two methane isotopologues - 12CH4 and 13CH4.

CH-P.4 FRI

Feedback cooling of a trampoline in a high-finesse cavity from room temperature

•*A. Manetta, I.M. Haghighi, D. Høj, J. van der Heijden, U.B. Hoff, and U.L. Andersen*; *Center for Macroscopic Quantum States bigQ, Department of Physics, Technical University of Denmark, Lyngby, Denmark*

We achieved feedback cooling of a SiN tethered membrane (trampoline) in a high finesse optical cavity down to an average phonon occupation number of 4000 starting from room temperature using coherent light at telecom wavelength.

CH-P.5 FRI

Analysis of engineered aluminum-based plasmonic devices decorated with graphene/2D nanomaterials for enhanced biosensing applications in the near-infrared region

S. Shukla and •P. Arora; *Birla Institute of Technology and Science, Pilani, Pilani, India*

The work utilizes the modified Attenuated Total Reflection configuration, to detect minute refractive index changes using surface plasmons. Highly-sensitive Aluminum-based plasmonic devices decorated with Graphene/2D nanomaterials are engineered to demonstrate biosensing in the near-infrared region.

ROOM 5

CI-5.5 FRI 17:30

Magneto-photonic on-chip device for all-optical reading of magnetic memory

•F.E. Demirer, S. Reniers, R. Lavrijsen, B. Koopmans, and J. van der Tol; Eindhoven University of Technology, eindhoven, Netherlands

The device implements magnetic racetrack-memory as its cladding. Uses magneto-optic effect to determine the magnetization direction, therefore read the magnetic bits. Built in IMOS platform, it modulates mode intensity at 20 GHz.

CI-5.6 FRI 17:45

Gigahertz Mid-Infrared Interband Cascade Detectors: Photo-Response Saturation by a Femtosecond Oscillator

•L.M. Krüger[1], J. Hillbrand[2], J. Heidrich[1], M. Beiser[2], R. Weih[3], J. Koeth[3], C.R. Phillips[1], B. Schwarz[2], G. Strasser[2,4], and U. Keller[1]; [1]Department of Physics, Institute for Quantum Electronics, ETH Zurich, Zürich, Switzerland; [2]Institute of Solid State Electronics, TU Wien, Vienna, Austria; [3]Nanoplus Nanosystems and Technologies GmbH, Gerbrunn, Germany; [4]Center for Micro- and Nanostructures, TU Wien, Vienna, Austria

We measured the bias-dependent photo-response and saturation behaviour of an interband cascade laser with a femtosecond OPO. The dynamic response shows a double-exponential decay, while a reverse bias increases the saturation power and 3-dB-bandwidth.

ROOM 6

JSIV-5.5 FRI 17:30

Stacked neural networks for predicting scattering spectra of core–(multi)shell particles

L. Kuhn[1], •T. Repän[2], and C. Rockstuhl[1,2]; [1]Institute of Theoretical Solid State Physics, Karlsruhe Institute of Technology, Karlsruhe, Germany; [2]Institute of Nanotechnology, Karlsruhe Institute of Technology, Karlsruhe, Germany

We present stacked neural networks approach to predict scattering spectra from core-shell particles (with multiple shells), where we stack multiple independently trained ANNs, each corresponding to a shell (or the core) of the particle.

JSIV-5.6 FRI 17:45

Segmentation integration in multivariate curve resolution applied to coherent anti-Stokes Raman scattering

•D. Boildieu[1,2], D. Helbert[2], E. Champion[3], A. Magnaudeix[3], P. Leproux[1], and P. Carré[2]; [1]XLIM-Université de Limoges, Limoges, France; [2]XLIM-Université de Poitiers, Poitiers, France; [3]IRCER-Université de Limoges, Limoges, France

We introduce an original approach for processing CARS congested spectra, based on multivariate curve resolution with non-negative least squares. We add a hyperspectral segmentation and regularization constraint and introduce the use of convolutional neural networks.

ROOM 7

CM-9.4 FRI 17:30

Photonic components in polymers made by femtosecond pulses

•D. Perevoznik[1,2], S. Bose[1], S. Burger[3], A. Demircan[1,2], and U. Morgner[1,2,4]; [1]Institute of Quantum Optics, Leibniz Universität Hannover, Hannover, Germany; [2]Cluster of Excellence PhoenixD (Photonics, Optics, and Engineering - Innovation AcrossDisciplines), Hannover, Germany; [3]Zuse Institute Berlin, Berlin, Germany; [4]Laser Zentrum Hannover e.V., Hannover, Germany

We report on a new waveguide writing concepts in PMMA. We found and investigate the optimal writing parameters to create single-mode waveguides with minimal propagation losses as well as demonstrate 2D and 3D Y-splitters.

CM-9.5 FRI 17:45

Polarization controlled orientation of LiNbO3 nanocrystals induced in Li2O – Nb2O5 – SiO2 – B2O3 glasses by femtosecond laser irradiation

•E. Muzi[1,2], M. Cavillon[1], M. Lancry[1], F. Brisset[1], B. Sapaly[1], D. Janner[2], and B. Poumellec[1]; [1]Institut de Chimie Moléculaire et des Matériaux d'Orsay (ICMMO), Université Paris-Saclay, Orsay, France; [2]Department of Applied Science and Technology (DISAT), Politecnico di Torino, Torino, Italy

Femtosecond laser irradiation of B2O3-containing Li2O – Nb2O5 – SiO2 glasses enables fast crystallization of LiNbO3 nanocrystals. Their spatial orientation can be controlled by light polarization, which provides additional degrees of freedom for photonic applications.

ROOM 8

CF-10.4 FRI 17:30

Synchronization of ultrafast pulses and pulse front tilt removal inside samples

R. Meyer[1], C. Xie[1,2], L. Froehly[1], R. Giust[1], L. Furfaro[1], C. Billet[1], and •F. Courvoisier[1]; [1]FEMTO-ST Institute, Univ. Bourgogne Franche-Comte, Besancon, France; [2]Ultrafast Laser Laboratory, Key Laboratory of Opto-electronic Information Technology of Ministry of Education, School of Precision Instruments and Opto-electronics Engineering, Tianjin, China

Ultrafast imaging requires probe pulses compressed in the sample and free from pulse front tilt. This is conventionally difficult to characterize after high NA microscope objectives. We solve these issues using a Kerr-based transient grating.

CF-10.5 FRI 17:45

Cage solitons of the Haus Master Equation

•G. Steinmeyer[1,2], E. Escoto[1,3], and A. Demircan[4]; [1]Max-Born-Institut, Berlin, Germany; [2]Humboldt-Universität, Berlin, Germany; [3]Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany; [4]Cluster of Excellence PhoenixD and the Institute of Quantum Optics, Hannover, Germany

Soliton solutions with varying degree of spectral convexity are discussed, showing excellent agreement with measured pulse shapes of few-cycle lasers and ANDi fiber lasers, filling a void in understanding mode-locked lasers with ultrabroad spectra.

ROOM 1

CH-P.6 FRI

Liquid immersion enables 3D printable diffractive optical elements

•R. Orange-Kedem, E. Nehme, L.E. Weiss, B. Ferdman, O. Alalouf, N. Opatovski, and Y. Shechtman; Technion Israel institute of technology, Haifa, Israel

By immersing a diffractive optical element in a near-index-matched solution we demonstrate a method to controllably scale up the dimensions of the DOE. This enables a low-cost fabrication method without compromising optical performance.

CH-P.7 FRI

A high-throughput Hyperspectral Microscope based on a Birefringent Ultrastable Common-Path Interferometer

•C. Manzoni, G. Cerullo, G. Valentini, A. Candeo, R. Vanna, B. Ardini, D. Comelli, and A. Bassi; IFN-CNR Politecnico di Milano, Milan, Italy

We introduce a Fourier-transform hyperspectral microscope based on an ultrastable interferometer. It enables wide-field acquisition with broad spectral coverage, tunable spectral resolution, high sensitivity. We provide examples of applications for fluorescence and Raman imaging.

CH-P.8 FRI

The contribution has been withdrawn.

CH-P.9 FRI

Widely Electrically Tuneable QCLs for Rapid Detection of Volatile Organic Molecules

•R. Brechbühler, P. Scheidegger, H. Looser, A. Kupferschmied, L. Emmenegger, and B. Tuzson; Laboratory for Air Pollution / Environmental Technology, Empa, CH-8600 Dübendorf, Switzerland

Widely electrically tunable quantum-cascade lasers using the Vernier effect are applied for the spectroscopic detection of volatile organic molecules. Our custom driving electronics allows for rapid switching between and fast scanning within individual laser-emission-frequency clusters.

CH-P.10 FRI

Statistical Model for SPAD-based Time-of-Flight systems and photons pile-up correction.

•A. Incoronato, M. Locatelli, and F. Zappa; politecnico di milano, milan, Italy

This work proposes a discrete-time statistical model of SPAD systems, useful to predict their behaviour in defined external conditions. Furthermore, the same model can be used to correct the distortion introduced by the detector.

CH-P.11 FRI

Non-Destructive Testing and Imaging of Marine Coatings using High-Resolution Mid-Infrared Optical Coherence Tomography

•C. Petersen[1,3], C. Markos[1,3], N. Israelsen[1,3], P. Rodrigo[2], G. Woyessa[1], P. Tidemand-Lichtenberg[2], C. Pedersen[2], and O. Bang[1,3,4]; [1]DTU Fotonik, Technical University of Denmark, 2800 Kgs Lyngby, Denmark; [2]DTU Fotonik, Technical University of Denmark, 4000 Roskilde, Denmark; [3]NORBLIS, 2830 Virum, Denmark; [4]NKT Photonics, 3460 Birkerød, Denmark

We report on fast and high-resolution mid-infrared OCT imaging of marine coatings, demonstrating its applicability for measuring wet film thickness, and for non-destructive inspection of particles and defects.

CH-P.12 FRI

Highly flexible deep learning based speckle correlation extraction

•Y. Wang[1], Z. Lin[2], Y. Li[2], C. Hu[2], H. Yang[2], and M. Gu[1]; [1]Centre for Artificial-Intelligence Nanophotonics, School of Optical-Electrical and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China; [2]School of Optical-Electrical and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China

We show that the trained convolutional neural network (COECNN) is able to extract scalable speckle correlation and make high-quality sparsity object predictions through an entirely different set of diffusers.

CH-P.13 FRI

An Optical Fiber-based SPR Sensor for Colorectal Cancer Diagnosis

R. Xavier, J. Alpino, •C. Moreira, and R. Cruz; IFPB Instituto Federal de Educação, Ciencia e Tecnologia da Paraiba, Joao Pessoa, Brazil

An optical fiber-based surface plasmon resonance sensor for colorectal cancer (CRC) diagnosis is presented here. In the proposed study, plastic (Polymethyl Methacrylate - PMMA) and fluoride-based (ZBLAN – ZrF4, BaF2, LaF3, ALF3, NaF) core materials have been investigated.

CH-P.14 FRI

The contribution has been withdrawn.

CH-P.15 FRI

Fourier Transform Spectrometer Combined with a Mid-Infrared Supercontinuum Source for Trace Gas Sensing

•M. Nematollahi, A. Khodabakhsh, K. Eslami Jahromi, R. Krebbers, M.A. Abbas, and F.J.M. Harren; Trace Gas Research Group, Department of Molecular and Laser Physics, Institute for Molecules and Materials, Radboud University, 6525 AJ , Nijmegen, Netherlands

We present a multi-species trace gas sensor based on a mid-infrared supercontinuum source, a multi-pass cell, and a compact home-built Fourier transform spectrometer, demonstrating 1GHz spectral resolution and detection sensitivity of a few hundred $ppbv.Hz^{-1/2}$.

CH-P.16 FRI

Fiber-coupled balanced-detection interferometric cavity-assisted photothermal spectroscopy for SO2 and CO detection

•J.P. Waclawek[1,2], H. Moser[1,2], and B. Lendl[1]; [1]Technische Universität Wien, Vienna, Austria; [2]Competence Center CHASE GmbH, Vienna, Austria

Highly sensitive, selective, as well as compact SO2 and CO trace gas sensing by balanced-detection ICAPS employing an overall fiber-coupled probe laser configuration is reported.

CH-P.17 FRI

Pitchfork Bifurcation of a Nonlinear Optical Resonator Enhances Sensing Speed and Precision

•K.J.H. Peters and S.R.K. Rodriguez; Center for Nanophotonics, AMOLF, Amsterdam, Netherlands

We demonstrate a novel optical sensing scheme based on a hysteretic resonator. The sensitivity of our sensor scales as a square-root function of the perturbation strength. Counterintuitively, the precision increases for fast measurements.

CH-P.18 FRI

Silicon micro-electromechanical resonator for enhanced photoacoustic gas detection.

•W. Trzpil, N. Maurin, R. Rousseau, D. Ayache, A. Vicet, and M. Bahriz; IES, Univ. Montpellier, CNRS, F-34000 , Montpellier, France

We present a new sensitive (11ppmv in 1s on ethylene using QCL) concept of gas sensor based on photoacoustic spectroscopy using silicon micro-resonator with capacitive transduction. We compared the limit of detection to commercial QTF.

CH-P.19 FRI

The Effect of Internal Loss on the Visibility of a Seeded SU(1,1) Interferometer

•I. Jonas; Bar Ilan university , Ramat Gan, Israel

We present an analysis of a seeded SU(1,1) interferometer in the high-loss regime. This configuration retains its quantum properties on top of the classical stimulation, rendering it practical in applications of quantum illumination and sensing.

CH-P.20 FRI

Evaluating Confocal Microscopy as a Tool to Diagnose Red Blood Cell Diseases

•L. Rey-Barroso[1], M. Roldán[2,5], F.J. Burgos-Fernández[1], S. Gassiot[3,5], A. Ruiz-Llobet[4], I. Isola[3,5], and M. Vilaseca[1]; [1]Centre for Sensors, Instruments and Systems Development, Technical University of Catalonia, Terrassa 08222, Spain; [2]Unit of Confocal Microscopy, Service of Pathological Anatomy, Hospital Sant Joan de Déu, Esplugues de Llobregat 08950, Spain; [3]Laboratory of Hematology, Service of Laboratory Diagnosis, Hospital Sant Joan de Déu, Esplugues de Llobregat 08950, Spain; [4]Service of Pediatric Hematology, Hospital Sant Joan de Déu, Esplugues de Llobregat 08950, Spain; [5]Institute of Pediatric Research, Hospital Sant Joan de Déu, Esplugues de Llobregat 08950, Spain

Red blood cell diseases are difficult to diagnose since they present characteristics that are somehow unspecific. In order to observe what could be affected at a cellular level, confocal microscopy was applied in this work.

CH-P.21 FRI

Multi-channel laser Doppler anemometer for airborne integration as real-time optical wind vector sensor

O. Kliebisch, •P. Mahnke, R.-A. Lorbeer, N. Miller, and M. Damm; German Aerospace Center, Institute of Technical Physics, Stuttgart, Germany

A rack-mounted laser Doppler anemometer (LDA) for integration into an research aircraft is presented. The LDA is tested as a potential optical air data sensor for measuring true air speed and local airflow angles.

CH-P.22 FRI

InAs/AlAsSb-Based Quantum Cascade Detector at 2.7 μm

•M. Giparakis[1], H. Knötig[1], M. Beiser[1], H. Detz[2], W. Schrenk[2], B. Schwarz[1], G. Strasser[1,2], and A.M. Andrews[1]; [1]Institute of Solid STate Electronics E362, TU Wien, Vienna , Austria; [2]Center for Micro- and Nanostructures E057-12, TU Wien, Vienna , Austria

A quantum cascade detector based on the InAs/AlAs0.16Sb0.84 material system was grown by molecular beam epitaxy. The device showed a room temperature peak response at the above bandgap wavelength of 2.7 μm, CO2 absorption line.

CH-P.23 FRI

High-Precision Interferometry With Helical Light Beams

•N. Kerschbaumer[1], L. Fochler[1], M. Reichenspurner[1], T. Lohmüller[1], M. Fedoruk[2], and J. Feldmann[1]; [1]Chair for Photonics and Optoelectronics, Nano-Institute LMU Munich, Department of Physics, Munich, Germany; [2]Vortex Photonics, Munich, Germany

We report that interferometry of helical light beams provides benefits for precision measurements of transparent and fluidic samples. Details on generating optical vortex beams using spiral phase plates in a Michelson interferometer will be discussed.

CH-P.24 FRI

Q- factor enhancement in photonic crystal cavities based on trapezoidal slotted nano-sticks for refractive index sensing

•J.H. Mendoza-Castro[1,2], L. O'Faolain[3,4], and M. Grande[1]; [1]Dipartimento di Ingegneria Elettrica e dell'Informazione, Politecnico di Bari, Bari, Italy; [2]Institute of Chemical Technologies and Analytics, Vienna University of Technology, Vienna, Austria; [3]Centre for Advanced Photonics and Process Analysis, Munster Technological University, Cork, Ireland; [4]Tyndall National Institute, Cork, Ireland

We present the design of slotted high-Q factor photonic crystal cavity in which an improvement of 2 orders of magnitude in the Q factor, as a function of angle sidewalls and number segments, is demonstrated

CH-P.25 FRI

High-Q whispering-gallery-mode resonator of material with strong Faraday Effect.

•A. Danilin[1], G. Slinkov[2], V. Lobanov[3], K. Min'kov[4], and I. Bilenko[5]; [1]Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia; [2]Faculty of Physics, Lomonosov Moscow State UniversityFaculty of Physics, Lomonosov Moscow State University, Moscow, Russia; [3]Russian Quantum Center, Moscow, Russia; [4]Russian Quantum Center, Moscow, Russia; [5]Faculty of Physics, Lomonosov Moscow State University, Moscow, Russia

We investigated the magneto-optical effect in the Terbium Gallium Garnet WGMR possessing the record quality factor Q=1.45×10^8 for such material. We have observed an eigenfrequency modulation and polarization declination induced by a harmonic magnetic field.

CH-P.26 FRI

Investigation of the influence of the number of spectral channels in colorimetric analysis

•A. Stefani[1], T. Götz[1], J. Vieregge[1], M. Wiedmann[1], W. Tschekalinskij[1], N. Holzer[1], V. Peters[1], M. Dold[2], M.-L. Bauerfeld[2], and S. Junger[2]; [1]Fraunhofer Institute for Integrated Circuits IIS, Erlangen, Germany; [2]Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany

We investigate the influence factors such as number, spacing and bandwidth of spectral channels of multi-spectral sensors used in colorimetric analysis, combing measurements, simulation and machine learning to infer the desired chemical parameters.

10:00 – 11:00

EG-P: EG Poster Session

EG-P.1 FRI

Speckle engineering through singular value decomposition of the transmission matrix

•*L. Devaud[1], B. Rauer[1], J. Melchard[2], M. Kühmayer[2], S. Rotter[2], and S. Gigan[1]; [1]Laboratoire Kastler Brossel, Sorbonne Université, École Normale Supérieure, Paris Sciences et Lettres (PSL) Research University, CNRS, Collège de France, Paris, France; [2]Institute for Theoretical Physics, Vienna University of Technology (TU Wien), Vienna, Austria*

We study speckles obtained behind a scattering media. We show that through the singular value decomposition of the medium transmission matrix and its Fourier filtering we can control the speckle's correlations.

EG-P.2 FRI

Nonlinear optics at the nanoscale: experiment versus theory

•*L. Rodríguez[1], C. Cojocaru[1], M. Scalora[2], and J. Trull[1]; [1]Department of physics, University Politècnica de Catalunya, Terrassa, Spain; [2]Aviation and Missile Center, US Army CCDC, Redstone Arsenal, Huntsville, USA*

We report a comparison of experimental and numerical results that conduct to the understanding of the harmonic generation at nanoscale from different strategic materials for nanophotonics: semiconductors (GaAs), conductive oxides (ITO) and metals (Au).

EG-P.3 FRI

The role of wall's curvature on the quantum tunneling within subnanometer gaps

•*M. Jalali[1], J.T. Svejda[1], J. Jose[2], S. Schlücker[2], and D. Erni[1]; [1]General and Theoretical Electrical Engineering (ATE), Faculty of Engineering, University of Duisburg-Essen, and CENIDE – Center for Nanointegration Duisburg-Essen, Duisburg, Germany; [2]Department of Chemistry, University of Duisburg-Essen, and CENIDE – Center for Nanointegration Duisburg-Essen, Universitätsstr. 5, Essen, Germany*

The effect of wall's curvature on the quantum tunneling within an air gap in gold nanodimers is investigated to realize the relation between the dimer radius or the wall's curvature and the red-shift in the surface plasmon (SP) coupling band.

EG-P.4 FRI

Nonadiabatic Tunneling Of Photoelectrons Induced By Few-Cycle Near-Fields

•*B. Lovász[1], P. Sándor[1], Z.G. Kiss[1], B. Bánhegyi[1], Z. Pápa[1,2], J. Budai[2], C. Prietl[3], J.R. Krenn[3], and P. Dombi[1,2]; [1]Wigner Research Centre for Physics, Budapest, Hungary; [2]ELI-ALPS Research Institute, Szeged, Hungary; [3]Institut für Physik, Karl-Franzens-Universitaet, Graz, Austria*

We recorded nanoplasmonic photoemission spectra for the regime of nonadiabatic electron tunneling. Characteristic features of multi-photon and strong-field emission are both present in a narrow range of intensities, signifying the transition interaction region.

EG-P.5 FRI

Crystal-oriented surface functions d-parameters of noble metals in plasmonic applications

•*Á. Rodríguez Echarri[1], P.A.D. Gonçalves[2], C. Tserkezis[2], F.J. García de Abajo[1,3], N.A. Mortensen[2,4], and J. Cox[2,4]; [1]ICFO – Institut de Ciències Fotòniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels, Barcelona, Spain, Castelldefels, Spain; [2]Center for Nano Optics, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark; [3] ICREA – Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, 08010 Barcelona, Spain, Barcelona, Spain; [4]Danish Institute for Advanced Study, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark, Odense, Denmark*

Feibelman d-parameters are characterized for a variety of noble metals and different crystallographic orientations. We use a rigorous quantum mechanical model to compute them and propose a variety of cases for their use in plasmonic applications.

EG-P.6 FRI

The contribution has been withdrawn.

EG-P.7 FRI

Theory of "hot" photo-luminescence from Drude metals

•*Y. Sivan and Y. Dubi; Ben-Gurion University, Beer-Sheva, Israel*

We provide the first complete electronic and photonic theory of luminescence from Drude metals. We resolve a series of arguments about the basic nature of the emission, its spectral shape and electric field dependence.

EG-P.8 FRI

High-Harmonic Spectroscopy through Matter Talbot-Lau Interferometry

•*A. García-Cabrera, C. Hernández-García, and L. Plaja; Grupo de Investigación en Aplicaciones del Láser y Fotónica, Universidad de Salamanca, Salamanca, Spain*

We demonstrate an ultrafast matter-Talbot effect in the nonlinear response of a low-dimensional solid to an intense laser. Our results show that it leaves a unique spectroscopic trace, opening the way for high-harmonic Talbot-Lau spectroscopy.

EG-P.9 FRI

Large Third-Order Nonlinear Optical Effect Induced by Plasmonic Metasurface with Sub-nm Gaps

•*T. Takeuchi and K. Yabana; Center for Computational Sciences, University of Tsukuba, Tsukuba, Japan*

We computationally investigated third-order nonlinear optical effects induced by plasmonic metasurfaces with sub-nm gaps. It has been clarified that the nonlinear effects are strongly enhanced by quantum tunneling and/or overbarrier currents through the sub-nm gaps.

EG-P.10 FRI

Interaction of photonic wheel with cluster of nanoparticles

•*J. Berškys and S. Orlov; State research institute Center for Physical Sciences and Technology, Vilnius, Lithuania*

We present an investigation of novel type optical beam with transversely orientated angular momentum to its propagation direction interaction with nanoparticles and clusters. The focus is on angular momentum, torques and forces during the interaction.

EG-P.11 FRI

Thermal effect in plasmon assisted photocatalysis: a parametric study

•*I.W. Un and Y. Sivan; School of Electrical and Computer Engineering, Ben-Gurion University of the Negev, Beer Sheva, Israel*

We show that the temperature rise in plasmon-assisted photocatalysis is weakly-dependent on the illumination wavelength, pulse duration, particle shape, size, and density, but is strongly-sensitive to the beam size and the host thermal conductivity.

EG-P.12 FRI

Plasmon mediated interactions between fluorescent emitters in weak and strong coupling regime.

•*K. Chevrier[1], C. Pérez[1], D. Bouchet[1], R. Carminati[1], Y. De Wilde[1], J.-M. Benoit[2], A. Gassenq[2], C. Symonds[2], J. Bellessa[2], and V. Krachmalnicoff[1]; [1]Institut Langevin, ESPCI Paris, Université PSL, CNRS, Paris, France; [2]Institut Lumière Matière, Université Claude Bernard Lyon 1, CNRS, Villeurbanne, France*

We investigate the plasmon mediated interaction between two different ensembles of fluorescent emitters, the first weakly coupled to a surface plasmon and the second strongly coupled to a surface plasmon.

EG-P.13 FRI

Breaking the Selection Rules of Spin-Forbidden Molecular Absorption in Plasmonic Nanocavities

•*O. Ojambati; Cavendish Laboratory, Department of Physics, JJ Thompson Avenue, University of Cambridge, Cambridge, United Kingdom*

We observe that a plasmonic nanocavity activates a molecular absorption peak from a forbidden transition. Time-dependent density functional theory reveals that Au atoms induce spin mixing to allow the new absorption.

EG-P.14 FRI

Targeted positioning of quantum dots inside 3D silicon photonic crystals observed by synchrotron X-ray fluorescence tomography

•*A.S. Schulz[1], D.A. Grishina[1], C.A.M. Harteveld[1], A. Pacureanu[2], J. Huskens[1], G.J. Vancso[1], P. Cloetens[2], and W.L. Vos[1]; [1]University of Twente, Enschede, Netherlands; [2]European Synchrotron Radiation Facility (ESRF), Grenoble, France*

We perform X-ray fluorescence tomography of a 3D photonic band gap crystal made from silicon with embedded quantum dot nanocrystals. We obtain the position of the quantum dots with a resolution of 50 nm.

EG-P.15 FRI

Tailoring the response of gold nanoantennas in optical near-field measurements: orientation and field size

•*R. Büchner[1], T. Weber[1], S.A. Maier[1,2], and A. Tittl[1]; [1]Chair in Hybrid Nanosystems, Nanoinstitute Munich, Faculty of Physics, Ludwig-Maximilians-Universität München, 80539 München, Germany; [2] The Blackett Laboratory, Department of Physics, Imperial College London, London SW7 2AZ, United Kingdom*

We study how the response of nanoantennas in near-field measurements depends on orientation and field-size, finding distinct regimes for weak and strong tip-antenna coupling and revealing the influence of collective effects on individual antenna signals.

EG-P.16 FRI

Silicon nanostructures for efficient high-harmonic generation

•*P. Peterka and M. Kozák; Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic*

We propose and numerically optimize silicon nanostructures for enhancement of high-harmonic generation efficiency. The field enhancement is reached by conical shape of the surface or by an anapole mode in silicon disks on glass substrate.

ROOM 3

10:00 – 11:00

JSIV-P: JSIV Poster session

JSIV-P.1 FRI

Deep Learning based Inverse Design of Integrated Silicon Nanophotonic Gratings

•A. Usman, H. Ali Akbar, A. Rahman, Z. Karim, and S.H. Asim; Habib University, Karachi, Pakistan

We demonstrated deep learning based inverse design of integrated silicon nanophotonic grating. Predicted geometries by the inverse design algorithm resulted in mean-square-error of the order of 10-4 while comparison of simulated and predicted transmission response.

JSIV-P.2 FRI

A Scheme for Optical Reservoir Computers with Atomic Memory

•E. Robertson [1,2], L. Jaurigue[2], L. Esguerra-Rodriguez[1,2], G. Gallego[2], K. Lüdge[2], and J. Wolters[1,2]; [1]Deutsches Zentrum f ür Luft- und Raumfahrt e.V. (DLR), Berlin , Germany; [2]Technische Universität Berlin, Berlin, Germany

We introduce an discrete opto-electronic reservoir computer with memory elements modelled using an SOA saturation profile as a non-linearity. The reservoir is used to learn a logical XOR function with a test accuracy of 80%.

JSIV-P.3 FRI

Deep Neural Networks with Time-Domain Synthetic Photonic Lattices

A. Pankov[1], O. Sidelnikov[1], •I. Vatnik[1], D. Churkin[1], and A. Sukhorukov[2]; [1]Novosibirsk State University, Novosibirsk, Russia; [2]The Australian National University, Canberra, Australia

We reveal that synthetic photonic lattice based on coupled fiber rings can realise deep neural networks foroptical pulse trains, and demonstrate the capabilities in efficient training for signal distortion compensation and nonlinear transformations.

JSIV-P.4 FRI

Optical Convolutional Neural Network with Atomic Non-linearity

•M. Yang[1,2], E. Robertson[2,3], L. Esguerra Rodriguez[2,3], and J. Wolters[2,3]; [1]Humboldt-Universität zu Berlin, Newtonstr.15, D-12489 , Berlin, Germany; [2]Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Rutherfordstraße 2, D-12489, Berlin, Germany; [3]Technische Universität Berlin, Straße des 17. Juni 135, D-10623, Berlin, Germany

An optical convolutional neural network is demonstrated in which linear operations are implemented by lenses and spatial light modulators (SLMs), while an optical non-linearity is realized by a cesium vapor cell as a saturable absorber.

JSIV-P.5 FRI

XY Neural Networks

•N. Stroev[1] and N. Berloff[1,2]; [1]Skolkovo Institute of Science and Technology, Moscow, Russia; [2]University of Cambridge, Cambridge, United Kingdom

We show how to build complex structures based on the nonlinear blocks of the XY model (accessible within many condensed matter systems) with the final target of realizing the deep learning architectures, that are able to perform complicated tasks.

ROOM 1

13:30 – 14:30

CM-P: CM Poster Session

CM-P.1 FRI

Element Migration and Local Refractive Index Control in Silicate Glass by Femtosecond Laser Induced Element Redistribution

M. Macias-Montero[1], F. Muñoz[2], B. Sotillo[3], J. del Hoyo[4], R. Ariza[1], P. Fernandez[3], J. Siegel[1], and •J. Solis[1]; [1]Laser Processing Group, Instituto de Óptica (IO-CSIC), Madrid, Spain; [2]Instituto de Cerámica y Vidrio (ICV-CSIC), Madrid, Spain; [3]Department of Materials Physics, Faculty of Physics, University Complutense of Madrid, Madrid, Spain; [4]Department of Optics, Faculty of Physics, University Complutense of Madrid, Madrid, Spain

Fs-laser induced element redistribution is applied to write microstructures with high positive refractive index contrast in ad-hoc compositionally designed silicate glass and to fabricate infrared optical waveguides, evaluating the glass modification mechanism.

CM-P.2 FRI

Prediction of the morphological features of laser-based patterned surfaces through the use of machine learning approaches

M.-C. Velli[1,2], •G. Tsibidis[1], A. Mimidis[1,3], E. Skoulas[1,3], Y. Pantazis[4], and E. Stratakis[1,2]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece; [2]Department of Physics, University of Crete, Heraklion, Greece; [3]Department of Material Science, University of Crete, Heraklion, Greece; [4]Institute of Applied and Computational Mathematics, Foundation for Research and Technology—Hellas, Heraklion, Greece

We have shown in this work that Machine-Learning based approaches can be used in laser-based fabrication as a predictive tool towards forecasting the laser parameters to produce application based morphological features on the surface of artificial materials.

CM-P.3 FRI

High energy density deposition inside the bulk of dielectrics via resonance absorption

•M. Hassan, K. Ardaneh, R. Meyer, C. Xie, C. Billet, L. Furfaro, L. Froehly, R. Giust, and F. Courvoisier; FEMTO-ST Institute, Univ. Bourgogne Franche-Comte, UMR CNRS 6174, Besancon, France

We demonstrate with experiments and simulations that femtosecond Bessel beams create in dielectrics overdense nanoplasmas with diameter below 200 nm, which open high aspect ratio nanochannels. The main mechanism is collisionless resonance absorption.

CM-P.4 FRI

Using liquid crystals as tuneable waveplates in femtosecond laser direct written waveguides

•K. Lammers[1], A. Alberucci[1], A. Szameit[2], and S. Nolte[3]; [1]Institute of Applied Physics, Abbe School of Photonics, Friedrich Schiller University Jena, Jena, Germany; [2]Institut für Physik, Universität Rostock, Rostock, Germany; [3]Fraunhofer Institute for Applied Optics and Precision Engineering, Jena, Germany

We demonstrate the use of liquid crystals as switchable retardation elements embedded in femtosecond laser direct written waveguides, allowing a switch e.g. from antidiagonal to diagonal output polarization.

CM-P.5 FRI

Study of femtosecond laser post-processing regimes for dispersion tailoring of fiber Bragg gratings

•T.O. Imogore[1], R.G. Krämer[1], T.A. Goebel[1], C. Matzdorf[1], D. Richter[1], and S. Nolte[1,2]; [1]Institute of Applied Physics, Abbe Center of Photonics, Friedrich Schiller University, Albert-Einstein-Straße 15, 07745, Jena, Germany; [2]Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Albert-Einstein-Straße 7, 07745, Jena, Germany

This study investigates for the first time, the evolution of the average refractive index (and by consequence the dispersion) of an inscribed fiber Bragg grating with respect to the femtosecond laser post-processing parameters.

CM-P.6 FRI

Conical Beams for Directing Chemical Etching along Deeply-Focussed Femtosecond Laser Modification Tracks

•E. Alimohammadian, E. Ertorer, and P.R. Herman; Department of Electrical and Computer Engineering, University of Toronto, Toronto, Canada

Conical phase front beam shaping is shown to enable chemical etching control of femtosecond laser modification tracks, compensating for surface aberration, enhancing etching rates, and providing a new means for shaping the cross-sectional channel profile.

CM-P.7 FRI

Off-Axis Filament Based Fiber Bragg Gratings for Azimuthally Resolved Displacement Sensing

H. Mahlooji[1], •A. Rahnama[2], G. Djogo[2], F. Azhari[1], and P.R. Herman[2]; [1]Department of Mechanical and Industrial Engineering, University of Toronto, 5 King's College Rd., M5S3G8., Toronto, Canada; [2]Department of Electrical and Computer Engineering, University of Toronto, 10 King's College Rd., M5S 3G4, Toronto, Canada

Aberrated femtosecond laser pulses were applied to telecommunication fiber, forming long and uniform filament arrays with narrow Bragg resonances. Overlaid gratings with rotational and positional offsets enabled photoelastic bending responses for azimuthally resolved displacement sensing.

CM-P.8 FRI

Creation of high-contrast structures in superpositions of higher order Bessel beams for laser processing of glasses

•P. Šlevas[1,2], E. Kozlovskis[1], S. Orlov[1], P. Gotovski[1,3], and O. Ulčinas[1,2]; [1]Center for Physical Sciences and Technology, Coherent Optics laboratory, Vilnius, Lithuania; [2]Workshop of Photonics, Vilnius, Lithuania; [3]Faculty of Electronics, Vilnius Gediminas Technical University, Vilnius, Lithuania

We report on generation of complex transverse intensity distribution beams, by superimposing several Bessel beams of higher order and different spatial frequencies, using geometrical phase elements and applications of such beams for glass processing.

CM-P.9 FRI

Time-resolved imaging and simulations of SiO2 films dynamic fracture due to laser-induced confined micro-explosion at Si/SiO2 interface

•I. Sakaev[1], J. Linden[2,3], and A. Ishaaya[1]; [1]Ben Gurion University of the Negev, Beer Sheva, Israel; [2]Additive Manufacturing Group, Orbotech Ltd., Yavne, Israel; [3]Bar Ilan University, Ramat Gan, Israel

PECVD SiO2 films on Si substrate irradiated by short laser pulses undergo dynamic fracture due to near-interface micro-explosion resulting in flyer ejection, spallation and fragmentation. The phenomena are investigated using time-resolved imaging and finite-elements simulations.

CM-P.10 FRI

Laser Processing for Surface Protection of Marble through Hydrophobicity Enhancement

R. Ariza[1], M. Alvarez[1], J. Solis[1], G. Costas[2], L. Tribaldo[2], and •J. Siegel[1]; [1]Laser Processing Group, Instituto de Óptica, IO-CSIC, Madrid, Spain; [2]Levantina y asociados de minerales, Novelda, Spain

Irradiation with ultrashort laser pulses was used to alter the surface wettability of marble. Combined with a surface ageing process, contact angles of 144º were obtained, showing great potential for withstanding environmental degradation and pollution.

CM-P.11 FRI

Hologram Recording Using Ultrashort Laser Pulses

Y. Kotsiuba[1,2], I. Hevko[1], and •I. Gnilitskyi[1,3]; [1]NoviNano LLC, Lviv, Ukraine; [2]Karpenko Physico-Mechanical Institute of the NAS of Ukraine, Lviv, Ukraine; [3]Department of Photonics, Lviv Polytechnic National University, Lviv, Ukraine

In this paper, we introduce a method of recording quasi-holograms on the steel by varying the spatial orientation of LIPSS. The obtained results will be the basis for a new technology of recording diffraction optical elements by ultrashort pulses.

CM-P.12 FRI

Laser Induced Periodic surface structure formation in solids via mid-IR Ultrashort Pulses

•S. Maragkaki[1], G.D. Tsibidis[1], R. Flender[2], L. Haizer[2], Z. Pápa[2], Z. Márton[2], and E. Stratakis[1,3]; [1]Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology (FORTH), Heraklion, Greece; [2]ELI-ALPS, ELI-HU Non-Profit Ltd., Szeged, Hungary; [3]Department of Physics, University of Crete, Heraklion, Greece

Ultrafast laser-induced LIPSS in the mid-infrared spectral region is a yet predominantly unexplored field with a large potential for a wide range of applications. Here, we present a parametric investigation on solids complemented with theoretical calculations.

CM-P.13 FRI

Large Area Surface Ablation and Micropatterning of Transparent Dielectrics with Femtosecond UV Laser Pulses

•D. Stonytė, V. Jukna, S. Butkus, and D. Paipulas; Laser Research Center, Faculty of Physics, Vilnius University, Vilnius, Lithuania

We present the results of a direct femtosecond UV laser surface ablation of transparent materials. Laser parameters are optimized for a minimal surface roughness value using our theoretical model that can also predict the ablation depth.

CM-P.14 FRI

Ultrafast laser micromachining of x-ray gratings and sub-micron hole patterns with differents beam shapes

R. Carreto[1], B. Lüscher[1], R. Holtz[1], and •B. Resan[1,2]; [1]Institute of Product and Production Engineering (IPPE), University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Windisch, Switzerland; [2]Faculty of Medicine, Josip Juraj Strossmayer University, Osijek, Croatia

We compare micromachining results with Gaussian and Bessel beams using an UV 10-picosecond laser system, in order to obtain tungsten gratings for X-ray interferometry medical imaging, and sub-micrometer hole patterns in tungsten foil.

CM-P.15 FRI

Fabrication of Microfluidic Macromolecule Separator by Femtosecond Direct Laser Writing

•L. Jonušauskas[1,2], D. Andriukaitis[1,2], D. Andrijec[1], R. Vargalis[1], O. Kornyšova[3], A. Butkutė[1,2], T. Dervinskas[3], V. Kaškonienė[3], M. Stankevičius[3], and A. Maruška[3]; [1]Femtika Ltd., Vilnius, Lithuania; [2]Laser Research Center, Faculty of Physics, Vilnius University, Vilnius, Lithuania; [3]Department of Chemistry, Vytautas Magnus University, Kaunas, Lithuania

In this work, a hybrid additive-subtractive direct laser writing is used to fabricate a passive, multi-level filter-based macromolecule separator. Sub-diffraction limited resolution, femtosecond bursts, and laser-independent methods to are used to improve the processing outcome.

CM-P.16 FRI

Laser Induced Periodic Surface Structured c-Si Solar Cell with more than 16% efficiency

•A. Goodarzi[1], O. Candemir[1], H. Nasser[1,2], M. Zolfaghari Borra[1,2], E. Genc[2], E. Hande Ciftpinar[1,3], A. Bek[1,2,3], R. Turan[1,2,3], and I. Pavlov[1,2]; [1]Department of Physics, Middle East Technical University, Ankara, Turkey; [2]The Center for Solar Energy Research and Applications (GÜNAM), Middle East Technical University,, Ankara, Turkey; [3]Micro and Nanotechnology Graduate Program, Middle East Technical University, Ankara, Turkey

Photonic properties of c-Si solar cell surface are enhanced by Laser Induced Periodic Surface Structuring. More than 16% efficiency is achieved without any chemical texturing of the surface.

CM-P.17 FRI

Volumetric 3D printing of conductive ceramics

•J. Madrid-Wolff [1], G. Konstantinou[1], D. Loterie[2], P. Delrot[2], and C. Moser[1]; [1]Laboratory of Applied Photonics Devices, School of Engineering, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland; [2]Readily3D , Lausanne, Switzerland

Two-photon additive manufacturing of ceramic materials has demonstrated high-precision manufacturing of tools at the micrometer scale. Here, we propose single photon volumetric additive manufacturing to overcome limitations on print size and which avoid the need for support materials.

CM-P.18 FRI

High Aspect Ratio Micro-Hole Drilling in Silicon Using Subsurface Laser Processing and Selective Chemical Etching

•M. Zolfaghari Borra[1,2], B. Radfar[1,2], H. Nasser[1], R. Turan[1,2,3], I. Pavlov[1,3], and A. Bek[1,2,3]; [1]The Center for Solar Energy Research and Applications (GÜNAM), Middle East Technical University, Ankara, Turkey; [2]Micro and Nanotechnology Graduate Program, Middle East Technical University, Ankara, Turkey; [3]Department of Physics, Middle East Technical University, Ankara, Turkey

We demonstrate a high aspect ratio micro-hole drilling technique using nanosecond-pulsed fiber laser focused in Si-subsurface followed by selective chemical etching. To obtain holes along with damage-free surfaces, the chemistry of the etching solution is optimized.

CM-P.19 FRI

Formation of thermochemical laser-induced periodic surface structures on zirconium films by focused femtosecond laser beam

•K. Bronnikov[1,2], A. Dostovalov[1,2], K. Okotrub[1], V. Korolkov[1,2], and S. Babin[1,2]; [1]Institute of Automation and Electrometry of the SB RAS, Novosibirsk, Russia; [2]Novosibirsk State University, Novosibirsk, Russia

Periodic structures were formed on zirconium films with a thickness of 50-170 nm using near-IR femtosecond laser pulses. The dependency of the period and structure uniformity on pulse energy and scanning rate was observed.

CM-P.20 FRI

Laser assisted oxygen cutting of thick mild steel with off-axis beam delivery of 400 W fiber-coupled diode lasers

•I. Sakaev and A. Ishaaya; Ben Gurion University of the Negev, Beer Sheva, Israel

Laser assisted oxygen cutting of 20-40 mm mild steel using total 400 W fiber-coupled diode lasers power is demonstrated. The laser beam is delivered off-axis to the cutting oxygen jet perpendicular to surface of the workpiece.

CM-P.21 FRI

Femtosecond laser-generated shockwaves in transparent media: Experiments and Simulation

•O. Koritsoglou[1], O. Utéza[1], D. Grojo[1], N. Sanner[1], D. Loison[2], and A. Mouskeftaras[1]; [1]Aix Marseille University, CNRS, LP3 UMR 7341, Marseille, France; [2]Institut de Physique de Rennes, CNRS, Rennes, France

We use a time-resolved transmission microscopy setup to study fs laser-generated shockwaves in transparent media. Our goal is to provide insight in the relation between absorbed laser energy density and induced stress fields.

CM-P.22 FRI

Direct Laser Writing of Optical Waveguides with Precipitated Silver Nanoparticles in Zinc Phosphate Glass

•G. Shakhgildyan, A. Lipatiev, S. Fedotov, M. Vetchinnikov, S. Lotarev, and V. Sigaev; Mendeleev University of Chemical Technology, Moscow, Russia

We report on the laser writing of nonlinear optical waveguides in zinc phosphate glass containing silver. We show that fabricated waveguides could be used for the supercontinuum generation of light in the near-IR range.

CM-P.23 FRI

Ultrafast-laser inscription of β-BaB2O4 crystal-in-glass waveguides in borate glass

•S.V. Lotarev, A.S. Lipatiev, A.S. Naumov, T.O. Lipateva, S.S. Fedotov, and V.N. Sigaev; D. Mendeleev University of Chemical Technology, Moscow, Russia

In this study, we demonstrate direct femtosecond laser writing of β-BaB2O4 crystal waveguides in the inside of 47,5BaO-5Al2O3-47,5B2O3 glass. The propagating mode profile was evaluated in the near field as Gaussian with slightly elliptical cross-section.

CM-P.24 FRI

Effects of various misalignments and beam impurities on creation of optical needle using Pancharatnam–Berry phase elements

P. Gotovski[1,2], P. Slevas[1,3], •S. Orlov[1], O. Ulčinas[1,3], and

A. Urbas[1,3]; [1]*Center for Physical and Technology Sciences, Vilnius, Lithuania*; [2]*Vilnius Gediminas Technical University, Faculty of Electronics, Vilnius, Lithuania*; [3]*Workshop of Photonics, Vilnius, Lithuania*

We consider optical elements based on the space-domain Pancharatnam–Berry phase for the generation of an optical needle. Both numerically and experimentally generation of an optical needle with imperfect input beams and misalignments is investigated.

CM-P.25 FRI

Periodic Surface Structures Induced by 2-μm Femtosecond Pulses on ITO

•*B. Bánhegyi*[1], *L. Péter*[1], *Z. Pápa*[1,2], *and P. Dombi*[1,2]; [1]*Wigner Research Centre for Physics, Budapest, Hungary*; [2]*ELI-ALPS Research Institute, ELI-HU Nonprofit Kft, Szeged, Hungary*

We analyze periodic surface structures produced by 2-μm femtosecond laser pulses on indium-tin-oxide thin-film with SEM and element analysis. The generated double-periodic morphologies are discussed in the frame of finite-difference and finite-element simulations.

CM-P.26 FRI

Tomographic Volumetric Additive Manufacturing in Scattering Resins

•*J. Madrid-Wolff*[1], *A. Boniface*[1], *M. Jonin*[1], *P. Delrot*[2], *D. Loterie*[2], *and C. Moser*[1]; [1]*Laboratory of Applied Photonics Devices, School of Engineering, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*; [2]*Readily3D, Lausanne, Switzerland*

Tomographic Additive Manufacturing produces three-dimensional objects by projecting light patterns onto cell-laden hydrogels. We improve print resolution and reduce the effects of scattering by incorporating a refractive-index matching agent.

CM-P.27 FRI

Direct laser writing of 3D microstructures for photocatalytic applications

•*I. Syngelakis*[1,2], *E. Kabouraki*[1], *G. Kenanakis*[1], *A. Klini*[1], *and M. Farsari*[1]; [1]*Institute of Electronic Structure and Laser (IESL), Foundation for Research and Technology-Hellas (FORTH), Heraklion, Greece*; [2]*Department of Materials Science and Technology, University of Crete, Heraklion, Greece*

The present work investigates the potential increase of the active surface area of TiO2 nanorods, synthesised on 3D microstructures, in order to efficiently enhance their photocatalytic performance.

CM-P.28 FRI

Selective Laser Etching of Crystalline Sapphire for 3D Structure Fabrication

•*A. Butkute, B. Siauryte, D. Paipulas, R. Sirutkaitis, and V. Sirutkaitis*; *Laser Research Center, Faculty of Physics, Vilnius University, Vilnius, Lithuania*

Selective laser etching is perspective technology in high quality 3D structures formation in glasses and crystals. However, SLE of crystals is not widely studied. Here we present SLE optimisation for crystalline sapphire processing.

CM-P.29 FRI

Direct Correlation of Local Fluence to Ablation Morphology Created by a Single Femtosecond Laser Pulse

•*H. Sakurai, K. Konishi, H. Tamaru, J. Yumoto, and M. Kuwata-Gonokami*; *The University of Tokyo, Tokyo, Japan*

We develop a method to directly correlate the two-dimensional ablated crater profile to the incident beam profile. We use this method to qualitatively explore previously unexplored intra-crater features in the femtosecond ablation of sapphire.

CM-P.30 FRI

Bio inspired Surface engineering via Ultrafast Laser Patterning for textiles made of polymers

•*E.-K. Koussi, C. Mauclair, and X. Sedao*; *University of Lyon, Jean Monnet University,UMR 5516 CNRS, Laboratory Hubert Curien, Saint Etienne, France*

In this work, we investigate the optimal laser parameters to reproduce liquid repellent properties on PET and PA66 fluoralkyl-free polymers for textile industry. The first tests of DLIP texture on the impact of silicon are presented.

CM-P.31 FRI

Triphenylamine-based aldehydes as photoinitiators for multiphoton polymerization

•*D. Ladika*[1,2], *G. Noirbent*[3], *F. Dumur*[3], *D. Gigmes*[3], *A. Mourka*[1], *M. Farsari*[1], *and D. Gray*[1]; [1]*Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, HERAKLIO,CRETE, Greece*; [2]*Department of Materials Science and Technology, University of Crete, HERAKLIO,CRETE, Greece*; [3]*Aix Marseille Univ., CNRS, ICR, UMR 7273, Marseille, France*

Presentation of three triphenylamine-based aldehydes which can be used as photoinitiators for Multiphoton Lithography. Besides their efficient formulations, they show good quality 3D prints with high aspect ratios and feature sizes in the sub-micrometer regime.

CM-P.32 FRI

Pyrolyzed microstructures made by two-photon polymerization: comparative study

•*M.I. Sharipova*[1], *T. Baluyan*[1], *K. Abrashitova*[1], *G. Kulagin*[1], *A. Petrov*[1], *A. Chizhov*[1], *T. Shatalova*[1], *D. Chubich*[2], *D. Kolymagin*[2], *A. Vitukhnovsky*[2], *V. Bessonov*[1], *and A. Fedyanin*[1]; [1]*Lomonosov Moscow State University, Moscow, Russia*; [2]*Moscow Institute of Physics and Technology (National Research University), Moscow, Russia*

Two-photon polymerization is a powerful technology to make 3D microstructures. Post-processing pyrolysis enhances both microstructures' resolution and chemical composition. We have analyzed shrinkage, elemental composition, survival rate and adhesion of microstructures made of three photoresists.

CM-P.33 FRI

Femtosecond Laser micromachining of Various Materials for Industrial Engraving Applications

•*D. Pallarés-Aldeiturriaga*[1] *and X. Sedao*[1,2]; [1]*Hubert Curien Laboratory, University of Lyon, Jean Monnet University University, UMR 5516 CNRS, F-42000, Saint Étienne, France*; [2]*GIE Manutech-USD, 20 rue Benoit Lauras, F-42000 , Saint Étienne, France*

A new optimization protocol for industrial femtosecond laser engraving has been developed. It has been applied to Polyether ether ketone (PEEK), sapphire and silicon carbide (SiC), producing remarkable results in all cases.

CM-P.34 FRI

The contribution has been withdrawn.

CM-P.35 FRI

Femtosecond laser texturing of surfaces: applications in industrial scale production

D. Čereška[1], *G. Kontenis*[1,2], *A. Žemaitis*[1,2], *R. Vargalis*[1], *G. Merkininkaitė*[1,3], *and* •*G. Nemickas*[1]; [1]*Femtika Ltd, Vilnius, Lithuania*; [2]*Laser Research Center, Vilnius University, Vilnius, Lithuania*; [3]*Department of Chemistry, Vilnius University, Vilnius, Lithuania*

femtosecond laser-induced surface functionalities in high speed and the capabilities of their applications in the industry.

CM-P.36 FRI

Laser scribing of Sb2Se3 thin-film solar cells

F. Giovanardi[1], •*F. Khozeymeh*[1], *F. Bissoli*[2], *S. Rampino*[2], *E. Gilioli*[2], *G. Trevisi*[2], *M. Mazzer*[2], *and S. Selleri*[1]; [1]*University of Parma, Department of Engineering and Architecture, Parma, Italy*; [2]*IMEM-CNR, Institute of Materials for Electronics and Magnetism, Parma, Italy*

A preliminary test of laser scribing in Sb2Se3 solar cell manufacturing has been performed. SEM image and EDAX analysis confirm the removal of the TCO layer without damaging the underlying absorber.

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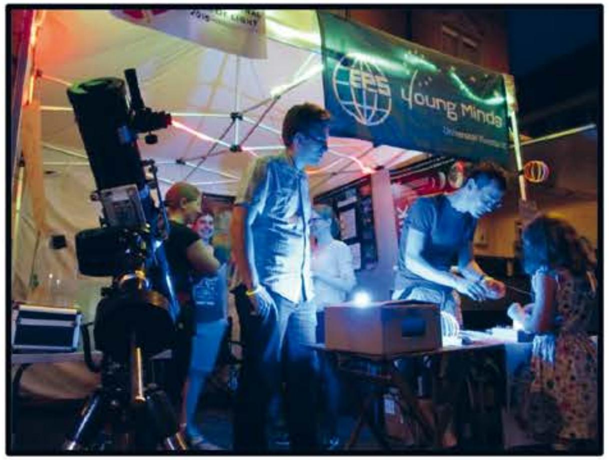

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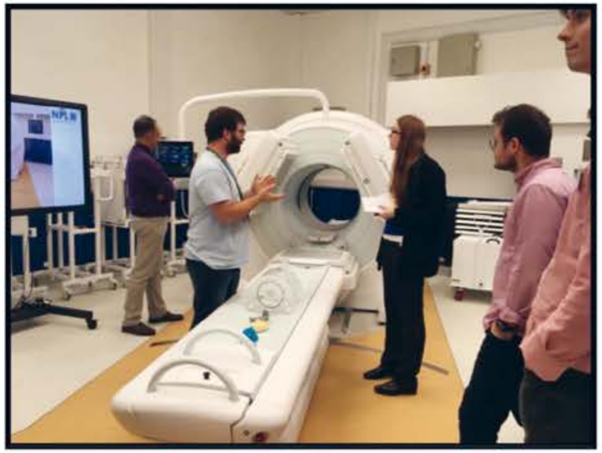

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