Advanced Photonics 2014
Congress Program

27–31 July 2014
Barcelona, Spain

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Welcome to the 2014 Advanced Photonics Congress! We hope you enjoy all that Barcelona offers, and take full advantage of the scientific sessions before you. The Congress has co-located four stimulating topical meetings (listed above) to allow attendees exposure to a wide variety of topics. This year’s Congress offers ample opportunities for networking and multiple events to motivate discussions on the latest research. We hope that bringing together leaders and experts among the different communities to share information and discuss topics across the disciplines of optical science and engineering will provide you with a rich experience in Spain.

The Joint Plenary session will be held on Monday, 28 July from 08:20–10:00 in Salon Rubi/Zafir. The Plenary session will feature two speakers - both experts in their respective fields. Benjamin Eggleton (Univ. of Sydney, Australia) will present Nonlinearities in Periodic Media, From Fiber to Silicon Chips. Following this presentation, Eric Mottay (Amplitude Systemes, France) will discuss Industrial Ultrafast Lasers.

The Advanced Photonics has two Joint Poster sessions. The first Joint Poster Session will be held on Monday, 28 July from 18:30–20:30 in conjunction with Congress Reception and Exhibits. The reception is open to registered committee members, presenting authors, students and full technical congress attendees. Congress attendees may purchase extra tickets for their guests. Please join us for this event and enjoy delectable fare while networking. The second Joint Poster session will be held on Tuesday, 29 July directly following the lunch break from 13:30–15:30. Both of the sessions is taking place in Salon Verdi.

Finally take an opportunity to stop by our exhibits in Salon Verdi during coffee/refreshment breaks from Monday–Wednesday of the congress and stay for the banquet on Wednesday, 30 July 18:30–20:00.

The Bragg Gratings, Photosensitivity, and Poling (BGPP) topical meeting gives you the opportunity to discover the impact on telecommunications and sensing and witness first-hand the latest advances and breakthroughs in the field of fiber gratings. BGPP continues to be a popular meeting for covering the state-of-the-art advances in fiber gratings in a relaxed and non-pressured atmosphere. The program is tailored for informal exchanges, forming new partnerships, and reconnecting with colleagues. This year’s meeting will feature 11 invited speakers, 33 oral presentations and 5 poster presentations.

The Nonlinear Photonics (NP) topical meeting is a venue for researchers interested in novel nonlinear optical processes in structures, devices and systems. The meeting covers the leading edge subjects in nonlinear optics such as rogue waves, dissipative solitons, metamaterials, plasmonics, fibre optics, supercontinuum generation, new lasers. It includes all modern aspects of nonlinear photonics (theory, numerical modeling and experiment) and is devoted to both temporal and spatial nonlinear effects. The NP topical meeting started in 1989 and is the oldest forum for scientists, experts and students among the meetings of this Congress. As in previous years, participants of the meeting will have a chance to submit extended research manuscripts to special Focus Issue of Optics Express after the congress. The meeting will feature 8 invited speakers, 86 oral presentations and 87 poster presentations.

The Optical Sensors (Sensors) meeting addresses all aspects of optical sensors including optical fiber sensors, laser based sensing, optical chemical and biological sensors, biomedical optical sensors, proximal and standoff spectroscopic and imaging sensors in the visible to the THz, quantum effects in optical sensing, and the scientific basis of optical sensing. Optical sensors have many applications in R&D, national defense, and commercial markets such as medical diagnostics and process control and thus have become an increasingly broad and engaging topic. This year’s meeting will include 33 invited speakers, 46 oral presentations and 19 poster presentations.
The Specialty Optical Fibers and Applications (SOF) meeting will discuss synthesis, processing, characterization, modeling, physical properties and applications of specialty and novel optical fibers with high technological impact potential. The purpose of this congress is to bring together global leaders from academia, industry, and the public/government sector to survey the present state of the art and project future trends in specialty optical fiber materials, designs, and applications. Particular attention will be paid to high energy fiber lasers, novel optical amplifiers and lasers, infrared and nonlinear fibers, micro-structured and photonic crystal fibers, active and passive polymer optical fibers, fiber-based sensors, crystalline and ceramic optical fibers, and fibers for biomedical and bioscience uses. We have scheduled a plenary speaker, 27 invited speakers, 2 tutorial speakers, 29 oral presentations, and 23 poster presentations.

There will also be a joint symposium between Sensors and BGPP and on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-Sensors will be a lively exchange between those who practice the art of surface functionalization and those who are attempting to develop new devices and systems, potentially cross-fertilizing and stimulating ideas between communities in what is becoming an increasingly important area of science and engineering. This symposium will include 1 keynote, 6 invited speakers and 3 oral presentations.

We all are very pleased to have you join us and we look forward to a great meeting!

**BGPP**
Stephen James Mihailov, National Research Council Canada, Canada, General Chair
Paul Westbrook, OFS Laboratories, USA, General Chair
John Canning, Univ. of Sydney, Australia, Program Chair
Morten Ibsen, Univ. of Southampton, UK, Program Chair

**NP**
Nail Akhmediev, Australian National Univ. Australia, General Chair
John Dudley, Université de Franche-Comté, Besancon, France, General Chair
Karsten Rottwitt, Technical Univ. of Denmark, Denmark, General Chair
Alexander Gaeta, Cornell Univ., USA, Program Chair
Yaroslav Kartashov, Institute of Phonic Sciences, Spain, Program Chair

**Sensors**
Ken Ewing, US Naval Research Laboratory, USA, General Chair
Mario F.S. Ferreira, Universidade de Aveiro, Portugal, General Chair

**SOF**
Ishvar Aggarwal, Univ. of North Carolina at Charlotte, USA, General Chair
John Ballato, Clemson Univ., USA, General Chair
Liang Dong, Clemson Univ., USA, Program Chair
Bryce Samson, Nufern, USA, Program Chair
Program Committee

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP)

General Chairs
Stephen Mihailov, National Research Council of Canada, Canada
Paul Westbrook, OFS Laboratories, USA

Program Chairs
John Canning, Univ. of Sydney, Australia
Morten Ibsen, Univ. of Southampton, UK

Program Committee Members

Fundamentals of Photosensitivity and Poling
Matthieu Lancry, Université Paris Sud, France, Subcommittee Chair
Costantino Corbari, Univ. of Southampton, UK
Marc Dussauze, CNRS Université de Bordeaux, France
Sylvain Girard, Université de Saint-Etienne, France
Leonid Glebov, Univ. of Central Florida, CREOL, USA
Cyril Hnatovsky, Australian National University, Australia
Saulis Joudkazis, Swinburne Univ. of Technology, Australia
Yasuhiro Shimotsuma, Kyoto Univ., Japan
Linards Skuja, Univ. of Latvia, Latvia
Christopher Smelser, Carleton Univ., Canada

Grating Properties and Fabrication Techniques
Kevin Chen, Univ. of Pittsburgh, USA, Subcommittee Chair
Martin Bernier, Université Laval, COPL, Canada
Mykhaylo Dubov, Aston Univ., UK
Moshe Horowitz, Technion Israel Institute of Technology, Israel
Dan Grobnic, National Research Council, Canada
Tristan Kremp, OFS Fitel LLC, USA
Graham Marshall, Univ. of Bristol, UK
Manfred Rothhardt, IPHT-Jena, Germany
Aiping Zhang, Hong Kong Polytechnic Univ., Hong Kong

Applications of Gratings and Poled Glass
Cicero Martelli, UTFPR Curitiba, Brazil, Subcommittee Chair
Andrea Cusano, Università del Sannio, Italy
Peter Kazansky, Univ. of Southampton, UK
Martin Kristensen, Aarhus Universitet, Denmark
Xiaoping Liu, Nanjing Univ., China
Paweł Niewczas, Univ. of Strathclyde, UK
Gang-Ding Peng, Univ. of New South Wales, Australia
Paul Steinvurzel, Northrop Grumman Corporation, USA
Hwa-yaw Tam, Hong Kong Polytechnic Univ., Hong Kong
Réal Vallée, Université Laval, COPL, Canada
Stephan Wildermuth, ABB AG, Corporate Research, Germany
Jianping Yao, Univ. of Ottawa, Canada

Nonlinear Photonics (NP)

General Chairs
Nail Akhmediev, Australian National Univ., Australia
John Dudley, Université de Franche-Comté, Besancon, France
Karsten Rottwitt, Technical Univ. of Denmark, Denmark.

Program Chairs
Alexander Gaeta, Cornell Univ., USA
Yaroslav Kartashov, Institute of Photonic Sciences, Spain

Program Committee Members

Temporal and Spatio-Temporal Effects
Neil Broderick, The Univ. of Auckland, New Zealand, Subcommittee Chair
Stefano Minardi, Friedrich-Schiller-Universität Jena, Jena, Germany
Fedor Mitschke, Institut für Physik, Universität Rostock, Germany
Arnaud Mussot, Univ. of Lille, France
Michelle Sander, Boston Univ., USA

Nonlinear Pulse Propagation in Fibers
Stefano Trillo, Univ. degli Studi di Ferrara, Italy, Subcommittee Chair
Ilan Boaz, Univ. of California Merced, USA
Wieslaw Krolikowski, Australian National Univ., Australia
Amy Lytle, Franklin & Marshall College, USA
Stefania Residori, Institut Non Lineaire de Nice, France

Computational Analysis, Design and Modeling of Dissipative and Conservative Systems
Stefan Wabnitz, Univ. degli Studi di Brescia, Italy, Subcommittee Chair
Alejandro Aceves, Southern Methodist Univ., USA
Shalva Amirnashvili, WIAS, Germany
Janke Yang, The Univ. of Vermont, Burlington, USA

Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling
Goery Genty, Tampere Univ. of Technology, Finland, Subcommittee Chair
Fabio Biancalana, Heriot Watt Univ., UK
Claudio Conti, Universita La Sapienza, Roma, Italy
Gian-Luca Oppo, Univ. of Strathclyde, Scotland
Majid Taki, Univ. of Lille, France

Poling, Spatial and Periodic Nonlinear Effects
Andrey Sukhorukov, Australian Natl. Univ., Australia, Subcommittee Chair
Thomas Pertsch, Univ. of Jena, Germany
Boris Malomed, Tel Aviv Univ., Tel Aviv, Israel
Kyriakos Hizanidis, National Technical Univ. of Athens, Greece
Ryf Roland, Alcatel, Lucent, USA
Active and Dissipative Effects
Philippe Grelu, Univ. of Burgundy, France, Subcommittee Chair
Vladimir Konotop, Univ. of Lisbon, Portugal
Nathan Kutz, Univ. of Washington, USA
Laurent Larger, Univ. of Franche-Comte, France
Kestutis Staliunas, ICREA, Universitat Politècnica de Catalunya, Spain

All-Optical Devices and Applications
Sergei K. Turitsyn, Aston Univ., UK, Subcommittee Chair
Majid Ebrahim-Zadeh, ICFO-The Institute of Photonic Sciences, Spain
Rene Essiambre, Alcatel, Lucent, USA
Ulf Peschel, Univ. of Erlangen-Nuremberg, Germany
Chad Husko, Univ. of Sydney, Australia

Novel Nonlinear Materials and Structures
Tobias Kippenberg, Ecole Polytechnique Federale de Lausanne, Switzerland, Subcommittee Chair
John Ballato, Clemson Univ., USA
Colin McKinzie, Alcatel Lucent, USA
Anna Peacock, Univ. of Southhampton, UK
Marc Sciamanna, Supelec Metz, France

Optical Sensors (Sensors)
General Chairs
Ken Ewing, US Naval Research Laboratory, USA
Mario F.S. Ferreira, Universidade de Aveiro, Portugal

Program Committee Members
THx Sensing
Enrique Castro-Camus, Centro de Investigaciones en Optica AC, Mexico
Mona Jarrahi, Univ. of California Los Angeles, USA
James Lloyd-Hughes, Univ. of Oxford, UK
Giacomo Scalari, ETH Zurich, Switzerland
Stephan Winnerl, Helmholtz-Zentrum Dresden Rossendorf, Germany

Optical Fiber Sensors
Jacques Albert, Carleton Univ., Canada
Gilberto Brambilla, Univ. of Southhampton, UK
John Canning, Univ. of Sydney, Australia
Geoffrey Cranch, US Naval Research Laboratory, USA
Manuel Lopez-Amo, Universidad Publica de Navarre, Spain
Jose-Miguel Lopez-Higuera, Universidad de Cantabria, Spain
Bishnu Pal, Indian Institute of Technology, India
Yun-Jiang Rao, Univ of Electronic Science & Tech China, China
Brandon Shaw, NRL, USA

Laser Based Sensors
Sunil Bhave, Cornell Univ., USA
Juergen Czarske, Technische Universitat Dresden, Germany
Steen Hanson, DTU Fotonik, Denmark
Yoshio Hayasaki, Utsunomiya Univ., Japan
Christian Koos, Karlsruhe Institute of Technology KIT, Germany
Christian Rembe, Polytec GmbH, Germany
Steve Rothberg, Loughborough Univ., UK
Ming Wu, Univ. of California Berkeley, USA

Optical Chemical and Biological Sensors
Angela Ervin, Department of Homeland Security, USA
Michael Hippler, Univ. of Sheffield, UK
Christopher Howle, Defence Science & Technology Laboratory, UK
Bernhard Lendl, Technische Universitat Wien, Austria
Goran Mashanovich, Univ. of Southampton, UK
Pavel Matousek, STFC Rutherford Appleton Laboratory, UK
Jonathan Matthews, Univ. of Bristol, UK
Ottos Muskens, Univ. of Southampton, UK
Tony Parker, STFC Rutherford Appleton Laboratory, UK
Paul Pellegrino, Rutherford Appleton Laboratory, UK
Derryck Reid, Heriot-Watt Univ., UK
Damiem Weidmann, Rutherford Appleton Laboratory, UK

Micro- and Nano-Engineered Sensors
James Chon, Swinburne Univ. of Technology, Australia
Kyoung-Youm Kim, Sejong Univ., South Korea
Byoungho Lee, Seoul National Univ., South Korea
Christoph Lienau, Carl V. Ossietzky Univ. Oldenburg, Germany
Misha Sumetsky, Aston Univ., UK
Minghong Yang, Wuhan Univ. of Technology, China

Nanophotonic and Plasmonic Biosensors
Hatice Altug, Ecole Polytechnique Federale de Lausanne, France
Laura Lechuga, Institut Català de Nanociència i Nanotecnologia, Spain

Specialty Optical Fibers & Applications (SOF)
General Chairs
Ishwar Aggarwal, Univ. of North Carolina at Charlotte, USA
John Ballato, Clemson Univ., USA

Program Chairs
Liang Dong, Clemson Univ., USA
Bryce Samson, Nufern, USA

Program Committee Members
Rui Almeida, Instituto Superior Tecnico, Portugal
Miguel Andrees, Universitat de Valencia, Spain
Jose Cruz, Universitat de Valencia, Spain
Sebastien Fevrier, Universite de Limoges, France
Francesco Peletti, Univ. of Southampton, UK
Kunimasa Saith, Hokkaido Univ., Japan
Axel Schulgen, Univ. of Central Florida, USA
Hwa Yaw Tam, Hong Kong Polytechnic Univ., Hong Kong
Nicholas Traynor, Azur Light Systems, France
Johann Troles, Universite de Rennes I, France

Thank you to all the Advanced Photonics Committee Members for contributing many hours to maintain the high technical quality standards of OSA topical meetings.
Joint Plenary Session
Monday, 28 July, 08:20–10:00
Salon Rubi/Zafir

**JM1A.1 • 08:30**
Nonlinearities in Periodic Media, From Fiber to Silicon Chips: Plenty to Bragg About
Benjamin Eggleton; Univ. of Sydney, Australia

Benjamin Eggleton is an ARC Laureate Fellow and Professor of Physics at the University of Sydney and is Director of the ARC Centre of Excellence for Ultrahigh Bandwidth Devices for Optical Systems (CUDOS). He obtained the Ph.D. degree in Physics from the University of Sydney, in 1996. He then joined Bell Laboratories, Lucent Technologies as a Postdoctoral Member of Staff, and was subsequently promoted to Research Director within the Specialty Fiber Business Division of Bell Laboratories. Eggleton has published 360 journal publications and over 100 invited presentations. He is a Fellow of OSA, IEEE and the Australian Academy of Technological Sciences and Engineering (ATSE). He was President of the Australian Optical Society and is currently Editor-in-Chief for Optics Communications.

**JM1A.2 • 09:15**
Industrial Ultrafast Lasers
Eric Mottay; Amplitude Systemes, France

Eric Mottay is the president and CEO of Amplitude Systemes, France, a company he founded in 2001 and which is now a leader in industrial ultrafast lasers. Eric graduated from the Ecole Superieure d’Optique, Orsay, in 1985, and has since specialized in laser development and manufacturing.

Welcome Reception
Monday, 28 July, 18:30–20:30
Salon Verdi

Join your fellow attendees for the Congress Reception. Enjoy delectable fare while networking. The reception is open to registered committee members, presenting authors, student and full technical congress attendees. Congress attendees may purchase extra tickets for their guest.

Joint Poster Sessions
Monday, 28 July, 18:30–20:30
Tuesday, 29 July, 13:30–15:30
Salon Verdi

Posters are an integral part of the technical program and offer a unique networking opportunity, where presenters can discuss their results one-to-one with interested parties. Each author is provided with a board on which to display the summary and results of his or her paper.

Joint BGPP and Sensors Symposium: Symposium on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-Sensors
Tuesday, 29 July
Salon Vivaldi

**JTu1C • 8:30–10:00, JTu2C • 10:30–12:30, JTu4C • 15:30–16:30**

Symposium Chair: Jacques Albert, Carleton Univ., Canada

The aim of this Symposium is to bring together chemists, biochemists, and photonic device designers to explore together how best to functionalize optical fiber devices to detect biochemical substances and chemicals with high sensitivity, selectivity, and robustness, while lowering the limit of detection to levels that will allow real applications to be developed.

The emphasis on the Keynote, Invited and Contributed talks will be placed on understanding and utilising the interface between the photons and the substances to be detected: specifically, understanding and optimising the transducing mechanism by which the presence of a molecular or biological agent results in a measurable change in the properties of the optical device (fibre, fibre grating and other waveguide technologies) and its reliability, reproducibility and robustness for both short and long term performance. Of particular importance are issues regarding the refractive index, absorption and transmission, scattering and porosity, and thickness of the functional layers and how these parameters can be optimized to enhance the device response. Functionalization for bare glass and plastic surfaces, as well as for fibers with metal, special oxide or graphene coatings for Surface Plasmon Resonance (SPR) based sensors or metal-nanoparticle assisted devices, including quantised effects associated with quantum dots and excitons, will be discussed.

Banquet
Wednesday, 30 July, 18:30–20:00
To Be Announced

Enjoy the last evening of the congress with your colleagues and taste of Spain.

Award

OSA Foundation Travel Grant

We are pleased to announce The OSA Foundation Travel Grant recipient for Advance Photonics Congress. The OSA Foundation Student Travel Grant Program is designed to provide career development opportunities by assisting students who wish to attend congresses and meetings. The grants are given to students working or studying science in qualifying developing nations so they can attend OSA-managed technical meetings and congresses.

This year’s recipient is:
Nithyanandan Kanagaraj; Pondicherry Univ., India
General Information

Registration
Main Foyer

<table>
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<th>Time</th>
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<tr>
<td>Sunday, 27 July</td>
<td>14:00–18:00</td>
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<tr>
<td>Monday, 28 July</td>
<td>07:00–18:00</td>
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<tr>
<td>Tuesday, 29 July</td>
<td>07:30–18:00</td>
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<tr>
<td>Wednesday, 30 July</td>
<td>08:00–17:30</td>
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<tr>
<td>Thursday, 31 July</td>
<td>08:00–17:00</td>
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Exhibit Hall
Monday, 28 July – Wednesday, 30 July
Salon Verdi

The Advanced Photonics exhibition is open to all registered attendees. Visit a diverse group of companies representing every facet of optics and photonics. Coffee breaks and Poster sessions will be held in the exhibition hall which is open Monday–Wednesday.

Exhibit Only Hours

<table>
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<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>Monday, 28 July</td>
<td>10:00–10:30</td>
<td>Opening and Coffee Break</td>
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<tr>
<td></td>
<td>15:30–16:00</td>
<td>Exhibits and Refreshment Break</td>
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<tr>
<td></td>
<td>18:30–20:30</td>
<td>Poster Session and Exhibits and Reception</td>
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<tr>
<td>Tuesday, 29 July</td>
<td>10:00–10:30</td>
<td>Exhibits and Coffee Break</td>
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<td></td>
<td>13:30–15:30</td>
<td>Poster Session and Exhibits and Refreshment Break</td>
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<tr>
<td>Wednesday, 30 July</td>
<td>10:00–10:45</td>
<td>Exhibits and Coffee Break</td>
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<td></td>
<td>16:00–16:30</td>
<td>Exhibits and Refreshment Break</td>
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About OSA’s Optics InfoBase

Registrants and current subscribers can access all of the congress papers, posters and postdeadline papers on OSA’s digital library, Optics InfoBase. The Optics InfoBase is a cutting-edge repository that contains OSA Publishing’s content, including 16 flagship, partnered and co-published peer-reviewed journals and 1 magazine. With more than 240,000 articles including papers from over 450 congress, Optics InfoBase is the largest peer-reviewed collection of optics and photonics.

Early Online Access to the Technical Digest and Postdeadline Papers

Full Technical Attendees have both EARLY and FREE continuous access to the digest papers through Optics InfoBase. To access the papers go to www.osa.org/PhotonicsOPC and select the “Access digest papers” essential link on the right hand navigation. As access is limited to Full Technical Congress Attendees only, you will be asked to validate your credentials by entering the same login email address and password provided during the Congress registration process. If you need assistance with your login information, please use the “forgot password” utility or “Contact Help” link.

Poster Presentation PDFs

The PDFs of select poster presentations will be available two weeks after the congress. While accessing the papers in Optics Infobase look for the multimedia symbol.

Update Sheet and Postdeadline Papers

All technical program changes will be communicated in the onsite Congress Program Update Sheet. All attendees receive this information with registration materials, and we encourage you to review it carefully to stay informed to changes in the program. Postdeadline papers will also be announced on the update sheet. Postdeadline Papers will not be printed or distributed at this year’s meeting. Postdeadline Papers can be found on Optics Infobase. Visit www.osa.org/PhotonicsOPC and select “Access Digest Papers”.

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### Explanation of Session Codes

The first letter of the code designates the meeting (N = NP, So = SOF, Se = Sensors, B = BGPP, J = Joint Session). The second element denotes the day of the week (M = Monday, Tu = Tuesday, W = Wednesday, Th = Thursday). The third element indicates the session series in that day (for instance, 1 would denote the first parallel sessions in that day). Each day begins with the letter A in the fourth element and continues alphabetically through a series of parallel sessions. The lettering then restarts with each new series. The number on the end of the code (separated from the session code with a period) signals the position of the talk within the session (first, second, third, etc.). For example, a presentation coded SeM1C.4 indicates that this paper is part of Sensors (Se) and is being presented on Monday (M) in the first series of sessions (1), and is the third parallel session (C) in that series and the fourth paper (4) presented in that session.

<table>
<thead>
<tr>
<th>Meeting Name</th>
<th>Number</th>
<th>Series Number</th>
<th>Day of the Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = NP</td>
<td>SeM1C.4</td>
<td>1</td>
<td>M</td>
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<tr>
<td>So = SOF</td>
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<td>2</td>
<td>Tu</td>
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<td>Se = Sensors</td>
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<td>B = BGPP</td>
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<tr>
<td>J = Joint Session</td>
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Invited papers are noted with 📘Invited الإسلامي.Title
Plenary papers are noted with 📘Plenary الإسلامي.Title
Tutorial papers are noted with 📘Tutorial الإسلامي.Title

### Early Online Access to the Technical Digest and Postdeadline Papers

Full Technical Attendees have both EARLY and FREE continuous access to the digest papers through Optics InfoBase. To access the papers go to www.osa.org/PhotonicsOPC and select the “Access digest papers” essential link on the right hand navigation. As access is limited to Full Technical Congress Attendees only, you will be asked to validate your credentials by entering the same login email address and password provided during the Congress registration process. If you need assistance with your login information, please use the “forgot password” utility or “Contact Help” link.
### Agenda of Sessions — Sunday, 27 July

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>14:00–18:00</td>
<td><strong>Registration, Main Foyer</strong></td>
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### Monday, 28 July

<table>
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<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>07:00–18:00</td>
<td><strong>Registration, Main Foyer (closed during lunch break)</strong></td>
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<tr>
<td>08:20–08:30</td>
<td><strong>Opening Comments, Salon Rubi/Zafir</strong></td>
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<tr>
<td>08:30–10:00</td>
<td><strong>JM1A • Plenary Session, Salon Rubi/Zafir</strong></td>
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<tr>
<td>10:00–10:30</td>
<td><strong>Exhibits and Coffee Break, Salon Verdi</strong></td>
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<tr>
<td>10:30–12:30</td>
<td><strong>NM2A • Active and Dissipative Effects</strong></td>
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<tr>
<td>10:30–12:30</td>
<td><strong>SoM2B • Soft Glass Fibers</strong></td>
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<tr>
<td>10:30–12:30</td>
<td><strong>SeM2C • Nanophotonic and Plasmonic Biosensors I</strong></td>
</tr>
<tr>
<td>10:30–12:30</td>
<td><strong>BM2D • Grating Fabrication</strong></td>
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<tr>
<td>12:30–13:30</td>
<td><strong>Lunch Break (On Your Own)</strong></td>
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<tr>
<td>13:30–15:30</td>
<td><strong>NM3A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling I</strong></td>
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<tr>
<td>13:30–15:30</td>
<td><strong>SoM3B • Fiber Lasers</strong></td>
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<tr>
<td>13:30–15:30</td>
<td><strong>SeM3C • Nanophotonic and Plasmonic Biosensors II (Ends at 15:45)</strong></td>
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<tr>
<td>13:30–15:30</td>
<td><strong>BM3D • Grating Applications I</strong></td>
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<tr>
<td>15:30–16:00</td>
<td><strong>Exhibits and Refreshment Break, Salon Verdi</strong></td>
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<tr>
<td>16:00–18:00</td>
<td><strong>NM4A • Poling, Spatial and Periodic Nonlinear Effects I</strong></td>
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<td>16:00–18:00</td>
<td><strong>SoM4B • Hollow Core Fibers (Ends at 18:15)</strong></td>
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<td>16:00–18:00</td>
<td><strong>SeM4C • Nanophotonic and Plasmonic Biosensors III (Ends at 18:15)</strong></td>
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<tr>
<td>16:00–18:00</td>
<td><strong>BM4D • Enhanced Grating Properties</strong></td>
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<tr>
<td>18:30–20:30</td>
<td><strong>JM5A • Joint Poster Session I and Exhibits and Reception, Salon Verdi</strong></td>
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**Key to Conference Abbreviations**

- **BGPP**  
  Bragg Gratings, Photosensitivity and Poling in Glass Waveguides
- **NP**  
  Nonlinear Photonics
- **Sensors**  
  Optical Sensors
- **SOF**  
  Specialty Optical Fibers & Applications
## Agenda of Sessions — Tuesday, 29 July

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<td>07:30–18:00</td>
<td>Registration, Main Foyer (closed during Lunch Break)</td>
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<tr>
<td>08:30–10:00</td>
<td>NTu1A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling II</td>
<td>SoTu1B • Fiber Sensors</td>
<td>JTu1C • Symposium on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-sensors - I, Salon Vivaldi</td>
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<tr>
<td>10:00–10:30</td>
<td>Exibits and Coffee Break, Salon Verdi</td>
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<td>10:30–12:30</td>
<td>NTu2A • Poling, Spatial and Periodic Nonlinear Effects II</td>
<td>SoTu2B • Mid-IR Fibers and Sources</td>
<td>JTu2C • Symposium on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-sensors - II, Salon Vivaldi</td>
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<td>12:30–13:30</td>
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<td>13:30–15:30</td>
<td>JTu3A • Joint Poster Session II and Exhibits, Salon Verdi</td>
<td>Refreshment Break 15:00–15:30</td>
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<td>15:00–17:30</td>
<td>NTu4A • All-Optical Devices and Applications I</td>
<td>SoTu4B • PBG Fiber Lasers</td>
<td>JTu4C • Symposium on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-sensors - III, Salon Vivaldi (Ends at 16:30)</td>
<td>SeTh5A • THz Sensing I (Starts at 16:30) BTu5B • Grating Sensors (Starts at 16:30)</td>
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<tr>
<td>17:45–19:00</td>
<td>Postdeadline Papers, To Be Announced in Update Sheet</td>
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<td>08:30–10:00</td>
<td>NW1A • Temporal and Spatiotemporal Effects I</td>
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<td>NW1B • Fiber Based Components</td>
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<td>SoW1C • Optical Fiber Sensors I</td>
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<td>BW1D • Poling and Miscellaneous</td>
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<tr>
<td>10:45–12:45</td>
<td>NW2A • Nonlinear Pulse Propagation in Fiber I</td>
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<td>NW2B • Multicore Fiber and Fiber Measurements</td>
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<td>SoW2C • Optical Fiber Sensors II</td>
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<td>BW2D • Femtosecond Processing and Writing</td>
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<tr>
<td>14:00–16:00</td>
<td>NW3A • All-optical Devices and Applications II</td>
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<td>NW3B • Fiber Sensors and Bragg Gratings</td>
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<td>SeW3C • Optical Fiber Sensors III</td>
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<tr>
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<td>NW4A • Temporal and Spatiotemporal Effects II</td>
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<td>NW4B • Novel Fiber Designs for Fiber Lasers</td>
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<td>SeW4C • Optical Fiber Sensors IV</td>
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<td>BW4D • Femtosecond Writing and Miscellaneous</td>
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<td>18:30–20:00</td>
<td>Banquet, TBA</td>
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## Key to Conference Abbreviations

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<tr>
<th>Abbreviation</th>
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<tr>
<td>SOF</td>
<td>Specialty Optical Fibers &amp; Applications</td>
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# Agenda of Sessions — Thursday, 31 July

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<td>NTh1A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling III</td>
<td>SoTh1B • Process Improvements for Fiber Lasers</td>
<td>SeTh1C • Mid- and long-wavelength IR sensors</td>
<td>SeTh1D • Laser Based Sensors I</td>
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<tr>
<td>10:00–10:30</td>
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<tr>
<td>10:30–12:30</td>
<td>NTh2A • Computational Analysis, Design and Modeling of Dissipative and Conservative Systems</td>
<td>SoTh2B • Pulsed Fiber Lasers</td>
<td>SeTh2C • Optical Chemical and Biological Sensors I</td>
<td>SeTh2D • Laser Based Sensors II</td>
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<td>12:30–13:30</td>
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<tr>
<td>13:30–15:30</td>
<td>NTh3A • Novel Nonlinear Materials and Structures</td>
<td>SeTh3B • Optical Chemical and Biological Sensors II</td>
<td>SeTh3C • Micro- and Nano-Engineered Sensors I</td>
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<td>15:30–16:00</td>
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<tr>
<td>16:00–18:00</td>
<td>NTh4A • Nonlinear Pulse Propagation in Fiber II (Ends at 17:45)</td>
<td>SeTh4B • THz Sensing II</td>
<td>SeTh4C • Micro- and Nano-Engineered Sensors II (Ends at 17:30)</td>
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**Key to Conference Abbreviations**

- **BGPP** - Bragg Gratings, Photosensitivity and Poling in Glass Waveguides
- **NP** - Nonlinear Photonics
- **Sensors** - Optical Sensors
- **SOF** - Specialty Optical Fibers & Applications
Topological Dissipative Solitons in Semiconductor Lasers, François Gustare1, Lorenzo Colombo1, Massimo Gudici1, Othmane Mouane2, Massimo Brambilla2, Franco Prati2, Giovanna Tissoni2, Brian Kellerer1, Boguslaw Tylicki1, Stephane Barland1, Institut Non Lineaire de Nice, Universite de Nice, France; "Dipartimento di Fisica "M. Merlin", Université degli Studi e Politecnico di Bari, Italy; "Dipartimento di Scienza e Alta Tecnologia, Università dell’Insubria, Italy; "Centre for Advanced Photonics and Process Analysis & Department of Applied Physics and Instrumentation, Cork Inst. of Technology, Ireland. We analyze the formation of non dispersive solitary waves along the propagation direction of a ring semiconductor laser with coherent forcing. We measure their phase dynamics and show that they can host a topological charge.

Manipulation of large soliton ensembles in Er-doped double-clad fiber laser, Aloune Nang1, Foued Ammar1, Mohamed Salhi1, Hervé Lablond1, Andrey Komarov1, Konstantin Komarov1, Francois Sanchez1; "Laboratoire de Photonicque LPhA E.A. 4464, Université d’Angers, France; "Inst. of Automation and Electrometry, Russian Academy of Sciences, Russian Federation. We have studied the influence of an external continuous wave on a passively mode-locked fiber laser operating in the soliton regime. Starting from an irregular soliton distribution it is shown that harmonic mode-locking is obtained.

Highly Nonlinear Soft Glass Microstructured Optical Fiber, Yasutake Ohishi1, Toyota Technological Inst., Japan. New microstructured optical fiber are developed using highly nonlinear soft glasses. Chromatic dispersions can be controlled better than conventional MOFs. Performances of supercontinuum and optical parametric gain are presented.

Optical Waveguide-based Single-molecule Studies in Diagnostics and Drug Screening, Fredrik Hook1, Chalmers Univ. of Technology, Sweden. Single binding events between membrane-protein receptors and their ligands in near-natural environments are presented, and the advantage offered by single-molecule sensitivity is discussed in the context of mechanistic biophysical studies, medical diagnostics and drug discovery.

The paper presents the development of regenerated FBG temperature sensors for the instrumentation of 4th Generation nuclear core, of the divertor for ITER Tokamak and for petrochemical process experimentations.
We theoretically model the nonlinear dynamics of surface plasmon polariton waves in gold nanorods. We find that interband absorption can be suppressed by ultrashort self-induced transparency plasmon-solitons.

Self-induced transparency in gold, Fabio Biancalana1, Andrea Marrucci1, Max-Planck-Inst Physik des Lichts, Germany; Physik, Heriot-Watt Univ., UK. We theoretically model the nonlinear dynamics of surface plasmon polariton waves in gold nanorods. We find that interband absorption can be suppressed by ultrashort self-induced transparency plasmon-solitons.

Conservative nonlinear interaction of light and a Bose-Einstein condensate in a lossy optical cavity, Martin Diver1, Gordon Robbi2, Gian-Luca Oppo1, Physic, Univ of Strathclyde, UK. We consider a Bose-Einstein condensate in an optical cavity being driven by an external laser beam. The modulated optical lattice induces conservative chaotic oscillations that are ubiquitous for pump rates that exceed a critical value.

PT-symmetric coupler with randomly varying parameters, Vladimir V. Konotop1, Dmitry Zezyulin2, Universidade de Lisboa, Portugal. We consider a stochastic PT-symmetric coupler with fluctuating parameters, which in average preserve conditions of exactly balanced gain and losses. We address different parametric regimes corresponding to the broken and unbroken PT symmetries.
Specialty Optical Fibers
Optical Sensors

SoM3B • Fiber Lasers
Presider: Bryce Samson; Nufern, USA

SeM3C • Nanophotonic and Plasmonic Biosensors II
Presider: Hatische Allug; Ecole Polytechnique Federale de Lausanne, USA

BMD3 • Grating Applications I
Presider: Morten Ibsen; Univ. of Southampton, UK

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Nonlinear Photonics

SoM3A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling I
Presider: Michelle Sander; Boston Univ., USA

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Optical Sensors

SeM3C.1 • 13:30
Coming to Gropiing with Amyloid Oligomers: Single Molecule Photobleaching Approaches, Vinod Subramanian1, FOI Inst. AMOLF, Netherlands.

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Optics:

SoM3A.3 • 14:00
Origins, Control, and Predictability of Optical Rogue Waves in Semiconductor Lasers, Jordi Zamora Munt1, Jose A. Reinoso3, Bruno Garbin2, Stephane Barland2, Massimo Giudici3, Jose R. Rias Leste1, Jorge J. Tredicce1, Cristina Masoller1, Instituto de Fisica Interdisciplinar y Sistemas Complejos, Universidad de las Islas Baleares, Spain; "Departamento de Fisica i Enginyeria Nuclear, Universitat Politecnica de Catalunya, Spain; "Departmento de Fisica Fundamental, Universidad Nacional de Educacion a Distancia, Spain; "Institut Non-Linearre de Nice, Universite de Nice Sophia Antipolis, France; "Departamento de Fisica, Universidade Federal de Pernambuco, Brazil." Poile Pluriplasmonique de la Matiere et de l'Environnement, Universite de la Nouvelle Caledonie, France. We investigate the mechanisms triggering optical rogue waves in a semiconductor laser with cw optical injection and with an external optical feedback in the short cavity regime and report some striking properties of these extreme events.

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SoM3B.2 • 14:00
Hyperspectral Backscattering Imaging using Gold-Silver Alloy Nanoparticles as Chromatic Biomarkers, David Roux1, Sergiy Patskovsky2, Eric Bergeron1, Michel Meunier1, "Dept. of Engineering Physics, Ecole Polytechnique de Montreal, Canada. Gold-Silver alloy nanoparticles (ANPs) are used as chromatic biomarkers to label cells. An epillumination configuration is used for hyperspectral backscattering imaging of the ANPs in celluilar environment.

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BM3D • Grating Applications I
Presider: Bryce Samson; Nufern, USA

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SoM3B.1 • 13:30
High Energy Pulsed Sources from Infrared to UV with Yb Rod Type fibers: Current Limits and Prospects, Philippe Roy1, Aurelien Berol1, David Deaj1, Raphael Lamer1, Roman Daul2, Kay Schuster1, Stefan Grimm1, Julien Saby1, Damien Sangla1, Francois Salin1, Xilim Fibre Photonics, Univ. of Limoges, France; "Inst. of Photonics Technology, Germany. We present current performances and limits of industrial high power rod-type LPF lasers in nanosecond and picosecond regime delivering high average power. To overcome current limitations, we propose improved inner microstructuration design.

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BM3D.2 • 14:00
Multi-axial strain sensing using polymer planar Bragg gratings, Manuel Rosenberger1, Steffen Hessler1, Stefan Belle1, Bernhard Schmaus2, Ralf Hellmann1, Applied Laser and Photonics Group, Univ. of Appl. Sci. Aachen, Germany; "Inst. of Microwaves and Photonics, Univ. of Erlangen-Nuernberg, Germany. We demonstrate, for the first time ever, a polymer planar Bragg grating sensor for multiaxial strain sensing. The sensor containing two perpendicular gratings is used for measuring compressive and tensile strain at different angles.

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BM3D.3 • 14:15
Two-Phase Flow Imaging by means of an 8x8 Optical Fiber Bragg Grating Grid, Carlos Zamarreño1, Cicerò Mattia1, Virginia Baronacci1, Eduardo N. Sants1, Marco J. da Silva1, Rigoberto E. Morales1, Ignacio R. Matias2, Francisco J. Arregui1, "Federal Univ. of Technology-Paraná, Brazil; "PolyUniv. of Navarra, Spain. Two-phase flows are characterized by means of the utilization of an optical fiber Bragg grating (FBG) grid is presented. The force applied by the airliquid flow on the FBGs is the underlying mechanism of this sensor.
We describe rogue waves in the defocusing regime. We report on experimental conditions in NM3A.4 • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modelling — Continued

NM3A.4 • 14:30
Vector Rogue Waves and Modulation Instability in the Defocusing Regime, Fabio Baronio1, Matteo Contorfesta1, Antonio Degasperis1, Sara Lombardo1, Miguel Orozotano1, Stefano Wabnitz1; 1Department of Information Engineering, Universita degli Studi di Brescia, Italy; 2PHLAM/RIGICA, CNRS-Universite Lille, France; 3INFN, Sapienza Universita di Roma, Italy; 4Department of Mathematics and Information Sciences, Northumbria University, UK; 5Department of Physics, Universita di Milano and Information Sciences, Northumbria University, UK. We report analytical solutions of the vector nonlinear Schrodinger equation that describes rogue waves in the defocusing regime. The link between modulation instability and rogue waves is displayed.

NM3A.5 • 14:45
Complex energy landscape dynamics at the origin of rogue wave soliton formation, Fabio Biancalana1, Andrea Armaroli1, Claudia Contrò1; 1Max-Planck-Inst Physik des Lichts, Germany; 2Physics, Univ. of Rome “Sapienza”, Italy; 3Physics, Henri-Watt Univ, UK. We explain the formation of rogue solitons in optical fibers as a random walk in the energy landscape which originates from the weak interaction of NLS solitons.

NM3A.6 • 15:00
Exploding Solitons vs Rogue Waves in Laser Cavities, Wonkeun Chang1, Naik Ahnmediev1; 1Australian National Univ, Australia. Exploding solitons can be found in dissipative systems including laser cavities and reaction-diffusion systems. Certain choice of laser parameters allows us to obtain very high amplitudes during explosions. They can be considered as rogue waves.

NM3A.7 • 15:15
Rogue wave statistics from a noise-like-pulse laser, Caroline Lecaplain1, Philippe Grelu1; 1Université Paris-Sud, CNRS, Université de Paris, France. We study the role of dispersion, and use the dispersive Fourier-transform method to study spectral fluctuations.

SeM3C • Nanophotonic and Plasmonic Biosensors II — Continued

SeM3C.3 • 14:30
Highly sensitive SERS based nano-sculptured thin film biosensor for the detection of vitellogenin: an endocrine disruption biomarker, Sachin K. Srivastava1, Atif Shalaby1, Isam Khalaal1, Christoph Grüner4, Bernd Rascherbach4, Ibrahim Abdelhalim4; 1Electrooptic Engineering, Ben-Gurion Univ of the Negev, Israel; 2Institut de Science et d’Ingenierie Supramoléculaires, Université de Strasbourg, France; 3The Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben Guern Univ of The Negev, Israel; 4Inst. for Experimental Physics II, Univ. Leipzig, Germany; 5School of Materials Science and Engineering, Nanyang Technological Univ., Singapore. A biosensor has been fabricated using the SERS of 4-Anilinophenol (4-ATP) on optimized nano-sculptured thin films (nSTFs) of silver over Si substrates. The limit of detection is as small as 5 pg/ml of vitellogenin.

SeM3C.4 • 14:45
Localised Surface Plasma Resonances for Sensing Applications, Evgeny K. Popov1, Anne-Laure Fehrembach1, Nadège Rassem1; 1Fresnel Institute, Aix-Marseille Univ. (AMU), France. Localized surface plasma resonances on deep metallic gratings can lead to significant field enhancement in very small volumes, that have large angular tolerances, and can be used for optical sensing in non-collimated beams.

SeM3C.5 • 15:00
Determination of penetration depth of localized surface plasma resonance fiber optic probe using polyethylene multilayers, Rasheda Bhardwaj1, Saumyo Mukherji1, Supama Mukherji1, 1Center for Research in Nanoscience and Nanotechnology, Indian Inst. of Technology Bombay, India; 2Department of Bioscience and Bioengineering, Indian Inst. of Technology, Bombay, India; 3Center for Environmental Science and Engineering, Indian Inst. of Technology Bombay, India. The penetration depth of the localized surface plasmon evanescent field of gold nanoparticle based fiber optic probe was estimated by measuring optical absorbance change at the resonance wavelength during the deposition of polyethylene multilayers.

SeM3C.6 • 15:15
Invited
Plasmonic Gas and Glucose Sensing using Resonant Nanomaterials, Harold W. Giessen1; 1Universität Stuttgart, Germany. We use resonant plasmonic nanoribbons for detection of glucose at physiological levels in the tear liquid, as well as for hydrogen gas at the lower explosive level concentration and CO in the mid-lirng vibration.

SeM3C.6 • 15:15
Tapered single-mode Yb-fiber laser at 976 nm, Martin Leich1, Martin Becker1, Alexander Hartung1; 1Universität Stuttgart, Germany. We report on a Yb-doped large-core fiber laser at 976 nm prepared by powder-sinter technology. Wave-length-locked single-mode operation is achieved with 10 W out of a standard single-mode fiber.

SoM3B • Fiber Lasers—Continued

SoM3B.3 • 14:30
Nonlinear Effects in High Peak Power 3C Fiber Amplifiers, Timothy S. McComb1, Geoff Fanning1, David Logan1, Roger Farrow1, Tyson L. Lawder1, Joanna J. Koponen1; 1LTcaster, USA. Picosecond chirally coupled core (3C) fiber amplifiers show nonlinear effects at hundreds of kW peak power not typical in LMA fibers. Polarization rotation and modulation instability-like effects are observed and model backed origins are proposed.

SoM3B.4 • 14:45
High-energy nonlinear-soliton pulses from a flat-top mode 50 μm-core ytterbium-doped leakage channel fiber, Pierre CAUDET1, Arnaud Perrin1, Pierre Gouriou1, Bryce N. Samson1, Thomas W. Hawkins1, Fanting Kong2, Liang Ding2, Pascal Dupriez4, Emmanuel Hugonnot1; 1CEA, France; 2ECE/COMSET, Clemson Univ., Canada; 3Physics, Univ. of Rome “Sapienza”, Italy; 4Department of Mathematics and Information Sciences, Northumbria University, UK. A flat-top 50μm-core ytterbium-doped leakage channel fiber has been used as a high-energy stage in a fiber MOPA. More than 1.6 mJ pulses have been obtained in the few nanoseconds and narrow bandwidth regime at 10 kHz with a flattened output beam.

SoM3B.5 • 15:00
High peak power nanocones and picosecond pulse delivery through a hollow-core Negative Curvature Fiber in the green spectral region for micro-machining, Piotr Jasek1, Fei Yu1, Richard M. Carter1, William J. Wadsworth1, Timothy A. Brit1, Jonathan C. Knight2, Jonathan D. Shepherd1, Duncan P. Hard1, Henroit-Watt Univ, 1UK, 2Univ of Bath, UK. We report efficient delivery of nanocones and picosecond laser pulses in the green spectral region with peak powers of 6 kW and 3MW respectively through a hollow-core NegativeCurvatureFiber and demonstration of fiber-based precision-micro-machining.

SoM3B.6 • 15:15
Tapered single-mode Yb-fiber laser at 976 nm, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1, Martin Leich1, Matthias J. Jaeger1, Stephan Grimm1, Jan Delli1, Denny Hoh1, Sylvia Glavind1.

SoM3B.6 • 15:15
Invited
Plasmonic Gas and Glucose Sensing using Resonant Nanomaterials, Harold W. Giessen1; 1Universität Stuttgart, Germany. We use resonant plasmonic nanoribbons for detection of glucose at physiological levels in the tear liquid, as well as for hydrogen gas at the lower explosive level concentration and CO in the mid-lirng vibration.

SoM3C • Specialty Optical Fibers & Applications

SoM3C.3 • 14:30
Highly sensitive SERS based nano-sculptured thin film biosensor for the detection of vitellogenin: an endocrine disruption biomarker, Sachin K. Srivastava1, Atif Shalaby1, Isam Khalaal1, Christoph Grüner4, Bernd Rascherbach4, Ibrahim Abdelhalim4; 1Electrooptic Engineering, Ben-Gurion Univ of the Negev, Israel; 2Institut de Science et d’Ingenierie Supramoléculaires, Université de Strasbourg, France; 3The Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben Guern Univ of The Negev, Israel; 4Inst. for Experimental Physics II, Univ. Leipzig, Germany; 5School of Materials Science and Engineering, Nanyang Technological Univ., Singapore. A biosensor has been fabricated using the SERS of 4-Anilinophenol (4-ATP) on optimized nano-sculptured thin films (nSTFs) of silver over Si substrates. The limit of detection is as small as 5 pg/ml of vitellogenin.
Scattering of Gap Solitons by PT-symmetric Defects, Fatkhulla Abdullaev1,2, Valery Brzhnyi3,4, Marco Salerno5,6, Department of Physics, International Islamic Univ, Malaysia, Malaysia; 2Centre de Fisica do Porto, Universidade do Porto, Portugal; 3Dipartimento di Fisica “E. R. Caianiello”, Universita di Salerno, Italy. The resonant scattering of a gap soliton from a local perturbation of the coupling constant, with a PT-symmetric defect is investigated. For suitable parameters of the defect potential the resonant transmission of soliton through the defect becomes possible.

Interaction of soliton with exceptional point defect in PT-symmetric waveguide, Yuli V. Bludov, Davide Agranat, Pierangeli Davide, NM4A.1 • 16:15

Photorefractive Solitons in an Out-of-equilibrium Ferroelectric, Davide Pierangelii, Jacopo Parravicini, Fabrizio Di Mei,1,2 Gianbatista Parravicini, Aharon J. Agrawal, Eugenio Del Re, Physics, Universita di Roma ’La Sapienza’, Italy; 1Center for Life Nano Science@Sapienza, IIT, Italy; 2Physics, Univ. of Pavia, Italy; 3Applied Physics, Hebrew Univ. of Jerusalem, Israel. We study two-dimensional soliton beams in disordered ferroelectrics. Supercooling accelerates photorefractive response and changes steady-state anisotropy. Effects are attributed to the anomalous polarization response of polaron-nano-regions.

Diffusion-resisting vortex Bessel beams with arbitrary trajectories, Ioannis Chremmos1, Juanying Zhao2, Demetrios N. Christodoulides3, Zhigang Chen1,4, Nikolaos K. Efremidis1, Mathematics and Applied Mathematics, Univ. of Crete, Greece; 2Max Planck Inst. for the Science of Light, Germany; 3Department of Physics and Astronomy, San Francisco State Univ., USA; 4CREOL/College of Optics, Univ. of Central Florida, USA. We theoretically predict and experimentally demonstrate that it is possible to generate diffusion-resisting higher order Bessel beams with vortex profiles that follow arbitrary trajectories. These beams are utilized for particle manipulation.

Hollow Core Photonic Bandgap Fibers for Mid-IR Applications, Natalie V. Wheeler, Marco N. Petrovich, Alexander M. Head, Naveen K. Baddela, Eric N. Fokoua1, John R. Hayes, Seyed Reza Sadeghodchi, G. Jason, J. F. Wooler1, D. Gray1, Marco N. Petrovich, Francesco Poletti1, Highfield Campus, Univ. of Southampton, UK. We review recent progress towards improving the transmission properties of hollow-core photonic band gap fibres including advances made in understanding the key issues limiting minimum loss and bandwidth in current fabricated structures.

Scattering assisted launch of SPR modes..., John Canning, Akib Karim, Nikki Tzoumis, Yanzhen Tan, Rodolfo Patyk, Patrick Timby5, Interdisciplinary Photonics Laboratories, The Univ. of Sydney, Australia; 1Inst. of Photonics Technology, Jinhun Univ., China; 2Graduate School of Electrical Engineering & Applied Computer Science, Federal Univ. of Technology, Brazil; 3Australian Centre for Microscopy & Microanalysis, The Univ. of Sydney, Australia. We report the excitation of a surface plasmon resonance (SPR) close to the orthogonal axis of a gold (Au) film on borosilicate glass.

Using Tunable Nanoscale Confinement to Image and Manipulate DNA, Sabrina Leslie, Daniel Berardi1, Jason S. Leith, Francois Trepanier1,2, Martin Stalder3, Olivier Martin1, Thin Film Optics, CSEM, Switzerland; 2Nanophotonics and Metrology Lab, EPL, Switzerland. Shadow evaporation is used to asymmetrically coat binary gratings and enhance the diffraction efficiency into a single order. First order transmittances of close to 70% are achieved experimentally for perpendicularly incident, non-polarized light.

D-shape fiber with Mach Zehnder Long-Period Gratings for a High Resolution and Selective Sensor, Lara Glavind2, John Canning1, Shannu Gao3, Kevin Cook4, Gang-Ding Peng5, Yihua Luo6, Bjarne F. Skipper6, Martin Kristenssen1, Technology & Service Solutions, Vestas Wind Systems A/S, Denmark; 2Department of Engineering, Aarhus Univ., Denmark; 3Interdisciplinary Photonics Laboratories, The Univ. of Sydney, Australia; 4Center for Optical and Electromagnetic Research, Zhejiang Univ., China; 5Photonics and Optical Communications, Univ. of New South Wales, Australia; 6Aarhus School of Engineering, Aarhus Univ., Denmark. The advantages of D-shape fiber in combination with an optical analog of Ramsey fringes using LPGs are presented. The mode-profiles of the sensor were characterized experimentally to provide deeper knowledge about improved functionality.
SeM4A.6 • 17:15
Wave instabilities in nonlinear Schroedinger systems with non vanishing background, Stefano Trillo1, Juan Totero2, Andrea Faralochi1; KAUST Univ., Saudi Arabia; Ferrara Univ., Italy. We investigate wave collapse in the generalized nonlinear Schroedinger (NLS) equation and in the presence of a non vanishing background. Through the use of viral identities, we establish a new criterion for blow-up.

SeM4B.3 • 17:30
Tutorial: Hollow-core Photonic Crystal Fibers: Guidelines and Applications, Fetah Benabid1; Xim Research Inst., CNRS, Xim Research Institute, France. We give a historical perspective on the major results that led to the advent of the photonic bandgap guiding hollow core photonic crystal fiber (FBG-PCF) and to that of inhibited-coupling one (HC-PCF). We review the progress made on gas-filled HC-PCF and photonic microcells, along with their applications for coherent optics, Raman comb generation, laser metrology, discharge based lasers and high field optics.

SeM4B.4 • 17:15
Accurate Modelling of Hollow Core Photonic Bandgap Fibre, Eric Rodrigue Numkam Fokoua1,2; LMOPS - EA4423, Université de Lorraine, France; OPTEL, Supélec, France. We numerically study the interactions of two counter-propagating Airy beams in a photorefractive crystal. By varying the Airy beams' properties and the photorefractive coupling strength, soliton-like interactions create new waveguide structures.

SoM4B.3 • 17:00
Gain from Helium-Xenon Discharges in Hollow Optical Fibres at 3.5 μm, Sam A. Bateman1,2, Walter Belardi3, Fei Yu4, Colin E. Weil5, William J. Wadsworth6; 1Physics, Univ. of Bath, UK; 2Department of Physics, Univ. of Oxford, UK. We investigate wave collapse in the generalized nonlinear Schroedinger (NLS) equation and in the presence of a non vanishing background. Through the use of viral identities, we establish a new criterion for blow-up.

SeM4B.5 • 17:00
Invited: Polymer Laser Bio-sensors, Anders Kristensen1, Christoph Vannamme1, Petur G. Hehmansson2, Cameron Smith3; 1DTU Nanotech, Danmarks Tekniske Universitet, Denmark. Organic dye based distributed feedback-lasers, featuring narrow linewidth and high spectral resolution, are used as highly sensitive refractive index sensors. The design, fabrication and application of the laser-in-cavity sensors are discussed.

SeM4A.5 • 17:00
Gravitational Phenomena Using Thermal Nonlinear Interactions, Rivka Bekenstein1, Ran Schleier2, Maar Mutzafi1, Carmel Rothschild3, Ido Dolens1, Aye Ane2, Moshkachi Segel1; 1Physics Department and Solid State Inst., Technion Israel Inst. of Technology, Israel; 2Department of Physical Electronics, Fleischman Faculty of Engineering, Tel Aviv Univ., Israel; 3Inst. of Spectroscopy, Russian Academy of Sciences, Russia. We study the non-linear interactions create new waveguide structures.

SeM4C.5 • 17:30
Poly-L-lysine monolayer-modified microfiber Bragg grating biosensor for specific DNA detection, Dandan Sun1,2, Qing Guo3, Changle Wang1, Cheng Li2, Chengbo Mou1; 1Leibniz Inst. of Photonic Technology (IPHT), Germany; 2Friedrich-Schiller-Universität Jena, Germany; 3Federal Univ. of Technology-Paraná (UTFPR), Brazil. The acousto-optic induced modulation of fiber Bragg gratings in a suspended core fiber is experimentally demonstrated. The grating bandwidth is increased by up to 57%, which is tunable by 10 V of an electric signal.

SeM4C.6 • 17:45
Improved Spectral Resolution of Long-Period Fiber Grating Sensors for Ultra-High Temperature Environments Using Narrow Interferences between Regenerated Gratings, Martin Kristensen1, Johnny Russell2, Shounag Gao3, Kevin Cooke4; 1Engineering, Aarhus Univ., Denmark; 2iP School of Chemistry, Univ. of Sydney, Australia. We thermally regenerated long-period fiber gratings at 850 °C. Two strong seed gratings 10μm apart interfere near 1550nm. The regenerated grating has narrow interference fringes above 20% deep and stable up to 1000 °C ideal for high-temperature sensors.

SeM4D.5 • 17:15
Sensitivity enhanced SRI sensor based on an Ex-FTG in thin cladding fiber, Zhijun Yan1, Songsoo Yang2, Zhongyan Sun3, Binbin Luo4, Changle Wang5, Cheng Li6, Chengbo Mou7; 1Aston Univ., UK; 2Wuhan National Laboratory for Optoelectronics, China; 3High sensitivity SRI sensor was fabricated by inscribing an ex-FTG in a thin cladding fiber, achieving enhanced SRI sensitivities of the TM and TE resonance peaks around 1000 cm⁻¹/RIU and 1150 cm⁻¹/RIU at the index of 1.345.

SeM4D.6 • 17:30
Acoustically Induced Increase of Bragg Grating Bandwidth in Four Holes Suspended Core Fiber, Ricardo E. Silva1,2, Martin Becker1, Manfred W. Rothhardt1, Alexandre A. Kohl1, Hartmut Bartel2; 1Leibniz Inst. of Photonic Technology (IPHT), Germany; 2Friedrich-Schiller-Universität Jena, Germany. We demonstrate optical analogues of gravitational intensity fringes above 20% deep and stable up to 1000 °C ideal for high-temperature sensors.
JMSA.1 Refractive index sensor based on a pair of hybrid 45 degree and 81degree tilted fiber gratings, Zhijun Yan1, Zhongyun Sun2, Songsong Xiong1, Changle Wang1, Chengbo Mou2, Cheng Li1, Jiafeng Li1, Kaiming Zhou1, Lin Zhang1, Anton Liu1, UK Waun National Laboratory for Optoelectronics, Huazhong Univ of Science and Technology, China: A hybrid structure comprising of a 45° and an 81° TFG based RI sensor has been demonstrated. The experiment results show a higher RI sensitivity, being around 180nm/RIU at RI=1.35 and 926nm/RIU at RI=1.412 region.

JMSA.2 Reliable lifetime prediction of gain flattening filters, Matthieu Lancy1, Sylvain Costes2, Bertrand Pournelle1, T. Lopez2, SP2M, Université d’Aix-Marseille, France: This paper is dedicated to the lifetime prediction of Gain Flattening Filters. Based on the master curve formalism, we predicted the ageing of the refractive index profile. Finally we modelled the spectral response of GFF under ageing.

JMSA.3 Development of beam distribution fibers for high energy pulsed laser within HELAS project, Jan Vanda1, Alessandro Candiani2, Roman Svabek1, HELAS project, Inst. of Physics, AS CR, Czech Rep.; 2Information Engineering Department, Univer. of Parma, Italy: Together with high power laser laser, a proper beam delivery system needs to be developed. Such a fiber system requires a new approach regarding fiber development and its integration with the laser beam delivery system.

JMSA.4 OAM mode converter in twisted fibers, Mario A. Usuga1, Felipe Beltran-Meja1, Cristian Cordero1, Idelfonso Tafur Monroy1, 1HiLASE project, Inst. of Physics, AS CR, Czech Rep.; 2Technological University of Colombia, Medellin, Colombia: We analyze the case of an OAM mode converter based on a twisted fiber, through finite element simulations where we exploit an equivalence between geometric and material transformations. The obtained converter has potential applications in MDM.

JMSA.5 Displacement Sensing by Using Optical Fiber with a Polymer Microlens on the Fiber Endface, Jie-Fang Hu1, Chun-Yin Yu1, National Sun Yat-Sen Univ., Taiwan: A FPI structure formed by fabricating a PDMS microlens on a SMF endface was employed in displacement sensing. A very high displacement sensitivity of 2.675 nm/nm can be successfully obtained.

JMSA.6 Modal Decomposition in Asymmetric Wave-length-Selective Fused Fiber Couplers, Gabriel Pelegina-Bonilla1, Katharina Hausmann1, Henrik Tunnemann1, Peter Wessel1, Hakon S. Sayem1, Uwe Morgner1, Jorge Neumann1, Dietmar Kracht1,2, Laser Zentrum Hannover e V, Germany; 2Centre for Quantum Engineering and Space-Time Research (QUEST), Germany: The coupling mechanism in asymmetric fused fiber couplers is investigated by tuning the pre taper length. A numerical model is performed to analyze the impact of pre tapering on the modal width of the excited modes.

JMSA.7 Withdrawn

JMSA.8 Low insertion loss single-walled carbon nanotube saturable absorber enabled by vacuum filtration method for all-fiber mode-locked laser, Hyub Lee1, Won SK Kwon1, Jin Hwan Kim1, Kyung-soo Kim1, Soobum Kim1, KAIST, Republic of Korea: We present a 1550nm all-fiber mode-locked laser employing a film-type saturable absorber comprising carbon nanotubes which is embedded in PDMS substrates by vacuum filtration to reduce non-saturable loss of the device.

JMSA.9 Tungstate-Tellurite Glass Microstructured Optical Fibers, Alexey F. Kosolapov1, Vitaly Donofeev1, Alexander Moussine1, Victor Plotnichenko1, Sergey Muraviev1, Maxim Kaptov1, Arkady Kim1, Fiber Optics Research Center, Russian Federation: We present the development of high-RI glass fibers. The obtained converter has potential applications in optical parametric oscillator with the wavelengths of 2.4 μm.

JMSA.10 Transition from Polarization Disorder to Anti-phase Polarization Domains in a Fiber Laser, Philippe Greki1, Caroline Lecaplain1, Aloua Ba1, Foad Amraoui1, Stefan Wabnitz1, Lab ICB UMR 6303 CNRS, Universite de Bourgogne, France: We present a two-dimensional directional coupler where the constituent waveguides are made of quartz structures that exhibit decay interference. Analytical and numerical results are presented and loss-free propagation and slow light switching occur.

JMSA.11 Monolithic Integration of Active LMA PCE and Standard Fiber Bragg Gratings into All-Fiber Lasers, Clermence Jolivet1, Julie Guer1, Peter Hofmann1, Axel Schlugsch1, CREOL, The College of Optics and Photonics, Univ. of Central Florida, USA: A method to monolithically integrate active LMA PCE with conventional fiber components (fiber Bragg gratings) in all-fiber lasers is proposed. Using novel mode-field adapters, cavity losses are mitigated and laser performances significantly improved.

JMSA.12 Supermode Decomposition During Operation of All Fiber Laser, Clermence Jolivet1, Daniel Flam1, Michael Duparme1, Kay Schuster1, Stephan Grimm1, Axel Schlugsch1, CREOL, The College of Optics and Photonics, Univ. of Central Florida, USA: A method to monolithically integrate active LMA PCE with conventional fiber components (fiber Bragg gratings) in all-fiber lasers is proposed. Using novel mode-field adapters, cavity losses are mitigated and laser performances significantly improved.

JMSA.13 Spatial coherence effect on damage occurrence in multimode optical fibers using nanosecond pulses, Amir Herzog2, Amir A. Ishaya1, Electrical and Computer Engineering, Ben-Gurion Univ., Israel: We investigate high peak power delivery in highly multimode optical fibers. By altering the spatial-coherence of the input beam, we demonstrate the transmission of 120μm ns pulses at 355nm through a multimode fiber.

JMSA.14 Supercontinuum Generation in a Three-core Chalcogenide-tellurite Fiber, Tongli Cheng1, Xiaole Xue1, Dinhung Dang1, Morio Matsumoto1, Takashi Misumi2, Takenobu Suzuki1, Yasutake Ohishi1, ofmala, Japan; 2Furukawa Denko Co., Ltd, Japan: We present a high peak power delivery system needs to be developed. Such a fiber system requires a new approach regarding fiber development and its integration with the laser beam delivery system.

JMSA.15 Experimental Observation of Auto-Oscillations in Nonlinear Optical Correlator, Jari Peltola1,2, Edmund Samuel1, Tongli Cheng1, Koji Asano1, Zhongchao Duan1, Takenobu Suzuki1, Yasutake Ohishi1, Optical Functional Materials Laboratory, Toyohashi Technical Inst., Japan: It is shown that an ultra-flat gain bandwidth of 658 nm at 30 dB (0.01-dB gain fluctuation) can be obtained by dual-pump optical parametric amplification using highly nonlinear tellurite hybrid microstructured optical fibers.

JMSA.16 A Waveguide Directional Coupler Based on Quantum Nanostructures with Decay Interference, Arminos Foutoouloukian1, John Bovis1, Endri Patrek1,2, Materials Science Dept., Univ. of Patras, Greece; 1Technological and Educational Inst. of Western Greece, Greece: We propose a two-dimensional directional coupler where the constituent waveguides are made of quartz structures that exhibit decay interference. Analytical and numerical results are presented and loss-free propagation and slow light switching occur.

JMSA.17 Withdrawn

JMSA.18 Experimental Observation of Auto-Oscillations in Nonlinear Optical Correlator, Svitlana Bugaychuk1, Igor Pryadko1, Vladyslav Gnatovsky1, Larisa Pryadko1, Natalya Medyiv1, Inst. of Physics, NAS Ukraine, Ukraine; 2Taras Shevchenko National Univ., Ukraine; 3National Univ. of Food Technology, Ukraine: Auto-oscillations are found experimentally in optical correlator based on nonlinear interaction of periodic fields. Their appearance may be explained by generating a dynamical moving grating in nonlinear medium, which is included in the correlator.

JMSA.19 Dark-bright rogue waves in long wave–short wave resonance, Shihua Chen1, Jose M. Soto-Crespo2, Philippe Greki1, Southeast Univ., China; 2CSIC Instituto de Optica, Spain; 3Universite de Bourgogne, France: Rogue wave coherence of the presented for the long wave–short wave resonance equation, featuring coupled dark and bright field counterparts. Numerical simulations show their robustness despite of modulational instability.

JMSA.20 Poynting Rogue Wave States in the Coupled Hirota Equations, Shihua Chen1, Jose M. Soto-Crespo2, Philippe Greki1, Southeast Univ., China; 3Université de Bourgogne, France: Rogue wave coherence of the presented for the long wave–short wave resonance equation, featuring coupled dark and bright field counterparts. Numerical simulations show their robustness despite of modulational instability.

JMSA.21 Frequency Comb-Linked Mid-Infrared Continuous-Wave Optical Parametric Oscillator, Jari Peltola1,2, Markus Vainio1, Thomas Forr1,2,1Tomas Heta1, Mikko Meri1, Lauri Halonen1, Centre for Metrology and Accreditation, Finland; Department of Chemistry, Univ. of Helsinki, Finland: We report on a frequency comb-based reference-oscillator using optical parametric oscillator. The frequency of the mid-infrared idler beam is locked to a near-infrared frequency comb after frequency doubling the idler beam.

JMSA.22 Ultra-flat and broadband optical parametric amplification in highly nonlinear tellurite hybrid microstructured optical fibers, Hoang Tuan Tong1, Edmund Samuel1, Tongli Cheng1, Koji Asano1, Zhongchao Duan1, Takenobu Suzuki1, Yasutake Ohishi1, Optical Functional Materials Laboratory, Toyohashi Technical Inst., Japan: It is shown that an ultra-flat gain bandwidth of 658 nm at 30 dB (0.01-dB gain fluctuation) can be obtained by dual-pump optical parametric amplification using highly nonlinear tellurite hybrid microstructured optical fibers.

JMSA.23 Spatially Modulated Optical Rogue Waves in Graded-Index Waveguide, Amit Goyal1, Kan-Chan K. De1, Choragudi N. Kumar1, Department of Physics, Panjab Univ., India: We present spatially modulated optical rogue wave solutions, which evolve as nonlinear waves on localized background beam, in graded-index waveguide through spatial variation of linear and nonlinear refractive index coefficients.

JMSA.24 Supercontinuum generation in silicon waveguides based on optical wave-breaking, David Castello-Lurbe1, Victor Torres-Company1, Enrique Silvestre1, Optical Univ. of Valencia, Spain; Microtechnology and Nanoscience, Chalmers University of Technology, Sweden: We theoretically find the third order dispersion that optimizes the spectral broadening induced by optical wave-breaking. It produces supercontinuum spectra spanning beyond 2/3 of an octave in a silicon waveguide pumping at 1550 nm.
Laser System for Generation 3D Ellipsoidal UV photoinjector to generate profiled UV optical laser system for implementation at DESY PITZ D. Ania-Castanon; Khazanov; Anatoly Poteomkin; Mikhail Krasilnikov; Alexander Apolonski; Inst. for Photonics, Technische Universität Wien, Austria; "Ludwig-Maximiliane Universität and Max-Planck-Institut fuer Quantenoptik, Germany; Quantum and Raman noise induce fundamental constrains on the energy scalability of dissipative solitons. Raman scattering forms a dissipative soliton, which behaves chaotically and cannot accumulate energy without stability loss.

Enhanced optical phase conjugation in nonlocal media. Kwon; Yoo; Ajou Univ., Republic of Korea. Optical phase conjugation by degenerate four-wave mixing is studied theoretically using the invarian embedding method. It is found that the efficiency of phase conjugation can be significantly enhanced in various meta-material structures.

Analytical expression for the z-scanned transmittance of a thin nonlocal nonlinear media. Albanea; M. Luis Arroyo Carrasco; M. Maribel Mendez Otero; Marcelo D. Turbe-Castillo; BUAP, Mexico; "INAOE, Mexico. Starting from a phenomenological model which takes into account the nonlocal character of a nonlinear interaction, an analytical expression for the z-scanned transmittance of a thin nonlocal nonlinear media was obtained.

RIN Transfer in Second-Order Raman Amplification with Centrally-Pumped Random Distribution Feedback Lasers, Juvo Nuho; Juan D. Arancibia; Inst. de Óptica, IO-CSIC, Consejo Superior de Investigaciones Científicas, Spain. The predicted RIN transfer function for 2nd-order amplification based on centrally-pumped RFLs is studied over a broad range of lengths and signal powers. Transfer is shown to be generally higher than in cavity RFLs.

Laser System for Generation 3D Ellipsoidal UV Pulses, Sergey Mironov; Ekaterina Gacheva; Laser System for Generation 3D Ellipsoidal UVJM5A.30 photoinjector to generate profiled UV optical laser system for implementation at DESY PITZ D. Ania-Castanon; Khazanov; Anatoly Poteomkin; Mikhail Krasilnikov; Alexander Apolonski; Inst. for Photonics, Technische Universität Wien, Austria; "Ludwig-Maximiliane Universität and Max-Planck-Institut fuer Quantenoptik, Germany; Quantum and Raman noise induce fundamental constrains on the energy scalability of dissipative solitons. Raman scattering forms a dissipative soliton, which behaves chaotically and cannot accumulate energy without stability loss.

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RIN Transfer in Second-Order Raman Amplification with Centrally-Pumped Random Distributed Feedback Lasers, Juvo Nuho; Juan D. Arancibia; Inst. de Óptica, IO-CSIC, Consejo Superior de Investigaciones Científicas, Spain. The predicted RIN transfer function for 2nd-order amplification based on centrally-pumped RFLs is studied over a broad range of lengths and signal powers. Transfer is shown to be generally higher than in cavity RFLs.

Laser System for Generation 3D Ellipsoidal UV Pulses, Sergey Mironov; Ekaterina Gacheva; Laser System for Generation 3D Ellipsoidal UVJM5A.30 photoinjector to generate profiled UV optical laser system for implementation at DESY PITZ D. Ania-Castanon; Khazanov; Anatoly Poteomkin; Mikhail Krasilnikov; Alexander Apolonski; Inst. for Photonics, Technische Universität Wien, Austria; "Ludwig-Maximiliane Universität and Max-Planck-Institut fuer Quantenoptik, Germany; Quantum and Raman noise induce fundamental constrains on the energy scalability of dissipative solitons. Raman scattering forms a dissipative soliton, which behaves chaotically and cannot accumulate energy without stability loss.
JMSA.49 Tailored Waveform Generation in Mode-Locked Fiber Lasers by Saif Cevher, Pulse Shaper, Sona Boscolo, Christophe Finot, Periklis Petropoulos, Aston Inst. of Photonic Technologies, Aston Univ., UK; Laboratory Interdisciplinary Carot de Bourgogne, Université de Bourgogne, France; Optronics Research Centre, Univ. of Southampton, UK. We numerically show the possibility of pulse shaping in a mode-locked fiber laser by inclusion of an amplitude-phase spectral filter into the laser cavity. Various advanced waveforms are generated, including parabolic, flat-top and triangular pulses.

JMSA.50 Controlling Rogue Waves by Group-Velocity Horizons, Ayhan Demircan, Carsten Bree, Shaika Amranaashvili, Ayhan Tajali, Alexander Pape, Uwe Morgner, Günter Stemmeier, Leibniz Universität, Hannover, Germany; WIAS, Germany; Max-Born-Institut, Germany. We present a way to actively control the appearance or destruction of rogue waves in supercontinuum generation. The scheme also allows manipulating the statistics of extreme events, independently of their generation mechanism.

JMSA.51 Suppression of Optical Rogue Waves in a CW Injected Semiconductor Laser With Current Modulation and Noise, Jordi Zamora Munt, Sandro Perrone, Ramon Vilaseca, Cristina Messodi, Instituto de Física Interdisciplinar y Sistemas Complejos, Universidad de las Islas Baleares, Spain; Département de Fisica i Enginyeria Nuclear, Universitat Politècnica de Catalunya, Spain. We propose a mechanism to suppress rogue intensity pulses by perturbing the laser with a weak sinusoidal modulation of the bias current and a moderate amount of incoherent light.

JMSA.52 Nonlinear optical phenomena in bulk dielectric media with few optical cycle mid-IR pulses, Andrew Dubets, Naïl Garejev, Vytalys Jukna, Gintaras Valiulis, Vytautas Jukna, Université de Rennes 1, France; 5NKT Photonics A/S, Denmark. We demonstrate wavelength conversion of 4-QAM signals in a FOPA with high conversion efficiency, Eduardo Temprana, Wahid Ataee, Ana Peric, Nikola Alić, Stefan Rindi, Electrical and Computer Engineering, Univ. of California, San Diego, USA. We demonstrate wavelength conversion of 4-QAM signals in a single-pump FOPA with 15 dB conversion efficiency. SBS suppression is achieved through pump-phase modulation whereas the idler-phase distortions are compensated digitally after detection.

JMSA.55 Wavelength Conversion of 4-QAM Signals in a Dispersion-Varying Optical Fiber, Abdelkrim Bendjaballah, Arnaud Musot, Pascal Szriftgiser, Antoine Lenouve, Yves Quirquemps, Laurent Bjugt, Gaëry Gentil, John M. Dudley, Laboratoire PhLAM/IRCCIA, Université Lille 1, France; Optics Laboratory, Tampere University of Technology, Finland; Institut FEMTO-ST, Université de Franche-Comté, France. We investigate numerically and experimentally the dynamics of Akhmediev Breathers in an optical fiber with a longitudinally step dispersion profile. We experimentally show that they can be sustained near their point of maximal compression.

JMSA.56 Dynamics of Akhmediev breathers in a dispersion-varying optical fiber, Abderrazak Bendjaballah, Arnaud Musot, Pascal Szriftgiser, Antoine Lenouve, Yves Quirquemps, Laurent Bjugt, Gaëry Gentil, John M. Dudley, Laboratoire PhLAM/IRCCIA, Université Lille 1, France; Optics Laboratory, Tampere University of Technology, Finland; Institut FEMTO-ST, Université de Franche-Comté, France. We investigate numerically and experimentally the dynamics of Akhmediev Breathers in an optical fiber with a longitudinally step dispersion profile. We experimentally show that they can be sustained near their point of maximal compression.

JMSA.57 Splitting after collision of high-order bright spatial solitons in Kerr media, Marcelo O. Iturbe-Castillo, Sabino Chavez-Cerda, Inst Nat Astrofisica Optica Electronica, Mexico. We study numerically the asymmetric collision of high order bright spatial solitons with a fundamental one. It is demonstrated the splitting of the high-order soliton under some separation distances and angles between the solitons.

JMSA.58 Statistical analysis of spatial frequency supercontinuum in pattern forming feedback systems, Vincent Odet, Mikhail Kolobov, Majid Taki, Eric Louvetagne, Inst de Physique, Universidad de Chile, Chile; Laboratoire PLAM, Université Lille 1, France. We perform statistically the peak intensity in terms of the probability density function that we model with the Generalized Gamma Distribution.

JMSA.59 Bound states of temporal cavity solitons, Jae K. Jang, Miro Erkintalo, Stuart Murdoch, Timothy Lee, 1EEE, Nanyang Technological Univ., Singapore. We report experimental observation of bound states of temporal cavity solitons persisting in passive optical fiber ring resonators. Bound states have been identified in two different cavities, with soliton-to-soliton separations of 20 and 11 ps.

JMSA.60 Non-adiabatically tapered microfiber refractometric sensors and its potential applications in environmental detection, Wenbin Ji, Bo Zhang, Swee Chuan Tjin, Yi Ping Liu, Bo Zhang, 1EEE, Nanyang Technological University, Singapore. We investigated an abruptly tapered microfiber refractive index (RI) sensor. The sensitivity for surrounding liquid RI up to 1.4 is 52,500 RIU/m and in RI range around 1.33 is 7500 nm/RIU.

JMSA.61 Spatially Offset Raman Line Scan for Content Detection in 15 dB Cavity Containing a PerkinElmer MZ6080S, Bernhard Zachhuber, Henrik Östmark, FOI, Defence Research Agency, Sweden. Auto-focus line scan system for identification of substances inside of turbid containers from varying distances up to one metre allows simultaneous collection of full Raman spectra from various spatial offsets via Spatially Offset Raman Spectroscopy.

JMSA.62 Improving the sensitivity of an interferometric fiber optic sensor for acoustic detection in rockfalls, Luca Schiavo, Luca Palmieri, 1Laboratoire PhLAM/IRCCIA, Université Lille 1, France; 2WIAS, Germany; Inter national Inst. for Urban Systems Engineering, China. Optimization of an interferometric fiber optic sensor for ultrasonic acoustic detection in rockfall monitoring is addressed. The optimized sensor employs a polymer clad fiber and improved design with an almost doubled acoustic sensitivity.

JMSA.63 Polymer-Clad Silica Sponges for Liquid Sensing: Long-term Measurement Repeatability and Production Imperfections, Matei Komnats, João P. Bazzo, Cicero Marcelli, Felipe Mezzadri, Christian Stehr, 1Research Inst. for Geo-Hydrological Protection, University of Greenwich, London, UK; 2WIAS, Germany; 3Versita, Brazil. We present an improvement of our polymer-clad silica fiber as a new solid-state refractometric sensor. We experimentally study its suitability in liquid sensing and the sensor stability and measurement reproducibility is carried out, providing stable sensitivities with respect to production imperfections.

JMSA.64 Temperature Sensing of High Power Generator Stator using DTS, João P. Bazzo, Cicero Martelli, Luciana Martinelli, 1Research Inst. for Geo-Hydrological Protection, University of Greenwich, London, UK; 2WIAS, Germany; 3Versita, Brazil. We present the design and realization of a high power generator stator temperature sensor using DTS. The main advantage of this approach over conventional sensors is the possibility to identify temperature variations over with high spatial resolution.

JMSA.65 Experimentations for a plastic optical pH sensor, Pablo Lopes, Rui Carvalho, Mario F. Ferreira, Universidade de Aveiro, Portugal. In this work we present the design of a transmissive pH sensor using plastic optical fiber (POF) and materials to entrap universal indicator. This sensor presents advantages over conventional ones namely lightweight, portability and low cost. The data is received by collecting cardio-vascular pulse wave from a fingertip and transmitted to the android phone by Bluetooth connectivity.
Nonlinear Photonics

08:30–10:00  NTu1A • Dissipative Solitons, Rogue Waves and Ultra-Short Pulse Modeling II
Presider: Arnaud Musset; Univ Lille 1, Laboratoire PhLAM, France

NTu1A.1 • 08:30
Radiating Dissipative-Dispersive Shock Waves via Bistability in Passive Microcavities, Stefano Trillo1, Stefania Malaguti1, Gaetano Bellanca1, Matteo Conforti1, Università degli Studi di Ferrara, Italy; 2CNR–Università Lille 1, France. Bistability in dissipative and dispersive systems allows the formation of modulated shock waves in passive nonlinear cavities operating with weak dispersion. These shocks are found to resonate radiate linear waves.

NTu1A.2 • 08:45
Generation and Control of Isolated Attosecond Pulses by Fiber-Compressed Sub-Cycle Pulses, Wei-Chun Chu1, Ka Fai Mak1, John C. Travers1, Philip Russell1, Photonic Crystal Fibre Science, Max Planck Inst for the Science of Light, Germany. High-harmonic generation driven by 2-kHz self-compressed pulses from an argon-filled kagome photonic-crystal fiber is investigated with the 1D atom model. The input carrier-envelope phase strongly modulates the simulated attosecond-pulse emission.

NTu1A.3 • 09:00
Solitons that are too Short in Duration, Shaiba Amirfazlifar1, Uwe Bandelow1, Nabil Akmaddi2, Weierstrass Inst for Applied Analysis and Stochastics, Germany. The Australian National Univ., Australia. Optical solitons cannot go beyond the critical single-cycle duration even for the most favorable medium dispersion. A universal feature that prohibits existence of too short solitons is an unavoidable formation of the singular cup.

NTu1A.4 • 09:15
Intermittency in integrable turbulence, Stephane Randoux1, Pierre Walczak1, Miguel Onorato1, Pierre Suret1, Universite de Lille 1, France. Universita degli Studi di Torino, Italy. We report the observation of intermittency (i.e. heavy-tailed deviations from gaussian statistics increasing with frequency scales) in an incoherent optical system ruled by the one-dimensional defocusing and integrable nonlinear Schrödinger equation.

NTu1A.5 • 09:30
Interaction between positive and negative frequencies in nonlinear optics, Fabio Biancalana1,2, Daniele Faccio1, Matteo Conforti1, Univerità degli Studi di Ferrara, Italy; 2Dipartimento di Fisica, Università degli Studi di Torino, Ferrara, Italy; 2CNRS-Université Lille 1, France. Soliton modelocking dynamics of an ultrashort pulse.

NTu1A.6 • 09:45
Kuramoto-Like Synchronization in Parametric Frequency Combs, Yanan H. Wen1, Michael R. Lamont2, Isabel M. Kloumann1, Steven H. Strogatz1, Alexander L. Gaeta 2, Applied and Engineering Physics, Cornell Univ., USA; Electrical and Computer Engineering, Cornell Univ., USA; Center for Applied Mathematics, Cornell Univ., USA. We show that soliton modelocking dynamics in parametric frequency combs is equivalent to synchronization phenomena that occur in many physical systems as described by the Kuramoto model for coupled oscillators.

SoTu1B • 08:30
Challenges of Long Distance Detection by Brillouin Scattering, Sonia Martin-Lopez1, Electronics, Alcala Univ., Spain. Brillouin distributed sensors have attracted the attention of both academic and industrial sectors, in particular for long-distance applications. Here I review some techniques for range improvement in BOTDA and explain the challenges behind them.

SoTu1B.1 • 08:30
Fiber Sensors
Presider: Paul Foy; Thorlabs Inc, USA

SoTu1B.2 • 09:00
The Development of Bend-insensitive, Highly-birefringent and Spun, Circularly Birefringent Fibers for ‘Real World’, Commercial Sensors, Christopher Emile1, Fibercore House, Fibercore Ltd, UK. After 30 years for fiber sensors are a commercial reality. Specially Fibers lie at the heart of FOG, hydrophones, geophones and current sensors. This paper tracks their development and emphasises their differences from conventional fibers.

SoTu1B.3 • 09:30
Fiber Sensors for the High Speed Railway Environment, Miguel Gonzalez-Herreras1,1, Massimo Filograno2,3, Pedro Comedas4,1, Alvaro Andres-Aguilas1,1, Miguel Rodriguez-Plazas1,1, Polytechnic School, Universidad de Alcala, Spain; 2Instituto de Optica, CSIC, Spain; 3ADIF, Innovation and Technology Direction, Spain. We review some recent work on fiber-optic sensors for the high-speed railway environment. In particular, we show convenient fiber-optic solutions for rail and wheel monitoring, perimeter security and catenary protection in changeover sections.

SoTu1C • 08:30
Keynote
Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-sensors - I
Presider: Jacques Albert; Carleton Univ., Canada

SoTu1C.1 • 08:30
Aptamer and DNA Hybridization Assays on Gold Fiber Optic Sensors with Nanoparticle Signal Enhancement, Filip Delport1, Filip Delport1, The Univ. of Sydney, Australia; 2School of Chemistry, The Univ. of Sydney, Australia. Detection of allergens and micro bacteria on a fiber optic SPR sensor is performed by means of an oligonucleotide bio-recognition surface. In this work, the DNA surface is optimized by mixing with PEG monolayers to suppress unspecific and enhance specific detection. Furthermore, due to the surface characteristic of DNA functionalized gold nanoparticles the bioassay sensitivity is increased and a mean of real-time multiplexing is introduced.

SoTu1C.2 • 09:15
Water on Au films, John Canning1,2, Nikki Tzoumis1,2, James Beattie1,1, University of Sydney, Australia; 2School of Chemistry, The Univ of Sydney, Australia. The interaction between deionized water and gold is shown to occur with just water immersion. A reduction in measured contact angles of ~ 10 deg is observed. This recovery over time, accelerated by heating.

SoTu1C.3 • 09:45
Invited
Water on Au films, John Canning1,2, Nikki Tzoumis1,2, James Beattie1,1, The Univ. of Sydney, Australia; 2School of Chemistry, The Univ of Sydney, Australia. The interaction between deionized water and gold is shown to occur with just water immersion. A reduction in measured contact angles of ~ 10 deg is observed. This recovery over time, accelerated by heating.
SoTu2A.4 • 11:30
3.5-µm bandwidth mid-infrared supercontinuum generation in a 2-cm long suspended-core chalcogenide fiber, Ouassama Mouawad1, Jeremy Picot-Clemente1, Foued Amrani1, Clement Struytski1, Julien Fatome1, Bertrand Kibler1, Frederic Desesveldavy1, Gregory Garet1, Jean-Charles Jules1, Dinhuan Deng2, Yasutake Ohsh1, Frederic Smetakala1, CNRS - Universite de Bourgogne, France; 2Toyota Technological Inst., Japan. A supercontinuum source extending from 0.6 to 4.1 µm has been successfully generated in a 2-cm long As2S3 chalcogenide suspended-core fiber by means of a nJ2-level 200-fs pumping at 2.5 µm.

SoTu2B.2 • 11:15
Negative Curvature Hollow-Core Fibers (NCHCFs) for Mid-IR Applications, Alexey F. Kosolapov1, Andrey Pryamikov1, Grigory Čerenkov1, Alexander Hemming1, Nikita Simakov1, Eugene Dianov1, 1Fiber Optics Research Center, Russian Federation. Properties of NCHCFs made from silica glass for light transmission in mid-IR are investigated, in particular, the influence of the cross-section geometry on optical properties and the core-cladding mode coupling due to bending.

SoTu2B.4 • 11:45
Holmium Fibre Lasers for High Power Laser Applications, Alexander Hemming1, Nikita Smakov1, John Haub1, Adrian Carter2, 1Defence Science Technology Organisation, Australia; 2Nufern, USA. Holmium-doped fibre lasers extend the operation of silica fibre lasers beyond 2.1 µm. We will discuss their applications, and present recent power scaling results of resonantly cladding-pumped holmium fibre amplifiers.

JTu2C.4 • 12:00
Enhancement of Plasmonic Properties of an All-Glass AgPO3/Silica Photonic Bandgap Fibre Using Thermal Poling, Ioannis Kanidakis1, Stavros Pissadakis1, 1Inst. of Electronic Structure and Laser, Foundation for Research and Technology-Hellas, Greece. We report on exposure of composite AgPO3/silica photonic bandgap fibres on external electric field, which leads to poling of the phosphate glass medium and causes significant changes on the guiding properties of the composite fibres.
Salon Rubi/Zafir

NTu2A • Poling, Spatial and Periodic Nonlinear Effects II—Continued

Salon Diamant

SoTu2B • Mid-IR Fibers and Sources—Continued

Salon Vivaldi

JTu2C • Symposium on Surface Functionalization of Optical Fiber and Waveguide Based Bio- and Chemical-sensors - II—Continued

NTu2A.7 • 12:15
Selective Compression of Temporally Splitted Femtosecond Pulses and Nonlinear Effects under Dynamical Bragg Diffraction in 1D Photonic Crystals, Sergey E. Svyakhovskiy1, Alexander Skorynin1, Vladimir A. Bushuev1, Sergey V. Chekalin1, Lidia V Frolova1, Victor Kompanets1, Anton Madykovsky1, Tatiana Murzina1, Boris I. Mantsyzov1; 1Department of Physics, Moscow State Univ., Russian Federation; 2Inst. of Spectroscopy RAS, Russian Federation. Temporal splitting of chirped pulses and their selective compression as well Laue soliton propagation under condition of dynamical Bragg diffraction in Laue scheme in 1D porous quartz-based PC are studied theoretically and experimentally.

SoTu2B.5 • 12:15
Engineering of Specialty IR Fiber Cables, Lynda E. Busse1, Frederick Kung3, Catalin Florea4, Brandon Shaw1, Ishwar D. Aggarwal2, Jas Sanghera1; 1US Naval Research Laboratory, USA; 2Sotera Defense Solutions, USA; 3Univ. Research Foundation, USA; 4Formerly with Sotera Defense Solutions, USA. Ruggedized cables designed for specialty IR fibers were successfully tested for laser transmission and under harsh environmental conditions. Antireflective surfaces on the fiber endfaces reduced reflections and increased IR laser damage thresholds.

JTu2C.5 • 12:15
Nanoimprinted and Angular Evaporated Aluminum Plasmonic Nanoantennas Arrays, Luc Duempelmann1,2, Benjamin Gallinet1, Lukas Novotny1; 1Thin Film Optics, CSEM, Switzerland; 2D-ITET, ETHZ, Switzerland. We describe a toolbox to create asymmetric subwavelength plasmonic nanostructures. The well-defined plasmon resonance leads to a specific angular uni-directional color change, tunable over the whole VIS spectra by varying the fabrication parameter.

12:30–13:30 Lunch Break (On Your Own)
JTu3A.1 Record retardance in silica and compact waveplates and related optical components photo-induced by femtosecond laser, Mathieu Lancy1, Rudy Desmarchelier1, Kevin Cook2, John Canning3, Bertrand Pommeller1; 1Université de Paris Sud, France; 2The Univ. of Sydney, Australia.
A wide range of laser parameters to achieve the highest retardance value within a single layer of nano-porous grating layers is demonstrated; i.e., 7.3° retardance depends on the number of layers present and can be accumulated in the direction of laser propagation to values higher than 1600 nm. This opens the door to using these nanostructures as refined building blocks for novel optical elements based on strong retardation, including using these properties with unprecedented resolution.

JTu3A.2 Growth Dynamics of Type II Gratings Made with Ultrafast Radiation, Dan Grobnic1, John V. Badding2, Anna C. Peacock1; 1Optoelectronics Research Centre, Univ. of Southampton, UK; 2Department of Chemistry and Materials Research Inst., Pennsylvania State Univ., USA. Four-wave mixing and broadband continuum generation are demonstrated for the first time in a small core silicon optical fiber in the short-wave infrared wavelength regime.

JTu3A.3 Mobility of 10 solitons in the discrete CQ Schrödinger equation, Cristian Mejía Cortés1,2; 1Consejo Sup. Investigaciones Científicas, Chile. We investigate mobility for localized modes in the discrete nonlinear Schrödinger equation with nearest-neighbor cubic and quintic terms. The largest soliton’s power admitting motion of kicked solitons is predicted analytically and numerically corroborated.

JTu3A.4 Effective pulse compression in photonic crystal fibers with linearly varying dispersion and nonlinearity, Hui Huang1, Qian Li1; 1Optoelectronics Research Centre, UK. We demonstrate effective pulse compression in photonic crystal fibers with linearly decreasing dispersion and nonlinearity, which enables near zero-group velocity at specific wavelengths.

JTu3A.5 Design of Highly Birefringence Solid Core Photonic Crystal Fiber with Elliptical Holes, Rahul K. Gangwar1, Vinod K. Singh1,2; 1Applied Physics, Indian School of Mines, India; 2A high birefringent photonic crystal fiber is designed using circular and elliptical air holes and numerically studied by finite element method. The birefringence value reaches the magnitude of 10-5 at 1.55 μm.

JTu3A.6 Demonstration of 4.4 dB on-off Brillouin gain in a silicon photonic wire, Raghav Van Law1,2, Bart Kuyken1,2, Dries Van Thourhout1,2, Roel Baets1,2; 1Photonics Research Group, Ghent Univ. - imec, Belgium; 2Center for Nano- and Biophotonics, Ghent Univ., Belgium. We experimentally show record 4.4 dB continuous-wave on-off Brillouin gain in a partially undoped silicon wire. Additional improvements in optical losses and mechanical confinement may enable clear net gain in this structure.

JTu3A.7 Nonlinear Optical Effects of Quantum Dot Metal Nanoparticle Hybrids: Analytical Results, Andreas Terzis1, Spyridon Kassinos1, John Bouvaitis1; 1Physics, Univ. of Patras, Greece; 2Technological and Educational Inst. of Western Greece, Greece. We study nonlinear optical susceptibilities of a quantum dot and a metal nanoparticle. Analytical expressions are derived solving the density matrix equations and the presence of the semiconductor material and the interparticle distance is reported.

JTu3A.8 Tunable Anisotropic Strain in Laser Crystalized Silicon Core Optical Fibers, Noel Healy1, Karin K. Rottwitt1; 1Technical Univ. of Denmark, Denmark; 2Boston Univ., USA. We numerically investigate asymmetric Bessel-like modes in an ancladding fiber. The self-focusing ability of asymmetric Bessel-mode designs is demonstrated and quantified including the angular dependency of this ability.

JTu3A.9 Broadband 3.4 nJ pulse generation using a fiber laser mode-locked by composite-type carbon nanotubes saturable absorber, Jin Hwan Kim1, Hyub Lee1, Charh D. Tr Nguyen2, Kyung-soo Kim1, Soo hyun Kim1; 1Division of Mechanical Engineering, Korea Advanced Inst. of Science and Technology, Republic of Korea. We demonstrate a long-cavity erbium-doped fiber laser mode-locked by a composite-type CNT-SA. Finally, the laser generated pulses, whose output spectrum and pulse energy are 20.2 nm and 3.4 nJ respectively.

JTu3A.10 Development of pure silica core F-downwobbled phase-separated aluminio-silicate based optical fiber for communication in radiation environment, Anirban Dhar1, Atasi Pal1, Ranjan Sen1; 1CSIR-Central Glass & Ceramic Research Inst., Kolkata, India. A low loss silica core fluorine down doped clad radiation resistant optical fiber has been fabricated using modified chemical vapor deposition process to transmit signals from optical sensors in radiation environment with reduced signal-to-noise ratio.

JTu3A.11 Sensitivity fluorescent membranes with carbon nanotubes saturable absorber, Jin Hwan Kim1, Hyub Lee1, Charh D. Tr Nguyen2, Kyung-soo Kim1, Soo hyun Kim1; 1Division of Mechanical Engineering, Korea Advanced Inst. of Science and Technology, Republic of Korea. We demonstrated a long-cavity erbium-doped fiber laser mode-locked by a composite-type CNT-SA. Finally, the laser generated pulses, whose output spectrum and pulse energy are 20.2 nm and 3.4 nJ respectively.

JTu3A.12 Modern Laser Power Delivery, Vachaspati Artyushkov1; 1Optofonics GmbH, Germany. Main types of optical fibers and hollow waveguides for Mid IR-range of spectra - from 2 to 10 μm, - will be compared to evaluate selection of the best flexible solutions dedicated for different applications.

JTu3A.13 Selfhealing of asymmetric Bessel-like modes, Luca S. Ruhle1, Karin K. Rottwitt1; 1Technical Univ. of Denmark, Denmark; 2Boston Univ., USA. We numerically investigate asymmetric Bessel-like modes in an ancladding fiber. The self-focusing ability of asymmetric Bessel-mode designs is demonstrated and quantified including the angular dependency of this ability.

JTu3A.14 Short-wave infrared continuum generation in high-birefringence amorphous silicon fibers, Li Shen1, Noel Healy1, Hu Y. Cheng2, Todd D. Day1, John V. Badding2, Anna C. Peacock1; 1Optoelectronics Research Centre, Univ. of Southampton, UK; 2Department of Chemistry and Materials Research Inst., Pennsylvania State Univ., USA. A large laser processing method for tuning the size of the anisotropic strain in a silicon core optical fiber is demonstrated. This technique can be used to individually tailor the core's opto-electronic properties for specific requirements.

JTu3A.15 Shortwave infrared continuum generation in high-birefringence amorphous silicon fibers, Li Shen1, Noel Healy1, Hu Y. Cheng2, Todd D. Day1, John V. Badding2, Anna C. Peacock1; 1Optoelectronics Research Centre, Univ. of Southampton, UK; 2Department of Chemistry and Materials Research Inst., Pennsylvania State Univ., USA. A large laser processing method for tuning the size of the anisotropic strain in a silicon core optical fiber is demonstrated. This technique can be used to individually tailor the core's opto-electronic properties for specific requirements.
JTu3A.25 Influence of high-order dispersion on Kerr frequency combs and intracavity soliton dynamics, Adedayo W. Adeleke1, Harun Gai2, Xuekun Bai3, Xianglong Zeng1,2,3 The Key Lab of Specialty Fiber Optics and Optical Access Network, Shanghai Univ., China;2TU Fotonic, Department of Photonics Engineering, Technical Univ. of Denmark, Denmark. The influence of high-order dispersion on temporal and spectral characteristics of microresonator-based optical frequency combs is investigated. The method and intracavity dispersive wave generations are utilized to analyze comb dynamics.

JTu3A.27 Light propagation in Cavity Formed By Nonlinear Defect And Interface Between Two Different Linear Waveguide Arrays, Slavica Kuzmanović1,2, Marija Stojarovski Krasnić1,3, Daniela Milović1, Ana Rodasovlević1, Goran Glorić1, Aleksandra Maluckov1, Mišljen Stepić1,2, Faculty of Natural Sciences and Mathematics, Univ. of Split, Croatia;1Department of Electronics, Faculty of Electrical Engineering, Univ. of Niš, Serbia;3Vinca Inst. of Nuclear Sciences, Serbia. We study light propagation in the vicinity of nonlinear defects that is placed near the interface between discrete linear waveguides. Various dynamical regimes including simultaneous excitation of different strongly localized cavity modes are observed.

JTu3A.28 Interaction of Breathers in the Two-Component Dirac-Maxwell Schrödinger Equation, Russell Campbell1, Gian-Luca Oppo1, Mateusz Borkowski2,3, Physik, Univ. of Strathclyde, UK;3Physics, Univ. Nicolaus Copernicus, Poland. Coupled discrete nonlinear Schrödinger equations describe two-species BEC in optical lattices or light polarization coupling in waveguide arrays. Elastic or inelastic collisions of traveling discrete breathers depend on the interaction parameter.

JTu3A.29 Vortex generation in photonic graphene, Vassilia Patloglou1, Daochang Song2, Jingjun Xu1, Zhigang Chen3, Nikolaos K. Efremidis1,3, Department of Physics, Technological Educational Institute of Crete, Greece;2Teda Applied Physics Inst., Shanghai Jiaotong Univ., China. We study vortex beam generation in the vicinity of the Dirac points in optically induced honeycomb photonic lattices that is triggered by the lattice pseudospin.

JTu3A.30 Photoionization induces pattern instability, labyrinth and foam textures, Vincent Odent1, Ignacio Andrade-Silva1, Marcel Clerc1, Daniel Escall1, Departamento de Física, Universidad de Chile, Chile;2Complex Systems Group, Universite Côte d’Azur, France. We study experimentally and numerically photoionization transition between a nematic and isotropic phases, induced by a Gaussian laser beam. The transition causes transitory nonlinear phenomenon as pattern instability, labyrinth and foam textures.

JTu3A.31 Experimental realization of transverse mode conversion using optically induced transient long-period gratings, Tim Hellwig1, Martin Schranck1, Sven Dobber1, Carsten Fallich1, Inst. of Applied Physics, Univ. of Münster, Germany. We present the experimental realization of transverse mode conversion in an optical fiber via an optically induced long-period grating by employing a setup with co-propagating femtosecond write and probe laser pulses.

JTu3A.32 Image transmission in Kagome photonic lattices, Cristian Mejía Cortés1, Universidad de llevar en, silv-centring oxides glasses. The localized (and nondiffraacting) linear modes in kagome photonic lattices. By combining these modes, different shapes can be composed and, therefore, a given image will propagate without distortion.

JTu3A.33 Femtosecond single-beam direct laser poling of silver-doped oxide glasses: correlation between fluorescence, metallic nanoparticles precipitation and effective second-order nonlinear optical properties, Marie Vangheluwe1,2, Yanick Petit1,2, Nicolaas Margraardt1,3, Patricia Hee1,3, Alexia Corcoran1,2, Benjamin Gaufrès1, Alexandre Farges1,2, Feng Liang1, Evelyne Fargin3, Alexandre Fargues3, Alexandre Fargues3, Feng Liang1, Evelyne Fargin3, Alexandre Fargues3, Alexandre Fargues3, Feng Liang1, E. F. C. M. Delft, Netherlands;3Institut de la Matière Condensée de Bordeaux, Bordeaux, France. We study spatial distribution, stability and correlation of linear and nonlinear optical properties made by femtosecond laser writing in silver-containing oxide glasses. The results provide relevant approaches to design nonlinear photonic structures.

JTu3A.34 Unconventional Broadband Conversion of Infrared Supercontinuum at the Second Harmonic Wavelengths, Farid El Bassi2,3, Dominique Pagnozzi1, Fabio Barbon1, Katarzyna Krupa1, Alessandro Tonello1, Badr M. Shalaby1, Alexandre Labruyère3, Vincent Couder4,3, Xilim Institut, Photonics dept, universite de Limoges, CNRS, France;1Dipartimento di Ingegneria dell’Informazione, Università di Brescia, Italy;2Physics Department, Faculty of Science, Tanta Univ., Egypt. Broadband frequency doubling of an infrared supercontinuum is demonstrated. This unconventional Second Harmonic Generation process is obtained in a PPLN crystal excited by a single-diffraction-limited beam by the beam self-focusing (collapse) in the optical waveguide/dielectric interface in case of superluminally propagated laser-induced nonlinear polarization is considered. The emission is strongly enhanced for definite intensity and excitation angle.

JTu3A.35 Coupling light into a whispering-gallery mode resonator with self-focused beam, Kien Pham1,2, Jasmijn Salaff1, Mathieu Chauvin1, Patrice Féron1, Université de Franche-Comté, France;2FOTON, France. Light coupling into a whispering-gallery mode resonator with a spatial soliton is demonstrated. Our setup, based on a LNIN3O3 prism, features robustness, mode selectivity and single-mode propagation thanks to the nonlinear confinement.

JTu3A.36 Asymmetrically Pumped Bragg Scattering with the Effects of Nonlinear Phase Modulation, Lasse Meljng1,2,3, Sven Michael K. Friis1, Dileep V. Reddy1,2,3, Karsten K. Rottwitt1,2,3, Michael G. Raymer4, Colin J. McKinstrie1,2, TU Fotonic, Technical Univ. of Denmark, Denmark;3Department of Physics, Univ. of Oregon, USA. We derive exact solutions to asymmetrically pumped Bragg scattering with nonlinear phase-modulation (NPM) and show that this setup allows for the frequency conversion of many temporal modes, while reducing the effects due to NPM.

JTu3A.37 Controlling Second-Harmonic Generation by Electro-optic Photonic Crystals, Yiping Chen,2 Department of Physics and Astronomy, Shanghai Jiaotong Univ., China. We propose and experimentally demonstrate controlling second-harmonic generation in electro-optic photonic crystals constructed by cascading Pockels effects. Shift spectrum shifts toward the overlapbandgap by nonlinear phase shifts.

JTu3A.38 Noise-induced traveling Nozaki-Bekki holes and patterns in experimental drifting patterns, Marcel Clerc1, Salvia Cuibolay1, Francisco de los Campos2, Monica A. Garcia-Nieto3, Eric Louvreauex1, Mario Woll3, PPLAM, France;1Departamento de Física, FCFM, Universidad de Chile, Chile;3Instituto de Física, Universidad Católica de Valparaíso, Chile. We show that, in drifting systems, noise appears and is able for inducing new phase singularities by generating specific initial conditions. Experimentally, these defects are evidenced in a Kerr medium subjected to a tilted optical feedback.

JTu3A.39 Dispersive waves dynamics in optical fibre systems, Salvia Cuibolay1, Majid Tak1, Eric Louvreaux1, Université de Lille 1, France. The study of spatio-temporal growth of a localized initial condition in an optical fibre system allows us to evidence two distinct regimes versus the third order dispersion strength. A value for the transition is found.

JTu3A.40 Inversed-modified Soliton Generation in Mode-locked Fibre Laser at Normal Dispersion, Mana Chengmeyash1, Alexander Krylov1, Chengbo Mou1, Naizhong Li3, Alex Rozhin2, Michael Ruben2, Natalia Avrutyan3, Elena Obrabotaz3, Sergei K. Turitsyn3, Evgeny Dionov3,1, Fiber Optic Research Center of RAS, Russian Federation;2Institut de Photonics Technology, Aston Univ., UK;3IPK, Germany, 1AM. Prokhorov General Physics Inst. of the Russian Academy of Sciences, Russian Federation. We demonstrate E- and Tm-doped fibre ring lasers mode-locked with a single-walled carbon nanotubes operating at normal intracavity dispersion and high nonlinearity. The lasers generate transform-limited and stable pulses.

JTu3A.41 Propagation dynamics of temporal Airy pulses in optical fibers with periodic dispersion, Dangfeng Fan1, Shadong Wang2, Xuekun Bai3, Xianglong Zeng1,2,3 The Key Lab of Specialty Fiber Optics and Optical Access Network, Shanghai Univ., China. The evolution dynamics of temporal Airy pulses with periodic dispersion landscapes are numerically studied. The Airy pulses are more robust to adapt to dispersion variation than conventional sech-shape pulses.

JTu3A.42 Enhanced supercontinuum generation in the normal dispersion regime by seeded dispersive wave emission and stimulated Raman scattering, Yi Qu1, Yiqiang Xu2, Kenneth K. Y Wong1, Kevin K. Tsia3, Universit of Hong Kong, Hong Kong. We present a new normal-dispersion pumped supercontinuum seeding mechanism based on a combined effect of stimulated Raman scattering and seeded dispersive wave emission. The seeded SC bandwidth is drastically enhanced to more than one octave.

JTu3A.43 Analysis of Rogue Wave Phenomena in Optical Fiber Based on Soliton’s Eigenvalue, Gihan Weerasekara1, Akhiro Tokunaga1, Hiroki Teranishi1, Merc Eberhard1, Akhiro Murata2, Osaka Univ., Japan;1Aston Univ., UK. The impact of third-order dispersion on optical rogue wave phenomenon is investigated numerically. We validate the TOD coefficient by utilizing the eigenvalue of the associated equation of the nonlinear Schrödinger equation (NLS).

JTu3A.44 Cascade Modulation Instability, Stefan Wabersich1, Università di Brescia, Italy. Cascade modulation instability leads to the break-up of the Fermi-Pasta-Ulam recurrence of nonlinear coupling between a pump and its sidebands in the anomalous dispersion regime of optical fibers.

JTu3A.45 Plasmon-enhanced emission of polarization entangled photons, Shahabedin Chatssrei Ariazabadi1, Vladimir Huziynyak2, Inst. of Physics, Univ. of Tartu, Estonia. The emission of polarization entangled photons by a metal-dielectric interface in case of superfluorinely propagating laser-induced nonlinear polarization is considered. The emission is strongly enhanced for infinite intensity and excitation angle.

JTu3A.46 Nonlinear combining of laser beams in optical waveguide, Pavel M. Lukshin2,1, Univ. of New Mexico, USA. We combine multiple laser beams with the total power above critical into single diffraction-limited beam by the beam self-focusing (collapse) in the optical waveguide/fiber with the Kerr nonlinearity.

JTu3A.47 Statistical description of soliton clustering in fiber lasers with slow-gain dynamics, J. N. Kut1, Philippe Grelu2, Applied Mathematics, Univ. of Washington, USA, 1Institut Carnot de Bourgogne, Universite de Bourgogne, France. We demonstrate theoretically that the dynamic clustering of solitons observed in a variety of experiments are due to the initial phase and position of interacting solitons with the slow gain dynamics of the fiber laser.
Acousto-Optics, ppm Resolution Using Time-Resolved In-Fiber
an optical spectrum spanning from 350 nm
optical fiber pumped at 532nm. We obtained
a rectangular-core multimode microstructured
fiber, with applications in flow cytometry in
We present

Visible Supercontinuum for Flow Cytometry
JTu3A.51

Anisotropy of phase-matched third harmonic
generation in germanium-doped silica optical
fiber, Benoit Boulanger, Adrien Born, Tomo-
taka Katsum, Corinne Felix, Patrick Segonds, Kamel Berchechi, Arlen Leussow,

Liquid crystals can in-
Jeroen Beeckman, Pascal Kockaert, Tersilla

A relative
humidity (RH) detector consisting of a thin gelatin
film inserted in a Mach - Zehnder interferometer
is proposed. Due to swelling of the gelatin, by
the water vapor absorption, interference pattern
is modified and RH is measured.

Metallic nanosil array with nanowires for
multiplexed plasmonic sensor design, Taerin
Chung, KyoKeun Lee, ByoungKoo Lee, Seoul
National Univ., Republic of Korea. Metallic
nanosil array has been designed for the design
of multiplexed plasmonic sensors. A metallic
nanosil with embedded metallic nanowires gives rise to multiple peaks, resulting from
plasmonic waveguide mode.

Temperature Sensing of High Power Generator
Stator using DTS, João P. Bazzo, Felipe Mez-
zadri, Cícero Martelli, Eron W. Silva, Daniel R.
Pipa, Jean Carlos Cardozo da Silva, Federal
University of Technology - Parana, Brazil. This
approach over conventional sensors is the
possibility to identify temperature variations over
with high spatial resolution.

Mode-Selective Sensing using Asymmetric
Waveguide Junctions, gergely racz, Nikos
Baliakas, Stavros Penty, Engineering
Department, Univ. of Cambridge, UK. An
events-wave absorbing sensor based on
mode-selective asymmetric waveguide junc-
tions is proposed for the first time. The device
mitigates the common optical effeck of spurious
response in absorption sensors due to the ana-
lyte transport fluid.

IR-probes for Fourier spectrometry, Liya V.
Zhuoika, Alexandr Shymigalei, Alexandr Kor-
vekoi, Vily, Physakav, Artemy Salimakar, 
Ural Federal Univ., Russian Federation.

Theoretical Investigation of a Quasi-Distrib-
uted Current Sensor Based on Hybrid PCF,
Felipe C. Salgado, Arismar C. Soe1, Danilo
H. Spadoti, ESTI, Federal Univ. of Itajubab,
Brazil. Using hybrid optical fiber to maintain the state-of-polarization (SOP), a quasi-
distributed current sensor based on Rayleigh
coward scattering can be implemented. A
analysis of the propagation in a distributed fiber sensor

Relative Humidity Measurement with a Thin
Geilatin Film, Sergio Caikota, 1, Research,
Centro de Investigaciones en Optica, Mexixo.
A relative humidity (RH) detector consisting of a thin gelatin
film Inserted in a Mach - Zehnder interferometer is proposed. Due to swelling of the gelatin, by
the water vapor absorption, interference pattern
is modified and RH is measured.

Metallic nanosil array with nanowires for
multiplexed plasmonic sensor design, Taein
Chung, KyoKeun Lee, ByoungKoo Lee, Seoul
National Univ., Republic of Korea. Metallic
nanosil array has been designed for the design
of multiplexed plasmonic sensors. A metallic
nanosil with embedded metallic nanowires gives rise to multiple peaks, resulting from
plasmonic waveguide mode.

Temperature Sensing of High Power Generator
Stator using DTS, João P. Bazzo, Felipe Mezz-
zadri, Cícero Martelli, Eron W. Silva, Daniel R.
Pipa, Jean Carlos Cardozo da Silva, Federal
University of Technology - Parana, Brazil. This
approach over conventional sensors is the
possibility to identify temperature variations over
with high spatial resolution.
NTu4A.1 • 15:30 Invited
Integrated All-optical Memories/Switches in a Photonic Crystal Chip, Kengo Nozaki1,2, Eiichi Kuramochi1,2, Akihiro Shirya2, Shinni Matsu0,3, Yomani Sato1,3, Masaya Natomi1,2, ‘NTT Nanophotonics Center, Japan; 2NTT Basic Research Laboratories, Japan; 3NTT Photonics Laboratories, Japan. Photonic crystal nanocavities were integrated to construct multi-channel all-optical switches and memories. Successful wavelength-addressing operations for more than 25 resonant channels were demonstrated with ultralow power consumption.

NTu4A.2 • 16:00
Direct Generation of Orthogonally Polarized Photon Pairs on a Chip via Spontaneous Non-Degenerate FWM, Christian Reimer1, Lucia Caspani1, Yoann Jestin1, Matteo Clerici1,2, Marcello Ferrera1,2, Luca Razzani1, Marco Peccianti1,2, Alessia Pasquazi1,2, Brent E. Little4, Sai T. Chu5, David J. Moss6, Sai T. Chu5, David J. Moss6, 1INRS-EMT, Canada; 2The Inst. for Photonics and Advanced Sensing, Aston Univ., UK; 3Department of Physics and Astronomy, Univ. of Sussex, UK; 4Research Laboratories, Kortrijk, Belgium; 5Department of Physics, The Univ. of Chinese Academy of Sciences, Beijing, China; 6School of Electrical and Computer Engineering, RMIT Univ. Melbourne, Australia. By suppressing stimulated parametric processes, we directly generate orthogonally polarized photon pairs on a chip via spontaneous non-degenerate FWM between orthogonally polarized pumps. Photon coincidences and optical parametric oscillation are measured.

NTu4A.3 • 16:15
On-Chip Broadband Terahertz Detection via Four-Wave Mixing in Electrically Biased Silica Micro-Slits, Matteo Clerici1,2, Anna Maschorova1,2, Saed Phong Ho1,2, Marco Peccianti1,2, Alessia Pasquazi1,2, Luca Razzani1,3, Kaiji Arai1,3, Roberto Morandotti1, INRS-EMT, Canada; 2School of Engineering and Physical Sciences, Heriot-Watt Univ., UK; 3NTT Nanophotonics Research Alliance, Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia; 4Department of Physics and Astronomy, Univ. of Sussex, UK. Exploiting four-wave mixing between an optical probe and a Terahertz field in a few micrometers thick Silica sample we demonstrate broadband coherent Terahertz detection by applying a bias as low as 100 V.

SoTu4B.1 • 15:30 Invited
Designs of Large Mode Area Solid-Core Photonic Bandgap Fibers for High Power Applications, Yes Quaquemepos1, Assaad Baz1, Pierre CAUVET2, Gérard Bouwmans1, Hicham El Hamzaoui1, Emmanuel Hugonnot1, Mohamed Bouaazouli1, Olivier Vanynoo1, 1CNRS - UMR 8523 - PHALM, Univ. of Lille, France; 2Centre d’Etudes Scientifiques et Techniques d’Aquitaine, CEA, France. Photonic BandGap Fibers are interesting candidates for high power delivery and laser applications due to their specific guiding properties. Mode diameters as large as 36 µm can be obtained in a flexible Yb-doped PBGF with a bending radius of 10 cm.

SoTu4B.2 • 16:00 Invited
Photonic Bandgap Fiber Lasers and Multicore Fiber Lasers for Next Generation High Power Lasers, Akira Shirakawa1, M. Chen1, Y. Suzuki1, K. Sato2, X. Fan3, Henrik Tunnermann3, M. Karow4, C. B. Clausen1, Sidsel R. Petersen1, Thomas T. Alkeskjold2, K. Saito3, 1The Inst. for Laser Science, Univ. of Electro-Communications, Japan; 2KT Photonic A/S, Denmark; 3DTU Fotonik, Denmark; 4Research Center for Advanced Photon Technology, Toyota Technological Inst., Japan. Photonic bandgap fiber lasers are realizing new laser spectra and nonlinearity mitigation that a conventional fiber laser cannot. Multicore fiber lasers are a promising tool for power scaling by coherent beam combination.

SoTu4C.1 • 15:30 Invited
Polyelectrolyte Multilayers for Surface Functionalization: Advantages and Challenges, Alexandre Francois1, Herbert Tze Cheung Fad2, Tanya Mamo3, 1The Inst. for Photonics and Advanced Sensing, Aston Univ., UK; 2CNRS - UMR 8523 - PHALM, Univ. of Lille, France; 3Centre d’Etudes Scientifiques et Techniques d’Aquitaine, CEA, France. Polymeric multilayers are attractive coatings with interesting properties that have been used for various applications including surface functionalization for biosensing. In this presentation we will describe the standard approach and mechanisms involved in PE layer-by-layer deposition, present the advantages of such approach and the challenges it raises for biological sensing especially with respect to non-specific binding as well as few examples of application for biosensing.

SoTu4C.2 • 16:00 Invited
Peptide and Ionic Liquid Monolayers to Reduce Nonspecific Adsorption of Biofluids and Improve Sensitivity of SPR Biosensors, Jean-François Masson1,2, Emmanuel Hugonnot1, Jean-François Masson1,2, 1Universite de Montreal, Canada; 2Centre d’Etudes Scientifiques et Techniques d’Aquitaine, CEA, France. Surface plasmon resonance sensors using these monolayers are effective to detect sensitive chemicals and the challenges it raises for biological sensing especially with respect to non-specific binding as well as few examples of application for biosensing.

All technical papers are currently available for online download.
Access papers at www.osa.org/PhotonicsOPC and click on Access digest papers under Essential Links
Specialty Optical Fibers
Optical Sensors

Salon Diamant

Nonlinear Photonics

Salon Vivaldi

SoTu4B • PBG Fiber Lasers—Continued

SoTu4B.3 • 16:30
Large-Mode-Area Yb-Doped Photonic Bandgap Fiber Laser, Guancheng Gu1, Fanting Kong2, Thomas W. Hawksins1, Joshua Parsons1, Maxwell Jones1, Christopher Dunn1, Monica T. Kalchevsky-Dong1, Kurinama Saitoh1, Liang Dong1; ECE/COMSET, Clemson Univ., USA; 2Graduate School of Information Science and Technology, Hokkaido Univ., Japan. A yterbium-doped all-solid photonic bandgap fiber laser with an approximately 50μm core diameter has been demonstrated with an efficiency of ~70% and good beam quality (M2<1.2)

SoTu4B.4 • 16:45
Tunable, Continuous-wave, Single-frequency Ultraviolet Sources Based on BiB3O6, Ka-vita Devi1, Suddapalli Chaitanya Kumar1, Majid Ebrahim-Zadeh1,2, 1ICFO-The Inst. of Photonic Sciences, Spain; 2Instituto Catalana de Recerca i Estudis Avancats (ICREA), Spain. We report stable, single-frequency, cw UV sources based on single-pass and intracavity sum-frequency-generation in BiB3O6. We have generated ~68mW of cw power at 354.7nm, and demonstrate tunable wavelength coverage across 333-345nm in the UV.

SoTu4B.5 • 17:00
CdsP2 optical parametric oscillator tunable across 6-8 μm synchronously pumped by a Ti:sapphire laser, Venkata Ramaiah Badarla1, Srikanth Sugavanam2, Simon Fabri3, Son Thai Le1, Sergey I. Kablukov1,4, Ian Lobachi1, Sergey Khorev5, Dmitry V. Churkin6,1, 1Aston Inst. of Photonic Technologies, Aston Univ., UK; 2Inst. of Automation and Electrometry SB RAS, Russian Federation; 3Zecotek Photonics, Inc., Canada; 4Novosibirsk State Univ., Russian Federation. We report high-resolution real-time measurements of spectral evolution in a fibre. The proposed and method combines optical heterodyning with a technique of spatio-temporal intensity measurements revealing fast spectral dynamics of cavity-based systems.

SoTu5A • 16:30
All-Silicon Based Terahertz Integrated Components: The Next Generation of Terahertz Imaging Systems, Richard Al Hadl1, Janusz Gropi1, Wolfgang Foerster1, Stefan Malz1, Hans M. Keller1, Neelanjan Sarmah1, Ullrich R. Pfeiffer1; 1HCT, Univ. of Wuppertal, Germany. This paper summarizes state-of-the-art terahertz detectors and sources in silicon technologies for terahertz imaging applications beyond 0.3 THz. It reviews ongoing research on a compact solution for handheld terahertz imaging applications.

SeTh5A.2 • 17:00
Invited
Terahertz Detection with Field-effect Transistors: Intrinsic versus Device Sensitivity Limits, Alvydas Lasukaitis1,2, Sebastian Boppela1, Maris Bauer1, Justinas Zdanevičius1, Jonas Matsukas1, Viktor Krazer1, G. Roskos1, Johann Wolfgang Goethe Universität Frankfurt, Germany; 1 Vilnius Univ., Lithuania. We discuss on fundamental and practical limitations for terahertz detection with field-effect transistors. The presentation compares expected and achieved sensitivities for silicon MOSFETs and AlGaN/GaN HEMTs also predicts performance for carbon nanotube and graphene rectifiers.

SeTu5A • 17:00
Invited
High Temperature Sensing with Fiber Bragg Gratings in Sapphire Fibers, Tino Elsmann1, 1Fiber Optics, Leibniz Inst. of Photonic Technology, Germany. We present fiber Bragg gratings in sapphire fibers for high temperature applications. With those gratings temperature measurements up to 1850°C are carried out inside an inductively heated MoSiO2 fabrication stage.

SeTu5B • 17:00
Invited
Metal-packaged Fiber Bragg Gratings for Structural Health Monitoring, Grzegorz Fusiak1, Pawel Nowaczas1, Michael Johnston1; 1Univ. of Strathclyde, UK; 2EDF Energy, Nuclear Generation, UK. The application of metal-packaged fiber Bragg grating sensors for structural health monitoring is discussed based on an example of an instrumented steel tendon subjected to changing temperature and mechanical loading.
Specialty Optical Fibers

quantum efficiency by Raman-driven molecular
uum radiation is frequency up-shifted with ~50% of Erlangen-Nuremberg, Germany.

We numerically and experimentally explore wave emission, and multi-mode transient Raman emissions. We observed multi-mode and multi-asymmetric wave propagation in gas-filled kagomé-PCF. These include self-focusing, intermodal dispersive-wave emission, and multi-mode transient Raman frequencies.

We made near-field measurements, which external fields are used to charge floatg waveguides. Here, we report a novel indirect method in the use of femtosecond pulses to produce Maker Fringes in poled silica structures is studied. The grating structure is written in single mode fiber using the point-by-point femtosecond laser technique.

Efficient Tunable Frequency Up-Conversion via Molecular Modulation in Gas-Filled Hollow-Core PCF, Sebastian T. Bauerschmidt1, Barbara M. Traubold1, David Novoa1, Amir Abdolvand1, Philip Russell1, 2Max Planck Inst. for the Science of Light, Germany; 3Center for Nanophotonics, FOM Inst. AMOLF, Netherlands; 4Thales Research and Technology, France. We demonstrate time-resolved measurements of soliton fission in nanophotonic waveguides for the first time. Using near-field measurements, we directly observe the nonlinear pulse evolution along the 1.5 millimetre device in-situ.

Invited

SofW1B.2 • 09:00
New Pump and Signal Combiners, Hakam S. Sayinc1, Thomas Tregge1, Gabriel Pelegavia-Bonilla2, Katharina Hausmann1, Henrik Tünneman1, Peter Wessels1, Jörg Neumann1, Dietmar Kracht1; Laser Development, Laser Zentrum Hannover e.V, Germany; Centre for Quantum Engineering and Space-Time Research, Germany. We used numerical methods to study light coupling between non identical fibers. Our investigations enabled us to develop combiners which represent a significant improvement beyond the state of the art.

Invited

SoW1B.3 • 09:30
Vanishing Core Optical Waveguides for Coupling, Amplification, Sensing, and Polarization Control, Victor I. Kopp1, Jonghyun Park2, Mitchell Wlodawski1, Eric Hubner1, Jonathan Singer1, Dan Neugroschl1; Chiral Photonics Inc, USA. Tapered optical waveguides utilizing a “vanishing core” concept possess unique properties that make them useful for dense multichannel coupling, spatial division multiplexing for communications and sensing, polarization control, and amplification.

Invited

SoW1C • 08:30
A Fiber Bragg Based Semi Distributed Pressure Sensor System for In-vivo Vascular Applications, Remco Nieuwland1, Martin Lemmen1, Raoul Oosterbrink1, Jan Schreuder1, Jostheusweg 1, TNO, Netherlands; CD Leycom, Netherlands. An overview of a fiber Bragg based sensor system, developed for in-vivo vascular pressure and temperature sensing, is presented. The focus is on sensor miniaturization and interrogator optimization to reach a viable sensor system.

Invited

BW1D.3 • 09:15
Femtosecond Maker Fringe measurement of discrete non-linearities in poled multi-layer silica structures, Pouyan Nasir1, Kasia Tadzi1, Christopher Smelser1, Christopher Smelser1, Department of Physics, University of Toronto, Canada; 2EPSRC Centre for Doctoral Training in Photonic Devices, Carleton Univ., Canada. In this presentation we discuss the use of femtosecond pulses to produce Maker Fringes in poled silica structures is studied. The impact of the discrete nature of the non-linearity in multi-layer structures is modeled.

Invited

BW1D.4 • 09:30
Guided Acoustic-Wave Brillouin Scattering in Few-Mode Fibers, Roland Ryf1, Rene-Jan Esca- mbre1, Robert W. Tkach1, Andrew R. Chraplyvy1, David W. Peckham2, Alan H. McCurdy2, Robert Lingle1; Bell Labs, Alcatel-Lucent, USA; 2OFS, USA. We measured the guided acoustic-wave Brillouin scattering in a few-mode fiber that supports LP01 and LP11 modes. We observed a strong correlation between the acoustic modes and optical intramodal and intermodal Brillouin scattering.
### NW1A • Temporal and Spatiotemporal Effects I—Continued

**NW1A.5 • 09:45**
**Mid-IR Few-Cycle Pulse Generation by Two-Pulse Collision,** Ayhan Demircan¹, Shalva Amiranashvili², Carsten Bree³, Uwe Morgner², Günter Steinmeyer⁴; ¹Leibniz Univ., Hannover, Germany; ²Weierstrass Inst., Germany; ³Max-Born Inst., Germany. We propose a novel adjustable compression scheme by two-color pumping, enabling a coherent pulse source with pedestal-free few-cycle pulses in the mid-infrared regime directly in one stage, without necessity of an external compensation scheme.

### BW1D • Poling and Miscellaneous—Continued

**BW1D.5 • 09:45**
**Evaluation of Impact of Beam Size on Fibre Bragg Grating Fabrication,** Adenowo Gbadebo¹, Elena Turitsyna¹, John A. Williams¹; ¹Aston Inst. of Photonics Technologies, Aston Univ., UK. We show the relationship between writing beam width and period chirp rate during fibre Bragg grating fabrication and the associated visibility constraints.

### SeW1C • Optical Fiber Sensors I—Continued

**SeW1C.5 • 09:45**
**Distributed measurement of vibrations in a ramified fiber structure using phase sensitive optical time domain reflectometry and wavelength routing concepts,** Juan Pastor Graells¹, Hugo F. Martins¹, Sonia Martin-Lopez¹, Miguel Gonzalez Herraez¹; ¹Electronics, Universidad de Alcalá, Spain. We show the possibility of fully distributed measurement of vibrations in a complex fiber topology using phase-sensitive optical time-domain reflectometry (ΦOTDR) and wavelength routing, allowing monitoring of complex structures with ramifications.

### 10:00–10:45 Exhibits and Coffee Break, Salon Verdi
We prove the formation of dispersive shocks. Describing spectral solitons and incoherent temporal potential in these fibers.

We have developed an interferometric optical fiber sensor. The instability is pumped by two waveguide modes: the wave turbulence kinetic equation, the weak Langmuir turbulence equation describing spectral solitons and incoherent dispersive shocks.

We observed polarization modulation instability in gas-filled photonic crystal fibers, Raman-induced soliton oscillations and tunneling in silica and germanate glasses. Solitons can show oscillations and tunneling. Coupler characteristics are reproduced by a waveguide model and the weak Langmuir turbulence equation describing spectral solitons and incoherent dispersive shocks.

We have demonstrated to be robust and reliable tools for one, two and three dimensional imaging of physical phenomena in industrial monitoring. Real world results are presented.

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Understanding the fission of higher-order NW2A.7 • 12:30

out of the parential N-soliton temporal slot.

Step-like ejections of fundamental quasi-solitons higher order dispersion reveals a mechanism of

born, Germany.

A detailed study of the N-soliton fibers. Our theoretical model shows an excellent

USA.

Krupa1, Alexis Labruyere 1, Badr M. Shalaby 1,3, Accevs2, Daniele Modotto 2, Katarzyna 1

1Univ. of Paderborn, Germany; 2Northrop Grumman Aerospace Systems, USA; 3State Key Laboratory of Electronic Thin Films and Integrated Devices, Univ. of Electronic Science & Technology of China, China; 4State Key Laboratory of Optical Thin Films and Integrated Devices, Univ. of Electronic Science & Technology of China, China; 5City Univ of Hong Kong, Hong Kong. Graphene based surface plasmonics in microfiber multimode interferometer is proposed for realization of sub ppm sensitive, temperature independent, and compact fiber-optic gas sensor.

Multiple Equilibrium States of Soliton Mol-

NW2A.5 • 12:00

Continued

Intermodal group delay and >~29 dB/m higher order modes suppression.

Continued

and Fiber Measurements—

SoW2B.5 • 12:00

Quantitative Mode Quality Characterization in a Leakage Channel Fiber with 100 μm Core Diameter, Fanbing Kong1, Guancheng Gu1, Thomas W. Hawkins1, Joshua Parsons1, Maxwell Jones1, Christopher Dunn1, Monica T. Kalachevsky-Ong1, Stephen P. Palese1, Eric Cheung1, Liang Dong1; ECE/COMSET, Clemson Univ., USA; 2Northrop Grumman Aerospace Systems, USA. We demonstrate a novel white-light interferometry with ~20 fs temporal resolution for quantitative mode characterization in a 100 μm core leakage channel fiber, obtaining ~55 fs/m intermodal group delay and >~29 dB/m higher order modes suppression.

SoW2B.6 • 12:15

Photodarkening: Investigation, Measurement and Standards, Stefano Taicche1, Hyvöe Ge-

bavi1, Ricardo Piccoli1, Thierry Robin1, Laurent Lablond1, Benoit Cadiot1, Achille Monteville1, David Mechlin1, Daniel Mileseanu1, Thomas Brand1, Lasse Lev1k1, Francois Salin1, Andy Malinowski1, Ulrich Hefter1, Tim Durand1, Udo Klotsback1; 1Singleton Park, Swansea Univ. - College of Engineering - Multidisciplinary Nanotechnology Centre, UK; 2NFiber S.A.S, Rue Paul Sabatier, France; 3Perfas, France; 4Politecnico di Torino, Corso Duca degli Abruzzi, Italy; 5DILAS s.r.l., Germany; 6NKT Photonics, Denmark; 7SOLE, France, 8SPI, UK, 9ROFIN, Germany; 10Fraunhofer IWS, Germany. This paper reports on the work done on photodarkening by our consortium. Particular emphasis is given to mitigate and measure photodarkening in high-quality Al-silicate fibers with high doping concentration.

SeW2C.5 • 12:15

Non-uniform shape sensor based on FBGs inscribed in multicore optical fibers, David Barama1, Iana Gasulla1, Salvador Sales1; 1TEAM UPR, Universitat Politècnica de València, Spain. A multi-point curvature sensor composed by an array of fifteen wavelength multiplexed FBGs has been inscribed in a multicore optical fiber and is demonstrated in order to measure non-uniform curvatures with a resolution of 0.5 ± 0.3 m⁻¹

SeW2C.6 • 12:30

Effects of Polishing Depth and Surface Roughness on D-Type F/O SPR Sensor Response, Burcu Guleryuz1, Mustafa M. Ainal1, ‘Materials Inst., TUBITAK Marmara Research Center, Turkey; 2Dept. of Metallurgical and Materials Eng., METU, Turkey. D-type fiber optic SPR sensors are developed at different polishing depths and surface roughness to study their responses to surrounding refractive index change. The sensors’ sensitivities are determined in the RI 1.33 and 1.47.
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<th>Session</th>
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<td>NW3A.1</td>
<td>Fiber Sensors and Bragg Gratings</td>
<td>Presenters: Timothy Birks; Univ. of Bath, UK</td>
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<td>Bipolar Optical Propagation in Nematic Liquid Crystals</td>
<td>Presenters: Engi, Univ. of Franche-Comte, France</td>
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<td>Brillouin Light scattering from surface acoustic waves in photonic microwires</td>
<td>Presenters: Thibaut Sylvestre; Univ. of Franche-Comte, France</td>
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<td>Universal Three-Dimensional Optical Logic</td>
<td>Presenters: Logan Wright; William H. Rennenger; Frank W. Wise; School of Applied and Engineering Physics, Cornell Univ., USA</td>
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<td>Optical Fiber curve sensing based on single mode - 7 core - single mode fiber structures</td>
<td>Presenters: Guillaume Sabatier; Amy Van Newkirk; Jose E. Antonia-Lopez; Axel Schulzgen; Rodrigo Amezcua-Correa; Centro de Investigaciones en Optica AC, Mexico; Centro de Investigaciones en Optica AC, Mexico</td>
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<td>NW3B.2</td>
<td>Optical Fiber curvature sensors based on high resolution nonlinear endomicroscopy</td>
<td>Presenters: Flavie Braud; Tigran Mansuryan; Guillaume Ducurthual; Remi Habert; Alexandre Kudinski; Frederique Lourdoue; Univ. Lille, France; Laboratoire XLIM, France</td>
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<td>NW3C.1</td>
<td>Post-processing Fibers for Sensing Applications</td>
<td>Presenters: Aron Fraszo; INESC Porto, Portugal</td>
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<tr>
<td>NW3C.2</td>
<td>Optical Fiber curvature sensors based on high resolution nonlinear endomicroscopy</td>
<td>Presenters: Label-free two-photon fluorescence imaging. Łańcuchy fotoniczne, Unia. Based on the integration of Ag nanostructures with microfibers, we demonstrate a hybrid photon-plasmom nanostructure optical sensor for detecting ammonia gas with high sensitivity and fast response.</td>
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<tr>
<td>NW3C.3</td>
<td>Optical Fiber curvature sensors based on high resolution nonlinear endomicroscopy</td>
<td>Presenters: Tapanes chemical etching is the opening up of new applications.</td>
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<td>NW3D.1</td>
<td>Tailored Draw Tower Gratings (DTG`s) and their Application in Sensing Technologies</td>
<td>Presenters: Eric Lindner; Albert Einstein Str. 9, Inst for Photonic Technologie el Jena, Germany</td>
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<tr>
<td>NW3D.2</td>
<td>Tailored Draw Tower Gratings (DTG`s) and their Application in Sensing Technologies</td>
<td>Presenters: Eric Lindner; Albert Einstein Str. 9, Inst for Photonic Technologie el Jena, Germany</td>
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<tr>
<td>NW3D.3</td>
<td>Tunable fiber Bragg gratings at 1.3 microns to improve the characterization of InAs Quantum Dot emission</td>
<td>Presenters: Guillaume Muñoz-Matutano; David Rivas; Amelie Ricchiuti; David Barrera; Carlos R Fernandez - Poussa; Juan Martinez-Pastor; Luca Seravalli; Giovanna Trevisi; Paola Frigeri; Salvador Sales; ITEAM, Universidad Politecnica de Valencia, Spain; ICMUV, Universidad Politecnica de Valencia, Spain; IC, Miguel Hernandez, Spain; CNR-EMI, Univ. of Parma, Italy. Tunable FBGs at 1.3 microns has been employed to improve the characterization of QD compared to conventional grating monochromators. Using this technique, single metamorphic InGaAs QDs has been characterized by time-resolved photoluminescence.</td>
</tr>
</tbody>
</table>
Specialty Optical Fibers & Applications

NW3A.5 • 15:00
A Highly Linear All Optical Gate Based on Coupled Photonic Crystal Cavities, Gregory Moline1, Alfredo De Rossi2, Gaëlle Lelouch3, Aude Martin1, Laurent Bramer1, Mathilde Gay2, Sylvain Combin1, Jérôme Genet1,2, Salvador Sales1, Kazuaki Sakoda1,2, 3Institut Mediterrani d’Estudis Avançats, Javaloyes2, Salvador Balle1, Massimo Giudici1, University of the Basque Country (UPV/EHU), Bilbao, Spain; 4CNRS-Université de Bourgogne, France.

SoW3B.5 • 15:30
Specialty Fibres and Components for Advanced Microscopy, Laurie Lagoo1, Costantino Corbari2, Walter Margulis3, Alexey Gladyshev4, Yves Hernandez5, Claire Dangis6, Applied Photonics, Multitel Inc, Belgium; 2Optoelectronics Research Centre, Univ. of Southampton, UK; 3Acro, Accro Swedish ICT, Sweden; 4Several research groups, 5National Inst. for Materials Science, Japan; 6National Inst. for Materials Science, Japan. We investigate fibre basic functions like SHG and pulse gating. We achieved 5.2% conversion efficiency into green light with 50 W peak pump power and demonstrated in-fibre pulse gating at 1 MHz repetition rate.

NW3A.6 • 15:15
Optical Flip-Flop Memory and Routing Operation Based on Polarization Bistability in Optical Fiber, Pierre-Yves Bony1, Massimiliano Guasoni1, Elie Assémat1, Stéphane Pitois1, Dominique Sugny1, Antonio Picozzi1, Hans-Rudolf Jauss1, Julien Fatome1, OMR / SLCO, Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), France. Thanks to a polarization bistability and associated hysteresis cycle generated in optical fibers through a counter propagating four-wave mixing process, we prove the proof-of-principle of an optical flip-flop memory and a 10Gbit/s routing operation.

NW3A.7 • 15:30
All-Fiber Based Chaotic Polarization Scrambler, Massimiliano Guasoni1, Pierre-Yves Bony1, Dominique Sugny1, Antonio Picozzi1, Hans-Rudolf Jauss1, Julien Fatome1, CNRS-Université de Bourgogne, France. We present a fiber-based polarization scrambler based on the nonlinear interaction between a signal and its backward replica generated and amplified by a reflective loop. The output polarization dynamic turns out to be chaotic.

NW3A.8 • 15:45
How Laser Localized Structures evolve out of Passive Mode-Locking, Mathias Marconi1,2, Jüri Javaliyev3, Salvador Balle1, Massimo Grudici2, Mathias Jovanovic3, University of Belgrade, Serbia; 2Institut Non-Linéaire de Nice, France; 3Departamento de Fisica, Universidade de las Illes Baleares, Spain; 4Institut Mediterrani d’Estudis Avançats, Spain. We investigate the relationship between passive mode-locking and the formation of temporal localized structures in the output of a laser, allowing for individual pulse addressing and arbitrary low repetition rates.

SoW3B.6 • 15:45
Origin of Extremely Small Bending Loss in Polaritonic Nano Fibers of Thiacyanine Molecules, Hirokazu Takada, Kazuaki Sakoda1, National Inst. for Materials Science, Japan. We calculated the dispersion relation and complex propagation constant of curved thiacyanine nanofibers by a finite-difference frequency-domain method with absorbing boundary conditions and reproduced their extremely small bending loss.

SoW3B.7 • 15:45
Fibre Optic Hydrogen Sulphide Gas Sensor Utilizing Cu/ZnO Nanoparticles, Satyendra K Mishra1, Charul Varshney2, Banish D Gupta1, National Inst. for Materials Science, Japan. In this paper we report the fabrication and characterization of a fibre optic H2S gas sensor utilizing zinc oxide (ZnO) nanoparticles. The sensor works on wavelength modulation scheme. The resonance wavelength increases with gas concentration.

SoW3B.8 • 15:00
Chemical Composition Gratings, Michael Fokine1, Patrick Holmberg1, Dept of Applied Physics, Kungliga Tekniska Hogskolan, Sweden. High-temperature stable fiber Bragg gratings will be reviewed with an emphasis on recent material studies using Chemical Composition gratings.

SoW3C.4 • 15:00
Lateral Force Sensor Based on a Long Fiber Bragg Grating and Time Waveform Analysis, Amelia L Irchiu1, David Benmer;1, Koji Norsaka1,2, Salvador Sales1,3, ETM Research Inst., Spain; 2Kochi Univ. of technology, Japan. A novel sensor based on a 10 cm-long fiber Bragg grating and a simple scheme is proposed, dedicated to position sensing and detection of a temperature gradient with a 1 nm spatial resolution.

SoW3C.5 • 15:15
Temperature Gradient Sensor Based on a Long Fiber Bragg Grating and Time Waveform Analysis, Amelia L Irchiu1, David Benmer;1, Koji Norsaka1,2, Salvador Sales1,3, ETM Research Inst., Spain; 2Kochi Univ. of technology, Japan. A novel sensor based on a 10 cm-long fiber Bragg grating and a simple scheme is proposed, dedicated to position sensing and detection of a temperature gradient with a 1 nm spatial resolution.

SeW3C.6 • 15:30
Long-term reliability of semiconductor light sources for fiber-optic current sensors, Miklos Lenner1, Lin Yang2, Andreas Frank1, Klaus Bohmer1, Corporate Research Centre, ABB Switzerland Ltd, Switzerland. The wavelength stability of the light source is crucial for the long-term accuracy of fiber-optic current sensors. Accelerated life tests over extended time periods demonstrated excellent reliability of 1310 nm superluminescent light emitting diodes.

SoW3C.7 • 15:45
Fibre Optic Hydrogen Sulphide Gas Sensor Utilizing Cu/ZnO Nanoparticles, Satyendra K Mishra1, Charul Varshney2, Banish D Gupta1, National Inst. for Materials Science, Japan. In this paper we report the fabrication and characterization of a fibre optic H2S gas sensor utilizing zinc oxide (ZnO) nanoparticles. The sensor works on wavelength modulation scheme. The resonance wavelength increases with gas concentration.

SeW3D.4 • 15:00
Simultaneous Force and Temperature Measurement using Optical Microfiber Asymmetrical Interferometer, Yuan Gong1, Yun-Jiang Rao1,2, Univ. of Electronic Science & Tech China, China. A novel optical microfiber asymmetric Fabry-Perot interferometric (MAFP) sensor is developed for simultaneous measurement of force and temperature. Sensitivities of 9.8 pm/°C and 0.025 dB/µN are obtained experimentally.
Specialty Optical Fibers

16:30–18:00
NW4A • Temporal and Spatiotemporal Effects II

President: Stefano Minardi; Inst. of Applied Physics, Germany

NW4A.1 • 16:30
Theoretical Description of Pulse Evolution and Phase Sensitive Amplification in Silicon Waveguides, Yanbing *(Young) Zhang1, Chad A. Babin1, Catherine Baskiotis1, Jayanta Sahu1; 1OFS Laboratories, USA.

We demonstrate a 19-μm-diameter core, single-mode, hollow-core, PRISM fiber, with greater than 60nm bandwidth, for multiwatt CW and pulsed fiber lasers for commercial applications are reviewed, in which output in excess of one hundred lasers per week is required.

NW4A.2 • 16:45
Ultra-low-energy hybrid light-matter temporal and spatio-temporal solitons, Dmitry V. Skryabin1, Paul Walker2, Dmitry Khrizhanovskii1, Mauris Skolnick1, Luís Tinkler1, Alex Yulin2; 1Physics, Univ. of Bath, UK; 2Graduate School of Sci. & Techn., Shizuoka Univ., Japan.

We report first experimental and theoretical studies of a new type of temporal solitons and spatio-temporal bright-dark solitons in strongly excited-polariton planar waveguides.

NW4A.3 • 17:00
Collapsing Arrest in Instantaneous Kerr Media via Parametric Interactions, Alessia Pasquazi1, Marco Peccianti1, Matteo Cenci2, Claudio Conto3; 1Microstructured Fiber and Devices, Fibercore Limited, UK; 2Advanced Laser Laboratory, SPI Centre, Univ. of Southampton, UK.

Femtosecond laser exposure of silica in the non-ablative regime induces localized volume changes resulting in a stress-field surrounding laser affected zones. Here, we review these effects and illustrate potential applications of laser-induced controlled stress-state in silica.

NW4A.4 • 17:15
Spontaneous degenerate four-wave mixing in hybrid photonic crystal fibers, Sidsel R. Petersen1, Jesper Leergaard1, Thomas T. Alkessjold1; 1Technical Univ. of Denmark, Denmark, 2KTH Photonic A+S, Sweden.

Frequency conversion through spontaneous degenerate four-wave mixing in large mode area hybrid photonic crystal fibers is considered. Intra- and intermodal four-wave mixing across photonic bandgaps is observed, with generation efficiencies up to 17%.

NW4A.5 • 17:30
Random distributed feedback fiber laser of ultimate efficiency, Ilya D. Vatnik1, Dmitriy V. Churkin1, Eugene V. Podicilov1, Sergey A. Babin1; 1Inst. of Automation and Electrometry SB RAS, Russian Federation; 2Aston Inst. of Photonic Technologies, Aston Univ, UK; 3Novosibirsk State Univ., Russian Federation.

We demonstrate a random fiber laser of ultimate efficiency. More than 2 Watts are generated from 0.5W of pump power over the generation threshold. At higher power, an optical efficiency corresponds to the quantum limit.

NW4B • Novel Fiber Designs for Fiber Lasers

16:30–18:00
SeW4B • Optical Fiber Sensors IV

President: Mario F.S. Ferreira; Universidade de Aveiro, Portugal

SeW4B.1 • 16:30
Invited
Challenges in Designing Fibers and Operating High Power CW and Pulsed Fiber Lasers, Fabio Ghezzi1,2, Matt Welsh1, Andrew Malinowski1, Nikita Daga1,2, Cristoph A. Codemard1,2, Michael K. Durkin1,2, Mikhail N. Zervas1,2; 1SPI Lasers UK Ltd., UK; 2Advanced Laser Laboratory, SPI Lasers UK Ltd., UK; 3Optoelectronics Research Centre, Univ. of Southampton, UK.

Challenges in design of high power CW and pulsed fiber lasers for commercial applications are reviewed, when output in excess of one hundred lasers per week is required.

SeW4B.2 • 17:00
All-solid chalcogenide microstructured optical fibers with photonic band gap propagation, Johann Trolle1, Celine Caillaud1, Gilles Renversez1, Laurent Brilland1, David Mechini1, Jean-Luc Adam1, Université de Rennes 1, France; 2Univ. of Aix Marseille, France; 3PERFS, France.

We report first experimental and theoretical studies of a new type of temporal solitons and spatio-temporal bright-dark solitons in strongly excited-polariton planar waveguides.

SeW4B.3 • 17:15
Large mode area pixelated trench fiber, Deepak Jain1, Catherine Baskiotis1, Jayanta Sahu1; 1OFS Laboratories, USA; 2Advanced Laser Laboratory, SPI Centre, Univ. of Southampton, UK.

Femtosecond laser exposure of silica in the non-ablative regime induces localized volume changes resulting in a stress-field surrounding laser affected zones. Here, we review these effects and illustrate potential applications of laser-induced controlled stress-state in silica.

SeW4B.4 • 17:30
Invited
Simultaneous Temperature and Strain Measurement by Using a Power-Interrogated Long-Period Fiber Grating, Hongpu Li1,2, Peng Wang1, Kesuke Hoshikawa1; 1Graduate School of Engineering, Shizuoka Univ., Japan; 2Graduate School of Sci. & Techn., Shizuoka Univ., Japan.

A novel power-interrogated LPG sensor that allows for simultaneous measurement of temperature and strain is proposed and experimentally demonstrated. The proposed LPG here is simultaneously used as both the sensing and the interrogating element.

SeW4C • Optical Fiber Sensors I

16:30–18:00
SeW4C • Optical Fiber Sensors IV

President: Mario F.S. Ferreira; Universidade de Aveiro, Portugal

SeW4C.1 • 16:30
Invited
Quantum Key Distribution using Phase Encoding in Double-Pass Silica-on-Silicon Circuits with Grating Reflectors, Martin Kristensen1, Johan Maack1,2, Thomas Balle1, Jacob Selchau1,2; 1Aarhus Universitet, Denmark. We have realized quantum key distribution over 50 km with phase encoding in silica-on-silicon circuits including Bragg grating filters allowing compact size and multichannel operation. The circuits are thermally adjusted to minimize crosstalk.

SeW4C.2 • 17:00
Multiplexed High Temperature Sensor Based on Multicore Fiber, Jose E. Antonio-Lopez1, Guillermo Salceda-Delgado1,2, Amy Van Niewkirk1, Axel Schulgen1, Rodrigo Amezcu-Correa1; 1Microstructured Fiber and Devices, CREOL, USA; 2Optical Fibers, CIO, Mexico.

A novel temperature sensor based on special multicore fiber (MCF) is studied. Experimental results show a repeatable and stable sensor operation at high temperatures with the capability to multiplex several devices in a single chain.

SeW4C.3 • 17:15
Ultrafast Ultrasonic Displacement Sensor Based on Photonic Crystal Fiber Modal Interferometer, Rajan Jha1, Jitendra Dash1, Sumit Dass1,2; 1,2IIT Bhilwara, India. An ultrasonic displacement sensor based on photonic crystal fiber modal interferometer using an external mirror is proposed. The mirror is displaced by a nanopositioner and the sensitivity of the sensor is 43 pm/nm.

SeW4C.4 • 17:30
Simultaneous Temperature and Strain Measurement by Using a Power-Interrogated Long-Period Fiber Grating, Hongpu Li1,2, Peng Wang1, Kesuke Hoshikawa1; 1Graduate School of Engineering, Shizuoka Univ., Japan; 2Graduate School of Sci. & Techn., Shizuoka Univ., Japan.

A novel power-interrogated LPG sensor that allows for simultaneous measurement of temperature and strain is proposed and experimentally demonstrated. The proposed LPG here is simultaneously used as both the sensing and the interrogating element.

SeW4D • Femtosecond Laser Induced Material Modifications to Control Stress-state in Glass, Yves Belloquard1,2; 1Mechanical Engineering Dept, Eindhoven Univ. of Technology, Netherlands.

Femtosecond laser exposure of silica in the non-ablative regime induces localized volume changes resulting in a stress-field surrounding laser affected zones. Here, we review these effects and illustrate potential applications of laser-induced controlled stress-state in silica.
### NW4A • Temporal and Spatiotemporal Effects II—Continued

**NW4A.6 • 17:45**
Reducing Raman Noise in Parametric Frequency Conversion by Varying the Input Pump Power, Søren M. Friis1, Lasse Mejling1, Karsten K. Rottwitt1; 1Technical Univ. of Denmark, Denmark. The phase-matching condition of parametric frequency conversion and the impact of Raman scattering depend on the power of two separate pumps. We show that Raman noise is reduced by asymmetrically varying the pump powers.

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### SoW4B • Novel Fiber Designs for Fiber Lasers—Continued

**SoW4B.5 • 17:45**
Supercontinuum Generation in a Chalcogenide Hybrid Microstructured Optical Fiber, Hiroyasu Kawashima1, Tongle Cheng1, Morio Matsumoto2, Takashi Misumi1, Takenobu Suzuki1, Yasutake Ohishi1; 1ofmlab, Japan; 2Furukawa Denshi Co., Ltd., Japan. The flat and broadband supercontinuum generation from 950 to 3350 nm in a chalcogenide hybrid microstructured optical fiber was obtained when it was pumped by a 2300 nm femtosecond laser.

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### SeW4C • Optical Fiber Sensors IV—Continued

**SeW4C.5 • 17:45**
Self-Power Wireless Fiber Optic Sensor, Edgar Mendoza1, Yan Esterkin1, Connie Kempen1, Sunjian Sun1; 1REDONDO OPTICS, USA. This paper describes recent progress towards the development of a lightweight, high-speed, and self-powered wireless fiber optic sensor structural health monitor system suitable for the detection of structural damage in advanced composite materials.

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### BW4D • Femtosecond Writing and Miscellaneous—Continued

**BW4D.4 • 17:45**
Time-domain optical signal processing based on discrete space-to-time mapping in cascaded co-directional couplers, Hamed Pishvai Bazargani1, Reza Ashrafi1, Jose Azana1; 1INRS, Canada. A novel optical signal processing scheme based on cascaded co-directional couplers is proposed and numerically demonstrated. The proposed approach can overcome important limitations of grating-assisted coupler structures.
08:30–10:00
**NTh1A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modelling**
*Presider: Goëry Genty; Tampere Univ. of Technology, Finland*

**NTh1A.1 • 08:30**
Saturation of the Kerr effect in carbon disulfide, Georges Boudaïb1,2, Valentin Besse1, Hervé Leblond1, Yvan Ackermann1, Université d’Angers, France. Accurate measurements of the nonlinear index in carbon disulfide shows a unusual saturation law of the Kerr effect which can be used to build a model of light propagation describing the filamentation in this liquid.

**NTh1A.2 • 08:45**
Multi-stability and polariton solitons in microcavity polaritonic wires, Dmitry V. Skryabin1, Gaby Slavcheva1, Andrey Gorbach1, Alex Pimenov1, Physics, Univ. of Bath, UK; 2WIAS, Berlin, Germany. We present theoretical study of non-linear effects in microcavity polaritonic wires. We report that typical microcavity bistability is replaced with multi-stability, parametric generation and dynamics of polariton solitons in the resonator wires.

**NTh1A.3 • 09:00**
Dissipative Vectorial Solitons in Semiconductor Lasers, Julien Jalayoles1, Mathias Marconi1, Stephane Barland1, Salvador Bale1, Massimo Giudici2, 1Institut non LINéaire de Nice, France; 2Mediterranean Inst. for Advanced Studies, Spain. Nonlinear polarization dynamics of VCSELs with a long-delay external cavity leads to vectorial dissipative solitons. The large temporal aspect-ratio enables the observation of multiple independent and/or bound solitons within the same roundtrip.

**NTh1A.4 • 09:15**
Nonlinear Optomechanical Patterns and Dissipative Solitons, Guillaume Labeyrie1, Enrico Tesi1, Pedro Gomes1, Gian-Luca Oppo1, Willie J. Firth1, Gordon Robb1, Aidan Arnold1, 1Institut Non Linéaire de Nice, France; 2Physics, Univ. of Strathclyde, UK; 3Consultant, Germany; 4AAMS Aarhus School of Marine and Technical Engineering, Denmark. The overlap with the water vapour band comes the challenge of optical detection of NO₂ by ship engines. Careful optical filtering over - predicts of air pollutants emitted through a fluctuating gas-liquid interface based on wavefront correction is presented. Experimental methods, adaptive optical components, simulations and applications are described.

**NTh1B • 08:30**
**SoTh1B.1 • 08:30**
Powder-sintering technique for high-power Fiber Lasers, Kay Schuster1, Stephan Grimm1, Birgit Müller1, Martin Leich1, Jan Delith1, 1IPHT, Inst. of Photonic Technology, Germany. A new approach for silica laser materials is presented. The technology is based on reactive powder doping, sintering and vitrification and yields in homogeneity of about 10-4.

**SoTh1B.2 • 09:00**
Termination of Special Optical Fibers for their Integration in High Performance Laser Systems, Pascal Duprez1, Rue FrankJos Mitterrand, Alphanov, France. A large variety of special optical fibers are employed in an increasing number of applications. Integrating these high performing fibers requires specific expertise. Technologies exploited to prepare such fibers for specific applications will be reviewed.

**SoTh1B.3 • 09:30**
Cocaine detection in liquid using a fibered platform and a mid-infrared quantum cascade laser, Grégoire M. Smolik1,2, Lubos Hvozdara1, Joa Di Francesco1, Pierre Jouy1, Yargo Boretti1, Kerstin Hans1, Markus W. Sigrist1, Jérôme Fass1, Hans Peter Hering1, 1Optics & Photonics Laboratory, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland; 2Inst. for Quantum Electronics, ETH Zürich, Switzerland. A miniaturized, trace level sensor for cocaine is presented. A quantum cascade laser emitting at 1720 cm⁻¹ is coupled to a fibred absorption flow-cell. A detection limit lower than 250 ng/mL (84 ppb) is reported.

**SoTh1C • 09:00**
**SeTh1C.1 • 08:30**
Chalcogenide optical fibers for mid-infrared sensing: state of the art and future strategies, Bruno Bureau1, Catherine Bousard-Pfeifer1,Virginie Nazabal1, Jean-Luc Adam1, Jacques Lusas1, 1Glass and Ceramic team, IONC-CSR-CNRS 6226, Univ. of Rennes, France; 2Chalcogenide glasses optical fibers are matchless devices to carry out Fiber Evanscent Wave Spectroscopy in order to collect the mid-infrared signature of most molecules and bio-molecules. Promising results and future strategies will be presented.

**SeTh1C.2 • 09:30**
Chalcogenide optical fibers for mid-infrared sensing: state of the art and future strategies, Bruno Bureau1, Catherine Bousard-Pfeifer1, Virginie Nazabal1, Jean-Luc Adam1, Jacques Lusas1, 1Glass and Ceramic team, IONC-CSR-CNRS 6226, Univ. of Rennes, France; 2Chalcogenide glasses optical fibers are matchless devices to carry out Fiber Evanscent Wave Spectroscopy in order to collect the mid-infrared signature of most molecules and bio-molecules. Promising results and future strategies will be presented.

**SeTh1D • 09:00**
**SeTh1D.1 • 08:30**
Advanced of Wideband Ultra-short Pulse Fiber Lasers and Sensing Applications, Lars Buettner1, Christoph Letziold1, Jürgen Czar1, 1IEE, Technische Universitaet Dresden, Germany. A technique for interferometric velocity measurements through a fluctuating gas-liquid interface based on wavefront correction is presented. Experimental methods, adaptive optical components, simulations and applications are described.
Advanced Photonics: OSA Optics & Photonics Congress • 27–31 July 2014

NTh1A • Dissipative Solitons, Rogue Waves and Ultra-short Pulse Modeling III—Continued

NTh1A.5 • 09:30 Dissipative Vector Solitons with Fast Evolving States of Polarization, Sergey Sergeev1, Sergei Popov1, Gunnar Jacobsen1, Sergey K. Turitsyn1; 1Aston Univ., UK. We report on a new vector model of a mode locked fiber laser. This model goes beyond the limitations of the previously used models and results in a new family of vector solitons.

NTh1A.6 • 09:45 Dynamics and statistics of noise-like pulses and Rogue Waves, Neil Broderick1, Mira Erkintalo1, Graham Donovan1; 1Physics, Univ. of Auckland, New Zealand. Mathematics, Univ. of Auckland, New Zealand. Numerical simulations of three different mode-locked laser cavities are compared. Both normal and anomalous dispersion cavities are examined and the resulting statistics compared for evidence of Optical Rogue Waves.

SoTh1B • Process Improvements for Fiber Lasers—Continued

SoTh1B.3 • 09:30 Ultralong Fiber Lasers with Coding in Free-Spectral Range for Secure Key Distribution, Alessandra Torrèlo1, Alain Barthélém1, Vincent Kermer1, Baddr M. Shalaby2, Kataryna Krupa2, Agnès Desfarges-Berthelomé2, Youssef El-Jazzouli3, Philippe Di Bi3, Sonia Boscolo3, Sergei K. Turitsyn1, Juan Diego-Ania-Castanon1; 1PHOTONIQUE, Université de Limoges, XLIM, UMR CNRS 7252, France; 2Aston Inst. of Photonic Technologies, Aston Univ., UK; 3IO-CSIC, Spain. We present experimental results on a 50km fiber laser switching among four different values of the free-spectral range for possible applications in secure key distribution.

SoTh1B.4 • 09:45 Spectroscopic properties of LaF3:Tm3+ nanoparticle-doped silica optical fibers, Manuel Vermill1, Jean-françois L1, Michel Ude2, Stanislaw Trzesien1, Bernard Dussardier1, Wilfried Blanc1, Olivier Tatterneau1, Philippe Vennéguès2, Courmtrey Kucera3, John Ballato1; 1IPLM, Université de Nice Sophia Antipolis, France; 2CIRSEE, CNRS, France; 3Materials Science and Engineering, Clemson Univ., USA. Silica-based fibers doped with LaF3:Tm3+ nanoparticles, prepared by MOVVD and solution doping exhibited a fluorescence lifetime of 70 μs at 810 nm and 1470 nm, with background losses below 0.1 dB/m at 1300 nm.

SeTh1C • Mid- and Long-wavelength IR Sensors—Continued

SeTh1C.4 • 09:30 Optical Imaging Through Crude Oil, Guillerme Dutrat1, Cicero Martelli1, Rodolfo Patyk1, Marco J. da Silva1, Taiga P. Vendruscolo1, Rogberto E. Morales1; 1Federal Univ. of Technology-Paraná, Brazil. Whilst crude oil is completely opaque at the visible/NIR regions it shows some transparency at the IR above 4 micrometers. This allows obtaining images from inside the volume containing crude oil.

SeTh1C.5 • 09:45 New class of crystal inorganic scintillators, Liya V. Zhukova1, Alexandre Shmygalev1; 1Ural Federal Univ., Russian Federation. We developed and made a new class of crystal single-layer and two-layer fiber inorganic scintillators (CIS). Received fiber CIS possess unique optic-physical properties. The CIS luminescent properties were studied by radiation bunches.

SeTh1D • Laser Based Sensors I—Continued

SeTh1D.3 • 09:30 Strain fiber ring cavity laser sensor based on the multiple-mode interference in photonic crystal fiber, Xudun Bai1, Xianglong Zeng1, Shaofei Wang1, Dengfeng Fan1; 1Shanghai Univ., China. A strain fiber laser sensor is demonstrated, which consists of a photonic crystal fiber in-line Mach-Zehnder interferometer as an optical filter and strain sensing head. Strain sensing sensitivity of 2.1 pm/με, and high sensing quality are achieved.

SeTh1D.4 • 09:45 High-speed Non-contact Displacement Sensor Based on Microchip Nd:YVO4 Laser Feedback Interferometry, Song Zhang1, Yingdong Tan1, Shilian Zhang1; 1Precision Instruments, Optoelectronic Engineering, China. We analyze the measurement speed limit of the microchip laser feedback interferometer and demonstrate a much improved measurement speed from 100μm/s to 120mm/s owing to the optimized system parameters and a novel signal processing method.
Modeling the dynamics of Frequency Comb Generation and Design of Planar Microring Resonators, Tobias Hansson1, 2Department of Physics, Univ. of Bayreuth, Germany; 3Univ. of Lille, France.

We consider a combined model of dissipative flows, dissipative solitons with energy and matter interaction of dispersive waves and solitons, Dmitry V. Skryabin1, Majid Taki2, Alex Yulin2, 3Physics, Univ. of Bath, UK; 2Univ. of Lisbon, Portugal; 3Univ. of Lille, France. We report a new class of instabilities of cavity solitons existing due to periodic boundary conditions in microrings and fiber cavities. These instabilities amplify emission of dispersive waves and promise novel optical parametric oscillators.

Dissipative solitons with energy and matter flows, Nail Akhmedzhanov1, Jose M. Soto-Crespo1, Helmut R. Brand2, 1Research School of Physics and Engineering, Australian National Univ., Australia; 2Department of Physics, Univ. of Bayreuth, Germany; Instituto de Optica, CSIC, Spain. We consider a combined model of dissipative solitons that are generated due to the balance between gain and loss of energy as well as to the balance between input and output of matter.

High-energy Ultrafast Fiber Lasers, Ammar Hidde1, Hongjie Wang2, M. J. Yang1, 2Department of Electrical and Computer Engineering, Canadian Institute for Photonic Innovation, University of Victoria, BC, Canada; 3School of Electrical and Information Engineering, The Univ. of Sydney, Australia; 4School of Chemistry, The Univ. of Sydney, Australia; 5School of Electrical and Information Engineering, The Univ. of Sydney, Australia. We report the first contained portable field fluorometer using a smartphone and a 3D printed sample holder.

Biomimetic Optical Filter Based Chemical Sensing Techniques, Ishwar D. Aggarwal1, Kevin Major1, M. Poutous1, Ken Ewing2, Jas Sanghera3, 1interdisciplinary Photonics Laboratory, University of Ottawa, Canada; 2Code 5620, Naval Research Laboratory, USA; 3School of Chemistry, The Univ. of Sydney, Australia. We report the first contained portable field fluorometer using a smartphone and a 3D printed sample holder.
NTh2A • Computational Analysis, Design and Modeling of Dissipative and Conservative Systems—Continued

NTh2A.4 • 11:30
Long-Range interaction of temporal incoherent solitons, Gang Xu1, Claire Michiel2, Josselin Garnier1, Bertrand Kibler1, Antonio Picozzi1; 1Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), CNRS - Univ. of Burgundy, France; 2Laboratoire de Physique de la Matière Condensée, CNRS - Université de Nice Sophia-Antipolis, France; 3Laboratoire de Probabilités et Modèles Aléatoires Université Paris Diderot, France. Contrary to conventional solitons, temporal incoherent solitons are sustained by a defocusing nonlinearity with anomalous dispersion and exhibit a non-mutual attractive-repulsive interaction. We explain these results by a long-range Vlasov formalism.

NTh2A.5 • 11:45
Collective coordinate approach for the dynamics of light pulses in fiber ring lasers, M. Alsae1, E. Felenou1, C. Mback1, Patrice Tchofo Dinda1, Philippe Greul1; Université de Bourgogne, France. We present an efficient variational approach for fiber lasers in which light pulses may execute complex dynamics, and we establish its validity by comparison with the numerical approach based on the generalized nonlinear Schrödinger equation.

NTh2A.6 • 12:00
Incoherent Dispersive Shocks and Spectral Collapse, Gang Xu1, Josselin Garnier2, Stefano Trillo3, Antonio Picozzi1; 1Laboratoire Interdisciplinaire Carnot de Bourgogne (ICB), CNRS - Univ. of Burgundy, France; 2Laboratoire de Physique de la Matière Condensée, CNRS - Université de Nice Sophia-Antipolis, France; 3Laboratoire de Probabilités et Modèles Aléatoires Université Paris Diderot, France. We investigate Raman wavelength sweeping, for triggering the self-Q-switched regime. Investigation of self-pulsed regimes is reported in a gas mixture that allows the interrogation of various gas species with concurrent compensation of disturbing effects caused by dust and dirt.

NTh2A.7 • 12:15
Nonlinear symmetry breaking and rogue waves formation in a dissipative optical system, Abdeslem Tahri, Saliya Gouilbash, Françoise Leo, Amaud Musoto; 1Physique, Univ. of Lille, France; 2Physique, Université libre de Bruxelles, Belgium. The frequency spectrum asymmetry observed in fiber systems is shown to originate from a nonlinear symmetry breaking. Analytical and experimental results are in excellent agreement. Rogue waves formation in strongly nonlinear regimes is presented.

NTh2B • Pulsed Fiber Lasers—Continued

SoTh2B.4 • 11:30
Invited
Solid-core and Hollow-core Photonic Crystal Fibre as Nonlinear Element for Synchronously Pumped Ring Cavities, Nicolas Joly1, Michael J. Schimschak1, David Novotny1, Pooma Hosseini1, Philip Russell2, Max-Planck Inst. for the Science of Light, Germany; 1Universität Erlangen-Nürnberg. We present recent studies of photonic crystal fibre ring cavity synchronously pumped by femtosecond pulses. In the case of a X-filleted tapered fibre, we predict the appearance of spontaneous symmetry breaking as well as multimode stability.

SoTh2B.5 • 12:00
Efficient wavelength conversion in CF4-filled photonic bandgap fibers, Lior Ben Yehuda1, Amiel A. Isayah2; 1Electrical and Computer Engineering, Ben Gurion Univ. of the Negev, Israel; 2ELECTROOPTICS Unit, Ben-Gurion Univ. of the Negev, Israel. We investigate Raman wavelength conversion in CF4-filled hollow-core photonic bandgap fibers. We obtain a record of more than 35% conversion efficiency in a 35cm-long, weakly pressurized, fiber at a peak power of only 2.6kW.

SoTh2B.6 • 12:15
Self-Q-switched Regime of Fiber Lasers as a Transition from Self-Induced Laser Line Sweeping, Pavel Peterka1, Pavel Horuzitsky1, Filip Todorov1, Jan Aubrecht1, Ondrej Podrasky1, Ivan Kasik1; 1Fiber Lasers and Nonlinear Optics, Inst. of Photonics and Electronics, Czech Republic. Investigation of self-pulsed regimes is reported for Fabry-Perot and ring Yb-doped fiber lasers. Role of recently discovered self-induced laser line sweeping for triggering the self-Q-switched regime is discussed.

SeTh2C • Optical Chemical and Biological Sensors—I—Continued

SeTh2C.4 • 11:30
Standoff Detection of Explosives and Buried Landmines Using Bacterial Biosensors, Yoshi Kabesha1, Ofar Bar-On1, Ori Eyal1, Sharon Yogur-Kroil1, Shimonon Beklin1, Aharon J. Agraitan1; 1Department of Applied Physics, The Hebrew Univ. of Jerusalem, Israel; 2Department of Plant & Environmental Sciences, The Hebrew Univ. of Jerusalem, Israel. A Standoff detection scheme for buried landmines and concealed explosive charges based on genetically engineered bacterial biosensors is presented. Concentrations of 4 mgL of 2,4-DNT on soil were detected from a distance of 50 meters.

SeTh2C.5 • 11:45
Wavelength Modulated Bimodal Interferometer for Highly Sensitive Biosensing Applications, Stefania Danie1, Daphné Duval1, Ana Belen González-Guerrero1, David Fanfà1, Carlos Dominguez2, Laura M. Lechuga1; 1Nanobiosensors and Bioanalytical Applications, ICN2 (ICSC and CIBER-BBN), Spain; 2IMB-CNIC (CSIC), Spain. With the final goal of implementing a Lab-on-Chip platform for highly sensitive biosensing applications, we demonstrate a phase modulation approach based on all-optical principles for integrated hetero-modal interferometers.

SeTh2C.6 • 12:00
Augmenting Labeled Bioassay Sensitivity—Exploiting Nanogold Optical Properties on an Optical Fiber Biosensor, Nirmal S. Punjabi1,2, Jitendra Satija1, Soumya Mukherji; 1Department of Bioscience and Bioengineering, IIT Bombay, India; 2School of Biosciences and Technology, IIT, Univ., India. A 20-fold enhancement in sensitivity of absorption based labeled fiber-optic biosensor was achieved using nanogold as reporter compared to conventional fluorescent dyes. This is due to high extinction coefficient and LSPR property of nanogold.

SoTh2C.7 • 12:15
Process-compatible analytical instrumentation based on optical absorption, Axel Kramer1, Mariana Troccoli1, Frederic Amann2,3, Gerhard Boehm1, Markus-Christian Demmerle1,2, 1Department of Electrical and Computer Engineering, The Univ. of Texas at Austin, USA; 2Adtech Optics, Inc., USA; 3Walter Schottky Institut, Technische Universität München, Germany. We demonstrate monolithic tunable terahertz quantum cascade lasers sources, Mikhail Belkin1, Seungyong Jung1, Aiting Jiang1, Hian Jiang1, Karan Vijayraghavan1, Xiaojun Wang1, Mariano Troccoli1, Frederic Amann2,3, Gerhard Boehm1, Markus-Christian Demmerle1,2, 1Department of Electrical and Computer Engineering, The Univ. of Texas at Austin, USA; 2Adtech Optics, Inc., USA; 3Walter Schottky Institut, Technische Universität München, Germany. We demonstrate monolithic tunable terahertz quantum cascade laser sources with a tuning range over 580 GHz at room temperature by integrating electrically separated distributed feedback section and distributed Bragg reflector section into a single device.

SeTh2D • Laser Based Sensors II—Continued

SoTh2D.4 • 12:00
Invited
Broadly Tunable Room Temperature Monolithic Terahertz Quantum Cascade Laser Sources, Mikhail Belkin1, Seungyong Jung1, Aiting Jiang1, Hian Jiang1, Karan Vijayraghavan1, Xiaojun Wang1, Mariano Troccoli1, Frederic Amann2,3, Gerhard Boehm1, Markus-Christian Demmerle1,2, 1Department of Electrical and Computer Engineering, The Univ. of Texas at Austin, USA; 2Adtech Optics, Inc., USA; 3Walter Schottky Institut, Technische Universität München, Germany. We demonstrate monolithic tunable terahertz quantum cascade lasers sources with a tuning range over 580 GHz at room temperature by integrating electrically separated distributed feedback section and distributed Bragg reflector section into a single device.

12:30–13:30 Lunch Break (On Your Own)
Nonlinear Diamond Photonics, Marko Loncar1,33 Oxford Street, Harvard Univ., USA. We developed a single-crystal diamond nanophotonic platform and demonstrated ring resonators with quality factors >106. Furthermore, we leveraged diamond's third order nonlinearity to demonstrate frequency comb generation at telecom wavelengths in our resonators.

NTh3a.2 • 14:00
Phase-lock cascaded stimulated Brillouin scattering and pulse train generation on a photonic chip, Thomas Buettner1, Inna V. Kabakova1, Moniz Merklen1, Darren D. Hudson1, Duk-Yong Chai1, Barry Luther-Davies2, Stephen J. Madden1, Benjamin Eggleton1,3. Centre for Ultrafast bandwidth Devices for Optical Systems (CUDA), Inst. of Photonics and Optical Science (IPOS), School of Physics, Univ. of Sydney, Australia; 2Laser Physics Centre, Australian National Univ., Australia. We experimentally demonstrate the generation of phase-locked Brillouin-frequency combs and gigahertz repetition rate pulse trains via the interplay of stimulated Brillouin scattering and Kerr-nonlinear four-wave mixing on a chalcogenide chip.

NTh3a.3 • 14:15
Power threshold of noise-seeded CW-pumped single-pass stimulated Raman-like scattering in dual-nanowire fibre, Roman Nosek1,2, Johannes R. Koehler1, Philip Russell1. Max Planck Inst. for the Science of Germany. Flexural resonances in the dual-nanowire fibre begin to oscillate upon pumping with mW of laser light, generating a frequency comb. Theory shows that structural inhomogeneities play an important role in determining the threshold power.

NTh3a.4 • 14:30
Guiding and steering light with nanocollodols, Roland A. Tegbørg1,2, Juan P. Torres1,3. Karen Volle-Sepulveda1. ICF-Institute de Ciencias Fotónicas, Spain; 2Universidad Nacional Autonoma de Mexico, Mexico; 3Dep. of Signal Theory and Communications, Universitat Politècnica de Catalunya, Spain. We experimentally demonstrate steering and guiding of a low power beam (633nm) by a light-induced waveguide created by self-focusing of a pump beam (532nm) in a nonlinear medium consisting of a suspension of dielectric nanoparticles.

NTh3a.5 • 14:45
Optical simulation of neutron oscillation in binary waveguide arrays, Fabio Bancalana1,2, Stefano Longhi3, Andrea Marini1. Physics and Astronomy, Univ. of Louisville, USA. Optical impedance spectroscopy based on a single-mode, electro-active, integrated optical waveguide was developed to investigate electron-transfer processes in redox assemblies of protein at unprecedented limit of detection (sub-femto-moles/cm2).

SeTh3B.3 • 14:15
Point-of-care Diagnostics using Integrated Optical-based Interferometric Nanobiosensors, Daphne Duval1,2,12 Daphne Duval1,2, Ana Belén Gonzalez-Guerrero1,2, Stefania Dante1,2, Cesar Sanchez-Huertas1,2, Juan P. Torres1,3, Karen Volle-Sepulveda1,2,3. ICF-Institute de Ciencias Fotónicas, Spain; 2ICN2, CIBER-BBN, Spain. An interferometric nanobiosensor was developed to demonstrate steering and guiding of a low power beam (633nm) in a nonlinear medium consisting of a suspension of dielectric nanoparticles.

SeTh3B.4 • 14:30
Invited
Fabrication and characterization of high sensitivity S-shaped optical fiber sensors, Shradiha K. Chauhan1, Joseph Thanion1, Nirmal S. Punjabi1, Dinesh K. Sharma1, Soumya Mukherjee1,2. Center for Research in Nanoscience and Nanotechnology, Indian Inst. of Technology Bombay, India; 2Department of Bioscience and Bioengineering, Indian Inst. of Technology, Bombay, India. A S-shaped optical fiber sensor was fabricated and its sensing potential was compared with a U-bend sensor. Evanescent wave absorbance and refractive index sensitivity of S-bend were found to be 1.8-fold and 1.5-fold higher than U-bend.

SeTh3B.5 • 15:00
Angular Resolution of the Porous Anodic Alumina/Aluminum Photonic-Plasmonic Sensors, Hande C. Arslan1,2, Burcu Guleryuz1,2, Mustafa M. Ailand1,2,3, Materials Inst., TUBITAK Marmara Research Center, Turkey; 2Dep. of Metallurgical and Materials Eng., Istanbul Univ., Turkey; 3Dep. of Metallographic and Materials Eng., Middle East Technical Univ., Turkey. We study the angular resolution of photonic-plasmonic sensors with porous anodic alumina and aluminum layers. The maximum resolution for the sensors is demonstrated as 6.8x10-8 in the refractive index range of 1.33-1.38.
We study theoretically and experimentally the nonlinear dynamics of a solid state laser with harmonically modulated losses. We analyze a transition where a drastic increase in size of the attractor induces extreme events.

We show that the use of dispersion oscillating fiber in passive cavities significantly extend modulational instability to edges and a stable self-similar expansion upon propagation of their central region.

We experimentally investigate the spectral correlation between multiple modulation instability side lobes in dispersion oscillating fiber. We found that process metrics related to each side lobe pairs act quasi-independently.

We present micro-scale stressors written in bulk silica using an ultrafast laser. Stress from nanograting formation of the orientation, magnitude, and anisotropy of the stress field.

Extreme nonlinear spectral enhancements are observed compared to the linear regime.
NTh4A.5 • 17:00
Picosecond fiber laser mode-locked at 260th harmonic by GHz acoustic resonance in photonic crystal fiber core, Meng Fang¹, Xin Jiang², Gordon Wong³, Georgy Onishchukov¹, Nicolas Joly¹; Goran Ahmed, Philip Russell; Max Plank Inst. for Science of Light, Germany; Department of Physics, Univ. of Erlangen-Nuremberg, Germany. Stable generation of picosecond pulses with repetition rate of ~1.57 GHz is demonstrated in a soliton fiber laser passively mode-locked by an acoustic resonance in the solid core of a silica glass photonic crystal fiber.

NTh4A.6 • 17:15
Dynamics of cascaded multiple dispersive waves generation in a dispersion oscillating photonic crystal fiber, Abdellahim Bendahmane¹, Flavie Braud¹, Benoit Barviau¹, Arnaud Mussot¹, Alexandre Kudlinski¹, Université de Lille, France. We report experimental results demonstrating the generation and the subsequent cascade of multiple dispersive waves from a single Raman-shifting soliton hitting several times the second zero dispersion wavelength of a dispersion oscillating fiber.

NTh4A.7 • 17:30
Experimental demonstration of coherent supercontinuum generation in a silicon wire pumped at telecommunication wavelengths, Franck Leot¹, Simon-Pierre Gorza², Stephane Coen³, Université Libre de Bruxelles, Belgium; Université de Lille, France. We study the coherence properties of supercontinuum spectra generated in a silicon wire pumped at telecommunication wavelengths. We numerically and experimentally demonstrate coherence across a span of 500 nm.

SeTh4B.3 • 17:00
Coherent THz imaging using the self-mixing effect in quantum cascade lasers, Paul Dean¹, Thomas Tamire², Anthony Lui³, Karl Bertling¹, Yah Leng Lim¹, Alex Valavanis¹, James Keeley¹, Raed Alhathloul¹, Siddhant Chowdhury¹, Lianhe Li¹, Suraj Khanna¹, Mohammad Lachab¹, Dragan Indjin², Aleksander Rakic³, Edmund H. Linfield¹, Alexander G. Davies¹, School of E&E Engineering, Univ. of Leeds, UK; School of Mathematics and Physics, Univ. of Queensland, Australia; School of Information Technology and Electrical Engineering, Univ. of Queensland, Australia. We demonstrate that the self-mixing effect in THz QCLs can be used for three-dimensional coherent imaging, swept-frequency interferometry for imaging and materials analysis, and high-resolution inverse synthetic aperture radar imaging.

SeTh4B.4 • 17:30
Title To Be Determined, Tahsin Akalin¹; 3 Rue de l’Oree du Bois, Université de Lille 1, France. Abstract Not Available

NOTES

Adjournment of Congress
Key to Authors and Presiders

Trepanier, Francois - BM2D.3, BM4D.1
Treves, Giovanna - BW3D.3
Trillo, Stefano - NMA4.6, NTh2A.6, NTh4A.3, NTu1A.1, NW2A.1
Trimbly, Patrick - SeM4C.2
Troccoli, Mariano - SoTh2D.4
Troels, Johann - JMSA 54, SoW4B.2
Trezes, Stanislav - SoTh1B.4
Tsa, Kevin K. - JTu3A.42
Tünnemann, Andreas - SoTh2B.1
Tünnemann, Henrik - JMSA 6, SoTu4B.2, SoW1B.2
Turitsyn, Sergei K. - JTu3A.40, NTh1A.5, SoTh1B.3, SoTh2B.2
Turitsyna, Elena - BW3D.3
Turkmen, Mustafa - SeM2C.3, SeM2C.4
Tykalewicz, Boguslaw - NW2A.1
Ude, Michèle - SoTh1B.4
Usuga, Mario A. - JMSA 5
Vainio, Markku - JMSA 21
Vaisocherová, Hana - JTu3A.29
Vaisocherová, Hana - JTu3A.30
Vanholsbeeck, Frederique - JTu3A.23, JTu3A.24
Vanvincq, Olivier - SoTu4B.1
Vanni, Markku - JMSA 21
Vaisocherová, Hana - JTu3A.29
Vanholsbeeck, Frederique - JTu3A.23, JTu3A.24
Vanvincq, Olivier - SoTu4B.1
Vanni, Markku - JMSA 21
Vaisocherová, Hana - JTu3A.29
Vanholsbeeck, Frederique - JTu3A.23, JTu3A.24
Vanvincq, Olivier - SoTu4B.1
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Vanvincq, Olivier - SoTu4B.1
Vanni, Markku - JMSA 21
Vaisocherová, Hana - JTu3A.29
Vanholsbeeck, Frederique - JTu3A.23, JTu3A.24
Vanvincq, Olivier - SoTu4B.1
Vanni, Markku - JMSA 21
Vaisocherová, Hana - JTu3A.29
Vanholsbeeck, Frederique - JTu3A.23, JTu3A.24
Vanvincq, Olivier - SoTu4B.1