Congratulations to the SOF Student Award Winner:

Jiajing Tu, Hokkaido Univ., Japan

Title: Design and Analysis of Heterogeneous Trench assisted multicore fiber under bending conditions

SOF - the meeting to discuss synthesis, processing, characterization, modeling, physical properties and applications of specialty and novel optical fibers with high technological impact potential.

Optical fibers, long an enabling technology for telecommunications, are proving to play a central role in a growing number of modern technologies including applications in defense and security, sensing, automotive, and biomedicine. The purpose of this conference 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.

Papers are being considered in the following topic categories:

**Optical Fibers:**

- Micro-structured fibers
- Soft glass fibers
- Novel designs and theory
- Novel glass compositions

**Fiber Lasers:**

- CW fiber lasers
- Pulsed fiber lasers
- Beam Combining in Fibers
- Fiber lasers, applications, general and misc

**Applications:**

- Fibers for sensors
- Nonlinear fibers
- Supercontinuum Fibers
- Telecommunication fibers

**General Chairs**

Ishwar Aggarwal, Univ. of North Carolina at Charlotte, USA
John Ballato, Clemson Univ., USA

**Program Chairs**
OIDA Workshop

Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond - Status of the Industry and Challenges Ahead Workshop
Thursday, 21 June
08:30 - 17:00
Complimentary to all Advanced Photonics Registrants!

Advanced Photonics Congress

- Access Networks and In-house Communications (ANIC)
- Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP)
- Integrated Photonics Research, Silicon, and Nano-Photonics (IPR)
- Nonlinear Photonics (NP)
- Specialty Optical Fibers & Applications (SOF)
- Signal Processing in Photonic Communications (SPPCom)

Sponsor:

OSA
Advanced Photonics Congress

17 June - 21 June 2012, Cheyenne Mountain Resort, Colorado Springs, Colorado, USA

Seven Collocated Meetings Covering All Aspects of Advanced Photonics

- Access Networks and In-house Communications (ANIC)
- Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP)
- Integrated Photonics Research, Silicon, and Nano-Photonics (IPR)
- Nonlinear Photonics (NP)
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OIDA Workshop

Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond - Status of the Industry and Challenges Ahead Workshop
Thursday, 21 June
08:30 - 17:00
Complimentary to all Advanced Photonics Registrants!

Special Items for Purchase:

OIDA Luncheon and Session
21 June 2012, 13:45 - 14:15
USD $35

Advanced Photonics Congress attendees are invited to join the OIDA Workshop on Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond-Status of the Industry and Challenges Ahead for a luncheon and a session presented by David Welch.
Exhibitors

Interested in being an Exhibitor at the Advanced Photonics Congress?

Exhibit space at this Congress is very limited, so be sure to sign up for your tabletop exhibit space today! This Congress provides you an audience of 400 scientists. Call Regan Pickett at 202-416-1474 or e-mail exhibitsales@osa.org for more information.

Corporate Sponsor:

Sponsor:
Specialty Optical Fibers & Applications (SOF)

17 June - 20 June 2012, Cheyenne Mountain Resort, Colorado Springs, Colorado, United States

Program

Please note: The Joint BGPP & SOF Plenary Session (JM1B) will begin at 8:00 AM on Monday, 18 June in the White River Room.

SOF - the meeting to discuss synthesis, processing, characterization, modeling, physical properties and applications of specialty and novel optical fibers with high technological impact potential.

A number of distinguished invited speakers have been invited to present at the meeting.

Plenary

JM1B
Monday, 18 June
8:00 - 10:00
White River

Nanoscale Glass Blowing
Abstract: The past 15 years has seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in unexpected ways has led to many novel applications.

Fire and Ice: 25 Years of Applying Fiber Optic Sensor Technology
Abstract: Over the past 25 years fiber grating sensor technology has been applied in extreme environments where conventional sensor technology has limited or in some cases non-existent measurement capabilities enabling widespread application potential.

Special Events

The congress has a variety of special events throughout the meeting including the OIDA Workshop, Congress Reception and special presentations. For more detailed information, view our Special Events page.
Specialty Optical Fibers & Applications (SOF)

17 June - 20 June 2012, Cheyenne Mountain Resort, Colorado Springs, Colorado, United States

Invited Speakers

Plenary

Philip Russell
Max Planck Institute for the Science of Light

Nanoscale Glass Blowing
Abstract: The past 15 years has seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in unexpected ways has led to many novel applications.

Eric Udd
Columbia Gorge Research, USA

Fire and Ice: 25 Years of Applying Fiber Optic Sensor Technology
Abstract: Since 1987 I have been heavily involved in identification of application that matched up well with fiber gratings sensors. Because initial costs were and in some cases continue to be high this often involved environmental measurements that were difficult and in some cases had not been performed using conventional sensor approaches. Much of my work has been in aerospace and has ranged from cryogenic measurements associated with liquid oxygen tanks to rocket nozzles...somewhat more hostile environments than "fire and ice". Along the way I diversified into applying fiber gratings sensor technology to civil structures, oil and gas, medical, utility and other areas. This paper provides a short summary of some of these ventures which I hope will be as interesting to readers as it has been to me.

Tutorials

Tutorial: Recent Developments in Fiber Lasers, Mode Stability Issues in LMA Fibers, Jens Limpert and Cesar Jauregui; Friedrich-Schiller-Universität Jena Institute of Applied Physics, Germany

Tutorial: Nonlinear Fibers for Parametric Signal Generation, Amplification and Processing, Stojan Rodic; California Institute for Telecommunications and Information Technology, USA

Invited Speakers

Hybrid photonic crystal fiber components and amplifiers, Thomas Alkeskjold; NKT Photonics, Denmark

Progress on Mid IR Chalcogenide fiber Devices, Francois Chenard; IRflex Corporation, USA
Narrow Linewidth Fiber Amplifiers, Scott Christensen; Lockheed Martin Coherent Technologies, USA

High Efficiency 1908nm Tm-doped Fiber Lasers, Dan Creedon; BAE Systems, USA

Military Interest in Fibers, Iyd Dajani; Air Force Research Laboratory/DELO/B761, USA

Large-core Single-mode Solid Photonic Bandgap Fibers, Liang Dong; Clemson Univ., USA

Making Lower Energy Photons from Fiber Lasers, Stuart Jackson; Institute of Photonics and Optical Science, Australia

High Power Passive Components for kW Lasers, Bertrand Gauvreau; ITF Optical Technologies Inc, USA

High Power All-Fiber Isolator for 1 Micron Fiber Lasers, Shibin Jiang; AdValue Photonics, Inc., USA

Ultrafast Laser Processing of Glass: From New Phenomena to Applications, Peter Kazansky; University of Southampton, UK

Nonlinear Properties of Silicon Optical Fibers, Anna Peacock; Univ. of Southampton, UK

Thulium-Doped Fiber Amplifier Development for NASA’s ASCENDS Mission, Mark Phillips; Lockheed Martin Coherent Technologies, USA

Nonlinear Frequency Generation in Poled Fibers: From Sum-Frequency Generation to Spontaneous Parametric Down Conversion for Polarization Entangled Photons, Li Qian; Univ. of Toronto, Canada

Light That Spins Inside Fibers, Siddharth Ramachandran; Boston University, USA

Progress on Fluoride Fibers for Mid IR, Mohammed Saad; IRphotonics, Canada

Progress on Tm-doped Fiber Lasers, Larry Shah; University of Central Florida, USA

Novel Super-Lattice Polarization-Maintaining Photonic Crystal Fibre for Pressure Sensing, Hwa Yaw Tam; Hong Kong Polytechnic University, Hong Kong

Optical Microfibers and Nanofibers, Limin Tong; Zhejiang University, China

Short-pulse Fiber Lasers Using Carbon Nanotube and Graphene, Shinji Yamashita; University of Tokyo, Japan
Special Events

**Plenary**

**JM1B**  
Monday, 18 June  
8:00 - 10:00  
White River

**Nanoscale Glass Blowing**  
Abstract: The past 15 years has seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in unexpected ways has led to many novel applications.

**Fire and Ice: 25 Years or Applying Fiber Optic Sensor Technology**  
Abstract: Over the past 25 years fiber grating sensor technology has been applied in extreme environments where conventional sensor technology has limited or in some cases non-existent measurement capabilities enabling widespread application potential.

**Poster Sessions**
The Joint Poster sessions 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. During both poster sessions light refreshments will be offered plus an opportunity to meet with exhibitors.

**Conference Receptions**

**Poster Reception & Exhibits**

Monday, 18 June
18:00 - 19:30

Centennial Room and Terrace

This Poster Reception is an opportunity to review the poster presentations and grab light refreshments and snacks. Don’t miss this opportunity to network with your colleagues and walk through the Exhibit floor.
Congress Reception & Exhibits

Tuesday, 19 June
18:00 - 19:30
Centennial Room and Terrace

This Reception brings together all of the meetings within the congress IPR, NP BGPP, SOF, SPPCom, and ANIC for a fun evening of networking with light appetizers and drinks. This event features another Joint Poster Session and is a great opportunity to learn about the latest products and innovations. Complimentary to full Technical attendees!

New! Networking Cookout

Wednesday, 20 June
18:30 - 20:30
The Courtyard
Ticketed event - This event is not included in the Congress registration fees.

Join us at this great event! Come meet with leaders of the optics and photonics community in a great informal and fun setting. Enjoy the sunset as you grab dinner, drinks and lively conversation! For $20 USD for full technical registrants, $10 USD for students.

Optoelectronics Industry Development Association (OIDA) Workshop

Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond - Status of the Industry and Challenges Ahead Workshop
Thursday, 21 June
08:30 - 18:00
Complimentary to all Advanced Photonics Registrants!

Program Topic: Ever growing internet traffic calls for more bandwidth at higher interface density and the telecom industry responded by migrating from a simple OOK to advanced modulation format transmission. Commercial systems e.g., coherent DP-QPSK modulation systems operating at 100Gb/s per wavelength have been deployed while many new developments are underway. They target different applications and vary by technology platform but all have one feature in common: optical components based on photonic integration.

It is becoming increasingly evident that the photonic integration, in some shape or form is the key to further advancement of such systems. The objective of this workshop is to provide a snapshot of the photonic integration techniques and platforms used for advanced modulation format transmission today and discuss challenges going forward. This workshop is sponsored by OIDA member company Infinera, Inc.

OIDA Luncheon Workshop Program

Photonic Integration
Thursday, 21 June
12:30 - 14:00

Tickets to lunch can be purchased for $35 USD when you register.

All Advanced Photonics Congress registrants are invited to join the OIDA Photonic Integration Workshop featuring guest speaker David Welch, Co-Founder and Executive Vice President of Infinera Corporation.
ADVANCED PHOTONICS CONGRESS 2012

- Access Networks and In-house Communications (ANIC)
- Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP)
- Integrated Photonics Research, Silicon, and Nano-Photonics (IPR)
- Nonlinear Photonics (NP)
- Speciality Optical Fibers & Applications (SOF)
- Signal Processing in Photonic Communications (SPPCom)

17-21 June 2012  •  Cheyenne Mountain Resort, 3225 Broadmoor Valley Road, Colorado Springs, CO, 80906 USA

We’re glad you’ll be joining us in Colorado Springs this summer! This packet should include what you need to prepare for the meeting. If you have any questions or need more information, please contact Meetings & Exhibits Coordinator Sam Nystrom at topicalexhibits@osa.org or +1.202.416.1995.

EXHIBITOR SERVICE MANUAL

Please provide this information to anyone who will be attending the meeting and staffing your company’s table.

Exhibit space will be assigned on-site based on the order of receipt of space contracts.

<table>
<thead>
<tr>
<th>IMPORTANT DEADLINES</th>
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<tbody>
<tr>
<td>17 May 2012</td>
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<tr>
<td>21 May 2012</td>
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<td>21 May 2012</td>
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<td>4 June 2012</td>
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<tr>
<td>14 June 2012</td>
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</tbody>
</table>
EXHIBIT SCHEDULE

Click [HERE](#) for a complete schedule of the meeting.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 June 2012</td>
<td>15.00-18.00</td>
<td>Registration Open</td>
</tr>
<tr>
<td>18 June 2012</td>
<td>7.00-18.00</td>
<td>Registration Open</td>
</tr>
<tr>
<td>18 June 2012</td>
<td>7.00-10.00</td>
<td>Exhibit Set-Up</td>
</tr>
<tr>
<td>18 June 2012</td>
<td>10.00-10.30</td>
<td>Exhibit Hours / Coffee Break</td>
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<td>15.30-16.00</td>
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<tr>
<td>18 June 2012</td>
<td>18.00-19.30</td>
<td>Joint Poster Session / Exhibitor Reception</td>
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<tr>
<td>19 June 2012</td>
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<tr>
<td>19 June 2012</td>
<td>18.00-19.30</td>
<td>Joint Poster Session/Exhibits/Conference Reception</td>
</tr>
<tr>
<td>20 June 2012</td>
<td>7.30-11.00</td>
<td>Exhibit Tear-Down</td>
</tr>
</tbody>
</table>

Exhibitors may set their own hours each day. We do not require that you remain at your display for the entire time, however, displays should be staffed during scheduled Coffee Breaks, Poster Sessions, and Receptions. Attendee traffic patterns vary daily. Most attendees will leave the technical sessions for the coffee breaks that are located in the exhibit area but will then return to the sessions. Exhibit traffic is limited during other times to the poster sessions and receptions that are located in the exhibit area.

EXHIBIT DETAILS

The exhibit, poster sessions, conference reception, and stand alone coffee breaks will be held in the Centennial Room of the Cheyenne Mountain Resort.

Exhibitors (tabletops and booths) will be provided with one 6’ x 30” (1.8288m x .762m) draped or skirted table, two chairs, and one wastebasket.

Tabletop: Your display must fit completely on the surface of the table for a total display space no larger than 6’w x 2’d x 8’h (approx. 1.829m x .61m x 2.438m). Decorations and signage may not be attached to or hung from any permanent structure. The total height all materials, including the table, must be no higher than 8 feet (approx. 2.438m).

Booth: Your display must fit completely within a 10’ x 10’ (3.048m x 3.048m) area which will be marked. Decorations and signage may not be attached to or hung from any permanent structure. In the front half of the booth (from aisle), the total height of all materials must not exceed 4 feet (1.219m). In the back half, the total height must be no higher than 8 feet (2.438m).

Please see the Exhibit Order Form at end of this kit for more information and pricing on electrical, internet, and audiovisual services. Contact Andre D’Amour, Assistant Director, Conference Services, at +1.719.538.4009 or [adamour@benchmarkmanagement.com](mailto:adamour@benchmarkmanagement.com) for further details. Exhibitors can order the following items directly from the hotel:

**ELECTRICAL SERVICE - Deadline: Monday, 4 June 2012**

Cost: US $25.00 for a dedicated 20 Amp 110V outlet with power strip.

This is an estimate of an order placed by 4 June. Orders placed later than this date may be charged a higher rate.

**NOTE:** It is highly recommended that power be ordered in advance. On-site orders will be charged a 25% additional fee and service may be delayed. Exhibitors can bring their own converters, extension cords, power strips and surge protectors, but these items may also be available through the hotel for a charge. International exhibitors should bring power converters with them, as they may not available. Electrical circuits may be non-exclusive and may be shared with other exhibitors.
INTERNET SERVICE - **Deadline: Monday, 4 June 2012**

Wireless internet is complimentary in all public spaces and guest rooms. It is not available in the meeting rooms, including the Centennial Room, where the exhibits will take place.

Wired Internet service is available upon request. Cost: US $100.00 for wired high speed internet access.

Note that the exhibit hours are flexible, and there will be time during the day to leave the exhibit area to utilize the wireless service in a guest room or public space.

AUDIOVISUAL SERVICE - **Deadline: Monday, 4 June 2012**

Computers, telecommunications, and projections equipment are all available for rental from the Cheyenne Mountain Resort. Please keep in mind that exhibits displays must stay within the 10’ x 10’ (3.048m x 3.048m) booth dimensions and 6’w x 2’d x 8’h (approx. 1.829m x .61m x 2.438m) tabletop dimensions.

EXHIBITOR REGISTRATION

Exhibitors may pick up their badges at the meeting’s registration desk during the following hours.

| 17 June 2012 | 13.00–18.00 |
| 18 June 2012 | 7.00–18.00  |
| 19 June 2012 | 7.30–17.00 |

EXHIBITOR BADGES – DEADLINE: MONDAY, 21 MAY 2012


Each person attending the meeting must have a badge. Each exhibiting company will receive three complimentary badges. Please complete the provided registration form (one per person).

(1) Exhibitor Technical Badge – includes access to all technical sessions and conference reception; one copy of technical digest on CD-ROM; one copy of conference program
(2) Exhibitor Personnel Badges – access to the exhibit hall only

If an additional registration is needed, that person must purchase a technical registration. The registration form is included with this packet. Please note, by signing up to exhibit, you are NOT automatically registered for the conference. A form must be submitted.

EXHIBITOR LISTING – **Deadline: Monday, 21 May 2012**

If you have not already done so, please email a 50-75 word description of your company (including complete contact information) to Sam Nystrom at [topicalexhibits@osa.org](mailto:topicalexhibits@osa.org). To have your description included in the Exhibitor Listings, it must be received no later than 21 May 2012. This listing will be distributed to each registrant at the meeting. The Exhibitor Listing Form is included at the end of this kit.
SECURITY

The hotel has security on the property; however security will not be specifically designated to monitor the meeting rooms. It is strongly recommended that you take any valuable equipment (i.e. laptops, small components, other materials) with you or secure them each night. It is also recommended that you bring a drape or cloth to cover your table each night. Each exhibitor is required to have adequate insurance levels, and basic precautions should be taken. Reference your exhibit space contract for required insurance levels.

Please do not store valuables under your table or leave objects such as phones, cameras, etc. on your table unless the booth is staffed.

TRANSPORTATION

For more information about transportation to the hotel, including airline and rental car discounts and links to public transportation, please visit our [Travel Information Website](#).

AREA AIRPORTS

Colorado Springs is served by the Colorado Springs Airport (COS). It is approximately 20 minutes from the Cheyenne Mountain Resort. COS is served by 10 commercial airlines and affiliates, offering 120 daily flights. Another option is the Denver International Airport (DEN), located approximately an hour from the Cheyenne Mountain Resort. DEN is served by 15 commercial airlines and their affiliates.

Airline Discount

For your convenience, OSA management has arranged discounted air travel with American Airlines. You may visit the American Airlines website at [www.aa.com](http://www.aa.com) to search for available flights and use the authorization code 8762EJ to receive your discount. You may also call the American Airlines Meeting Services Desk directly at +1.800.433.1790 for assistance with reservations and ticket purchases.

SHUTTLE SERVICES

A shuttle service provided by the resort is available from COS for approximately US $30 per person roundtrip or US $18 per person one-way. Call +1.719.538.4000 to set up a pickup and have your flight dates, times, and numbers ready.

Super Shuttle

SuperShuttle is the nation's leading shared-ride airport shuttle, providing door-to-door ground transportation and provides service to and from 28 major airports in 23 cities. Service is available at Denver International Airport (DEN), but not at Colorado Springs Airport (COS). Super Shuttle is pleased to offer a discount to participants attending the Advanced Photonics Congress. Please refer to code CQAFL. Discounted reservations may be made on the Super Shuttle website or by phone at +1.800.BLUE VAN (258.3826).

TAXIS

A one-way taxi from COS to the Cheyenne Mountain Resort is approximately US $25.

**Yellow Cab:** +1.719.634.5000  
**Spring Cab:** +1.719.444.8989
RENTAL CARS

A selection of rental cars is available from Colorado Springs Airport and Denver International Airport.

Rental Discount
Avis Rent-a-Car is pleased to offer low rates with unlimited mileage to participants attending OSA Optics and Photonics Congresses. For reservations call +1.800.331.1600 or consult the worldwide telephone directory and refer to Avis Worldwide Discount #D004076. Reservations may also be made on the Avis website.

DRIVING DIRECTIONS TO CHEYENNE MOUNTAIN RESORT

FROM COLORADO SPRINGS AIRPORT (COS)

1. Go west on Mark Proby Pkwy approximately 3 miles to Academy Blvd.
2. Turn left on Academy and stay in the left-hand lane.
3. Follow Academy approximately 4 miles to Highway 115.
4. Exit north at Highway 115.
5. Proceed approximately one mile to Cheyenne Mountain Blvd.
6. Turn left on Cheyenne Mountain Blvd. and go one block to Broadmoor Valley Rd.
7. Turn left and go three blocks to Cheyenne Mountain Resort.

FROM DENVER INTERNATIONAL AIRPORT (DEN) VIA I-25

1. Head south.
2. Take the ramp onto Peña Blvd.
3. Take Exit 285 to merge onto I-225 S towards Colorado Springs/Aurora.
4. Take 1A on the left to merge onto I-25 S towards Colorado Springs.
5. Exit 138 - Circle Drive.
6. Turn West (toward the mountains).
7. Two miles to Highway 115 South - Canon City.
8. Continue under the overpass and LEFT turn onto ramp.
9. First traffic light, Cheyenne Mountain Boulevard, turn RIGHT.
10. Take the first LEFT, Broadmoor Valley Road - (Resort's sign on the corner).
11. One half mile to Cheyenne Mountain Resort - Main Entrance on the LEFT.

PARKING AT RESORT

Complimentary self-parking and valet-parking is available in a secure outdoor lot at the resort.

HOUSING

A block of sleeping rooms has been reserved for the convenience of Advanced Photonics meeting attendees at the Cheyenne Mountain Resort. In order to secure the group rate, you must reserve your room by Thursday, 17 May 2012.
The daily meeting rates are:

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single/Double Room</td>
<td>US $169.00</td>
</tr>
<tr>
<td>Extra Person Charge</td>
<td>US $10.00</td>
</tr>
<tr>
<td>Resort Fee</td>
<td>US $8.00</td>
</tr>
</tbody>
</table>

Rates will be honored 3 days prior and post conference dates. State and local taxes are 9.4%. Check-in time is 13.00 and check-out time is 15.00. If you book within the block, the following services are complimentary to make your stay more enjoyable:

- Fitness classes
- Outdoor tennis
- Boating and fishing (seasonal)
- Bell and Room Attendant gratuities
- 800 and Local call access
- Newspaper and in-room coffee and tea
- Fitness Center and Aquatics access and parking

Some of the amenities available at the Cheyenne Mountain Resort include delicious Hotel Dining, an 18-hole Golf Course, various Recreational Activities, and nearby Area Attractions.

Book your Hotel Reservation:

- [ONLINE](#)
- Call: +1.719.538.4000 and request 2012 OSA Advanced Photonics Congress Rate

**SHIPPING & MATERIAL HANDLING**

**MATERIAL HANDLING / DELIVERY & STORAGE**

Delivery, load-in and load-out must occur at the hotel loading dock. There are no exceptions. Exhibitor vehicles may park in the driveway to the loading dock for the amount of time required to perform their task. If this time is expected to exceed 30 minutes, the exhibitor must obtain special written authorization. In addition, exhibitors must supply their own equipment to transport supplies into the Hotel. During move-in, any damage incurred to the walls, carpet, doors, door frames and elevators will be billed. Should the exhibitor leave without cleaning up properly, they will be responsible for any additional labor charges to restore the room to its prior condition. A pre- and post-conference walk-through inspection of the space to be used may also be required.

If needed, please notify topicalexhibits@osa.org in advance and we will work with you to have your shipment delivered.

**SHIPPING INSTRUCTIONS**

Due to limited space, the Cheyenne Mountain Resort cannot accept packages more than 2 weeks prior to the start of the meeting. Incoming shipments will not be assessed an incoming shipping fee. Please label your incoming boxes as follows:

Cheyenne Mountain Resort
Advanced Photonics Optical
Attn: Vendor Name
3225 Broadmoor Valley Road
Colorado Springs, CO 80906
RETURN SHIPMENTS

All packages must be shipped off property within 24 hours of completion of meeting. All exhibitors are responsible for packing and labeling their own materials (boxes, crates, display cases). The Cheyenne Mountain Resort will not be liable for any items left in the room after the conference. All outgoing materials (boxes, crates, display cases) must be properly labeled with a shipping label and form, provided by the hotel. Outgoing boxes are $7.50 a piece.

After completing the above, the hotel will transport all boxes and display cases to the Shipping/Receiving area at the end of the conference. Please retain a copy of your shipping form for tracking purposes.

FREIGHT FORWARDING SHIPMENTS / CUSTOMS BROKERS

Vendors using freight forwarding companies or customs brokers are responsible for making their own pick-up and ship-out arrangements. Please inform Andre D’Amour, Assistant Director, Conference Services, at +1.719.538.4009 or adamour@benchmarkmanagement.com of any freight forwarding shipments that you may have in the event that you are not present when the pick-up is made. Please make sure that all necessary documents are included with your shipment.

AIR FREIGHT / CARGO – DOMESTIC SHIPMENTS

STS Air Cargo is available to assist those companies who need to ship exhibit materials to and from Colorado Springs. For more information, please contact:

STS Air Cargo
PO Box 998
Millbrae, CA 94030
Phone: +1.800.692.6116
Fax: +1.650.692.6175
stsair@stsair.com

CUSTOMS & INTERNATIONAL SHIPMENTS

All shipments which will be traveling internationally MUST use a customs broker. Management is not responsible for any shipments that may be stopped at customs or for any additional charges that may be incurred for international shipments. Below is a suggested customs broker. TWI Global will assist those companies which need to ship exhibit materials to Colorado Springs. For more information, please contact:

Alison Minichiello
TWI Group, Inc.
230-59 International Airport Center Blvd.
North Lobby, Suite #250
Jamaica, New York 11413
Tel: +1.718.995.0500
aminichiello@twiglobal.com

PROMOTIONAL OPPORTUNITIES

Take advantage of the opportunity to maximize your company’s meeting presence through the unique sponsorships available at Advanced Photonics 2012. Increase your company’s visibility among qualified attendees while utilizing a cost-effective way to gain a competitive advantage. Don’t miss your chance to reach hundreds of attendees!

To take advantage of a sponsorship opportunity, please call +1.202.416.1474 or email Regan Pickett at rpickett@osa.org.
Fax: +1 202.558.3995, Attn: Sam Nystrom – topicalexhibits@osa.org

Please provide the following information for inclusion in the Buyers’ Guide, which will be provided to all attendees. One listing per company is provided. Should a company miss this deadline, you will not be listed in the Guide.

**SUBMIT BY 21 MAY 2012**

Provide all information as it is to be published. Please write legibly in dark ink and fax to +1 202.558.3995 or email to topicalexhibits@osa.org.

- Company Name ___________________________________________________  
- Address 1 ________________________________________________________  
- Address 2 ________________________________________________________  
- City __________________________ State/Province ________________________  
- ZIP/Postal Code __________________________ Country __________________  
- Phone __________________________ Fax ____________________________  
- Web site _________________________________________________________  
- Email ___________________________________________________________  

**50-75 word description** *(any descriptions over 75 words may be edited)*:

________________________________________________________________________  
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Exhibitor Response Form

Advanced Photonics Congress 2012

- Access Networks and In-house Communications (ANIC)
- Bragg Gratings, Photosensitivity and Poling in Glass Waveguides (BGPP)
- Integrated Photonics Research, Silicon, and Nano-Photonics (IPR)
- Nonlinear Photonics (NP)
- Specialty Optical Fibers & Applications (SOF)
- Signal Processing in Photonic Communications (SPPCom)

Email Response Form to topicalexhibits@osa.org, or fax to +1 202.558.3995, ATTN: Sam Nystrom

Company: _____________________________________________________________

Contact: ______________________________________________________________

Phone: ___________________________ Email: _____________________________

A) We ordered internet through the hotel:
   □ Yes
   □ No
   Deadline to order is 4 June.

B) We ordered electricity through the hotel:
   □ Yes
   □ No
   Deadline to order is 4 June.

C) We ordered audiovisual through the hotel:
   □ Yes
   □ No
   Deadline to order is 4 June.
**EXHIBIT ORDER FORM**  
Cheyenne Mountain Resort  
**To Guarantee services, please fill form out completely**  
Cheyenne Mountain Resort  
3225 Broadmoor Valley Rd. • Colorado Springs, CO 80906 • Fax: 719.576.4711

Your Company Name  
Contact Name  
Address  
City ________________________________ State __________ ZIP __________

Telephone __________________________ FAX __________________________

Booth Number ________________________ Meeting Name __________________________

CREDIT CARD NUMBER_________________________ EXP. ______________

Name as it appears on C.C.:_________________________ Billing Zip Code:_________________________

SIGNATURE:_________________________________________________________________________

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*requires IT assistance to set up

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<tr>
<td>Pallet</td>
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**SUB TOTAL**

**22% SERVICE CHARGE**

**TAX 7.4%**

**Total:**

**Shipping**

All incoming and outgoing boxes will incur a $7.50 handling fee each direction. Any box over 50lbs will incur a $65 handling fee. This fee can either be charged to the guest room or a credit card (please see credit card authorization form).

For any out-going packages the resort requires a Cheyenne Mountain Resort shipping form to be completed. Shipping forms can be received at the Business Service Center, located on the Conference Level in the Main Lodge.

Cheyenne Mountain Resort is dedicated to providing superior service and will ensure your boxes are tracked and stored in a secure fashion.

If you have any questions about our shipping procedures please feel free to contact us at 719-538-4000 ext 4300.
Welcome to the 2012 Advanced Photonics Congress! We hope you enjoy all that Colorado Springs offers, and take full advantage of the scientific sessions before you. The Congress has co-located six stimulating veteran topical meetings (listed above) to allow attendees exposure to a wide variety of topics.

This year’s Congress will offer 8 plenary speakers, ample opportunities for networking, and multiple events to motivate discussions on the latest research and exhibits featuring companies which will help enhance your organization. There will be two joint poster sessions, the first will have served refreshments on Monday, 18 June from 18:00–19:30. The second poster session with the conference reception will be on Tuesday, 19 June from 18:00–19:30. A special feature of this year’s Congress is the OIDA Workshop, “Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond - Status of the Industry and Challenges Ahead” with an optional Luncheon program with guest speaker David Welch, Co-Founder and Executive Vice President of Infinera Corporation on Thursday, 21 June. 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 Colorado Springs.

The Access Networks and In-house Communications (ANIC) topical meeting is designed to present many of the latest advances in the development of FTTx technologies ranging from significant advancements in device development to the development of sophisticated algorithms to transmit data, control and monitor the network, and efficiently distribute the signals. This year's meeting will have a plenary speaker, 7 invited speakers, 10 oral presentations and 4 poster presentations.

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 a plenary speaker, 13 invited speakers, 51 oral presentations and 11 poster presentations.

The Integrated Photonics Research, Silicon, and Nano-Photonics (IPR) is a long standing meeting with a great tradition of excellence in innovative science, advanced engineering and cutting edge technology that covers all aspects of research in a burgeoning area of integrated photonics. This year’s meeting will include traditional areas such as photonic integrated circuit design, technology and applications; physics and technology of on-chip active and passive photonic devices; planar waveguide technology, lightweight circuits and systems-on-the chip; theory, modeling and numerical simulation of waveguide and integrated photonic devices and circuits; integrated diffractive optics and micro-photonics. Also, IPR 2012 will continue to cover hot topics in nano-photonics, including generation, detection, transport and utilization of optical fields on the “nanoscale.” A new feature of IPR 2012 is an emerging area of research that relates to various aspects of slow light, including basic physics, implementation and potential use in integrated photonics. This year's meeting will include 2 plenary speakers, 28 invited speakers, 70 oral presentations and 8 poster presentations.

The Nonlinear Photonics (NP) topical meeting is a venue for researchers interested in nonlinear optical processes in structures, devices and systems. The meeting covers all aspects of nonlinear photonics and is devoted to both temporal and spatial nonlinear effects. It covers computational as well as experimental aspects and discusses nonlinear material aspects as well as nonlinear systems. The meeting will also feature 2 plenary speakers, 8 invited speakers, 68 oral presentations and 76 poster presentations.
The Speciality 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 conference 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, 20 invited speakers, 3 tutorial speakers, 38 oral presentations, and 11 poster presentations.

The Signal Processing in Photonic Communications (SPPCom) meeting will discuss photonic transmission technology required in communication networks of all kind, from access to long haul and submarine, focusing on advanced signal processing techniques to overcome signal impairments, and to achieve increased system capacities and spectral efficiencies. The topical meeting with feature 16 invited speakers, 26 oral presentations, and 1 poster presentation.

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

ANIC
Pandelis Kourtessis, London Herts Univ., UK
Thomas Pfeiffer, Alcatel-Lucent, Germany
Antonio Teixeira, Universidade de Aveiro, Portugal

BGPP
Morten Ibsen, Univ. of South Hampton, UK
Paul Westbrook, OFS Laboratories, USA

IPR
Dan-Xia Xu, National Research Council Canada
Anatoly Zayats, King's College London, UK

NP
Wieslaw Krolikowski, Australian Natl. Univ., Australia
Frank Wise, Cornell Univ., USA

SOF
Ishwar Aggarwal, Univ. of North Carolina at Charlotte, USA
John Ballato, Clemson Univ., USA

SPPCom
Fred Buchali, Alcatel-Lucent, Bell-Labs, Germany
Robert Killey, Univ. College of London, UK
David Plant, McGill Univ., Canada

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Fianium

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Air Force Office of Scientific Research (AFSOR)
Nufem
Congress Highlights

BGPP Welcome Reception (Invitation Only)
Sponsored by Fianium
Sunday, 17 June, 18:00–19:30
Grand River Terrace

BGPP attendees are invited to kick-off the conference with this networking event. Join your colleagues for an intimate reception with drinks and light appetizers.

Joint Poster Sessions
JM5A – Monday, 18 June, 18:00–19:30
JTu5A – Tuesday, 19 June, 18:00–19:30
Centennial Room and Terrace

The Joint Poster Sessions 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. During both poster sessions, refreshments will be offered plus attendees have an opportunity to meet with exhibitors.

Conference Receptions

Poster Reception & Exhibits
Monday, 18 June, 18:00–19:30
Centennial Room and Terrace

This Poster Reception is an opportunity to review the poster presentations and grab light refreshments and snacks. Don’t miss this opportunity to network with your colleagues and walk through the Exhibit floor.

Congress Reception & Exhibits
Tuesday, 19 June, 18:00–19:30
Centennial Room and Terrace

This Reception brings together all of the meetings within the congress IPR, NP BGPP, SOF, SPPCom, and ANIC for a fun evening of networking with light appetizers and drinks. This event features another Joint Poster Session and is a great chance to learn about the latest products and innovations. Complimentary to full Technical attendees!

Optoelectronics Industry Development Association (OIDA) Workshop

Photonic Integration for Advanced Modulation Format Transmission at 100Gb/s and Beyond – Status of the Industry and Challenges Ahead Workshop
Thursday, 21 June, 08:30–18:00
White River

Complimentary to all Advanced Photonics Congress Registrants!

Program Topic: Ever growing internet traffic calls for more bandwidth at higher interface density and the telecom industry responded by migrating from a simple OOK to advanced modulation format transmission. Commercial systems e.g., coherent DP-QPSK modulation systems operating at 100Gb/s per wavelength have been deployed while many new developments are underway. They target different applications and vary by technology platform but all have one feature in common: optical components based on photonic integration.

It is becoming increasingly evident that the photonic integration, in some shape or form is the key to further advancement of such systems. The objective of this workshop is to provide a snapshot of the photonic integration techniques and platforms used for advanced modulation format transmission today and discuss challenges going forward. This workshop is sponsored by OIDA member company Infinera, Inc.

OIDA Luncheon Workshop Program
Photonic Integration
Thursday, 21 June, 12:30–14:00
Colorado II & III

Tickets to lunch can be purchased for $35 USD when you register.

All Advanced Photonics Congress registrants are invited to join the OIDA Photonic Integration Workshop featuring guest speaker David Welch, Co-Founder and Executive Vice President of Infinera Corporation.

Plenary and Keynote Speakers

Fire and Ice: 25 Years of Fiber Grating Sensor Technology
Monday, 18 June
JM1B.1 • 08:30, White River

Eric Udd, Columbia Gorge Research, USA

President of Columbia Gorge Research has been deeply involved with fiber optic sensors since 1977 and helped pioneer early work on fiber optic gyros, fiber optic smart structures for health monitoring, high temperature and high speed fiber optic sensors systems, multi-axis strain sensors and fiber optic pressure sensors. He worked for McDonnell Douglas from 1977 to 1993, where he managed over 25 DoD, NASA and internally funded fiber optic sensor programs. Mr. Udd has held a series of positions moving from Engineer/Scientist, to Manager-Fiber Optics, and in 1989 was appointed as one of 40 McDonnell Douglas Fellows. In 1993, he started Blue Road Research and directed the growth of the company through its acquisition by Standard MEMS in January 2000. In January 2006, Mr. Udd left Blue Road Research to found Columbia Gorge Research. Columbia Gorge Research is strongly focused on the objective of moving fiber optic sensor technology to the field quickly and efficiently supporting both end users and developers of the fiber optic sensor technology by forming synergistic relationships with
other companies and organizations. Mr. Udd has 45 issued US Patents and several more pending on fiber optic technology, has written and or presented over 150 papers and has chaired approximately 30 international conferences on fiber optic technology. He has edited the books *Fiber Optic Sensors: An Introduction for Engineers and Scientists*, Wiley, 1991 (2nd edition 2011) and *Fiber Optic Smart Structures*, Wiley, 1995. Mr. Udd is a Fellow of SPIE and OSA and a member of IEEE and the LEOS. Mr. Udd has been awarded the Richardson Medal for 2009 by the Optical Society of America for his work on fiber optic sensors and the field of fiber optic smart structures.

**Negative Refraction and Light Bending with Plasmonic Nanoantennas**
Monday 18 June
JM1A.1 • 08:30, Colorado I

Vlad Shalaev, Purdue Univ., USA

Vladimir (Vlad) M. Shalaev, Scientific Director for Nanophotonics in Birck Nanotechnology Center and Distinguished Professor of Electrical and Computer Engineering at Purdue University, specializes in nanophotonics, plasmonics, and optical metamaterials. Vlad Shalaev received several awards for his research in the field of nanophotonics and metamaterials, including the Max Born Award of the Optical Society of America for his pioneering contributions to the field of optical metamaterials and the Willis E. Lamb Award for Laser Science and Quantum Optics. He is a Fellow of the IEEE, APS, SPIE, and OSA. Prof. Shalaev authored three books, twenty one book chapters and over 300 research publications.

**Nanoscale Glass Blowing**
Monday, 18 June
JM1B.2 • 09:15, White River

Philip Russell, Max Planck Institute for the Science of Light, Germany

Philip Russell is a Director at the Max-Planck Institute for the Science of Light in Erlangen, Germany and holds the Krupp Chair in Experimental Physics at the University of Erlangen-Nuremberg. He obtained his doctorate in 1979 at the University of Oxford. His research interests currently focus on scientific applications of photonic crystal fibers and related structures. He is a Fellow of the Royal Society and the Optical Society of America (OSA) and has won several international awards for his research including the 2005 Körber Prize for European Science, the 2005 Thomas Young Prize of the Institute for Physics (UK) and the 2000 OSA Joseph Fraunhofer Award/Robert M. Burley Prize - for the invention of photonic crystal fiber.

**The Roles of Optics in Information Processing**
Monday, 18 June
JM1A.2 • 09:15, Colorado I

David A.B. Miller, Stanford Univ., USA

David A. B. Miller received his Ph.D. from Heriot-Watt University in Physics in 1979. He was with Bell Laboratories from 1981 to 1996, as a department head from 1987. He is currently the W. M. Keck Professor of Electrical Engineering, and a Co-Director of the Stanford Photonics Research Center at Stanford University. He has been active in professional societies and was President of the IEEE Lasers and Electro-Optics Society in 1995. His research interests include physics and devices in nanophotonics, nanometalics, and quantum-well optoelectronics, and fundamentals and applications of optics in information sensing, switching, and processing. He has published more than 240 scientific papers and the text "Quantum Mechanics for Scientists and Engineers", holds 69 patents, has received numerous awards, is a Fellow of OSA, IEEE, APS, and the Royal Societies of Edinburgh and London, holds two honorary degrees, and is a Member of the National Academy of Sciences and the National Academy of Engineering.

**Technology Platforms for Photonic Integrated Circuits**
Tuesday, 19 June
JT1B.1 • 08:30, Colorado I

Michael Wale, Oclaro, UK

Michael Wale is Director Active Product Research at Oclaro, based at Caswell, UK, in which role he is responsible for strategic programs in photonic integration technologies and their applications. Mike received his BA, MA and D. Phil. degrees in physics from the University of Oxford, UK. He has been active in photonics research, development and manufacturing since the early 1980s, with particular emphasis on photonic integrated circuit technology. Alongside his role at Oclaro, Mike is a part-time Professor at Eindhoven University of Technology in The Netherlands and an Honorary Professor at Nottingham University in the UK. Prof. Wale is a member of the Executive Board of the European Technology Platform, Photonics21, and chairman of its Working Group on Design and Manufacturing of Optical Components and Systems.

**Complex Nonlinear Opto-Fluidics**
Tuesday, 19 June
JT1B.2 • 09:15, Colorado I

Mordechai (Moti) Segev, Technion – Israel Institute of Technology, Israel

Mordechai (Moti) Segev is a Distinguished Professor of Physics, at the Technion, Israel. He received his B.Sc. and D.Sc. from the Technion in 1985 and 1990, respectively. After spending three years at Caltech as a post-doc, he joined Princeton in 1994 as an Assistant Professor, becoming an Associate Professor in 1997, and a Professor in 1999. In the summer of 1998, he went back to Israel, eventually resigning from Princeton in 2000. Moti Segev’s research interests are mainly in Nonlinear Optics, Solitons, Sub-Wavelength Imaging, Lasers and Quantum Electronics, although he finds much entertainment in more demanding fields such as basketball and hiking. He has more than 280 publications in refereed journals, many book chapters, and has given more than 100 Plenary, Keynote and Invited presentations at conferences. Among his most significant contributions are the discoveries of photorefractive solitons, of incoherent (white light) solitons and of accelerating wavepackets of Maxwell’s equations, first observation of 2D lattice solitons, first experimental demonstration of Anderson localization in a disordered periodic system, and the invention of sparsity-based subwavelength imaging technique. Moti Segev is a Fellow of the OSA and of the APS. He has won numerous awards, among them the 2007 Quantum Electronics Prize of the EPS, the 2009 Max Born Prize - for the invention of the photonic crystal fiber.
Award of the OSA, and the 2008 Landau Prize (Israel). In 2011, he was elected to the Israel Academy of Sciences and Humanities. However, above all his personal achievements, Moti Segev takes pride in the success of the graduate students and post-doctoral fellows that have worked with him over the years. Among those are currently 16 university professors in the United States, Germany, Taiwan, Croatia, Italy, India and Israel.

**Future Optical Access Networks**
Wednesday, 20 June
JW1A.1 • 08:30, Platte

**Yun Chung**, Korea Advanced Inst. of Science and Technology, Republic of Korea

Y. C. Chung is a professor of electrical engineering at the Korea Advanced Institute of Science and Technology (KAIST), which he joined in 1994. From 1987 to 1994, he was with the Lightwave Systems Research Department at AT&T Bell Laboratories. From 1985 to 1987, he was with Los Alamos National Laboratory under AWU-DOE Graduate Fellowship Program. His current activities include high-capacity WDM transmission systems, all-optical WDM networks, optical performance monitoring techniques, WDM passive optical networks, and fiber-optic networks for wireless communications, etc. He has published over 500 journal and conference papers in these areas and holds over 80 patents. Prof. Chung is a Fellow of IEEE and OSA, and a Member of Korean Academy of Science and Technology.

**Quo Vadis, Spatial Multiplexing?**
Wednesday, 20 June
JW1A.2 • 09:15, Platte

**Henning Buelow**, Universitaet Erlangen, Germany

Henning Buelow is Distinguished Member of Technical Staff in the Department of Optical Technologies at Bell Labs Alcatel-Lucent in Stuttgart, Germany. He received his Dipl.-Ing. degree in electrical engineering from the University of Dortmund, Germany, and a Ph.D. from the University of Berlin for work on integrated optical switching matrices. He joined Bell Labs (former Alcatel-Lucent Research-and-Innovation) in Stuttgart, Germany, in 1990. Since then he worked on optical amplifiers, on polarization mode dispersion, and on dynamic distortion mitigation in high bit-rate transmission systems by electronic and optical signal processing. His current research interests are mode multiplexed systems and coded modulation for coherent systems. Between 2008 and 2011 he has been Guest-Professor with the University of Erlangen, Germany.

**Tutorial Speakers**

**Nonlinear Fibers for Parametric Signal Generation Amplification and Processing**
Monday, 20 June
SM4E.4 • 17:15, Rio Grande/Gunnison

**Stojan Radic**, Univ. of California San Diego, USA

Stojan Radic joined the UCSD faculty in November 2003. He received his Ph.D. in optics from The Institute of Optics (Rochester) in 1995. Radic gained a worldwide reputation while working in industry, first at Corning in the Photonics Technology division, and later at Bell Laboratories in Lightwave Systems Research (1998–03). Immediately prior to coming to the Jacobs School, Radic held a chaired position at Duke University. Radic has published 40 articles in refereed journals, and serves on committees for Optical Fiber Communication (OFC), Conference on Lasers and Electro-Optics (CLEO) and Optical Amplifiers and their Applications (OAA) conferences.

**Recent Developments in Fiber Lasers, Mode Stability Issues in LMA Fibers**
Tuesday, 19 June
STu4F.5 • 17:15, Rio Grande/Gunnison

**Jens Limpert** and César Jauregui Misas, Friedrich-Schiller-Universität Jena

Prof. Jens Limpert was born in Jena, Germany, in 1975. He received his M.S in 1999 and Ph.D. in Physics from the Friedrich Schiller University of Jena in 2003. His research interests include high power fiber lasers in the pulsed and continuous-wave regime, in the near-infrared and visible spectral range. After a one-year postdoc position at the University of Bordeaux, France, where he extended his research interests to high intensity lasers and nonlinear optics, he returned to Jena and is currently leading the Laser Development Group (including fiber- and waveguide lasers) at the Institute of Applied Physics. He is author or co-author of more than 150 peer-reviewed journal papers in the field of laser physics. His research activities have been awarded with the WLT-Award in 2006 and with an ERC Starting Grant in 2009. Jens Limpert is member of the German Physical Society and the Optical Society of America.

**Dr. César Jauregui Misas** was born in Santander, Spain, in 1975. He received both his Telecommunication Technical Engineering degree and his Telecommunication Engineering degree at the University of Cantabria. In 2003, he got his Ph.D. degree at that same University. In 2005 he began a two-year post-doc stay at the Optoelectronics Research centre, where he investigated the phenomenon of slow-light in optical fibers. Since 2007 he is working at the Institute of Applied Physics in Jena. His primary research concerns are high-power fiber lasers, non-linear effects in optical fibers and Fiber Optic sensors. César Jáuregui has co-authored more than 120 papers presented in conferences and scientific journals. He has been awarded with several academic prizes. Among them, in 2004, he was awarded with a prize for the best Thesis at the University of Cantabria.
Proudly committed to innovation since 2000

With its advanced fiber Bragg gratings designs and assemblies, TeraXion is proud to work you on complex designs and prototype challenges. Our custom offering aims to transform ideas in cutting-edge solutions that fit the very specific needs of universities and research centers.

12 years after its creation, TeraXion is more committed than ever to innovate and is well positioned for future growth by leveraging its fiber Bragg grating, specialized lasers and silicon photonics platforms for your benefits.

Sustained innovation is made possible thanks to our talented people and to our valuable partners.

Thank you partners, we are delighted to innovate with you.

TeraXion’s contribution at BGPP 2012

- **Bragg grating notch filters in silicon-on-insulator waveguides (BW2E.3)**
  *Y. Painchaud, M. Poulin, C. Latraverse, N. Ayotte, M.-J. Picard and M. Morin*
  Session: Applications of Gratings and Poled Glass: Novel Bragg Grating Filters
  Time: Wednesday June 20, 11:00 AM

- **100 nm Wide Fiber Bragg Grating Dispersion Compensator Around Zero Dispersion Wavelength (BW4E.1)**
  *F. Trépanier, M. Morin, G. Brochu, Y. Painchaud, D. C. Adler, W. Wieser and R. Huber*
  Session: Applications of Gratings and Poled Glass: FBG Applications to Optical Signal Processing
  Time: Wednesday June 20, 4:00 PM

- **Characterization of Integrated Bragg Grating Profiles (BM3D.7)**
  *Alexandre D. Simard; Yves Painchaud; Sophie LaRochelle*
  Session: Grating Properties and Fabrication: Novel Fibers and Grating Design
  Time: Monday June 18, 3:15 PM

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**About TeraXion:**
- 200 employees
- 125 publications
- 32 granted patents
- Privately owned
- 120,000 devices sold
- 500 customers
## Technical Program Committees

### Access Networks and In-house Communications (ANIC) Program Committee

**Chairs**
- Pandelis Kourtessis, London Herts Univ., UK
- Thomas Pfeiffer, Alcatel-Lucent, Germany
- Antonio Teixeira, Universidade de Aveiro, Portugal

**Committee Members**
- Silvio Abrate, Istituto Superiore Mario Boella, Italy
- Slavisa Aleksic, Technische Universität Wien, Austria
- Erich Leitgeb, Institut für Hochfrequenztechnik, TU Graz, Austria
- John Mietuch, Univ. College, London, UK
- Thas Nirmalathas, The Univ. of Melbourne, Australia
- Giorgio Tosi Beleffi, Istituto Superiore C.T.I., Italian Ministry of Economic Development, Italy
- Stewart Walker, Univ. of Essex, UK
- Muneer Zuhdi, Etisalat, UAE

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

**General Chairs**
- Morten Ibsen, Univ. of Southampton, UK
- Paul Westbrook, OFS Laboratories, USA

**Program Chairs**
- Stephen Mihailov, Communications Research Center, Canada
- Lin Zhang, Aston Univ., UK

**Committee Members**
- Thierry Cardinal, ICMCB, France, Chair
- Lionel Canioni, CPMOH-Université Bordeaux 1, France
- John Canning, Univ. of Sydney, Australia
- Monica Ferraris, Politecnico di Torino, Italy
- Saulius Juodkazis, Swinburne Univ. of Technology, Australia
- Leonid Glebov, Univ. of Central Florida, CREOL, USA
- Peter Kazansky, Univ. of Southampton, UK
- Denise Krol, Univ. of California Davis, USA
- Stefan Nolte, Friedrich-Schiller-Universität Jena, Germany
- Dimitris Papazoglou, Univ. of Crete, Greece
- Jianrong Qui, Zhejiang Univ., China
- Mykhaylo Dubov, Aston Univ. , UK
- Victor Grubsky, Physical Optics Corp. , USA
- Moshe Horowitz, Technion Israel Institute of Technology , Israel
- Tristian Kemp, OFS Fitel LLC ,
- Hans Limberger, Ecole Polytechnique Federale de Lausanne , Switzerland
- Graham Marshall, Macquarie Univ. , Australia
- Kyunghwan Oh, Yonsei Univ. , South Korea
- Stavros Pissadakis FORTH-IESL, Greece
- Manfred Rothhardt, IPHT, Germany

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Lars Zimmermann, Technische Universitaet Berlin, Germany
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Dmitry Chigrin, Univ. of Wuppertal, Germany; Subcommittee Chair
Sven Burger, Zuse-Institut Berlin (ZIB), Germany
Masafumi Fujii, Univ. of Toyama, Japan
Stephen O’Brien, Tyndall National Institute, Ireland
James Pond, Numerical, Canada
Christopher Poulton, Univ. of Technology Sydney, Australia
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Sailing He, Zhejiang Univ., China and Joint Research Center of Photonics of the Royal Institute of Technology, Sweden
Masaya Notomi, NTT Basic Research Laboratories, Japan
Milos Popovic, Univ. of Colorado at Boulder, USA
Edwin Pun, City Univ. of Hong Kong, China
John Rogers, Univ. of Illinois at Urbana-Champaign, USA
Din Ping Tsai, National Taiwan Univ., Taiwan
William Whelan-Curtin, Univ. of St. Andrews, UK

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Thomas Krauss, Univ. of St. Andrews, UK; Subcommittee Chair
Ben Eggleton, Sydney University, Australia
Kobus Kuipers, Amsterdam, The Netherlands
Christelle Monat, Lion, France
Susumu Noda, Kyoto Univ., Japan
Marco Santagiustina, Univ. of Padova, Italy
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Arnaud Mussot, Univ. of Lille, France
Gunter Steinmeyer, MBI Berlin and TUT Tampere, Germany
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Nonlinear Devices and Systems
Sergei Turitsyn, Aston Univ., UK, Subcommittee Chair
Liam Barry, Dublin City Univ., Ireland
Robert Boyd, Univ. of Rochester, USA
Andrew Ellis, Tyndall National Inst., Ireland

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Curtis Menyuk, Univ. of Maryland Baltimore, USA
Jesper Moerk, Technical Univ. of Denmark, Denmark

Spatial Effects, Poling, Periodic Structures
Thomas Pertsch, Friedrich Schiller Univ. Jena, Germany, Subcommittee Chair
Costantino De Angelis, Univ. Brescia, Italy
Yaroslav Kartashov, ICFO, Castelldefels, Spain
Walter Margulis, Acreo, Sweden
Joram Pistora, Technical Univ. of Ostrava, Czech Republic
Andrey Sukhorukov, Australian National Univ., Australia

Novel Nonlinear Materials
John Ballato, Clemson Univ., USA Subcommittee Chair
Alex Gaeta, Cornell Univ., USA
Seth Marder, Georgia Inst. of Technology, USA
Robert Norwood, Univ. of Arizona, USA
Siddartha Ramachandran, Boston Univ., USA
Edo Waks, Univ. of Maryland, USA

Instabilities in Nonlinear Optics
Goery Genty, Tampere Univ. of Technology, Subcommittee Chair
Jerome Kasparian, Univ. of Geneva, Switzerland
Stefania Residori, CNRS and INLN Nice, France
John Travers, Max Planck Inst. for the Science of Light, Erlangen, Germany
Stefano Wabnitz, Univ. of Brescia, Italy

Nonlinearities in Novel Propagation Environments
Anna Peacock, ORC and Univ. of Southampton, UK, Subcommittee Chair
Fabio Biancalana, Max Planck Inst. of the Science of Light, Erlangen, Germany
Neil Broderick, Univ. of Auckland, New Zealand
Francois Courvoisier, CNRS Inst. FEMTO-ST, France
Boris Kuhlmeier, Univ. of Sydney, Australia
Roberto Morandotti, INRS-EMT, Canada
Nicola Panoiu, Univ. College London, UK

Nonlinearities in Lasers and Dissipative Systems
Philippe Grelu, Univ. of Burgundy, France, Subcommittee Chair
Juan-Diego Ania-Castanon, Instituto de Optica, CSIC, Spain
Stephane Coen, Univ. of Auckland, New Zealand
Steven Cundiff, JILA/Univ. of Colorado, Boulder, USA
J. Nathan Kutz, Univ. of Washington, USA
J. Roy Taylor, Imperial College London, UK

Modelling, Analysis and Computational Techniques in Nonlinear Photonics
Stefano Trillo, Univ. of Ferrara, Italy
Alejandro Aceves, Southern Methodist Univ., USA
Sonia Boscolo, Aston Univ., UK
Claudio Conti, Sapienza Univ. of Rome, Italy
Ulf Peschel, Univ. of Erlangen, Germany
Ping Kong Alex Wai, Hong Kong Polytechnic Univ.
Specialty Optical Fibers & Applications (SOF) Program Committee

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General Chairs
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Guifang Li, Univ. of Central Florida, USA
Dan Sadot, Bershava Univ., Israel
Chongxin Xie, Alcatel Lucent, USA
Xingwen Yi, Univ. of Electronics and Sience of China, China
Zuquin Zhu, Univ. of Science and Technology China, China
Captured Session Content

We are delighted to announce that your 2012 Advanced Photonics technical registration includes a valuable new enhancement! A portion of the sessions at this year’s congress are being digitally captured for on-demand viewing. All captured content from listed sessions will be live for viewing within twenty-four hours of being recorded. Just look for the symbol in the Agenda of Sessions and abstracts to easily identify the presentations being captured. Content will be available for 60 days following the Congress.

Explanation of Session Codes

The first letter of the code designates the meeting (For instance, A=Access Networks and In-house Communications, B=Bragg GRATings, Photosensitivity and Poling in Glass Waveguides, I=Integrated Photonics Research, Silicon and Nano-Photonics, N=Nonlinear Photonics, S=Specialty Optical Fibers & Applications, SP=Signal Processing in Photonic Communications, J=Joint). The second element denotes the day of the week (Monday=M, Tuesday=Tu, Wednesday=W). 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 AW1A.4 indicates that this paper is part of the Access Networks and In-house Communications meeting (A) and is being presented on Wednesday (W) in the first series of sessions (1), and is the first parallel session (A) in that series and the fourth paper (4) presented in that session.

Invited papers are noted with ✽

Tutorials are noted with Tutorial

Plenaries are noted with Plenary

Captured Content Sessions are noted with ✽

Exhibit Hours

<table>
<thead>
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<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Room</th>
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<td>10:00–10:30</td>
<td>Exhibit Hours / Coffee Break</td>
<td>Centennial Room</td>
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<td>18 June 2012</td>
<td>15:30–16:00</td>
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<tr>
<td>18 June 2012</td>
<td>18:00–19:30</td>
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<td>Centennial Room &amp; Terrace</td>
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<td>10:00–10:30</td>
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<td>18:00–19:30</td>
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<th>Event</th>
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<tr>
<td>15.00–18.00</td>
<td>Registration, Lower Lobby, Conference Level</td>
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<tr>
<td>18.00–19.30</td>
<td>BGPP Welcome Reception (Invite Only), Grand Riverview Terrace</td>
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## — Monday, 18 June

<table>
<thead>
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<td>07:50–08:00</td>
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<tr>
<td>08:00–10:00</td>
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<td>JMB1 • Joint BGPP and SOF Plenary Session</td>
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<td>Opening Comments</td>
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<tr>
<td>08:30–10:00</td>
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<td>JM1A • Joint IPR &amp; NP Plenary Session I - Vladimir Shalaev and David Miller, Colorado I</td>
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<td>10:00–10:30</td>
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<td>Coffee Break and Exhibits, Centennial Room</td>
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<tr>
<td>10:30–12:30</td>
<td></td>
<td>II: Integration, Modeling &amp; Simulations II: Optics and Nano-optics</td>
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<tr>
<td>12:30–13:30</td>
<td></td>
<td>Lunch Break, On Your Own</td>
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<tr>
<td>13:30–15:30</td>
<td></td>
<td>III: Lasers and Integration</td>
</tr>
<tr>
<td>15:30–16:00</td>
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<td>Coffee Break and Exhibits, Centennial Room</td>
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<tr>
<td>16:00–18:00</td>
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<td>IM4A • Electro-Optic Modulators and Switches</td>
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<td>18:00–19:30</td>
<td></td>
<td>JM5A • Joint Poster Session &amp; Reception/Exhibit, Centennial Room &amp; Terrace</td>
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### Key to Conference Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ANIC</td>
<td>Access Networks and In-house Communications</td>
</tr>
<tr>
<td>BGPP</td>
<td>Bragg Gratings, Photosensitivity, and Poling in Glass Waveguides</td>
</tr>
<tr>
<td>IPR</td>
<td>Integrated Photonics Research, Silicon and Nano Photonics</td>
</tr>
<tr>
<td>NP</td>
<td>Nonlinear Photonics</td>
</tr>
<tr>
<td>SPPcom</td>
<td>Signal Processing in Photonics Communications</td>
</tr>
<tr>
<td>SOF</td>
<td>Specialty Optical Fibers</td>
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</tbody>
</table>

Advanced Photonics: OSA Optics & Photonics Congress • 17–22 June 2012
# Agenda of Sessions — Tuesday, 19 June

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tr>
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<td>08:20–08:30</td>
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<tr>
<td>08:30–10:00</td>
<td>SpTu1A • OFDM I, JTu1B • Joint IPR &amp; NP Plenary Session II — Michael Wale and Moti Segev, Colorado I</td>
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<td>10:00–10:30</td>
<td>Coffee Break and Exhibits, Centennial Room</td>
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<td>10:30–12:30</td>
<td>SpTu2A • OFDM II, ITu2B • Waveguides, Polarizers and Dispersion</td>
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<tr>
<td></td>
<td>ITu2C • Slow Light in Photonic Crystals</td>
</tr>
<tr>
<td></td>
<td>NTu2D • Nonlinear systems and Nonlinear Dynamics</td>
</tr>
<tr>
<td></td>
<td>BTu2E • Applications of Gratings and Poled Glass: FBG Sensors and Interrogation Systems</td>
</tr>
<tr>
<td></td>
<td>STu1D • Fiber &amp; Fabrication</td>
</tr>
<tr>
<td>12:30–13:30</td>
<td>Lunch Break, On Your Own</td>
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<tr>
<td>13:30–15:30</td>
<td>SpTu3A • DSP Algorithm I</td>
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<tr>
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<td>ITu3B • Microphotonics Filters</td>
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<tr>
<td></td>
<td>ITu3C • Tunable Delay</td>
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<tr>
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<td>NTu3D • Nonlinearities in Novel Propagation Environments</td>
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<td>BTu3E • Sensor Symposium I</td>
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<td></td>
<td>STu3F • Mid IR</td>
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<tr>
<td>15:30–16:00</td>
<td>Coffee Break and Exhibits, Centennial Room</td>
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<tr>
<td>16:00–18:00</td>
<td>SpTu4A • Subsystems</td>
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<td></td>
<td>ITu4B • Integration of Silicon Photonics with Other Technologies</td>
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<td></td>
<td>ITu4C • Metamaterials, Sensors and Optical Properties of Nanoparticles</td>
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<td>NTu4D • Spatial Effects and Periodic Structures</td>
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<td>BTu4E • Sensor Symposium II (ends at 17:15)</td>
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<td></td>
<td>STu4F • Fiber Lasers I</td>
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<tr>
<td>18:00–19:30</td>
<td>JTu5A • Joint Poster Session &amp; Reception/Exhibit, Centennial Room &amp; Terrace</td>
</tr>
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**Key to Conference Abbreviations**

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<td>SPPcom</td>
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<td>SOF</td>
<td>Specialty Optical Fibers</td>
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Advanced Photonics: OSA Optics & Photonics Congress • 17–22 June 2012
## Agenda of Sessions — Wednesday, 20 June

<table>
<thead>
<tr>
<th>Time</th>
<th>Arkansas</th>
<th>Platte</th>
<th>Colorado II</th>
<th>Colorado I</th>
<th>White River</th>
<th>Rio Grande/ Gunnison</th>
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<tbody>
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<td>ANIC</td>
<td>SPPCom</td>
<td>IPR</td>
<td>NP</td>
<td>BGPP</td>
<td>SOF</td>
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<tr>
<td>07:30–18:00</td>
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<tr>
<td>08:20–08:30</td>
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<td>Comments</td>
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<tr>
<td>08:30–10:00</td>
<td>JW1A • Joint SPPCom &amp; ANIC Plenary Session - Yun Chung and Henning Buelow, Platte</td>
<td>IW1B • Plasmonics and Applications</td>
<td>NW1C • Novel Nonlinear Effects</td>
<td>BW1D • Fundamentals of Photosensitivity and Poling: Direct Laser Writing and Thermal Poling</td>
<td>SW1E • Fiber Based Sensors</td>
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<tr>
<td>10:00–10:30</td>
<td>Coffee Break and Exhibits, Colorado Gallery and Grand Rivers Gallery</td>
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<tr>
<td>10:30–12:30</td>
<td>AW2A • PON Technology Trends</td>
<td>SpW2B • Coherent System Implementation</td>
<td>IW2C • Nanophotonics for Energy Conversion and Applications</td>
<td>NW2D • Theory of Novel Nonlinear Processes</td>
<td>BW2E • Applications of Gratings and Poled Glass: Novel Bragg Gratings Filters (ends at 12:15)</td>
<td>SW2F • Fiber Lasers II</td>
</tr>
<tr>
<td>12:30–13:30</td>
<td>Lunch Break, On Your Own</td>
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<td>13:30–15:30</td>
<td>AW3A • Indoor Networks</td>
<td>SpW3B • High Capacity System</td>
<td>IW3C • Photonic Crystals</td>
<td>NW3D • Rogue Waves and Novel Propagation Effects</td>
<td>BW3E • Applications of Gratings and Poled Glass: Applications of Gratings and Poled Glass: Lasers Grating Structures and Reflectors</td>
<td>SW3F • Applications of Fiber Lasers/ Devices</td>
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<tr>
<td>15:30–16:00</td>
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<tr>
<td>16:00–18:00</td>
<td>AW4A • OFDM- and WDM-PON Technologies</td>
<td>SPPCom Postdeadline Paper Session and Rump Session</td>
<td>IW4C • Bionanophotonics and Si Nanophotonics</td>
<td>NP Postdeadline Paper Session</td>
<td>BW4E • Applications of Gratings and Poled Glass: FBG Applications to Optical Signal Processing (ends at 17:15)</td>
<td>BGPP Postdeadline Paper Session (17:15–18:00)</td>
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<tr>
<td>18:30–21:30</td>
<td>Networking Dinner (Tentative), Cheyenne Courtyard/Backup: Centennial Room</td>
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<tr>
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<td>Specialty Optical Fibers</td>
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# Agenda of Sessions — Thursday, 21 June

<table>
<thead>
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<th>Time</th>
<th>Colorado I</th>
<th>Platte</th>
<th>White River</th>
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<tr>
<td>07:30–12:30</td>
<td>Registration, Lower Lobby, Conference Level</td>
<td></td>
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<tr>
<td>08:30–10:00</td>
<td>NTh1A • Novel Nonlinear Materials</td>
<td>SpTh1B • DSP Algorithm II</td>
<td>Integration for Advanced Modulation Format Transmission at 100Gb/S and Beyond – Status of the Industry and Challenges Ahead Workshop</td>
</tr>
<tr>
<td>10:00–10:30</td>
<td>Coffee Break, Colorado Gallery and Grand Rivers Gallery</td>
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<tr>
<td>10:30–12:30</td>
<td>NTh2A • Nonlinear Effects in Optical Waveguides</td>
<td>SpTh2B • Monitoring (10:30–12:00)</td>
<td>Continued from Above</td>
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<tr>
<td>12:30–14:00</td>
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<td>OIDA Lunch – Ticketed, Colorado II &amp; III</td>
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<td>14:00–18:00</td>
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<td>OIDA Workshop (continued)</td>
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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ANIC</td>
<td>Access Networks and In-house Communications</td>
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<tr>
<td>BGPP</td>
<td>Bragg Gratings, Photosensitivity, and Poling in Glass Waveguides</td>
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<td>IPR</td>
<td>Integrated Photonics Research, Silicon and Nano Photonics</td>
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<td>NP</td>
<td>Nonlinear Photonics</td>
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<td>SPPcom</td>
<td>Signal Processing in Photonics Communications</td>
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<td>SOF</td>
<td>Specialty Optical Fibers</td>
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**OIDA Lunch – Ticketed, Colorado II & III**

**OIDA Workshop (continued)**
Monday, 18 June

Colorado I

Joint Integrated Photonics Research, Silicon and Nano Photonics/Nonlinear Photonics

White River

Joint Bragg Gratings, Photosensitivity, and Poling in Glass Waveguides/Specialty Optical Fibers

**07:00–18:00**  
**Registration, Lower Lobby, Conference Level**

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08:20–08:30  
**Opening Comments**

08:30–10:00  
**JM1A • Joint IPR & NP Plenary Session I**

Frank Wise; Cornell Univ., USA; Anatoly Zayats; Univ. of London King’s College, UK, Presider

JM1A.1 • 08:30  
**Plenary**

Negative Refraction and Light Bending with Plasmonic Nanoantennas, Vladimir M. Shalaev1; Purdue Univ., USA. We review the exciting field of optical metamaterials and outline the recent progress in developing tunable and active MMs, semiconductor-based and loss-free negative-index MMs. We also discuss a new approach for broadband light bending.

JM1A.2 • 08:15  
**Plenary**

The Roles of Optics in Information Processing, David A. B. Miller1; Stanford Univ., USA. Optics has many potential roles it could play in information processing. History, prospects and technology for interconnects and other applications are summarized, including key requirements for potentially viable technological approaches.

10:00–10:30  
**Coffee Break, Centennial Room**

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08:20–08:30  
**Opening Comments**

08:30–10:00  
**JM1B • Joint BGPP and SOF Plenary Session**

John Ballato; Clemson Univ., USA; Morten Ibsen; Univ. of Southampton, UK, Presider

JM1B.1 • 08:30  
**Plenary**

Fire and Ice: 25 Years of fiber grating sensor technology, Eric Udd1; Columbia Gorge Research, LLC, USA. Over the past 25 years fiber grating sensor technology has been applied in extreme environments where conventional sensor technology has limited or in some cases non-existent measurement capabilities enabling widespread application potential.

JM1B.2 • 09:15  
**Plenary**

Nanoscale Glass Blowing, Philip Russell1; Max Planck Institute for the Science of Light, Germany. The past 15 years has seen the emergence of glass fibers with intricate transverse microstructures, often with nanoscale features. Their ability to guide and manipulate light in unexpected ways has led to many novel applications.

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**NOTES**

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10:30–12:30  
**IM2A • Highly Integrated Optical III-V Circuits**  
Milan Mashanovitch; Univ. of California Santa Barbara, USA, Presider

**IM2A.1 • 10:30**  
Generic InP-based integration technology, today and tomorrow,  
Meint K. Smi;*1 Electrical Engineering, Technische Universität Eindhoven, Netherlands. Generic Photonic Integration Processes will cause a revolution in micro and nanophotonics. Generic InP-based technology provides a broad photon functionalit, both active and passive. It also has a good potential for future integration with electronics.

**IM2A.2 • 11:00**  
Modified Uni-Traveling Carrier Photodiodes Heterogeneously Integrated on Silicon-on-Insulator (SOI), Andreas Bozin; Ping Fu;‘1 Zhi Li;‘, Huapu Pan;‘ Quigui Zhou;‘ Allen Cross;‘ Molly Piels;‘ Jon Peters;‘; Jon E. Bowers;‘ Joe C. Campbell;‘ ECE Department, Univ. of Virginia, USA. ‘ECE Department, Univ. of California Santa Barbara, USA. We propose and demonstrate a novel InP-based evanescently-coupled modified uni-traveling carrier photodiode (MUTC PD) on SOI waveguide. A 100-μm long waveguide MUTC PD reaches a third-order intercept point (IP3) of 20 dBm at 7 GHz and 10 mA.

**IM2A.3 • 11:15**  
Selective-area-growth technology for flexible active building blocks, Helene Debreges;‘1 Jean Decobert;‘ Nadine Lagay;‘ Ronan Guillame;‘ David Carrara;‘ Olivier Patard;‘ Christophe Kazmierski;‘ Romain Breton;‘ III-V Lab, France. Selective area growth enables to locally tune the epitaxial material thickness and composition on a single InP substrate. This paper presents this technology and its application to photonic integrated circuits, illustrated by two realisations.

**IM2A.4 • 11:45**  
Large-scale Monolithic Integration Enabling Terabit Transmitters and Coherent Super-channel Architecture, Masaki Kato;‘ Damien Lambert;‘ Vikrant Lal;‘ Matthias Kurt;‘ Joseph Summers;‘ Peter Evans;‘ Scott Cercone;‘ Matthie Fishe;‘, Roman Malende-vich;‘ Jefferey Rahm;‘ Amed Duml;‘ Andrew Dentz;‘ Ranjani Muthul;‘ Randal Salvatore;‘ Adam James;‘ Pavel Stedml;‘ Eva Strelecka;‘ Thomas Valtavisi;‘ Forrest Sedgwick;‘ Omar Khayam;‘ Radkhrihnag Nagarajan;‘ Je Tang;‘ Jiaming Zhang;‘ Huan-Shang Tsai;‘ Tim Buttle;‘ Mark Mays;‘ David Krause;‘ John McNicol;‘ Kiang;‘ Tuan Wu;‘ Han Sun;‘ Mike Reffe;‘ Fred Kish;‘ David Welch;‘ Infinera Corporation, USA. In this talk, we review InP-based, 10 wavelength, polarization-multiplexed quadrature phase-shift keying (PM-QPSK) transmitter and receiver photonic integrated circuits (PICs) that enable terabit coherent super-channel architecture.

**IM2B.1 • 10:30**  
Future Requirements of Modeling Software for Integrated Optical Communication Systems, Michael Hochberg;‘ Thierry J. Pingart;‘; Tom Buxer;‘ Electrical and Computer Engineering, Univ. of Delaware, USA. ‘Electrical Engineering, Univ. of Washington, USA. ‘Lucent, Inc., USA. As silicon photonics processes mature, the infrastructure needed to support large scale design needs to follow suit. We discuss here future requirements for modeling of integrated optical communication systems.

**IM2B.2 • 11:00**  
Simulation and Optimization of Photonic Integrated Circuits, Jackson Klein;‘ James Pond;‘ Lumerical Solutions, Inc. Canada. We will demonstrate the simulation of photonic integrated circuits, initially using analytical models for each element of the circuit. The results of physical electromagnetic and electrical solvers will then be incorporated to simulate realistic photonic integrated circuits.

**IM2B.3 • 11:30**  
CAPHE: Time-domain and Frequency-domain Modeling of Nonlinear Optical Components, Martin Fiers;‘; Thomas Van Vaerenbergh;‘‘‘; Joni Dambre;‘; Peter Bienstmann;‘;‘ ‘Center for Nano- and Biophotonics, Ghent Univ., Belgium. ‘Department of Electronics and Information Systems, Ghent Univ., Belgium. We present CAPHE, a tool for modeling optical circuits in time and frequency domain. Some applications are optical filter design, variational studies and dynamical modeling of strongly nonlinear components (microttinges, microdisks, SOAs).

**IM2B.4 • 11:45**  
Topology optimization of nano photonic systems, Yury Elesin;‘ Fengwen Wang;‘ Jacob Andkjær;‘ Jakob S. Jensen;‘ Ole Sigmund;‘ Technical Univ of Denmark, Denmark. We describe recent developments within nano-photonic systems design based on topology optimization. Applications include linear and non-linear optical waveguides, slow-light waveguides, as well as all-dielectric cloaks that minimize scattering or back-scattering from hard obstacles.

**IM2C.1 • 10:30**  
Tiny Waves We should Never Ignore, Shabir Amirnashvili;‘ Carsten Breve;‘ Fedor Mitschke;‘ Ayhan Demirci;‘ ‘Weierstrass Institute for Applied Analysis and Stochastics, Germany. ‘Univ. of Rostock, Germany; ‘no Affiliation, Germany. Tiny dispersive waves are naturally generated by non-resonant wave interactions and Cherenkov radiation of solitons. We have found that these waves may in turn feed the solitons and spontaneously switch them to a large amplitude state.

**IM2C.2 • 11:00**  
Do solitons arise from modulational instability?, Christoph Mah Natalie;‘ Fedor Mitschke;‘ ‘Institut fuer Physik, Universitaet Rostock, Germany. The notion that a train of solitons arises from cw by modulational instability is rejected by using discrete scattering transform, adopted to infinite domain. Inclusion of the Raman effect, however, can induce soliton formation.

**IM2C.3 • 11:15**  
Modulation Instability in Xened-Filled Hollow-Core Photonic Crystal Fiber Francesco Tani;‘ John C. Travers;‘ Ka Fai Mak;‘ Wionkadang Chang;‘ Philip Russell;‘ ‘Max Planck Institute for the Science of Light, Germany. ‘Department of Physics, Univ. of Erlangen-Nuremberg, Germany. Abstract: We experimentally access the modulation instability regime in xenon-filled kagome PCF. Soliton orders ~100 are obtained with few-μJ, 490 fs pulses at 800 nm. Numerical simulations confirm pulse breakup into ultrashort solitons.

**IM2C.4 • 11:30**  
Stimulated Modulation Instability in Silicon for Energy Efficient Supercontinuum Generation, Peter DeVoe;‘ Daniel R. Solli;‘ Claus Ropers;‘ Prakash Koonath;‘, Bahrain Jalah;‘ ‘Department of Electrical Engineering, Univ. of California, Los Angeles, USA. ‘California NanoSystems Institute, Univ. of California, Los Angeles, USA. ‘Courant Research Center Nano-Spectroscopy and X-Ray Imaging, Univ. of Göttingen, Germany. Nonlinear losses limit supercontinuum efficiency in silicon. This fundamental limitation can be relaxed and higher energy efficiency and a more stable output can be obtained by stimulating modulation instability with an off-resonant weak seed.

**IM2C.5 • 11:45**  
Stimulated Generation of Spectral Incoherent Solitons through Supercontinuum Generation Bertrand Edel;‘ Claire Michel;‘ ‘“Université Paris XIII, France. We study experimentally the highly nonlinear regime of supercontinuum generation in photonic crystal fibers. We report a transition from continuous to discrete spectral incoherent solitons in the low-frequency edge of the supercontinuum spectrum.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

10:30–12:15

**BM2D • Grating Properties and Fabrication: Femtosecond Inscription**

*Manfred Rothhardt, IPHT, Germany, Presider*

**BM2D.1 • 10:30 Invited**

*Monolithic Fiber Lasers for the Mid-Infrared, Real Vallee*;
*Centre de Optique photonique et laser, Universite Laval, Canada.* The recent development of rare-earth doped as well as Raman gain fluoride all-fiber laser operating beyond 2.2 μm is reviewed.

**BM2D.2 • 11:00**

*Fiber Bragg grating operating in the visible range written with 400 nm femtosecond pulses and a phase-mask, Julien Carrier*;
*Centre d'optique photonique et laser, Universite Laval, Canada.* A Bragg grating with reflectivity of 99.9% at 542.2 nm was written in silica fiber using 400 nm femtosecond pulses and a phase-mask. This is the first step towards the development of all-fiber visible lasers.

**BM2D.3 • 11:15**

*Discrete non-planar reflections of a fs laser pulse written volume Bragg grating (VBRG), Daniel Richter*;
*Christian Vogtlander*, *Jens U. Thomas*, *Andreas Timmermann*, *Stefan Nehm*, *Friedrich-Schiller-Universitaet Jena, Abbe Center of Photonics, Institute of Applied Physics, Germany.* We present a VBG inscribed in fused silica by three beam interference of fs pulses. The generated twodimensional grating structure exhibits a discrete diffraction pattern which can be described based on the Ewald sphere.

**BM2D.4 • 11:30**

*Orientation dependence of higher order mode reflections in femtosecond pulse written fiber Bragg gratings, Jens U. Thomas*, *Markus Blundus*, *Christian Vogtlander*, *Ria G. Becker*, *Andreas Timmermann*, *Stefan Nehm*, *Friedrich-Schiller-Universitaet Jena, Abbe Center of Photonics, Institute of Applied Physics, Germany.* We present a VBG inscribed in fused silica by three beam interference of fs pulses. The generated twodimensional grating structure exhibits a discrete diffraction pattern which can be described based on the Ewald sphere.

10:30–12:30

**SM2E • Joint SOF, BGPP & NP Session I**

*John Ballato, Clemson Univ., USA, Presider*

**SM2E.1 • 10:30 Invited**

*Ultrafast Laser Processing of Glass: From New Phenomena to Applications, Peter G. Kazansky*, *M. Beresna*, *M. Gecevicius*;
*Univ. of Southampton, UK.* Ultrafast laser processing of glass reveals new phenomena. Reviewed, are recent demonstrations of 3D optical memory, vortex polarization converters employing self-assembled nanostructuring, ultrafast laser calligraphy and polarization writing control using pulses with tilted front.

**SM2E.2 • 11:00 Invited**

*High Power Passive Components for kW Lasers, Bertrand Gauvreau*, *Mathieu Faucher*, *Nigel Holehouse*;
*TTF Laboratories Inc., Canada.* Accelerating deployment of industrial kilowatt fiber lasers caused a rapidly increasing demand for high performance passive components. We present a leading manufacturer point of view on the trends and future limitations of the technology.

**SM2E.3 • 11:30**

*AgBr-TlI, AgBr-KRS-5 photonic crystals and fibers based on them for Middle and Far infrared, Andrey I. Chazov*, *Alexandir S. Korsakov*, *Dmitry S. Vrublevsky*, *Vladislav V. Zhukov*, *Lyra Y. Zhukova*, *Nadezhda Terlyga*;
*Ural Federal Univ. named after the first President of Russia B.N.Eltsin, Russian Federation.* Crystals of new composition for manufacturing of photonic fibers for middle and far infrared range are described. Doping of AgCl-AgBr solid solutions with TlI resulted in higher photostability and wider transmission range of grown crystals and extruded fibers.

**SM2E.4 • 11:45**

*Direct UV Written Waveguide’s Dispersion in Flexible Silica Flat Fibre Chip, Desmond M. Chow*, *Din Chai Yee*, *Seyed Reza Sandoghchi*, *Faisal Rauf Mahamad Adikan*;
*Electrical Engineering, Univ. of Malaya, Malaysia.* Dispersion of Direct UV Written channel waveguides in novel flexible silica Flat Fibre chip was numerically simulated via Finite Element Method. Result shows nearly zero chromatic dispersion at communication band with application in Integrated Optics.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**IM2A • Highly Integrated Optical III-V Circuits—Continued**

**IM2A.5 • 12:15**

Cryogenic Operation of Silicon Photonic Modulators, Jeremy Wright1, Doug C. Trotter1, William Zortman1, Anthony L. Lentine2, Eric Shanes3, Michael R. Watts, Akin Aktuktu4, Marty Peckerar1; 1Materials Engineering, Univ. of Tokyo, Japan.

**IM2B • Theory, Modeling & Simulations I: Numerical Methods—Continued**

**IM2B.5 • 12:00**

Perfectly Matched Layers Conforming to Triangular Lattices for Numerical Simulations of Photonic Crystal Devices, Shichang She1, Ya Yan Lu1; 1City Univ. of Hong Kong, Hong Kong. For simulating photonic crystal devices with a triangular lattice structure, it is advantageous to use hexagon unit cells and truncate the domain along the edges of these unit cells. A perfectly matched layer (PML) technique that conforms to triangular lattices is developed in this paper.

**IM2B.6 • 12:15**

Three-dimensional periodic LOD-FDTD method with a fundamental scheme, Yusuke Nakayama1, Junji Yamashita1, Hisamatsu Nakano2; 1Hosei Univ., Japan. We develop a three-dimensional implicit FDTD method based on the locally one-dimensional scheme to analyze periodic structures. Computational time is reduced to 29% of that for the explicit FDTD method with acceptable results being maintained.

**IM3A • Lasers and Integration**

Joris Van Campenhout; InterUniv. Microelectronics Center, Belgium, Presider

**IM3A.1 • 13:30**

Recent Advances in Germanium Based Devices, Kazumi Wada1; 1Materials Engineering, Univ. of Tokyo, Japan. The present paper has reviewed recent advances in Ge growth and devices in Si microphotonic. We have shown a high quality Ge growth without a post-growth annealing. Strain-engineered Ge will be an important material platform for not only photodetectors but modulators and light emitters.

**IM3A.2 • 14:00**

Low Power Computer Interconnect with 1060nm VCSEL, Jean Benoit Herouet1, Shigeru Nakagawa2; 1IBM Research - Tokyo, Japan. Results on an optical link using a high efficiency 1060 nm VCSEL are presented. Clear eye patterns are obtained at 25 Gbps. A Tx module with a 1.7 pJ/bit energy consumption at 10 Gbps is demonstrated.

**IM3B • Theory, Modeling & Simulations II: Plasmonics and Nano-optics**

**IM3B.1 • 13:30**

Discontinuous Galerkin Methods in Nanophotonics, Kurt Busch1; 1Institut für Physik, AG Theoretische Optik & Photonik, Humboldt Universität zu Berlin, Germany; 2Max-Born Institut, Germany. Nanophotonic devices typically feature complex geometries and materials with nonlinear optical properties. This poses serious challenges to computational approaches. The Discontinuous Galerkin Time-Domain method provides a rather flexible approach to accurate computations of such systems.

**IM3B.2 • 14:00**

Non-asymptotic Effective Medium Theory, Igor Tsukerman1; 1Electrical & Computer Eng, Univ. of Akron, USA. In the proposed non-asymptotic homogenization theory the coarse-grained fields are defined to satisfy Maxwell’s equations and boundary conditions exactly. The end result is an extended material tensor with 36 local and additional nonlinear parameters.

**IM3C • Advances in Nonlinear Signal Processing and Applications**

**IM3C.1 • 13:30**

Advances in Optical Signal Processing Based on Phase Sensitive Parametric Mixing, David J. Richardson1, Joseph Kakande1, Radan Sladek1, Francesca Parmigiani1, Periklis Petropoulos2; 1Optoelectronics Research Centre, Univ. of Southampton, UK. We review our recent work in the area of optical processing of phase encoded signals, focusing in particular on optical phase quantization - a key functionality for regeneration and test and measurement applications.

**IM3C.2 • 14:00**

High resolution time-space conversion of sub-picosecond pulses at 1.55μm by non-degenerate SFG in PPLN crystal, Denez Shavyrot2, Christine Silberborn3, Dan M. Marom3, Harald Hermann1, Wolfgang Sohler1, Raimund Ricken1; 1Applied Physics, Hebrew Univ. of Jerusalem, Israel; 2Applied Physics, Univ. of Paderborn, Germany. We demonstrate time-space conversion of ultrashort optical pulses using sum-frequency generation in PPLN. An order of magnitude increase in conversion efficiency over our previous work was achieved, whilst maintaining a resolution factor of 90.

**IM3C.3 • 14:15**

All-optical nonlinear simultaneous polarization and intensity regeneration of a 40-Gb/s telecommunication signal, Philipp Moritz1, Julien Fatome1, Christophe Finot1, Stéphane Pitois1, Guy Millot2; 1ICB, Université de Bourgogne, France. We experimentally report the simultaneous all-optical regeneration of the polarization state and the intensity profile of a 40 Gb/s Return-to-Zero telecommunication signal by means of Kerr effect occurring in a single segment of fiber.
BM2D • Grating Properties and Fabrication: Femtosecond Inscription—Continued

BM2D.6 • 12:00
Femtosecond Laser-induced, Electro-optically Tunable Waveguide Bragg Gratings in Lithium Niobate, Sebastian Kreusser1, Wolfgang Horn1, Cornelia Denz2, Westfälische Wilhelms-Universität, Institute for Applied Physics, Germany; 2Westfälische Wilhelms-Universität, Center for Nonlinear Science (CoNioS), Germany. We demonstrate the fabrication of electro-optically tunable, type-II Bragg gratings in lithium niobate. The waveguide is structured periodically to achieve narrowband reflections in the c-band. An electric field is used to achieve electro-optic tuning of the reflection maximum by \( \Delta \lambda = 625 \, \text{pm} \).

Relief Bragg gratings are inscribed into solid core photonic crystal fibres using 248nm laser radiation and toluene vapors. These gratings exhibit reflection extinction ratios greater than 20dB, while surviving inscription—Continued

BM3D.1 • 13:30
Waveguide Bragg Gratings for the Realization of High-Quality Monolithic Cavities, Edward H. Bernhardt1, Henk van Wijleren2, Kerstin Winthoff3, René de Rudder4, Markus Pollnau2, 1Westfälische Wilhelms-Universität, Institute for Applied Physics, Germany; 2Westfälische Wilhelms-Universität, Center for Nonlinear Science (CoNioS), Germany; 3Integrated Optical Microsystems Group, Univ. of Twente, Netherlands; 4Transducers Science and Technology Group, Univ. of Twente, Netherlands. The fabrication and characterization of waveguide Bragg gratings integrated with aluminum oxide channel waveguides are reported. Passive and lasing Bragg-grating-based cavities with Q-factors exceeding 1.5 x 10^6 and 1.1 x 10^11, respectively, are demonstrated.

BM3D.2 • 14:00
Relief Bragg grating reflectors inscribed into solid core photonic crystal fibres, Maria Konstantaki1, Paul Childs1, Michele Sozzi1, Stavros Pissadakis1, 1FORTH-IESL, Greece. Relief Bragg gratings are inscribed inside the capillaries of solid core photonic crystal fibres using 248nm laser radiation and toluene vapors. These gratings exhibit reflection extinction ratios greater than 20dB, while surviving up to 1200°C.

BM3D.3 • 14:15
Direct-write depressed cladding waveguide Bragg gratings in ZBLAN glass, Simon Gross1, David G. Lancaster1, Heike Ebendorf-Heidepriem2, Tanja M. Mose3, Alexander Fuerbach3, Michael J. Withford3, 1Macquarie Univ., Australia; 2Hokkaido Univ., Japan. Strong waveguide Bragg-gratings (10 dB reflectivity) were fabricated by the direct-write technique in ZBLAN glass. Based on a depressed cladding, an array of 169 periodic and in phase modifications was placed inside the core.

BM3E.1 • 13:30
Large-core Single-mode Solid Photonic Bandgap Fibers, Liang Dong1, Kunimasa Saitoh1, Fanting Kong1, Paul Foy1, Thomas Hawkins1, Devon McClane1, 1Clemson Univ., USA; 2Hokkaido Univ., Japan. Mode-area scaling of single-mode fibers is critical to power scaling of fiber lasers. Significantly different guidance principle of solid photonic bandgap fibers provides new design opportunities. Recent progress in this area will be reported.

BM3E.2 • 14:00
Low Loss (34 dB/km) Silica Hollow Core Fiber for the 3 μm Spectral Region, Fei Yu1, William I. Wadsworth2, 1Jonathan C. Knight1, 2Physics, Univ. of Bath, UK. We describe the characteristics of a silica hollow-core fiber for transmission around 3 μm wavelength, with minimum attenuation of 34 dB/km. The design is based on the use of a negative curvature core wall.

BM3E.3 • 14:15
Photonic bandgap confinement in an all-solid tellurite glass photonic crystal fiber, Joris Louteau1, Gerardo Scarpignato1, George Athanasiou2, Nadia G. Boetti3, Emanuele Mura3, Massimo Olivero3, 1DISAT, Politecnico di Torino, Italy; 2DELEN, Politecnico di Torino, Italy. The manufacturing process and the fiber characterization procedures of an all-solid tellurite glass photonic bandgap fiber are described and discussed. Results of experimental loss measurements are compared with modeling predictions to discuss the fiber quality.

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
We demonstrate an active phosphorous doping of Ge in oxide trenches showing a design for CMOS compatible structures is demonstrated. Selective growth of highly phosphorus doped Ge laser, employing of WDM to enhance aggregate bandwidth density and power silicon-organic hybrid (SOH) strip waveguides. Optical gain is provided by a dye-doped polymer cladding enabling room-temperature lasing at telecommunication wavelengths.

Control of dispersion in photonic crystal waveguides using group symmetry theory, Pierre Colman, Sylvain Combrié, Gaëlle Leboucq, Alfredo De Rossi, Thales Research and Technology, France; Danmarks Tekniske Universitet, Denmark. We demonstrate dispersion tailoring by coupling modes in a photonic crystal waveguide. Different dispersion features are generated and controlled by a single geometrical parameter. This concept is demonstrated experimentally with very good agreement with theory.

Scattering of evanescent wave by nanowires, David A. Shapiro, Ionel I. Pupuzescu, Raluca Miron, Institute of Automation and Electrometry, Russian Federation; A. V. Rzhanov Institute of Semiconductor Physics, Russian Federation. The scattering of evanescent wave, one of the main processes of nanophotonics, is studied in 2D geometry using boundary integral equations and special two-domain Green function. The problem is studied for a single, a pair, and a series of nanowires.

Polarization converters using optical nano-waveguides, Junji Yamachi, Takashi Hashimoto, Yuu Wakabayashi, Hisamatsu Nakano, Hosei Univ., Japan. Polarization converters using optical nano-waveguides are proposed and investigated numerically. An extinction ratio of more than 15 dB is obtained over a wavelength range of 1.3 μm to 1.7 μm for an embedded air-core waveguide.

We demonstrate an on-chip, dual-channel, single-photon upconversion detector at 1300 nm, Paulina S. Kao, Jason S. Pelc, Lijun Ma, Martin M. Fejer, Xiao Tang, Joint Quantum Institute, NIST-Univ. of Maryland, USA; Information Technology Laboratory, National Institute of Standards & Technology, USA; E. L. Ginzton Laboratory, Stanford Univ., USA. We show a dual-channel, upconversion detector at 1.3 μm wavelength based on phase-modulated periodically poled LiNO3, and use it for wavelength-to-time division multiplexing to achieve high data rates, useful for quantum key distribution.

Deep submicron etched-slot coupled semiconductor lasers fabricated by standard UV-lithography, Tingting Yu, Lei Wang, Li Zou, Jianjun He, Zhejiang Univ., China. A single mode deep submicron etched-slot coupled laser is fabricated using standard UV-lithography. A threshold current of 22 mA and SMSR near 40 dB is achieved and the slope efficiency is 0.178 W/A.

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Deep submicron etched-slot coupled semiconductor lasers fabricated by standard UV-lithography, Tingting Yu, Lei Wang, Li Zou, Jianjun He, Zhejiang Univ., China. A single mode deep submicron etched-slot coupled laser is fabricated using standard UV-lithography. A threshold current of 22 mA and SMSR near 40 dB is achieved and the slope efficiency is 0.178 W/A.
BM3D • Grating Properties and Fabrication: Novel Fibers and Grating Design—Continued

BM3D.4 • 14:30
Integrated Holographic Polymer-Dispersed Liquid Crystal Bragg Reflector into Photonic Crystal Fibre, Gianluigi Zito1, Stavros Pissadakis1; Foundation for Research and Technology-Hellas (FORTH), Institute of Electronic Structure and Laser (IESL), P.O. Box 1385, 71 110, Greece. The fabrication of a Bragg phase grating by photo-induced modulation of a liquid crystal/polymer composite material integrated into a photonic crystal fibre is demonstrated.

BM3D.5 • 14:45
Dynamic Frequency Tuning in a Fiber Grating Cavity, Zhangwei Yu1,2, Yves Painchaud3, John Canning3; University of Sydney, Australia, Presider

BM3D.6 • 15:00
Physical Insight into Dispersionless FBG Designs, Michalis N. Zervas1,2,2; University of Southampton, UK; SPI Lasers, UK. We provide physical insight into the role different sections play in inverse-scattering-designed dispersionless FBGs. Using this knowledge we design and fabricate strong (>30dB) bidirectional dispersionless filters.

BM3D.7 • 15:15
Characterization of Integrated Bragg Grating Profiles, Alexandre D. Simard1, Yves Painchaud2, Sophie LaRochelle2; Université Laval, Canada; TeraXion, Canada. Spectral responses of gratings in SOI are extracted using time windowing to eliminate parasitic reflections. Filtering high spatial frequencies of the phase profile, obtained by layer peeling, allows examination of the wafer thickness uniformity.

SM3E • PBG & PCF Fibers—Continued

SM3E.4 • 14:30
Invited
Hybrid photonic crystal fiber components and amplifiers, Thomas T. Alkeskjold1, Marko Laurila1, Kristian R. Hansen1, Mette Jørgensen1, Sidsel Petersen1, Jesper Lægsgaard1, Christina Olausson1, Jes Broeng1; NKT Photonics, Denmark; DTU Fotonik, Department of Photonics Engineering, Denmark. We present recent development of hybrid photonic crystal fiber amplifiers and components providing enhanced spectral and modal filtering.

SM3E.5 • 15:00
Invited
Femtosecond direct laser writing of linear and nonlinear optical properties in photosensitive glass, Lionel Cunin1, Gautier Papon1, Arnaud Royer1, Nicolas Marquestau1, Yannick Petit1, Kevin Bourhis2, Marc Dussaux1, Thierry Cardinal3; LOIMA, Univ. Bordeaux, France; TSM, Univ. Bordeaux, France; IC-MC, CNRS, France. Glasses specifically tailored with photosensitive agents such as silver are efficient material for direct laser writing localized linear and non linear optical properties. The relation between the photo-induced structures and the modifications of the linear and optical properties are discussed.

SM3E.6 • 15:15
Invited
Nonlinear Frequency Generation in Poled Fibers: From Sum-Frequency to Polarization-Entangled Photon Pairs, Li Qian1, Eric Y. Zhu1, Zhiyuan Tang1; Electrical and Computer Engineering, Univ. of Toronto, Canada. We review progress in periodically-poled silica fibers (PPSFs). Using a birefringent PPSF, we enable spectrally-separate QPM and demonstrate polarization-dependent sum-frequency generation and direct polarization-entangled photon pair generation.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**IM4A • Electro-Optic Modulators and Switches—Continued**

**IM4A.2 • 16:30**
Photic Integration in State-of-the-Art Silicon Photonics Processes, Jason Orcutt1, Research Laboratory of Electronics, Massachusetts Institute of Technology, USA. Photonic integration within state-of-the-art CMOS and DRAM processes leverages the existing electronic manufacturing infrastructure to minimize cost. Suitable design techniques combined with in-foudry optimization or post-processing have enabled integration within several advanced technologies.

**IM4A.3 • 17:00**
Low Power SiGe Electroabsorption Modulators for Optical Interconnects, Edward Fe1, Elizabeth Edwards2, Yi-Jie Huo3, Xiaochi Chen4, Stephanie Claassen5, Xi Liu6, Yewong Rong7, Theodore Kamins1, David Miller1, James Harris1; “Electrical Engineering, Stanford Univ., USA; “Phillips Lumileds, USA. We demonstrate low voltage quantum-confined Stark effect electroabsorption in a Ge/SiGe quantum well diode with a new thin intrinsic layer design. Showing the potential for absorptive modulators with low photocurrent dissipation power.

**IM4A.4 • 17:15**
Integrated Electro-optical Switching with Phase-Modified Liquid Crystal Blends, Florent Costauche1, Martin Blaß1, Kirstin Bornhorst1, Andreas Rieck1, Haldor Hartwig1; “Electrical Engineering, Stanford Univ., USA; “Philips Lumileds, USA. We demonstrate low voltage quantum-confined Stark effect electroabsorption in a Ge/SiGe quantum well diode with a new thin intrinsic layer design. Showing the potential for absorptive modulators with low photocurrent dissipation power.

**IM4A.5 • 17:30**
Ultra-Wideband Design for Very-Low Voltage Substrate-Removal Electro-optic Modulators, Selm Dogru1, Nadir Dogru1; Department of Electrical and Computer Engineering, University of California, Santa Barbara, USA. Ultra-wide bandwidth, very-low drive voltage modulator design is presented. Design combines buried electrodes made of doped semiconductor and dielectrics with very large dielectric constant dispersion. 0.4 V V device with bandwidth exceeding 100 GHz is possible.

**IM4A.6 • 17:45**
Thin Film Electro-Optic Devices for 50 GHz Applications, Jian- heng Li1, Zihui Liu1, Bruce W. Wessels1; Department of Materials Science and Engineering and Materials Research Center, Northwestern Univ., USA. We have demonstrated mm scale, thin film electro-optic modulator utilizing a photonic crystal structure. By decreasing device length the EO response was greater than 50 GHz. The microwave response of the modulator was measured and simulated.

**IM4B • Theory, Modeling & Simulations III: Active photonics—Continued**

**IM4B.2 • 16:30**
Suppressing Mode Competition in Terahertz Quantum Cascade Lasers, Huda M. Tanvir1, B.M. Azizur Rahman1, Kenneth Grat- tan2; “School of Engineering and Mathematical Sciences, City Univ. London, UK. “Terahertz QCLs based on metal-metal waveguides are often susceptible to lase with higher order modes. This paper aims to introduce a waveguide structure that is able to suppress the generation of higher order modes.

**IM4B.3 • 16:45**
Quasi-Phase-Matching for Broadband Discrete Mid-IR FWM in Width-Modulated Si Photonicwire Waveguides, Jeffrey H. Driscoll1, Richard R. Genre1, Jerry J. Dadap1, Nicola C. Panoiu1, Richard M. Osgood1; “Department of Electrical Engineering, Colum- bia Univ., USA; “Electronic and Electrical Engineering, Univ. College London, UK. We investigate quasi-phase-matching via silicon waveguide width-modulation as an effective means to achieve four-wave-mixing between the telecommunications bands and mid-IR.

**IM4B.4 • 17:00**
Intersubband optical properties of GaAs/InGaAs nanopore superlatticemos, Yuming Xiao1, John O’Brien2; “Electrical Engineer- ing, Univ. of Southern California, USA. GaAs/InGaAs nanopore superlattices are analyzed. Subband gaps are observed from 1-20 meV. Optical absorption due to intersubband transitions is studied and strong absorption peaks covering terahertz and far infrared ranges are observed at various temperatures.

**IM4B.5 • 17:15**
Multiples versus Single Quantum Well Transistor Laser Performances, Iman Taghavi1, Hassan Kazazian2, Jean Pierre Lebarron3; “Photonic Research Laboratory, Electrical engineering, Amirkabir Univ. of Technology, Islamic Republic of Iran; “Beamh Institute for advanced science and technology, Univ. of Illinois at Urbana-Champaign, USA; “Electrical Engineering, Univ. of Illinois at Urbana-Champaign, USA. We present a transport-based model that can be used to investigate the optoelectronic operations of transis- tor lasers with multiple quantum wells. Significant enhancement in device performances is anticipated when the MQW structure is properly designed.

**IM4B.6 • 17:30**
Buried metal grating for vertical fiber-waveguide coupling with high directionality, Pin-Tso Lin1, Chi-Yao Wu2, Po-Tsung Lee1, photonicns, National Chiao Tung Univ., Taiwan. We numerically propose a buried metal grating coupler which can forbid diffractions toward substrate by itself. When the grating is higher than 600 nm, it can reach 90% coupling directionality without using substrate mirror.

**IM4B.7 • 17:45**
Time-Domain Analysis of High-Order Laterally Coupled DFB Lasers, akram akrout1, Kais Dridi1, Trevor Hall1; “Photonic technol- ogy laboratory, Ottawa Univ., Canada. A time-domain traveling wave algorithm is extended to investigate high-order laterally- coupled distributed feedback semiconductor laser. The effect of longitudinal spatial hole burning is mitigated by means of fine tuning of the grating duty cycle.

**IM4C • Nonlinearities in Lasers and Dissipative Systems—Continued**

**IM4C.2 • 16:30**
Environmentally stable, passively modelocked, all-normal dispersion fibre simulator laser, Neil Broderick1, Claude Agugnuragiay2, Joseylin S. Chen3, Vladimir Kraglov1; “Physics, Univ. of Auckland, New Zealand; “Southern Photonics Ltd., New Zealand. We report on a new simulation fibre laser system based on a nonlinear amplifying loop mirror. The laser is robust and produces linearly chirped pulses that can be recompressed to 350fs.

**IM4C.3 • 16:45**
Effect of Slow Gain Dynamics in Mode-Locked Fiber Lasers: Chirped Soliton Molecules, Alessandro Zaumen1, Philippe Grech2, Falk Ledermann3; “Institute of Condensed Matter Theory and Solid State Optics, Abbe Center of Photonics, Friedrich-Schiller-Universitat Jena, Germany; “Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS, Université de Bourgogne, France. We theoretically and experimentally demonstrate the protal role of the gain-dynamics in the formation of chirped soliton molecules in mode-locked lasers. Such molecules are characterized by an increasing separation from leading to trailing pulses.

**IM4C.4 • 17:00**
Ultrabroadband Mode-Locked Laser Based on Self-Similar Amplification, Andy Chong1, Hai Liu2, Bai Nie3, Brandon G. Bale4, Stefan Wabnitz5, Marcos Dantus6, William Renninger3, Frank W. Wise6; “Electro-Optic program, Univ. of Dayton, USA; “Department of Physics, Univ. of Dayton, USA; “Department of Applied Physics, Cornell Univ., USA; “Department of Chemistry, Michigan State Univ., USA; “Photonic Research Group, Aston Univ., UK; “Department of Information Engineering, Université di Brescia, Italy. We demonstr- ate an ultrabroadband mode-locked spectrum beyond the gain bandwidth from a fiber laser based on self-similar amplification. 21-6 pulses (the shortest from a fiber laser) are generated after phase correction.

**IM4C.5 • 17:15**
Dispersive rogue waves out of fiber lasers, Nail I. Akhmediev1, Philippe Grech2, Jose-Maria Soto-Crespo3; “Optical Sciences Group, Australian National Univ., Australia; “Instituto de Optica, CSIC, Spain; “Laboratoire Interdisciplinaire Carnot de Bourgogne, Université de Bourgogne, France. We study rogue waves in dissipative systems such as unidirectional fiber laser. We have found that the probability of producing extreme pulses in this setup is higher than in any other system considered so far.

**IM4C.6 • 17:30**
1.8 GHz Harmonically Mode-Locked Fiber Laser Employing Raman-Like Optoacoustic Interactions in PVC, Myongsoon Kang1, Philip Russell2; “MPI for the Science of Light, Germany. By making use of 1.8 GHz acoustic resonances in a 1.8 μm photonic crystal fiber core we generate a high-repetition-rate optical pulse train at the 317th harmonic of an Er-doped fiber ring laser.

**IM4C.7 • 17:45**
Crescent Waves in Optical Cavities, Yuan Yao Lin1, Jihua P. Chandroth2, Tin-Dong Lee1, Ray Kuan Lee1; “National Tsing Hua Univ., Taiwan. We theoretically and experimentally generate stationary crescent surface solitons pinned to the boundary of a micro-structured vertical cavity surface emission laser by triggering the intrinsic cavity mode as a background potential.
**BM4D • Fundamentals of Photosensitivity and Poling: Photo-induced Processes and Gratings—Continued**

**BM4D.2 • 16:30**

Three Bragg Grating Types in Hydrogen-Loaded Heavily Germanium-Doped Fibers, Oleg Medvedkov1, Sergei Vasiliyev1, Pavel Gnusin1, Evgeny Dianov1; FORC RAS, Russian Federation. Competition of two photosensitivity mechanisms in H2-loaded Ge-doped fibers (75 mol.% GeO2) results in complicated dynamics of FBG writing with successive formation of three grating types. The induced refractive index annealing is also nonmonotonic.

**SM4E.2 • 16:30**

Highly nonlinear photonic crystal fiber with an unprecedented high figure of merit at 1 μm, Alexandre Kadinski1, Damien Labat1, Gilles Melin1, Arnaud Massot1; PhLAM, Univ. Lille 1, France; PRYSMIAN Group, France. We report a highly-nonlinear germanium doped photonic crystal fiber with Kerr and Raman nonlinear coefficients of 69.3 W⁻¹.km⁻¹ and 94 W⁻¹.km⁻¹ respectively, with losses of 17.5 dB/km at 1 μm, which leads to a record figure of merit at 1 μm.

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**BM4D.3 • 16:45**

Temperature-Resolved Spectroscopy of UV-Induced Absorption in H2-Loaded Germanosilicate Fiber, Pavel Gnusin1, Sergei Vasiliyev1, Oleg Medvedkov1, Evgeny Dianov1; FORC RAS, Russian Federation. Annealing of UV-induced absorption near 1.4-μm in H2-loaded germanosilicate fibers is investigated by means of temperature-resolved spectroscopy. As a result, the contribution of H-containing groups to the induced refractive index is estimated.

**SM4E.3 • 16:45**

Invited Nonlinear properties of silicon optical fibers, Anna C. Peacock1, Priyanth Mehta1, Todd D. Day2, Justin Sparks1, Pier I. Sazio1, John V. Badding2, Noel Healy1; Optoelectronic Research Centre, Univ. of Southampton, UK; Department of Chemistry, Pennsylvania State Univ., USA. The nonlinear transmission properties of hydrogenated amorphous silicon core fibers are characterized for short pulse propagation. The influence of the material quality and core size will be discussed in relation to device performance.

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**BM4D.4 • 17:00**

Stress changes induced by cw-244-nm Ar+ irradiation in H2-loaded SMF-28e optical fibers, Georgios Violakis1, Nandita Aggarwal1, Hans G. Limberger1; STI, EPFL, Switzerland. Fiber Bragg Gratings were fabricated in pristine Bi-Al-SiO2 and SMF-28e fibers using pulsed ArF-eximer and cw-244-nm Ar+ laser with varying total fluence. Stress measurements revealed initial expansion followed by compaction.

**SM4E.4 • 17:15**

Invited Tutorial: Nonlinear Fibers for Parametric Signal Generation, Amplification and Processing, Stojan Radic1; Univ. of California San Diego, USA. Abstract not provided.
**JM5A.1** Low confinement loss of the tellurite hybrid-guiding photonic bandgap fiber, Tonglei Cheng, Yasutaka Oishi1; Research Center for Advanced Photon Technology, Toyota Technological Institute, Japan. We present a numerical investigation on the low confinement loss properties of a tellurite hybrid-guiding photonic bandgap fiber with a solid core surrounding high-index rod and air-holes.

**JM5A.2** Coherent Multiple Pulses Generation in a Passively Mode-locked Fiber Laser Cavity with Normal Dispersion, Weiping Guo 2, Meisong Liao1, Hirohisa Kawashima1, Takenobu Suzuki1, Yasutaka Oishi1; Research Center for Advanced Photon Technology, Toyota Technological Institute, Japan. The coherent multiple pulses with the number from 2 to 5 are observed in a 1.15 μm normal dispersion cavity. The spectra are highly modulated and the largest pulse separation of 31.9 ps is observed.

**JM5A.3** Tungstate-tellurite glass fibers for spectral region up to 3 μm, Vitaly Doretov1, Alexander Misser1, Igor Kravt1, Sergey Motoz1, Dmitrii Churbanov1, Alexey F. Kosolapov1, Evgeny Dianov1; 1Institute of Chemistry of High-Purity Substances of RAS, Russian Federation, 2Fiber Optics Research Center RAS, Russian Federation. Optical fibers were produced from high-purity TeO2-5%La2O3- (Bi2O3) glasses. Total loss was less than 0.5 dB/m at 1.2-2.8 μm and above 1 μm the transmission of O/H groups absorption at 3 μm with further sharp increase.

**JM5A.4** Ramon Response and SFS in Phospho-Tellurite Fiber, Yasutaka Oishi1, Shohei Miyoshi2, Xin Yan1, Takenobu Suzuki1; Toyota Technological Institute, Japan. Phospho-tellurite fiber has high controllability of Raman gain properties. With this feature, wavelength shift and delayed propagation of optical pulse induced by SFS can be effectively controlled.

**JM5A.5** Demonstration of Large Mode Photonic Crystal Fibers in DWDM application, Pedro S. Medelina1, Edward A. Whittaker2; 1Physics Dept, Stevens Institute of Technology, USA; 2AT&T Labs, USA. We report on the application of PCF-LMA-25 fiber in a ULH DWDM network, showing no transmission impairments at different Sonet rates or at a combined 0.5 Terasip with 45 wave-lengths after 720 km.

**JM5A.6** Phosphate Double-Cladding Optical Fiber for High-Power Laser Applications, Emanuele Mura1, IJoris Loutsteau1, Nadia G. Boett1, Giuseppe Scarpa1, Daniele Negre1, Silvio Abate1, Daniel Melioli1; DISAT - Department of Applied Science and Technology, Politecnico di Torino, Italy, 2PhotoLab, Istituto Superiore Mario Boeillo, Italy. Phosphate glasses were developed in order to fabricate a passive double-cladding optical fiber for high power and laser applications. The fibre preform was fabricated by rotational casting technique. The use of this technique is reported for the first time using phosphate glasses.

**JM5A.7** RIN transfer in random distributed feedback fiber lasers, Javier Nuño del Campo1, Mercedes Alcon-Camas1, Juan D. Anta-Castanon1; 1Instituto de Optica `Daza de Valdel”, CSIC, Spain; 2Optica/ FEMTO-ST institute, Univ. of franche-comte, France. A numerical analysis of the RIN transfer from the Raman pumps to the signal in random distributed feedback fiber lasers is presented. Results show RIN transfer levels comparable to those in distributed Raman amplification.

**JM5A.8** Experimental investigation of Fiber Optical Parametric Amplifier Pulse Generators, Arto R. Yla-Ollikainen1, Camille Sophie Brez1, 2EPFL, Switzerland. In light of recent theoretical results, the possibility to generate optical Sinc pulses rather than wider Gaussian pulses using fiber optical parametric amplification is experimentally investigated. The impact of pump pulse modulation is also discussed.

**JM5A.9** Terahertz Field Detection Boost by Nonlinear Collapse of Normally Dispersed Optical Pulses, Marco Pecchia1, Matteo Clerici1, Mostafa Shalaby2, Luca Caspani2, Antonio Lotti3, Arnaud Couairon1, David Cooke2, Tsumuyuki Ozaki3, Daniele Facchio1, Roberto Morandotti1; 1Institute for Complex Systems, National Research Council, Italy; 2Energie Materiaux Telecommunications, institut national de la recherche scientifique, Canada; 3Dipartimento di Scienza e Alta Tecnologia, Università dell’Insubria, Italy; “Centre de Physique Theorique”, CNRS, France; “Dept. of Physics, McGill Univ., Canada; “School of Engineering and Physical Sciences, Heriot-Watt Univ., UK. We demonstrate the Terahertz field signal enhancement in the Air Biased Coherent Detection scheme in the transition from below to above the critical power for self-focusing of positively chirped optical probe pulses.

**JM5A.10** Dual mode mode-locked laser based on an integrated nonlinear microring resonator, Marco Pecchia1,2, Alessia Pasquali2, Brent Little1, Sad T. Chua1, David J. Moss1, Roberto Morandotti1; 1INRS- Energie Mat & Tele Site Varennes, Canada; 2Institute for Complex Systems - CNR, Italy; “Infinera Ltd. USA; “CUDOS, School of Physics, Univ. of Sydney, Australia. We demonstrate a mode locked laser based on an integrated high-Q microring resonator that exhibits stable operation of two slightly shifted spectral optical comb replicas, generating a highly monochromatic radiofrequency modulation.

**JM5A.11** All-Optical Phase Regeneration in a Highly Nonlinear Lead-Silicate Fiber, Mohamed A. Ebrahim1, Francesca Parmigiani1, Xian Feng1, Liam Jones1, Joseph Kakande1, Radan Slavík2, Francesco Poletti3, Giorgio M. Ponto1, Junichi Sh1, Marco N. Petrovich1, Periklis Petropoulos1, Wei H. Loh1, David J. Richardson1; 1Univ. of Southampton, UK. We demonstrate phase regeneration of a 40 Gbit/s DPSK signal in a 1.7-nm-long-silicate-fiber using a black-box phase-sensitive amplifier. Results show an improvement in the values of the signal after regeneration for various noise levels.

**JM5A.12** Coherent Supersposition of 800 and 400-nm Spectral Components in a Supercontinuum Pulse Generated in Air-Gas-Filled Hollow Core Fiber, Fumihiko Kannari1, Kento Yoshikyo1, Shohei Kondo1, Yu Oshu1, Kizoo Unit1, Japan. 800 and 400 nm broadband components in a supercontinuum pulse generated by phase modulation based on core-frapping of fundamental and second-harmonic femtosecond pulses from an Air-Gas-filled Hollow Core fiber were separately compressed and coherently superposed.

**JM5A.13** Nonlinear Dynamics of Micro-Resonator Based Optical Parametric Oscillators, Andrey B. Matsko1, Anatoliy Savchenkov1,害川将広2, 村上和樹2, 森田宗毅2; 1Physics, Univ. Paris Diderot - Paris 7, France; 2Physics, Wuerzburg Univ. We demonstrate with realistic numerical simulations that the gain bandwidth of two pumps fiber optical parametric amplifiers can be twice as large as the one of a single pump configuration.

**JM5A.14** All-Optical broadband phase noise emulation, Liam Jones1, Francesca Parmigiani1, Joseph Kakande1, Periklis Petropoulos1, David J. Richardson1; 1Optoelectronics Research Centre, Univ. of Southampton, UK. We demonstrate and characterize a technique to emulate broadband phase noise. This is achieved by exploiting cross-phase modulation induced spectral broadening, in a highly nonlinear fiber, of a signal from an intense incoherent light source.

**JM5A.15** Demonstration of polarization pulling in a fiber optical parametric amplifier, Birgit Stiller1, Philippe Morin2, Duc minh Nguyen3, Julien Fatome4, Herve Mailhotte4, Stephane Pimis1, Thibaut Sylvès4; 1Optics / FEMTO-ST institute, Univ. de franche-comte, France; 2institut de carbone de bourgogne, Université de bourgogne, France. We report the experimental demonstration of all-optical polarization pulling of an initially polarization-scrambled signal using a fiber-optical parametric amplifier. Nonlinear polarization pulling has been achieved for both the signal and idler with 25 Gb/s.

**JM5A.16** Optical Characterization of Nonlinear THZ Emitters, Silvia Manfari1, Filippo Ghiglione1, Alessio ANDRONICO1, Ivan Favero1, Sara Ducchi1, Yanko Todorov1, Martin Kump1, Mathieu Munsch1, Julien Claudon1, Jean Michel Gerard1, Giuseppe Leo1; 1Physics, Univ. Paris Diderot - Paris 7, France; 2Physics, Wuerzburg Univ., Germany; 3CEA, France. We report on the optical characterization of AlGaAs nonlinear THZ emitters based on triple resonant microcylindrical cavities. Reflectivity spectra measured from 2D arrays of pillars showing the excitation of THZ whispering gallery modes are presented.

**JM5A.17** Engineering of apodized chirped gratings based on desired second-order nonlinearity function, Ameneh Bostani1, Ammarhousen Tebranci1, Raman Kashyap1; 1École Polytechnique de Montréal, Canada. A novel design for apodized aperiodically poled lithium niobate is proposed to generate smooth ultra-wide second-harmonic intensity response. To exactly realize a desired effective second-order nonlinearity function, poled regions should be located in specific places.

**JM5A.18** Twofold enhancement of the gain bandwidth in two pumps fiber optical parametric chirped pulse amplifiers, Arnaud Massot1, Alexandre Kudlinski1, Emmanuel Hugonnot1, Yphlam1, France; 2CEA, France. We demonstrate with realistic numerical simulations that the gain bandwidth of two pumps fiber optical parametric chirped amplifiers can be twice as large as the one of a single pump configuration.

**JM5A.19** All-Optical broadband phase noise emulation, Liam Jones1, Francesca Parmigiani1, Joseph Kakande1, Periklis Petropoulos1, David J. Richardson1; 1Optoelectronics Research Centre, Univ. of Southampton, UK. We demonstrate and characterize a technique to emulate broadband phase noise. This is achieved by exploiting cross-phase modulation induced spectral broadening, in a highly nonlinear fiber, of a signal from an intense incoherent light source.

**JM5A.20** All-Optical Time-Stamp Digitizer for Capturing Ultrastable Optical Time Series and Rogue Events, Ali Fard1, Brandon Buckley1, Sanja Zlatanovic1, Camille-Sophie Brez1, Johan Radzi1, Bahram Jalali1; 1Ecole Polytechnique Federale de Lausanne, Switzerland. We propose an all-optical time-stamp oscilloscope, combining four-wave mixing and time-stretch technique for real-time capture of ultrafast optical time-series, beyond the bandwidths achievable by electronics. As a proof-of-concept, we demonstrate capture of 40-Gbit/s optical data.

**JM5A.21** Measurement of phase noise in four-wave mixing and its effect on wavelength conversion, Aravind Ananth1, Ruberna Shihab1, Deepa Venkitesh1, IFT: MiMUS, India. Increase in phase noise due to Four-Wave Mixing (FWM) is analyzed and experimentally verified using delayed self-heterodyne and heterodyne scheme. The possible scheme is suggested to minimize the phase noise on FWM based wavelength conversion of phase modulated data.
Stoletov’s, Russian Federation; Institute of Photonics Technologies, Mathematics, Vladimir State Univ. named after A.G. and N.G. Shtokalo; G. Ferri; 2National Research Centre “Keldysh”, Moscow, Russia; 3Australian National Univ., Canberra, Australia. We report the first experimental observation of an oscillating spatial soliton in parabolic Weber beams in photorefractive nonlinear media. One of the observed features is an enhanced beam mobility. We present a highly flexible multiplexing method to optically induce quasiperiodic trapping.

JM5A.31
Spectral width and pulse duration tuning in Yb+ mode-locked fiber laser based on frequency-selective feedback. Patrick Rose1, Falko Diebel1, Martin Boguslawski1; 1Institut für Angewandte Physik, Karlsruhe Institute of Technology, Germany. We report on the first experimental observation of an oscillating spatial soliton in parabolic Weber beams in photorefractive nonlinear media. The existence and propagation of the soliton is shown numerically and experimentally.

JM5A.32
Complex Soliton Dynamics in Lattices with Longitudinal Modulation, Panagiotis Papagiannis1, Patrick Rose1, Martin Boguslawski1; 1Institute of Applied Physics, Univ. of Munster, Germany. We report on a simple method with a high spectral and spatial resolution for mapping variations in the cavity resonance of a plano-plane broad-area laser based on frequency-selective feedback.

JM5A.33
Withdrawn

JM5A.34
Disorder mapping in VCSELs using frequency-selective feedback, Ioann Nobel1, Thoersten Ackemann1, Neal Radwell1,2, Roland Jager1; 1Physics, Univ. of Strathclyde, UK; 2Dept. of Physics and Astronomy, Glasgow Univ., UK; 3ULM Photonic GmbH, Germany. We present an uniﬁcation with a simple method with a high spectral and spatial resolution for mapping variations in the cavity resonance of a plano-plane broad-area laser based on frequency-selective feedback.

JM5A.35
Optical Induction of Multipleriodic Photonic Ratchets, Cornelia Denz1, Martin Boguslawski1, Andreas Ketterle1, Patrick Rose1; 1Institute of Applied Physics, Univ. of Munster, Germany. We present a highly ﬂexible multiplexing method to optically induce multipleriodic photonic ratchets. We demonstrate its versatility by the induction of a photonic ratchet. The corresponding refractive index landscape is analyzed implementing digital holography techniques.

JM5A.36
Synchronization of Limit Cycles in Nonlinear Passive Fiber Ring Resonators by a Weak Coupling via seeding in different polarizations is provided by the rational solutions is compatible with the statistical description provided by the weak wave turbulence theory.

JM5A.37
Fast Effective Nonlinear-Optical Response in Anisotropic Glasses of Co-allophanes, Svitlana Buzgyshchuk1, Anatoly Tolochko1, Gerturbard Klimushkev1, Yuriy Garbuzovskiy2, Darina Melnik1, Inna Tokmenkova1, Tatiana Mironova1, Institute of Physics NAS Ukraine, Ukraine; Institute of General and Inorganic Chemistry NAS Ukraine, Ukraine; Institute of the_hide:1.000000.jpg

JM5A.38
Rogue Wave Description: Rational Solitons and Wave Turbulence Theory, Bertrand Kibler1, Kamal Hammani1, Claire Michel1, Christophe Finot1, Antuan Pizzi1; Laboratoire Interdisciplinaire Carnot de Bourgogne, France; Laboratoire de Physique de la Matière Condensée, France. We show that rogue waves can emerge from optical turbulence and that their coherent deterministic description provided by the rational solutions is compatible with the statistical description provided by the wave turbulence theory.

JM5A.39
Four-wave mixing instabilities in telecom ﬁbers, Julien Fatome1, Christophe Finot1, Guy Millot1, Andrea Armaroli2, Stefano Trillo2; 1Lund University, Sweden; 2Dept. of Physics, Univ. of Strathclyde, UK. We present an experimental measurement of probability density functions for the power of the intracavity Stokes ﬁeld in a Raman ﬁber laser. Rare extreme events associated to a nongaussian statistics are observed.

JM5A.40
Optical rogue waves in Raman ﬁber lasers, Stephane Randoux1, Pierre Suret1; Universite de Lille 1, France. We present an experimental measurement of probability density functions for the power of the intracavity Stokes ﬁeld in a Raman ﬁber laser. Rare extreme events associated to a nongaussian statistics are observed.

JM5A.41
Synchronization of Limit Cycles in Nonlinear Passive Fiber Ring Resonators by a Weak Coupling via seeding in different polarizations is provided by the rational solutions is compatible with the statistical description provided by the weak wave turbulence theory.

JM5A.42
Analysis of the Multi-Pulsing Instability in Mode-Locked Lasers Using Dynamical Dimension Reduction, Eli Shilizerman1, J. Nathan Kutz1; 1University of Washington, USA. We introduce a dimension reduction method that determines the stability of mode-locked pulses and the onset of the multi-pulsing instability. Applying it to the master-mode-locking model, operating regimes and high-energy pulses are demonstrated.

JM5A.43
Intermittent Self-Pulsing in a Raman Fiber Laser, MaLa El-Taher1, Sergey Sergeev1, Elena G. Turitsyna1, Sergei K. Turitsyn1, Paul Harper1; 1Aston Univ., UK. We report on an experimental study of intermittent self pulsing caused by the coupling of the first and second Stokes cascades in a fiber Raman laser.

JM5A.44
Formation and propagation of shock waves in nonlocal media, Neda Ghofrani1, Luigi Amato Santamarina1, Viola Folli2, Claudio Conti2; 1IPCF, CNR, Italy; 2DCN, CNR, Italy; 3Physics Department, La Sapienza Univ., Italy. We report on the observation of shock waves in nonlocal thermal nonlinear media, investigating the way nonlinearity and nonlocality affect the point of shock formation and its dynamic through the samples.

Centennial Room & Terrace

JM5A • Joint Poster Session I—Continued

Advanced Photonics: OSA Optics & Photonics Congress  •  17–22 June 2012  27
Nonlinear switching in a purely plasmonic directional coupler, Ull Peschel1, Daniel Pless1, Jing Wen1, Arian Kriech1; 1Institute of Optics, Information and Photonics: Nonlinear Optics and Nanophotonics, Univ. of Erlangen-Nuremberg, Cluster of Excellence Engineering of Advanced Materials and Erlangen Graduate School in Advanced Optical Technologies, Germany. Plasmonic components allow for subwavelength integration while simultaneously generating extraordinary field enhancement thus amplifying nonlinear effects. Here we present first experimental results indicating nonlinear switching in a plasmonic directional coupler of a few micrometers length.

Influence of Nonlinear Pulse Propagation on Squeezed Vacuum Pulse Generation in a Photonic Crystal Fiber, Fumihiko Kannari1, Shota Sawai1, 1Universite de Bourgogne, France. By appropriately combining the effects of second- and fourth-order dispersion, and by carefully choosing the pump power, we create a photon reservoir which suppresses the drifts of sidebands in the spectra of polarization modulation instability

Power and spectral optimization of random distributed feedback fiber lasers, Dmitry V. Churkin1,2, Ilya Vatnik1,2, Sergey Babitski1; 1Astos Univ., UK; 2Novosibirsk State Univ., Russian Federation; 1Institute of Automation and Electrometry SB RAS, Russian Federation. We present the optimization of power and spectral performances of the random DFB fiber laser using the balance equation set. The numerical results are in good agreement with experiments.

Gain-controlled Soliton Routing in Dissipative Optical Lattices, Yannis Komis1,2, Sotiris Droulias1, Panagiotis Papagiannis1, Andrea Fratalocchi1, Danilo Brambila1; 1KAUST Univ., Saudi Arabia; 2Institute of Condensed Matter Theory and Solid State Optics, Friedrich-Schiller-Universität Jena, Germany. We predict the existence of breathing solitons in semiconductor microcavities. Parametric mixing of polaritons from the upper and lower branch of the dispersion relation gives rise to their formation requiring a nonzero excitonic dispersion.

Nonlinear refractive and absorptive response of a thin nonlocal media, Marcelo D. Iturbe-Castillo1, Emma V. Ramirez Garcia2, Marcela M. Mendez Otero2, Maximino L. Arroyo Carrasco2, 1KAUST Univ., Saudi Arabia; 2Departamento de Física y Astronomía de la Facultad de Ciencias, Universidad de Puebla, Mexico. A model to describe both nonlinear refractive and absorptive response of a thin nonlocal media is proposed. The model is used to obtain the far field intensity of the close or open aperture z-scan technique.
CUDOS is a research consortium between seven Australian universities, funded by the Australian Research Council under the Centres of Excellence Program. The CUDOS VISION is to be the world-leader in research in on-chip photonics, for all-optical signal processing.

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After completing an internship with CUDOS Sydney in 2010, I saw the opportunity of being part of a world leading group in optics, based in a top ten rated city. Now, being a PhD student at CUDOS allows me to work on hot projects with cutting edge infrastructures while living the Australian lifestyle inside and outside Uni... that's work-life balance, mate! 
YVAN PAQUOT, CURRENT CUDOS PHD STUDENT

At the time I applied for a PhD, the CUDOS group was already well-known around the world as one of the leading photonics research centres. So, when I got a Postgraduate Scholarship I did not hesitate to accept it. I am glad I did it since CUDOS proved to be a strong team of first class optics scientists and very active in promoting professional growth.
IRINA KABAKOVA, RECENT CUDOS PHD GRADUATE, NOW POSTDOCTORAL FELLOW, THE UNIVERSITY OF SYDNEY

I co-founded Envato, which operates thriving internet based marketplaces where over 700,000 members buy and sell digital content, and employs a staff of over 60. Apart from the usual critical thinking abilities, a PhD at CUDOS has given me international experience representing a leading world class research institution and the mindset to build my own enterprise.
VAHID TA’EED, FORMER CUDOS PHD, NOW MARKETPLACE GM, ENVATO

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These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

08:30–10:00
SpTuA • OFDM I
Xiang Zhou; AT&T Corp., USA, Presider

SpTuA.1 • 08:30  Invited
Real-time Coherent Optical OFDM Receiver for Intradynne Detection in High Data Rate Transmission, Noriaki Kaneda1, Tino Pflüger1, Stephen Corteselli1, Qi Yang2, Andreas Leven1, Young-Kai Chen2; 1Bell labs, USA; 2State Key Laboratory of Optical Communication Technologies and Networks, China; 3Bell Laboratories, Alcatel-Lucent, Germany. We review an implementation of real-time coherent optical OFDM receiver in FPGAs. 28.6-Gb/s data per optical wavelength is demonstrated in intradyne detection. QPSK modulated sub-carriers are detected using 9.83-GS/s ADCs and DSP implemented on FPGAs.

SpTuA.2 • 08:30
Multi-Band OFDM versus Single-Carrier DP-QPSK for 100 Gbps Long-Haul WDM Transmission, Julie Karaki1, erwan pincemin1, Didier Grot1, Thierry Guillossou1, Yves Jaouën2, Raphael Le Bidan3; 1France Telecom Orange Labs, France; 2Telecom ParisTech, France; 3Telecom Bretagne, France. We experimentally compare the performance of coherent DP-MB-OFDM and DP-QPSK for 100 Gbps long-haul WDM transport. We show that, after transmission over 1000 km of DCF-free G.652 fiber line, DP-MB-OFDM and DP-QPSK have nearly the same performance at 100 Gbps.

SpTuA.3 • 09:15
Nonlinear transmission performance of reduced guard interval OFDM and quasi-Nyquist WDM, Sean Kilmurray1, Tobias Fehenberger1, Polina Bayvel1, Robert Killey1; ‘Univ. College London, UK. The nonlinear transmission performance of reduced guard interval OFDM and quasi-Nyquist WDM (PDM-QPSK, PDM-QAM-8 and PDM-QAM-16) with high information spectral densities is compared over ULAF and SMF, both by simulations and analytically.

SpTuA.4 • 09:30  Invited
Real-time OFDM and Nyquist transmitters, Juerg Leuthold1; ‘Karlsruher Institut für Technologie, Germany. We compare OFDM and Nyquist WDM multi-carrier transmission. Single-laser 26 Tb/s OFDM and 32.5 Tb/s Nyquist WDM transmission is reported. Experimentally we demonstrate a spectral efficiency of 18 bit/s/Hz.

08:30–10:00
JTuB • Joint IPR & NP Plenary Session II
Wieslaw Krolikowski; Australian National Univ., Australia; Dan-Xia Xu; National Research Council, Canada, Presider

JTuB.1 • 08:30  Plenary
Technology Platforms for Photonic Integrated Circuits, Michael J. Wale1; ‘Oclaro Technology Ltd, UK. Generic technology platforms offer attractive design and manufacturing routes of photonic integrated circuits. This paper reviews current position, with particular reference to European platforms based on InP, silicon and dielectric materials.

JTuB.2 • 09:15  Plenary
Complex Nonlinear Opto-Fluidics, Mordechai Segev1; ‘Technion Israel Institute of Technology, Israel. Our work on symbiotic dynamics of light and nano-particles in liquids will be reviewed. Light-force varies the local particle density, modifies the fluid properties, inducing flow patterns, causing synergetic nonlinear-dynamics of light, nano-particles and fluid.
Polarization-dependent refractometer based on a surface long-period grating inscribed in a D-shaped fiber grating (LPFG), is investigated for simultaneous measurement of ambient index and temperature. Han1; Aarhus Univ., Denmark.

Wavelength-Selective Mode-Switching in a Reflective Long Period Grating Mach-Zehnder Interferometer, John Canning1, Martin Kristensen1, Kevin Cook1; Uni of Sydney, Australia; Engineering, Aarhus Univ., Denmark. We demonstrate that two consecutive long-period gratings separated by 180 nm interfere with high visibility allowing us to switch easily between the core and the cladding mode with a small wavelength shift of 3.2 nm, corresponding to a signal switching contrast better than 14 dB.

Hybrid Sagnac interferometer with a locally D-shaped polarization-maintaining fiber, Hyun-Joo Kim1, Oh-Jang Kwon1, Young-Geun Han1; Hanyang Univ., Republic of Korea. Transmission characteristics of a surface long-period grating (SLPG) inscribed in a D-shaped photonic crystal fiber (PCF) are investigated, which exhibits strong dependence on TE and TM polarization modes.

Bragg Gratings, Photosensitivity, and Poling in Glass Waveguides

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

08:30–10:00
BtU1C • Grating Properties and Fabrication: Long Period Gratings
Hans Limberger; Ecole Polytechnique Federale de Lausanne, Switzerland, Presider

BtU1C.1 • 08:30
Wavelength-Selective Mode-Switching in a Reflective Long Period Grating Mach-Zehnder Interferometer, John Canning1, Martin Kristensen1, Kevin Cook1; Uni of Sydney, Australia; Engineering, Aarhus Univ., Denmark. We demonstrate that two consecutive long-period gratings separated by 180 nm interfere with high visibility allowing us to switch easily between the core and the cladding mode with a small wavelength shift of 3.2 nm, corresponding to a signal switching contrast better than 14 dB.

BtU1C.2 • 08:45
Polarization-dependent refractometer based on a surface long-period grating inscribed in a D-shaped photonic crystal fiber, Hyun-Joo Kim1, Oh-Jang Kwon1, Young-Geun Han1; Hanyang Univ., Republic of Korea. Transmission characteristics of a surface long-period grating (SLPG) inscribed in a D-shaped photonic crystal fiber (PCF) are investigated, which exhibits strong dependence on TE and TM polarization modes.

BtU1C.3 • 09:00
Hybrid Sagnac interferometer based on a D-shaped polarization-maintaining fiber incorporating a fiber Bragg grating and a long-period fiber grating, Oh-Jang Kwon1, Choolu Kang1, Young-Geun Han1; Hanyang Univ., Republic of Korea. A hybrid Sagnac interferometer with a locally D-shaped polarization maintaining fiber (PMF) incorporating a fiber Bragg grating (FBG) and a long-period fiber grating (LPFG), is investigated for simultaneous measurement of ambient index and temperature.

BtU1C.4 • 09:15
Long-period fiber grating inscribed in a tapered fiber, Min-Seok Yoon1, Hyun-Joo Kim1, Young-Geun Han1; Hanyang Univ., Republic of Korea. A long-period fiber grating (LPFG) written in a tapered fiber was proposed and experimentally demonstrated. Strain sensitivity of the proposed LPFG based on a tapered fiber was improved to be -2.99 nm/µe.

BtU1C.5 • 09:30
Phase Reconstruction from Transmission for Long Period Fiber Gratings, Bing Zuo1, Kin S. Chiang1; Department of Electronic Engineering, City Univ. of Hong Kong, Hong Kong. We demonstrate a method to reconstruct the phase spectrum of a long-period fiber grating (LPFG) from its transmission spectrum. We apply the method to different kinds of LPFGs and verify it both numerically and experimentally.

BtU1C.6 • 09:45
Post-fabrication wavelength trimming of fiber Bragg gratings by using a 213-nm 8-ps pulsed laser, Yuval P. Shapira1, Vladimir Smulakovski1, Boris Spokter1, Moshe Horowitz1; Technion - Israel Institute of Technology, Israel. We demonstrate post-fabrication wavelength trimming of FBGs in two fiber types by using a 213-nm pulsed laser and show that it has significant advantages compared to trimming by using Argon-Ion laser.

08:30–10:00
Stu1D • Fiber & Fabrication
Shibin Jiang; AdValue Photonics, Inc., USA, Presider

Stu1D.1 • 08:30
Laser Annealing of Amorphous Silicon Core Optical Fibers, Noel Healy1, Sakellaris Mailis1, Todd D. Day1, Pier J. Sano1, John V. Badding1, Anna C. Peacock1; ‘Optoelectronics Research Centre, UK; Penn State Univ., USA. Laser annealing of an optical fiber with an amorphous silicon core is demonstrated. The annealing process produces a fiber that has a highly crystalline core, whilst reducing the optical transmission losses by ~3 orders of magnitude.

Stu1D.2 • 08:45
Annealing of Semiconductor Core Optical Fibers, Nishant Gupta1, Colin McMillen1, Rajendra Singh1, Ramakrishna Podila1, Appa Rao1, Thomas Hawkins1, Paul Fry1, Stephanie Morris1, Kelvin Poole1, Lin Zhu1, John Ballato1, Robert Rice1; Holcombe Department of Electrical and Computer Engineering, Clemson Univ., USA; Center for Silicon Nanoelectronics, Clemson Univ., USA; Department of Chemistry, Clemson Univ., USA; Department of Physics and Astronomy, Clemson Univ., USA; The Center for Optical Materials Science and Engineering Technologies (COMSET) and the School of Materials Science and Engineering, Clemson Univ., USA; Dreamcatchers Consulting, USA. Ex-situ rapid photothermal annealing is shown, through X-ray diffraction, Raman spectroscopy and Schottky diodes, to enhance the structural homogeneity of silicon optical fibers by increasing local crystallinity, thus advancing their optoelectronic performance.

Stu1D.3 • 09:00
Fabrication of Polymeric Micro-Photonic Structures on the Tip of Optical Fibers, Stephen M. Kuebler1, John E. Williams1, Daniel J. Prepon1, Raymond C. Rumpf1; Chemistry Department, Univ. of Central Florida, USA; CReOL, The College of Optics and Photonics, Univ. of Central Florida, USA; EM Lab, W.M. Keck Center for 3D Innovation, Univ. of Texas at El Paso, USA. A method is described for fabricating truly three-dimensional micro-photonic structures directly onto the end face of an optical fiber.

Stu1D.4 • 09:15
Fabrication of Microstructured Fibers Using an Effect of Pressure Self-Regulation in Sealed Holes, Sergey Semjonov1, Alexander N. Denisov1, Evgeny Dianov1; Fiber Optics Research Center, Russian Federation. Theoretical aspects of drawing the holey preform with sealed holes at the top end are discussed. Experimental results on drawing in such a regime are presented.

Stu1D.5 • 09:30
One-step Multi-material Preform Extrusion for Robust Chalcogenide Glass Optical Fibers, Guangming Tao1, Sourab Shabahang1, Ayman A. Aboourayj1; Univ. of Central Florida, CREOL, USA. We demonstrate a novel process of one-step extrusion of multi-material fiber preforms containing chalcogenide glasses and polymers. The polymer lends mechanical robustness to the drawn chalcogenide infrared fibers and tapers.

Stu1D.6 • 09:45
Molten Core Fabrication of Crystalline Oxide Core Optical Fiber, John Ballato1, Colin McMillen1, Thomas Hawkins1, Paul Fry1, Lin Zhu1, Robert Rice1, Oscar Statsudd1; The Center for Optical Materials Science and Engineering Technologies (COMSET) and the School of Materials Science and Engineering, Clemson Univ., USA; Holcombe Department of Electrical and Computer Engineering, Clemson Univ., USA; Dreamcatchers Consulting, USA; Department of Electrical and Computer Engineering, Univ. of California- Los Angeles, USA. A reactive molten core process was employed to make optical fibers with cores in the bismuth germanate family, containing a biphasic crystalline mixture of acentric Bi2GeO5 and cubic bismuth oxide (β-Bi2O3/BiO2-x).
Invited

Digital signal processing has enabled the generation and detection of orthogonal-frequency-division-multiplexing based superchannels that advantageously leverage parallelism to achieve high data-rate, high spectral-efficiency, and potentially low cost-per-bit.

We investigate spectral shaping on DFT-OFDM and its application in fiber transmission systems. We also discuss the tolerance of RGI CO-OFDM to laser phase noise and fiber nonlinearity. Systems with greatly improved uniformity, which is enabled by dispersion tailoring using a nano-scale slot structure, for on-chip frequency comb generation.

Efficient Parametric Gain at 1.55 um in a GaInP Photonic Crystal Waveguide, Isabelle Cester1, Gadi Eisenstein1, Sylvain Combrié2, Alfredo De Rosa2; 1Department of Information Engineering, Universita degli Studi di Padova, Italy; 2Electrical Engineering Department, Technion, Israel; 3Thales Research and Technology, France. A complete and rigorous model of parametric gain in photonic crystal waveguides, including dispersive losses, has been derived. The predicted narrowband amplification might enable tuneable slow light device applications.

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
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10:30–12:30
Nu2D • Nonlinear Systems and Nonlinear Dynamics
Dmitry Skryabin; Univ. of Bath, UK, Presider

Nu2D.1 • 10:30
Pulse shaping assisted investigation of interacting dispersion-managed solitons, Alexander Hause1, Philipp Rohrmann1, Fedor Matsche1; Institut für Physik Universität Rostock, Germany. Fiber-optic dispersion-managed solitons can form stable molecules. Systematically mapping out parameter space using a flexible pulse shaper, we investigate the binding mechanism and confirm predictions. Phenomena off equilibrium are also described and explained.

Nu2D.2 • 10:45
Soliton Eigenvalue Evolution in Plasma-Influenced Nonlinear Gas-Fiber Optics, John C. Travers1, Wonkeun Chang1, Philipp Hoefer1, Philip Russell1,2; Max Planck Institute for the Science of Light, Germany; 2Department of Physics, Univ. Erlangen-Nuremberg, Germany. We study the influence of ionization on soliton evolution and the self-frequency blue-shift in a gas-filled photonic crystal fiber by numerically solving the direct scattering problem of a suitably perturbed nonlinear Schrödinger equation.

Nu2D.3 • 11:00
Adler synchronization of spatial laser solitons pinned by defects, Yoann Noble1, Pavel Paulav1, Craig Mcnally1, William Firth1, Pere Colet1, Gia-Luca Oppo1, Thorsten Ackemann1; Physics, Univ. of Strathclyde, UK; Institut für Theoretische Physik, Technische Universität, Germany; IFISC, Universitat Illes Balears, Spain. Spatial disorder due to growth fluctuations in broad-area semiconductor lasers induces pinning and frequency shifts of spatial laser solitons. We demonstrate frequency and phase-locking between two spatial solitons in VCSELs with frequency-selective feedback.

Nu2D.4 • 11:15
Vector Solitons with Slowly Precessing States of Polarization, Chengbo Mou1, Sergey Sergeev1, Aleksy Rathin1, Sergei K. Turitsyn1; Photonics Research Group, Aston Uni, UK. We observed new types of polarization rotating vector solitons in a carbon nanotube mode locked fiber laser with anomalous dispersion cavity.

Nu2D.5 • 11:30
Characterization of Temporal Cavity Solitons by Frequency Resolved Optical Gating (FROG), Ja K. Jung1, Stuart G. Murdoch1, Jose Azana1, Stuart G. Murdoch1, Alexei M. Zheltikov1; IIESL, 1IESL, FORTH, Greece; 2Department of Fiber Photonics, ACREO, Sweden; 3Department of Information Engineering, Univ. of Parma, Italy. We study the influence of ionization on soliton evolution and the self-frequency blue-shift in a gas-filled photonic crystal fiber by numerically solving the direct scattering problem of a suitably perturbed nonlinear Schrödinger equation.

10:30–12:30
Bu2E • Applications of Gratings and Poled Glass: FBG Sensors and Interrogation systems
Jose Azana; INRS-Energie Materiaux et Telecom, Canada, Presider

Bu2E.1 • 10:30
Invited
Plasmons and nanoparticle coatings on optical fibers: playing with Tilted Fiber Bragg Gratings, Jacques Albert1, Christophe Caucheteur1, Li Yang Zhao1, Anatoli Ianoul1, Sean Barry1; Carleton Univ, Canada; Université de Mon, Belgium; China Jiliang Univ, China. Strong, narrowband, and polarized cladding mode resonances from tilted fiber Bragg gratings are used to probe uniform and granular nanoscale metal coatings. The effects of Plasmon field localization on the grating transmission are described.

Bu2E.2 • 11:00
A shear displacement sensor based on a ferrofluidic defected microstructured optical fiber Bragg grating, Alessandro Candiani1, Maria Konstantaki1, Walter Margulis1, Stavros Pasadakis1; IESL, FORTH, Greece; 2Department of Fiber Photonics, ACREO, Sweden; 3Department of Information Engineering, Univ. of Parma, Italy. We demonstrate frequency and phase-locking between two spatial solitons in VCSELs with frequency-selective feedback.

Bu2E.3 • 11:15
Femtometer-Resolution Wavelength Interrogation of a Phase-Shifted Fiber Bragg Grating Sensor Using an Optoelectronic Oscillator, Ming Li1, Wangzhe Li2, Jianping Yao2; Jose Azana1; INRS-Energie Materiaux et Telecom, Canada; 2Univ. of Ottawa, Canada. A novel technique to achieve femtometer-resolution wavelength interrogation of a PSFBG sensor is proposed and demonstrated using an optoelectronic oscillator. Wavelength interrogation of a PSFBG strain sensor with a resolution of 360fm is experimentally demonstrated.

Bu2E.4 • 11:45
Use of an FBG Sensor for In-situ Temperature Measurements of Gas Dielectric Barrier Discharges, Meena Ashawat1, Bachir Saoudi1, Elton Soares de Lima Filho1, Michel Wertheimer1, Raman Kashyap1; Department of Engineering Physics, Ecole Polytechnique de Montreal, Canada; 2Department of Electrical Engineering, Ecole Polytechnique de Montreal, Canada. We report the use of a fibre Bragg grating (FBG), which is immune to electromagnetic-fields and/or high-voltages encountered in plasma environments, to measure the temperature in various noble gases, Nitrogen and air dielectric barrier discharge.

Bu2E.5 • 11:30
A Novel Dual-Core Photonic Crystal Fiber Coupler With A Metal Wire, Shuyan Zhang1, Xia Yu1, Ying Zhang1; Precision Measurements Group, Singapore Institute of Manufacturing Technology, Singapore. We report a novel fiber coupler design with plasma-ix effect. The coupling length is reduced by 40 times in the near infrared region. The air hole diameter and the pitch size will affect coupler performance.

10:30–12:30
Stu2F • Fiber Based Devices
Li Qian; Univ. of Toronto, Canada, Presider

Stu2F.1 • 10:30
Invited
Optical Microfibers and Nanofibers, Limin Tong1,2; Zhejiang Univ, China. Optical micro-nanofibers exhibit interesting properties including tight optical confinement, high fractional evanescent waves, step field gradient and abnormal dispersion, which open opportunities for developing microscale fiber-optic components, devices ranging from resonators, lasers to sensors.

Stu2F.2 • 11:00
High Power All-Fiber Isolator for 1 Micron Fiber Lasers, Shihui Jiang1; AdValue Photonics, Inc., USA. We successfully developed an all-fiber isolator by using our proprietary Faraday rotator fiber. The throughput power of all-fiber isolator is several times higher than that of current free-space fiber pigtailed isolator.
**COLOMBO II**

**Tu2B** • Waveguides, Polarizers, and Dispersion—Continued

**Tu2B.5** • 11:45

Asymmetric Codirectional Coupler between Regular Nanowaveguide and Slot Waveguide for Polarization Conversion, Benjamin Wohlfeld1, Lars Zimmermann2, Klaus Petermann1; 1Institut für Hochfrequenztechnik, Technische Universität Berlin, Germany; 2HP GmbH, Germany. A polarization converter based on an asymmetric codirectional coupler made of SOI nanowaveguides is proposed. Strong coupling between the fundamental TM mode of a nanowaveguide and the fundamental TE mode of a slot-waveguide is achieved.

**Tu2B.6** • 12:00

An Integratable Electrically Tunable Dispersion Trimmimg, Kambit Jamshidi1, Stefan Meister1, Bulent Frankke1, Ave Alsaidi2, Sebastian Kapur3, Thomas Schneider1; 1Institut für Hochfrequencechnologie, HFTL, Germany; 2TU Berlin, Institut für Optik und Atomare Physik, Germany. An electrically tunable dispersion trimming method is proposed which can be integrated in a CMOS compatible process. Feasibility of the method is studied by simulations to produce or compensate variable dispersions up to 65 ps/nm.

**Tu2B.7** • 12:15

Withdrawn

**Tu2C** • Slow Light in Photonic Crystals—Continued

**Tu2C.5** • 11:45

How Much Can Slow Light Increase the Efficiency in Thin-Film Planar Solar Cell Devices?, Olivier G. Deparis1, Ounsi El Daif2; 1Facultes Univ Notre-Dame de la Paix, Belgium; 2IMEC, Belgium. Slow-light induced enhancement of solar light absorption is predicted in Bragg resonators built from layers of active (photovoltaic) and passive (transparent conductive oxide) materials. Applications to photo-current enhancement in realistic thin-film solar cells are discussed.

**Tu2C.6** • 12:00

Invited

Resonance fluorescence in a photonic crystal waveguide: Mollow triplet sampling of the slow-light modes, Stephen Hughes1, 2; 1Queens Univ. at Kingston, Canada. We introduce a formalism to study resonance fluorescence of a driven quantum dot in a photonic crystal waveguide. Unusual Mollow triplets emerge due to simultaneous sampling of different parts of the slow-light band structure.

**COLOMBO III**

**Tu3B** • Microphotonic Filters

**Tu3B.8** • 13:30

Refractive Index Engineering with Subwavelength Gratings in Silicon Waveguides, Pavel Cheben1, Thomas Schneider1; 1National Research Council Canada, Canada. Subwavelength structures in silicon waveguides are presented, including practical components such as fiber-chip coupling, coupler, waveguide crossings, a polarization converter, a waveguide multiplexer and a Terahertz optical switch.

**Tu3C** • Tunable Delay

**Tu3C.3** • 13:30

Tunable Delay, Thomas Krauss; Univ. of St Andrews, UK, Presider

**Tu3C.1** • 13:30

Invited

Application of Time-Space Duality to Temporal Cloaking, Alexander L. Gaeta1, Moti Fridman1, Alessandro Farsi1, Yotishomo Okawachi2; 1Cornell Univ., USA. We utilize time-lens technology based on parametric four-wave mixing to create a short temporal gap in a light beam that can allow for one dimensional cloaking of an event.
NTu2D • Nonlinear Systems and Nonlinear Dynamics—Continued

NTu2D.6 • 11:45
Spatio-temporal collapse of ultrashort pulses in multimode optical fibers, Graham D. Hesketh1,2; Optoelectronics Research Centre, UK. Investigating MW peak-power ultra-short pulse propagation in multimode fibers using a multimode Schrödinger equation reveals nonlinear and dispersive effects can cause dramatic compression in space-time even for launch peak powers below the critical power. Numerical and experimental results reveal that linear collapse is possible in a very narrow range of parameters, with non-linear collapse competing for higher powers.

NTu2D.7 • 12:00
All-fiber transform-limited spectral compression by self-phase modulation of amplitude-shaped pulses, Julien Fatome1, Bertrand Kibler1, Eben R. Andriesen2, Herve Rigneault2, Christophe Finot2; 1Université de Franche-Comté, France; 2Institut Fresnel, France. We demonstrate efficient spectral compression of picosecond pulses in an all-fiber configuration at telecommunication wavelengths. Thanks to parabolic pulse shaping, a spectral compression by a factor 12 is achieved with an enhanced Strehl ratio.

NTu2D.8 • 12:15
Beam steering using spatial OPA in Kerr media: a space-time analogy of parametric slow light, Gil Fanouris1, Thibault Sylvestre1,2; 1Université de Franche-Comté, France; 2Institut Fresnel, France. In a way similar to an optical cavity, the pulse can be spatially delayed using slow light propagation, we theoretically demonstrate that beam steering can be readily achieved using optical parametric amplification in Kerr type nonlinear media.

NTu2E • Applications of Gratings and Poled Glass: FBGs and Interrogation systems—Continued

NTu2E.5 • 11:45
Transverse load tilted fiber Bragg grating sensor with variable sensitivity, Tingting Sun1,2, Yang Zhang1, Jacques Albert1, Department of Electronics, Carleton Univ., Canada; School of Physics and Optoelectronics Engineering, Nanjing Univ. of Information Science & Technology, China. A transverse load sensor for small forces (<7N) is demonstrated with a tilted fiber Bragg grating compressed between soft materials. The sensitivity of the device is optimized for different force ranges by changing the material.

NTu2E.6 • 12:00
Simultaneous Sensing of Temperature and Strain by Combined FBG and Mode-Interference Sensors, Alexander Sukhiev1, Rainer Engelbrecht1, Lars Buehle1, Berhard Schmauss1,2,1; Lehrstuhl für Hochfrequenztechnik, Universität Erlangen, Germany; 2Erlangen Graduate School in Advanced Optical Technologies, Universität Erlangen, Germany. We examine the combination of a FBG and mode-interference sensor for simultaneous temperature and strain sensing. Results for temperature and strain sensitivities are presented and the sensor performance in a simultaneous measurement experiment is evaluated.

NTu2E.7 • 12:15
Real-time 3D shape reconstruction scheme based upon fibre optic Bragg gratings, Ranjeet S. Bhamber1, Thomas Allopp1, G. Lloyd1, David Wehl2, Juan D. Ana-Castanon1; 1Instituto De Optica “Deaz De Valdes”, Spain; 2Photonics Research Group, Dept of Electronic Engineering, Aston Univ., UK. A new reconstruction technique is presented for reconstruction of 3D objects using a few FBG sensors. The propagation of a large number of light beams between the sensor and the object is simulated numerically, and then an algorithm is employed to reconstruct in real time the enveloped object with a 1% to 9% volumetric error.

Stu2F • Fiber Based Devices—Continued

Stu2F.4 • 11:45
Polymer Optical Fibers for Luminescent Solar Concentration, Eisnaar Hooman Banerji1, Ayman F. Abouraddy2; 1Univ. of Central Florida, CREOL, USA; 2Univ. of Central Florida, CREOL, USA. The correct design and numerical optimization of an all-polymer fiber as a luminescent solar concentrator is presented with large-area, lightweight, and flexible fabrics constructed of such fibers are a cost-effective alternative for mobile applications.

Stu2F.5 • 12:00
Design and Analysis of Heterogeneous Trench-Assisted Multi-core Fiber under Bending Condition, Suajing Tu1, Kunimasa Satoh1, Masanori Koshiha1, Katsuhire Takenaga2, Shoichiro Matsuo1; 1Division of Media and Network Technologies, Hokkaido Univ., Japan; 2Optics and Electronics Laboratory, Fujikura Ltd, Japan. Heterogeneous trench-assisted multi-core fiber (Hetero-TA-MCF) is proposed to achieve larger effective area. The crosstalk value at 1550-nm of Hetero-TA-MCF can be lower than “50” dB at 100-km propagation.

Stu2F.6 • 12:15
Multimaterial Fibers for Generating Structured Nanoparticles, Joshua J. Kaufman1, Guangming Tao2, Soroush Shababang1, Esmaeil-Hooman Banaei1, Ayman F. Abouraddy2; 1Univ. of Central Florida, CREOL, USA. We present a pathway to the fabrication of a structured spherical nanoparticles that leverages the scalability of fiber fabrication technology and an in-fiber Playteau-Rayleigh capillary instability. Thermal treatment of multi-material fibers post-drawing produces spherical nanoparticles.

12:30–13:30 Lunch Break, On Your Own

13:30-15:30 NTu3D • Nonlinearities in Novel Propagation Environments

Anna Peacock; Univ. of Southampton, UK, Presider

NTu3D.1 • 13:30
Invited
Photonic microcells, Fethi Benabid1; Univ. of Bath, UK. We review the recent progress on hollow-core photonic crystal fibers and their integrated form of photonic microcells in both their design and fabrication and in their applications for coherent optics, Raman comb generation laser metrology, and discharge based lasers.

NTu3E • Sensor Symposium I

Sophie LaRochelle; Universite Laval, Canada, Presider

NTu3E.1 • 13:30
Invited
Measuring Detonation, Deflagration and Burn Velocities with Fiber-optic Bragg Grating Sensors, Jerry Bentner1, Eric Udd2, 1Detonation Science, Lawrence Livermore National Laboratory, USA; 2Applied Science, Columbus Gorge Research, USA. Embedded fiber-optic Bragg grating sensors allow the measurement of the progress of high-speed reactions inside energetic materials. These sensors show promise as tools to measure the performance of solid rocket motor propellants and high explosives.

Stu3F • Mid IR

Ishwar Aggarwal; Univ of North Carolina at Charlotte, USA, Presider

Stu3F.1 • 13:30
Guided mode resonance filter as wavelength selecting element in Er:ZBLAN fiber laser, Eric G. Johnson1, Yuan Li1, Ryan Woodward1, Menelaos Poutous1, Indumathi Raghu1, Indumathi Raghu1, Ayman F. Abouraddy2; 1Univ. of Central Florida, CREOL, USA. We present a pathway to the fabrication of a structured spherical nanoparticles that leverages the scalability of fiber fabrication technology and an in-fiber Playteau-Rayleigh capillary instability. Thermal treatment of multi-material fibers post-drawing produces spherical nanoparticles.

Stu3F.2 • 13:45
High-purity tungstate-tellurite glasses for Mid-IR, Vitaly Dorofeev1, Alexander Moiseev1, Igor Krayev1, Sergey Motorin1, Alexey F. Kosolapov1; 1Institute of Chemistry of High-Purity Substances RAS, Russian Federation, 2Fiber Optics Research Center RAS, Russian Federation. Monolithic preforms of high-purity TeO2-WO3-La2O3-(Bi2O3) glasses were produced. Absorption of hydroxyl groups was down to n×0.001 cm−1 at ~3 μm in both core and cladding. Optical fibers with loss less than 0.5 dB/m at a wavelength range of 2.7-2.9 μm were made from them.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
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These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
We show that optical nonlinearities allow sub-wavelength beams to propagate in circular trajectories without being attenuated in spite of their partially evanescent spectrum. Such beams are exact solutions to Maxwell’s equations with Kerr or saturable nonlinearity.
SpTu4A • Subsystems—Continued

SpTu4A.4 • 17:00
t 500Gb/s PIC Based Coherent Optical Modem, Jeffrey Rahn1, Saurabh Kumar1, Matthew Mitchell2, Roman Malendovc1, Han Sun1, Kuang-Tsan Wu1, Pierre Mertz1, Kevin Crossore1, Gilad Goldfarb1, Hong Wang1, Masaki Kato1, Vikrant Lal1, Peter Evans1, Damien Lambert1, Huan-Shang Tsai1, Parmjit Samra1, Brian Taylor1, Alan Nilsson1, Atul Mathur1, Xiangjun Zhao1, Song Yu1, Steve Grubb1, Radhakrishnan Nagarajan1, Fred Kish1, David Welch1; 1Infinera Corporation, USA; 2Infinera Canada, Canada. We present a 500 Gb/s, PM-QPSK Photonic Integrated Circuit (PIC) based MODEM, software configurable into 250 Gb/s TCM mode, as a flexible optical network building block, operating over a 6000 km link with flex ROADMs.

SpTu4A.4 • 17:00
Long Period Gratings based on silica PLCs for optical signal processing applications, Jia Jiang1, Patrick Dumas1, Christopher J. Ledderhof1, Claire Callender1; 1Communications Research Centre Canada, Canada. Planar waveguide long period gratings have been implemented by creating a permanent refractive index modulation on the lower cladding of a waveguide. Design and fabrication of silica and polymer LPG devices for applications in high-speed optical signal processing are presented.

SpTu4A.4 • 17:15
Single Mode 3D Diffusive Photopolymer Optics for Optical Integrated Circuits, Chunfang Ye1, Keith Kamya1, Amy Sullivan1, Robert Mcleod1; 1Univ. of Colorado at Boulder, USA; 2Agnes Scott College, USA. We demonstrate single mode three-dimensional optics fabricated via direct-write lithography in diffusive photopolymers, including uniform waveguides, symmetrical waveguide tapers, 90° flat waveguide bends and waveguides through thin hybrid subcomponents.

SpTu4A.4 • 17:15
High Density Hybridly Integrated Light Source with a Laser Diode Array on a Silicon Optical Waveguide Platform, Takanori Shimizu1, Nobuki Hatori1, Makoto Okano1, Masahide Ishizaka1, Yutaka Urino1, Tsuyoshi Yamamoto1, Masahiko Morii1, Takahiro Nakamura1, Yushiko Arakawa1; 1PFCG2, Japan; 2FETRA, Japan; 3AIST, Japan; The Univ. of Tokyo, Japan. A novel high-density hybridly integrated light source with a laser diode array on a silicon optical waveguide platform was developed. This light source is a practical candidate for use with photonic integrated circuits for interchip optical interconnection.

SpTu4A.6 • 17:30
Impact of DSP on the design of InP-based transceivers for highly-compact cost-effective 100Gbit/s PM-QPSK, Donald S. Gour1, Walter Forysak1, Chris F. Clarke1; 1Oclaro Technology Ltd, UK. We consider the design of InP-based modulators and receivers for applications in highly compact modular 100G PM-QPSK transceivers. Numerical simulations demonstrate that coherent detection followed by DSP enables reduction in electrical bandwidth requirements.

SpTu4A.6 • 17:45
Analysis of Parallel Optical Sampling Rate and ADC Requirements in Digital Coherent Receivers, Abel Lorences Riesgo1, Michael Galili1, Christophe Peuchert1; 1Photonics Engineering, Technical Univ. of Denmark, Denmark. We comprehensively assess analog-to-digital converter requirements in coherent digital receiver schemes with parallel optical sampling. We determine the electronic requirements in accordance with the properties of the free running local oscillator.

SpTu4A.7 • 17:45
Laser Triggered Displacement of Embedded Carbon Microparticles in PDMS, Francisco Sánchez-Arévalo1, Juan Hernández-Cordero1, Reiner Pimentel-Dominguez1, Jesús Espinosa-Moreno1, Marcela Gómez1; 1Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico; 2Instituto de Investigación en Materiales, Universidad Nacional Autónoma de México, Mexico. We report the experimental evidence of laser-triggered displacement of carbon microparticles embedded in PDMS. Changes in the PDMS surface due to thermal effects owing to optical absorption of the microparticles are evaluated using dynamic speckle analysis.

SpTu4A.7 • 17:45
Nanoparticle self-assembly a new approach to fabricating optical interconnects, single photon sources and more, John Canning1, Massoud Naghibi1, Brant Gibson1, Melissa Nash1, Hari Jayaseelan1, Maxwell Crossley1; 1Univ. of Sydney, Australia; 2Physics, Univ. of Melbourne, Australia. A novel approach to fabricating optical waveguides and self-assembled structures at room temperature opens the way for integrating complex materials onto existing platforms. We demonstrate the fabrication of 7cm optical microfibres, and integrate nanodiamonds in these waveguides.
Nonlinear Photonics

Colorado I

White River

Rio Grande/Gunnison

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**NTu4D • Spatial Effects and Periodic Structures—Continued**

**NTu4D.4 • 17:00**
Enhanced Cerenkov second-harmonic emission in nonlinear photonic structures, Ksawery K. Kalinowski1, Philip Rock8ig1, Yan Sheng1, Moses Ayudé2, Jörg Imbrock3, Cornelia Denz2, Wiesław Z. Krolikowski4; 1Faculty of Physics and Applied Physics, National University of Science and Technology, Malaysia; 2Faculty of Physics and Applied Physics, National University of Science and Technology, Malaysia; 3Institute of Physics, Westfälische Wilhelms-Universität, Germany. We demonstrated significant (over 2×10^2) enhancement of the Cerenkov second-harmonic generation in periodically poled nonlinear crystal. We show that this effect is caused by the simultaneous fulfillment of the Cerenkov and Raman-Nath emission conditions.

**NTu4D.5 • 17:15**
Nonlinear propagation below cut-off in line-defect waveguides, Stefania Malaguti1, Gastano Bellanca2, Sylvain Combrie2, Alfredo De Rossi1, Stefano Trillo1; 1Universita degli Studi di Ferrara, Italy; 2THALES Research and Technology, France. We describe nonlinear propagation in a line-defect photonic crystal waveguide below transmission cut-off in terms of novel temporal gap-soliton solutions. All-optical control of the group velocity over mm-length scales is envisaged.

**NTu4D.6 • 17:30**
Modulational Instability in Nonlinear PT-symmetric Photonic Lattices, Yaakov Lumere1, Mikael C. Rechtsman2, Mordechai Segev1; 1Physics, Technion, Israel. We study nonlinear PT-symmetric lattices, and find a variety of new phenomena, among them nonlinearly-induced transition to stable PT-symmetry, instability suppression at high nonlinearities and modulation instability in unexpected regimes.

**NTu4D.7 • 17:45**
Observation of all-optical Berezinskii-Kosterlitz-Thouless crossover in a photonic lattice, Guohai Situ1, Jason W. Flescher1; 1Princeton Univ., USA. We experimentally observe an all-optical Berezinskii-Kosterlitz-Thouless transition, in which vortices spontaneously appear due to nonlinear interactions. We show that the number of vortices and their correlations agree with predictions from mean-field theory.

**BTu4E • Sensor Symposium II—Continued**

**BTu4E.3 • 17:00**
Resonant Waveguide Grating Biosensors for Cell Biology and Drug Discovery, Ye Fang1; 1Corning Incorporated, USA. Label-free optical biosensors have been long used for biomolecular interaction analysis. Here I review recent advances of resonant waveguide grating biosensor systems for whole cell sensing, and their applications in cell biology and drug discovery.

**BTu4E.4 • 17:15**
Short-wavelength fiber Raman pulse-pumped by multimode laser diode at 806 nm, Tianfu Yao1, Johan Nilsson1; 1Univ. of Southampton, UK. We demonstrate a fiber Raman laser emitting at 835 nm when pumped by bursts of 50–100 ns pulses from a multi-mode laser diode at 806 nm. The slope efficiency reaches 38%.

**Stu4F • Fiber Lasers I—Continued**

**Stu4F.4 • 17:00**
Recent Developments in Fiber Lasers, Mode Stability Issues in LMA Fibers, Jens Limpert1, Cesar Jauregui2; 1Friedrich-Schiller-Universität Jena, Germany. The very high average powers currently extracted from Large Mode Area Fibers show that thermally-related effects will play a very prominent role in the future development of fiber laser systems.
JTu5A.1 General Memory Polynomial for Transmission impairments Mitigation in Coherent Communication Systems, Nelson Costa1,2, Daniel Fonseca1,2, Adolfo Cartaxo1,2, Tiago F. Alves1,2; Instituto de Telecomunicacoes, Portugal; 2Ericsson, Sweden.

JTu5A.2 A Novel Restoration Algorithm for Business and Residential FTTx Broadband Access Networks, Narid Ghasaiazadi1,2; Ericsson Inc., USA. A novel restoration algorithm for FTTx broadband access networks based on the concept of utility optimization is introduced to maximize both business and residential end-users happiness by avoiding different scenarios.

JTu5A.3 Extended WDM-PON Employing High Polarization Dependence R-SOAs and EDFA/Raman Amplification, Uysus Duaatt1, Joao Rosolem1, Murilo Romero1; Converged Networks, Research and Development Center in Telecommunications (CIn3P), Brazil; Electrical Engineering, Univ. of Sao Paulo (USP), Brazil. An extended WDM-PON employing high polarization dependence R-SOAs and EDFA/Raman amplification at the CO is proposed in this work. We experimentally demonstrated error free operation over 70km using directly modulated R-SOAs at 1.52 Gb/s.

JTu5A.4 Simplified Numerical Simulation of Bursty Packet Traffic Amelioration by Erbium-Doped Fiber Amplifiers, Thermo Pelcian1,2, Joao Pinto1,2, Paulo S. Andre1,2; Instituto de Telecomunicacoes, Portugal; Physics Department, Aveiro Univ., Portugal. We propose a simplified numerical model to study burst induced signal distortion in EDFAs. The obtained experimental and simulated results for the signal amplitude decay rate are comparable, with a simulation time of 4.7 ns/bit.

JTu5A.5 Experimental Demonstration of an Indoor Localization System with Single Channel Imaging Receiver, KE WANG1,2, Ampalia vananapilir Nimalatath1,2, Christina Lim1,2, Estratos Skafidas1,2; National ICT Australia - Victoria Research Laboratory, Australia; 1Department of Electrical and Electronic Engineering, The Univ. of Melbourne, Australia. In this paper we experimentally demonstrate an optical wireless based indoor localization system with single channel imaging receiver. Compared with the system without imaging receiver, the localization accuracy can be improved from ~13.08cm to ~5.1cm.

JTu5A.6 Thermal radiation from patterned Pt microstructures, Gabriel Vasile1,2, Mustafa Arakan1; Norsir Ingvorsson1; Science Institute, Univ. of Iceland, Iceland; 1National Institute of Research and Development for Cryogenics and Isotopic Technologies, Romania. We investigate the thermal radiation in the infrared regime of micro-fabricated Platinum (Pt) heaters, i.e. resistively heated wires, with Gold (Au) nanoparticle deposits on the surface and photonic crystals (holes, pillars and gratings).

JTu5A.7 A reinterpretation of the metamaterial perfect absorber, Yong Zeng1,2; Los Alamos National Laboratory, USA. We analytically prove that the appearance of two almost out-of-phase currents inside a metamaterial is necessary for a perfect absorber. We further show that evanescent waves consume the electromagnetic energy significantly.

JTu5A.8 All-Optical Delta Sigma Modulator Employing Semiconductor Ring Lasers, Azemuddin Syedi1,2, Mohammad R. Sayed1; Center for VLSI and Embedded Systems Technology, International Institute of Info Tech, India; Electrical and Computer Engineering, Southern Illinois Univ. Carbondale, USA. A semiconductor ring laser is designed so as to work as an inverted integrator coupling three of such integrators as an all-optical Delta Sigma Modulator is designed. The phenomenon of injection locking and switching is used.

JTu5A.9 Design of Doubly Coupled Resonator Optical Waveguides, Shuntaro Makino1, Yuki Kuyanagi1, Kummata Saitoh1, Masanori Koshida1; Graduate School of Information Science and Technology, Hokkaido Univ., Japan. We propose doubly-coupled resonator optical waveguides (D-CROWs). D-CROWs are composed of cascaded ring resonators based on 1-D photonic crystals. We show that D-CROWs realize small group velocity compared with conventional 1-D photonic crystals based CROWs.

JTu5A.10 Bending devices based on Long Range Surface Plasmon Polariton Waveguide embedded in Fluorinated Polymer, Jia Jang1, Sarkis Jacob1, Claire Callender1; Communications Research Centre Canada, Canada. This work presents low-loss bending waveguides based on long-range surface plasmon polaritons (LRSSP) excited by end-fire coupling. The waveguides were fabricated by embedding thin film stripes of gold in a low optical absorption perfluoroclobutane (FPCB) polymer.

JTu5A.11 Spool plasma polaron formed by 1D strip grazing, ELAMINE Fatemi1,2, Gulsah Ibrahim1, Oussedalt Meherzi1, Gharbi Tissi1; Raman Spectroscopy, Tunisie; 1Femto-ST, UMR CNRS No. 6174, Route de Gray, France; Charles Coulomb Laboratory, UMR 5221 CNRS UM2 (L.C.), France. We demonstrate using the parametric formulation of combined boundary condition method (CBCM) with the adaptive spatial resolution (ASR) that 1D metallic strip grazing infinitely thin and perfectly conductive create spool plasma polaritons.

JTu5A.12 Nano-selective area growth of InGaAs/InP using CBE in situ etching, Naderde Kuznetsova1, Elizaveta Semenova1, Shima Kadhodhazadeh2, Martin Schubert3, Kresten Yvind1; Photonics Engineering, DTU, Denmark; 1Electron Nanostructure, DTU, Denmark; 2Modern Optics and Photonics, The Univ. of Konstanz, Germany. We are investigating the conditions for nano-patterned selective area epitaxial growth using e-beam lithography on HSI resist and in-situ etching in the MOVPE reactor.

JTu5A.13 Modeling of a nano-metallic surface plasmonic lens for wider optical window operation, Ghanbhuy Singh1, Ashishkar Goyal1, Viju Jainay1; Malaviya National Institute of Technology, India. A simplified implementation of the Nano-metallic lens with equidistant slits but having different widths is evaluated. The design tolerance and variation in the focal point position in accordance to alteration in the properties of the lens are explored in brief.

JTu5A.14 Design and Development of a New Polymeric Microstructured Fiber for Application in FFTH Networks, Katrin Wetlikow1, Pawel Gdula1,2, Pawel Szczepanski1,2, Ryszard Buczyński1,2, Ryszard Piramidowicz1; Institute of Microelectronics and Optoelectronics, Warsaw Univ. of Technology, Poland; 1National Institute of Telecommunications, Poland; 2Institute of Electronic Materials Technology, Poland; 3Faculty of Physics, Univ. of Warsaw, Poland. This paper is focused on designing and modeling of a new type of microstructured plastic optical fiber for application in Fiber-To-The-Home systems, with improved modal dispersion and bending losses.

JTu5A.15 Optical Dispersion Measurements in Chalcogenide Glass Fibers and Tapers, Soroush Shabahang1, Guangming Tao1, Ayman F. Abouraddy1; Univ. of Central Florida, CREOL, USA. Dispersion of chalcogenide (CG) bulk samples, multiple-ClG fibers and tapers is measured. We demonstrate normal and anomalous wavelength dispersion in the tapers and support the results with finite-element simulations.

JTu5A.16 Cladding Glass Development for Semiconductor Core Optical Fibers, Stefanie Morris1, Thomas Hawkins2, Paul Foley2; John Bal- lato1, Steve Martin2; Robert Rice3; 1The Center for Optical Materials Science and Engineering Technologies (COMSET) and the School of Materials Science and Engineering, Clemson Univ., USA; 2Department of Materials Science & Engineering, Iowa State Univ. of Science and Technology, USA; 3Dreamcatcher Consulting, USA. Cladding glass compositions have been developed to minimize thermal expansion mismatch in the glass clad crystalline core fibers. These tailored compositions have also shown to reduce oxygen content in the fibers.
JTu5A.23
THIRD-HARMONIC GENERATION IN OPTICAL MICRO-FIBERS, Aurélien Coillet1,2, Philipp Greul1, JCB UMR 6303 Université de Bordeaux, France; FEMTO-ST UMR 6174 Université de Franche-Comté, France. We explain the relatively easy, wideband, THG conversion that we observe experimentally in silica glass microfibers by the tapering geometry. As a challenging perspective, we compare THG efficiencies effective in silica and tellurite glasses.

JTu5A.24
Nonlinear Surface Plasmon Polaritons, Mirjam Deutsch;1 Univ. of Oregon, USA. We present analytical analyses of the nonlinear interaction of NPP fields at a silver–vacuum interface, in the presence of a third-order optical susceptibility in the metal. Both sum- and difference-frequency generation interactions are addressed.

JTu5A.25
Coherent Superposition of ω and 2ω Spectral Components in Supercontinuum Pulse Generated in a Gas-Filled Hollow Core Fiber, Kenta Yoshikiyo1, Shohei Kondo1, Yo Oshii1, Fumihiko Kanmuri1; Electronics and Electrical Engineering, Keio Univ., Japan; 800 and 400 nm broadband components generated by phase modulation based on nonlinear copropagation of fundamental and second-harmonic femtosecond pulses in an Ar-gas-filled hollow core fiber were separately compressed and coherently superposed to generate broadband shaped laser pulses.

JTu5A.26
Multiple transmission filters for enhanced energy in mode-locked fiber lasers, I. J. Kut1, Peng Li1, Alex P. K. A. Wai1, Edwin Ding1;1 Univ. of Washington, USA; 2Electronic and Information Engineering, The Hong Kong Polytechnic Univ., China; 3Mathematics and Physics, Acusa Pacific, USA. We demonstrate that incorporating multiple sets of waveplates and polarizers in a ring cavity laser allows for the suppression of multi-pulsing and a significant enhancement (an order of magnitude) of the mode-locked pulse energy.

JTu5A.27
Interaction of dark vector polaron solitons, Albrecht Werner1,2, Oleg A. Egorov1, Falk Lederer1,2;1 Institute of Condensed Matter Theory and Solid State Optics, Friedrich Schiller Univ., Germany; 2Abbe Center of Photonics, Friedrich Schiller Univ., Germany. We study the interaction dynamics and stability properties of dark vector polaron solitons in a semiconductor microring. We observe both the spontaneous symmetry breaking of polarization and the fusion of two vector solitons.

JTu5A.28
PM Raman fiber laser at 1679 nm, Ask S. Svane1, Karsten K. Rottwitt1; DTU Fotonik, Technical Univ. of Denmark, Denmark. We demonstrate a PM Raman fiber laser emitting light at 1679 nm. The laser has an slope efficiency of 67 % and an output power of more than 175 mW with a 27 pm linewidth.

JTu5A.29
Multi-solitons in a Dispersion Managed Fiber Laser using a Carbon Nanotube-Coated Taper Fiber, Amos Martinez1, Mika Omura1, Masato Takahagi1, Bo Xu1, Takahiro Kuga1, Takaaki Ishigure1, Shintaro Yamashita1; Electronic Engineering, University of Tokyo, Japan; 2Faculty of Science and Technology, Keio University, Japan; 3Department of Physics, The Univ. of Tokyo, Japan. Stable, phase-locked, sub 30fs soliton pairs and triplets are generated in a dispersion-managed mode-locked fiber laser using a taper fiber coated with a carbon nanotube (CNT) polymer as a saturable absorber.

JTu5A.30
Formation of dissipative soliton during self-diffraction of waves, Serifana Bugaychuk1, Robert Conte2;1 Institute of Physics NAS Ukraine, Ukraine; 2LBC MENO Ecole normale supérieure de Caen (CMAL), France; 3Service de physique de l’état condensé (CNRS URA 2464), France. We derive complex Ginzburg-Landau equations (CGLEs) for wave self-diffraction at four-wave mixing in nonlinear cavity. Evolution of unstable dissipative solitons of the cavity's intensity pattern form inside a cavity that is described by CGLEs.

JTu5A.31
Bifurcation to chaotic polarization mode hopping in vertical-cavity surface-emitting lasers, Martin Virte1,2, Marc Sciamanna1, Krassimir Panajotov1,2; OPTEL Research Group, Supelsac, Laboratoire Matériaux Optiques, Photoniques et Systèmes (LMOPS) EA-4423, France; 2Department of Applied Physics and Photonics (DR-TONA), Vrije Universiteit Brussel, Belgium; 3Institute of Solid State Physics, Bulgaria. We make an in-depth analysis of a bifurcation scenario that leads to chaotic hopping between two elliptically polarized modes in VCSELs. Our work brings new light on recent experiments using quantum dot VCSELs.

JTu5A.32
Rectangular Superimposition solutions to the Nonlinear Schrodinger Equation, Neil Broderick1, Claude Auvergaray1, Vladimir Kruglov1; 1Physics, Univ. of Auckland, New Zealand. In this paper we extend the class of self-similar solutions to the Nonlinear Schrodinger Equation to Rectangular pulses, show how they could be generated experimentally and discuss practical applications.

JTu5A.33
Withdrew

JTu5A.34
Effect of the modulation parameters on the evolution of a spectrally phase modulated pulse in a tapered fiber for super-continuum generation, Pedro L. Bertarin1, Emiliano R. Martins1, Sérgio C. Zilés1, Ben-Hur V. Borges1; 1Escola de Engenharia de São Carlos, Universidade de São Paulo, Brazil, 2School of Physics and Astronomy, University of St Andrews, UK; 3Instituto de Fisica de Sao Carlos, Universidade de Sao Paulo, Brazil. In this paper we demonstrate how the supercontinuum (SC) generated by a spectrally phase modulated femtosecond pulse in a tapered fiber is influenced by the modulation parameters.

JTu5A.35
Threshold and Above Threshold Analysis of Two-Dimensional Square Lattice Index and Gain Coupled Photonic Crystal Laser with Transverse Magnetic Polarization, Marcin Koś1,2, Paweł Szczepański1,2; 1Univ. of Warsaw, Poland; 2Warsaw Univ. of Technol-ogy, Poland; 3National Institute of Telecommunications, Poland. In this work, a threshold and an above thresholds analyses based on the coupled mode theory for square lattice photonic crystal band edge laser with gain and index modulation are presented.

JTu5A.36
Photon and phonon coupling by electrostrictive forces in photonic crystal fiber, Jean Charles Beugnot1, Vincent Laude1; 1Institut de Physique de la Matière, Université de Lille 1, France; 2Institut Carnot de Bourgogne, France. We revisit the traditional treatment of the wave turbulence theory and we study theoretically, numerically and experimentally the nonlinear propagation of partially coherent optical waves in single mode optical fibers.

JTu5A.37
Tunable Wavelength Broadcasting in a PPLN with Multiple QPM Peaks, Marceu Abisnava1, Amirhossein Tehranchi1, Krishnamoorthy Pandiryan1, Myongsik Cha1, Raman Kashyap2; 1Department of Engineering Physics, Ecole Polytechnique de Montréal, Canada; 2Department of Electrical Engineering, Ecole Polytechnique de Montréal, Canada; 3School of Electrical and Electronic Engineering, SASTRA Univ, India; 4Department of Physics, Pauls National Univ, Democratic People’s Republic of Korea. Tunable multiple-x ßler broadcasting of a signal to selective WDM channel is demonstrated utilizing temperature-assisted tuning of QPM pump wavelengths based on cascaded nonlinear mixing in bulk PPLN with an aperiodic domain in the center.

JTu5A.38
Pulse delaying using Raman-assisted parametric amplification in polarization-maintaining fibers, Nous NASSER1, Gil FANJOUX1, Eric Lante1, Thibault Sylvestre1; 1department of Optics, FEMTO-ST, France. We study both analytically and numerically pulse delaying and advancement through Raman-assisted optical parametric amplification in polarization-maintaining fibers and show that the Raman gain enhances the optical delay up to 35%.

JTu5A.39
Existence regime of stable fiber-optic three-soliton molecules, Philipp Rohrmann1, Alexander Hause1, Fedor Mitschke1; 1Universitas Rostock, Germany. We investigate conditions for existence of stable compounds of three solitons in dispersion-managed fiber. With such compounds one might transmit 2 bits per timeslot in a solitonic system.

JTu5A.40
High-repetition-rate ultrashort pulse generation in nonlinear fibers with exponentially decreasing dispersion, Qian Li1,2, Xi Li1,2, Jean-Michel Germain1,3; 1Univ. of Aachen, Germany; 2Institut Carnot de Bourgogne, France. We revisit the traditional treatment of the wave turbulence theory and we study theoretically, numerically and experimentally the nonlinear propagation of partially coherent optical waves in single mode optical fibers.

JTu5A.41
Self-induced transparency quadrant solitons in noncentrosymmetric media doped with quantum dots, Sergey A. Fomichev1,2; 1Dalhousie Univ., Canada. We discover and numerically explore self-induced transparency quadrant solitons (SET-QS) in semiconductor waveguides doped with quantum dots. We discuss a hybrid nature of the SET-QS and the material parameter range for their experimental realization.

JTu5A.42
Extreme value statistics in quasi-CW Raman fiber lasers, Dmitry V. Churkin1,2, Oleg Grebennikov1, Sergey Smirnov1,2; 1Institut Carnot de Bourgogne, France; 2Institut d’Optique, Université Paris-Saclay, France. We discover and numerically explore self-induced transparency quadrant solitons (SET-QS) in semiconductor waveguides doped with quantum dots. We discuss a hybrid nature of the SET-QS and the material parameter range for their experimental realization.

JTu5A.43
Dissipative Optical Solitons In Dense Media Of Doped Waveguides, Alexey Prokhorov1, Mikhail Y. Gubin1, Andrey Y. Leksin1, Maxim G. Gladush2, Alexander P. Alodjants1, Sergei M. Arakelian1; 1Institute of Applied Physics, St Petersburg, Russia; 2Institut d’Optique, Université Paris-Saclay, France. We discover and numerically explore self-induced transparency quadrant solitons (SET-QS) in semiconductor waveguides doped with quantum dots. We discuss a hybrid nature of the SET-QS and the material parameter range for their experimental realization.

JTu5A.45
Withdrawn

JTu5A.45
Dissipative Optical Solitons In Dense Media Of Doped Waveguides, Alexey Prokhorov1, Mikhail Y. Gubin1, Andrey Y. Leksin1, Maxim G. Gladush2, Alexander P. Alodjants1, Sergei M. Arakelian1; 1Institute of Applied Physics, St Petersburg, Russia; 2Institut d’Optique, Université Paris-Saclay, France. We discover and numerically explore self-induced transparency quadrant solitons (SET-QS) in semiconductor waveguides doped with quantum dots. We discuss a hybrid nature of the SET-QS and the material parameter range for their experimental realization.
JTu5A.46  
Withdrawn

JTu5A.47  
Q-Switching principle is based on dynamic spectral overlapping of a Fiber Bragg Grating and a Tunable Fiber Fabry-Perot Filter, Rodolfo Martinez1, Adebayo Adedotun1, Lin Zhang1, Aston Univ., UK; 2School of Electronic Engineering, Seoul National Univ., Republic of Korea. We propose a systematic method for the synthesis of arbitrary group delay responses by using all-pass structures of coupled optical cavities. Optimum structure parameters design, in terms of filter order and accuracy, are obtained.

JTu5A.48  
Highly Strain-Sensitive Long-Period Grating in Hi-Bi Fiber with a Reference Fiber Bragg Grating, Toru Mizunami1, Adebayo Adedotun1, Lin Zhang1, Aston Univ., UK; 2School of Electronic Engineering, Seoul National Univ., Republic of Korea. We propose a systematic method for the synthesis of arbitrary group delay responses by using all-pass structures of coupled optical cavities. Optimum structure parameters design, in terms of filter order and accuracy, are obtained.

JTu5A.49  
Fiber Bragg grating Fabry-Perot structures under loading and their applications in switchable multi-wavelength lasers, Xuexue Shu1, Aston Univ., UK; 2School of Electronic Engineering, Seoul National Univ., Republic of Korea. We demonstrate a fiber-optic SPR based sensor with metallic nanostructures on the fiber end facet. Two-dimensional metallic slit arrays are designed to induce the plasmonic reflection in the infrared region. The proposed sensor shows a high sensitivity of 1000 nm/RIU.

JTu5A.50  
Fiber Bragg Grating Inscription With Ultraviolet Radiation and Two Beam Interference in Microstructured Optical Fiber, Martin Beck1, Thomas Geermaert2, Tigran Bagdasaryan2, Kay Schuster1, Pawel Mergo1, Manfred W. Robbhardt1, Hartmut Barthel2, Francis Berghmans2, Hugo Thienpont2,1Institute of Photon Technology, Germany; 2Brussels Photonics Team B-PHOT, Vrije Universiteit Brussel, Belgium; 3Maria Curie-Sklodowska Univ., Poland. Fiber Bragg grating (FBG) inscription in microstructured optical fibers (MOF) is accompanied (by) low intensity and contrast ratio of the interference. Nanosecond and femtosecond ultraviolet exposure reveal the feasibility of gratings pure silica MOFs.

JTu5A.51  
Chemical sensor using Mach-Zehnder interferometer based on a pair of largely tilted fiber gratings, Xiangfeng Chen1,2, Kaiming Zhu1, Adebayo Adedotun1, Lin Zhang1, Aston Univ., UK; 2School of Electronic Engineering, Seoul National Univ., Republic of Korea. We demonstrate a fiber-optic SPR based sensor with metallic nanostructures on the fiber end facet. Two-dimensional metallic slit arrays are designed to induce the plasmonic reflection in the infrared region. The proposed sensor shows a high sensitivity of 1000 nm/RIU.

JTu5A.52  
Synthesis of Arbitrary Group Delay Responses with All-Pass Optical Cavities Structures, Miguel A. Preciado1, Xuexue Shu1, Kate Sugden1, Miguel A. Muriel1,1Photonics Research Group, Aston Univ., UK; 2Photonic Technology, Universidad Politécnica de Madrid, Spain. We propose a systematic method for the synthesis of arbitrary group delay responses by using all-pass structures of coupled optical cavities. Optimum structure parameters design, in terms of filter order and accuracy, are obtained.

JTu5A.53  
Fiber-optic end probe with two-dimensional metallic slit arrays for sensing in the infrared region, Kyuho Kim1, Sookyoung Roh1, Daewoon Chun1, Byoungho Lee1, Aston Univ., UK. Characteristics of fiber Bragg grating based Fabry-Perot (FBG-FFP) structures under transversal loading are investigated. A novel switchable multi-wavelength fiber laser employing loaded FBG-FFP is also demonstrated.

JTu5A.54  
Output Radiating Arrayed Waveguide Grating: Characterization of Phase Errors and UV Trimming, David Sinefeld1, Noam Goldshields1, Roy Zekter1, Nahum Gorbator2, Moshe Tur3, Dan M. Marom1,1Applied Physics, Hebrew Univ. of Jerusalem, Israel; 2Faculty of Engineering, Tel Aviv Univ., Israel. We developed a phase error measurement technique for AWG that radiate to free-space, based on pair-wise far-field interference of adjacent waveguide pairs. We also performed initial phase trimming experiments on individual waveguides with a UVlaster.

JTu5A.55  
Frequency dependence of the Brillouin spectrum of an aluminosilicate optical fiber on temperature and strain, Francesca H. Mountfort1, Mohammad Belal1, Jayanta K. Sahu1,1Optoelectronics Research Centre, Univ. of Southampton, UK. The spontaneous Brillouin spectrum of an aluminosilicate fiber shows two distinct peaks. Strain and temperature coefficients of 0.092±0.007 MHz/με, 1.5±0.2 MHz/°C for Peak 1 and 0.031±0.0025 MHz/με, 1.1±0.1 MHz/°C for Peak 2 is obtained for exploitation in temperature-strain distinction.

JTu5A.56  
Generation and application of tunable supercontinuum, Zhao Lei1,1Chinese Academy of Engineering Physics, China. Supercontinuum with tunable wavelength range from the blue end of the visible to the near-infrared is obtained. Fluorescence microscopy by a commercial confocal microscope is achieved using the tunable supercontinuum as illumination light.

JTu5A.57  
Similarities in fiber Bragg gratings written in fiber amplifiers, Yuval F. Shapira1, Moshe Horowitz1, Electrical Engineering, Technion - Israel Institute of Technology, Israel. We show, by using numerical simulations, that self-similar pulses can be obtained at the output of a fiber Bragg grating written in a fiber amplifier.
08:30–10:00
**JW1A • Joint SPPCom and ANIC Plenary Session**
Chao Lu; Hong Kong Polytechnic Univ., Hong Kong, and Ed Harstead, Alcatel-Lucent, USA, Presiders

**Plenary**
*Future optical access networks,* Yun Chung; 'Korea Advanced Inst of Science & Tech, Republic of Korea. This paper discusses the most competitive technical solutions for future optical access networks capable of providing >10-Gb/s service to each subscriber.

**Invited**
*Molding light propagation with phase discontinuities,* Zeno Gaburro; 1, N. Yu, M. A. Kats, F. Aieta; 1, P. Genevet; 1, 3, 4; ‘Harvard Univ., USA; ‘Dipartimento di Fisica, Univ. of Trento, Italy; ‘Institute for Quantum Studies and Department of Physics, Texas A&M Univ., USA; ‘Dipartimento di Fisica e Ingegneria dei Materiali e del Territorio, Università Politecnica delle Marche, Italy. Conventional optical components rely on gradual phase shifts accumulated during light propagation to shape light beams. New degrees of freedom are attained by introducing abrupt phase changes over the scale of the wavelength.

**Plenary**
*Quo vadis, spatial multiplexing?* Henning Buelow; 1, 1, Alcatel-Lucent, Bell Labs, Germany. Application areas and motivation of high bit-rate transport over fiber bundle, multi-core fiber, and multimode fiber are revisited. With a focus on mode multiplexing, recent research is reviewed and direction of future research is discussed.

**Invited**
*Design of Ultra-Small Mode-Evolution Type Polarization Rotator Based on Surface Plasmon Polariton,* Masa-aki Komatsu; 1, Kunimasa Saitoh; 1, Masanori Koshiba; 1; ‘Graduate School of Information Science and Technology, Hokkaido Univ., Japan. We propose an ultra-small polarization rotator based on a surface plasmon polariton phenomenon. Numerical simulations show that a 5-μm-long polarization rotator with extinction ratio better than -15 dB on the entire C-band is achievable.

**Plenary**
*Experimental Investigation of CMOS-Compatible Metal-Insulator-Silicon-Insulator-Metal Waveguides,* Min-Suk Kwon; 1, Jin-Soo Shin; 1, Sang-Yung Shin; 1; ‘Electrical and Computer Engineering, Ulsan National Institute of Science and Technology, Republic of Korea; ‘Electrical Engineering, Korea Advanced Institute of Science and Technology, Republic of Korea. Metal-insulator-silicon-insulator-metal waveguides are experimentally investigated. Their fabrication process is explained, and their measured characteristics are discussed. Their measured propagation loss is 0.262 (0.219) dB/μm when the width of silicon is ~136 (~183) nm.
08:30–10:00
NW1C • Novel Nonlinear Effects
Neil Broderick; Univ. of Auckland, Australia, Presider

NW1C.1 • 08:30
Sagnac Interferometer for Background Reduction in Stimulated Raman Scattering Loss Spectroscopy, Sven Dobner1, Michael Kue1, Carsten Cled2, Carsten Fallnich1, Petra Gros1; Institute for Applied Physics, Westfälische Wilhelms-Universität, Germany. We use a Sagnac interferometer for an unprecedented background reduction of 175B in stimulated Raman scattering (SRS) loss spectroscopy employing a 1MHz ytterbium fiber laser/amplifier system.

NW1C.2 • 08:45
Enhancement of a nanocavity lifetime through slow light propagation, Patrick Grabrov1, Rainer Bencheikh1, Maia Brunswick1, Alejandro M. Yacaman1, Yannick Dumeige2, Juan A. Levenson3, Philippe Hamel1; Laboratoire de Photonique et de Nanostructures, Centre National Recherche Scientifique, France; 2FOTON, Université /8$t

08:30–10:00
BW1D • Fundamentals of Photosensitivity and Poling: Direct Laser Writing and Thermal Poling
Lionel Canto1; CPMOH-Universite Bordeaux 1, France, Presider

BW1D.1 • 08:30
Optical anisotropy of self-assembled nanostructure in glass, Yasuhiro Shiotsumana1, Miki Nakabayasab1, Kirotaka Miura1, Kanyuki Hira1, Peter G. Kazansky2; Department of Material Chemistry, Kyoto Univ., Japan; 3Optoelectronics Research Centre, Univ. of Southampton, UK. Femtosecond laser direct writing of form birefringence originated from self-organized nanostructure in glass is reviewed. Its application to rewritable five-dimensional optical data storage is also demonstrated.

BW1D.2 • 09:00
Direct Laser-Writing in a silver-zinc doped phosphate glass: Spatial discrimination of aggregates - Formation mechanism, Yan-nick Pet1, Arnaud Boyom1, Nicolas Marquestaut1, Gaetan Papot1, Kevin Bouth1, Marc Dussauze1, Oriane Mollen1, Aurelien Drezet1, Serge Huant1, Vincent Rodriguez2, Thierry Cardinal3, Lionel Canto1; ICMCB, Univ. Bordeaux / CNRS, France; 2LOMA, Univ. Bordeaux / CNRS, France; 3ISM, Univ. Bordeaux / CNRS, France; ‘Néel Institute, Univ. Joseph Fourier / CNRS, France. We report on spatially and spectrally-resolved linear optical properties induced by Direct Laser Writing in a prepared silver-doped phosphate glass, opening interesting possibilities for elementary photonics bricks. The formation mechanism of optical structures is proposed.

BW1D.3 • 09:15
Thermally poled oxide glasses: correlation between polarization mechanisms and non linear optical properties, Vincent Rodriguez1, Marc Dussauze1, Tatiana Crémoix1, Frédéric Adamietz1, Evelyne Fargion1, Thierry Cardinal1; ICMCB, Univ. Bordeaux / CNRS, France; 2LOMA, Univ. Bordeaux / CNRS, France; 3ISM, Univ. Bordeaux / CNRS, France; Néel Institute, Univ. Joseph Fourier / CNRS, France. We have investigated structural rearrangements induced by poling on oxide glasses. Combined Raman/SHG micro-imaging technique has highlighted strong correlations between NLO properties and poling mechanisms.

BW1D.4 • 09:30
A novel extraction algorithm for spectral phase interferometry, Alexia Pasqua1, Marco Pecianti2,3, Jose Arana1, David J. Moss2, Roberto Morandotti2; IRIS-Energie Mat & Tele Site Vannes, Canada; 1Institute for Complex Systems - CNR, Italy; 2ISTS, School of Physics, Univ. of Sydney, Australia. We demonstrate an innovative extraction algorithm for X-SPIDER that significantly extends the measurement time window of the method without requiring device design modifications.

08:30–10:00
SW1E • Fiber based Sensors
Michalis Zervas; Univ. of Southampton, UK, Presider

SW1E.1 • 08:30
Novel Super-Lattice Polarization-Maintaining Photonic Crystal Fibre for Pressure Sensing, Hwa Yaw Tam1, Ming-Leung Vincent Tse1, Lok-Hin Cho2, Chao Liu1; ‘Electrical Engineering, Hong Kong Polytechnic Univ., Hong Kong; Electronics and Information Engineering, Hong Kong Polytechnic Univ., Hong Kong. A novel super-lattice polarization-maintaining photonic crystal fiber designed for the realization of highly sensitive fiber-optic pressure sensor using the Sagnac loop interferometer method was fabricated. The fiber has a birefringence of 8.5x10^-4.

SW1E.2 • 09:00
Acrylate coated optical fibers for up to 200°C application temperatures, Valery Kozlov1, Kevin Bennett1; Corning Incorporated, USA. Optical fibers with specialty acrylate coatings (single and dual coat designs) were tested at temperatures up to 200°C in normal atmosphere to define fiber properties stability and maximum operating temperatures.

SW1E.3 • 09:15
A magnetic field sensor based on a ferrofluid infiltrated PMMA-microstructured optical fibre, Alessandro Candidiani1, Alexander Argirov1, Richard Livier1, Sergio Leon-Saval2, Stefano Selleri2, Stavros Pissadakis1; IESS, FORTH, Greece; Institute of Photonics and Optical Science, The Univ. of Sydney, Australia; Deptartment of Information Engineering, Univ. of Parma, Italy. A magnetic field sensor based on a ferrofluid infiltrated PMMA-microstructured optical fibre is presented. The infiltrated fibre sensor is operating in transmission mode while measuring magnetic fields up to 1250 Gauss.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

JW1A • Joint SPPCom and ANIC Plenary Session—Continued

IW1B • Plasmonics and Applications—Continued

IW1B.4 • 09:30
Enhancement of thermal dissipation by encapsulation with MgF2 or SiO2 of Hybrid III-V/SOI nanolasers, Rama Raj1, Alexandre Bazin1, Fabrice Raineri1; 1LPN-CNRS, France. We report on the improvement of the thermal dissipation of hybrid III-V/SOI nanolasers by encapsulating the structures with MgF2 or SiO2. Careful design was necessary to obtain theoretical quality factor above 10^6. CW operation was then obtained.

IW1B.5 • 09:45
Angular Study of the Random Laser Emission, Crescencio Garcia-Segundo1, Francisco Tenopala-Carmona1, Natanael B. Cuando-Espitia2, Juan Hernández-Cordero2; 1Instrumentación y Medición, Centro de Ciencias Aplicadas y Desarrollo Tecnológico, Universidad Nacional Autónoma de México, Mexico; 2Reología, Instituto de Investigación en Materiales. Universidad Nacional Autónoma de Mexico, Mexico. We present experimental results of a random laser in a cylindrical cell. With this configuration we manage to exhibit that the laser's lasing modes, the lasing threshold and the peak wavelength exhibit angular dependence.

10:00–10:30 Coffee Break, Colorado Gallery and Grand Rivers Gallery
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**NW1C • Novel Nonlinear Effects—Continued**

**NW1C.5 • 09:30**
Longitudinal power distribution in a random DFB fiber laser, Dmitriy V. Churkin1,2, Atalla El-Tahe1, Ilya Vatnik2, Juan D. Ania-Castanon1, Paul Harper1, Eugene Podivilov1, Sergey Babkin2, Sergei K. Turitsyn1; 1Aston Univ., UK; 2Institute of Automation and Electrometry SB RAS, Russian Federation. We have measured the longitudinal power distribution inside a random distributed feedback fiber laser. Both analytic solution and results of direct numerical modeling are in excellent agreement with experimental observations.

**NW1C.6 • 09:45**
Demonstration of Kerr Nonlinearity in Silicon Microlindrical Resonators, Natasha Vukovic1, Noel Healy1, Priyanth Mehta1, Anna C. Pearce1; Optoelectronics Research Centre, Univ. of Southampton, UK. We investigate the Kerr nonlinearity in a-Si:H based microlindrical resonators. The large resonant wavelength shift observed for pulsed excitation is used to demonstrate ultrafast all-optical switching.

**BW1D • Fundamentals of Photosensitivity and Poling: Direct Laser Writing and Thermal Poling—Continued**

**BW1D.4 • 09:30**
Picossecond Laser Pulse Induced Phase Transformation in Sapphire, Jiyeon Choi2, Thierry Cardinal2, Dongsik Shin1, Yongkwon Cho1, Jeong Suh1; Dept. of Laser and electron beam application, Korea institute of machinery and materials, Republic of Korea; ICMCB, Universite Bordeaux, France. Picossecond laser induced structural change in z-cut sapphire wafer were investigated through Raman spectroscopy and transmission electron microscopy. The broadening at 417 cm⁻¹ and the presence of a new Raman peak near 420 cm⁻¹ were observed.

**BW1D.5 • 09:45**
Zeoisil formation by femtosecond laser irradiation, John Canning1, Matthias Lancry2, Kevin Cook1, Bertrand Poumellec1; Univr. of Sydney, Australia; LPCES, Universite de Paris Sud, France. We report the fabrication of zeolite by exploiting rapid local heating and quenching, under very high induced pressures, when silica is irradiated by femtosecond near IR laser.

**SW1E • Fiber based Sensors—Continued**

**SW1E.4 • 09:30**
Light That Spins Inside Fibers, Siddharth Ramachandran1, Poul Kristensen2; 1ECE Department, Boston Univ., USA; 2OFS-Fitel, Denmark. Polarisation- and phase-vortices are emerging as light-beams of immense interest in several scientific and technological applications. We review recently developed techniques for generating them, as well as manipulating their nonlinear optical properties, with optical fibers.

10:00–10:30 Coffee Break, Colorado Gallery and Grand Rivers Gallery
10:30–12:30  
**AW2A • PON Technology Trends**  
*Amplavananpilia Nimalathius, Univ. of Melbourne, Australia, Presider*

**AW2A.1 • 10:30**  
*Invited*  
Options for TDM PON beyond 10G, Doujit van Veen1, Dusan Suvakovici2, Hungkei Chow3, Vincent Houtman4, Ed Harsteard5, Peter J. Winzer6, Peter Vetter7; *Bell Labs, Alcatel-Lucent, USA; *Bell Labs, Alcatel-Lucent, USA. This paper proposes an architecture to increase the downstream transmission of TDM PON from 10-Gbps to 40-Gbps. Challenges like chromatic dispersion tolerance, optical power budget, cost, and coexistence with legacy PONs are discussed.

**AW2A.2 • 11:00**  
*Auto-Tuning PID controller based on Genetic Algorithms for the Bandwidth Allocation in LR-PONs, Tamara Jimenez1, Noemi Meray1, Ramon J. Duran1, Patricia Fernandez1, Ignacio de Miguel2, Juan Carlos Aguado2, Rubén M. Lorenzo3, Evantito J. Abril3; *Dpt. of Signal Theory, Communications and Telematic Engineering, Univ. of Valladolid, Spain. A new bandwidth allocation algorithm for LR-EPONs based on a PID controller tuned with Genetic Algorithms is proposed to efficiently fulfill the subscribers’ bandwidth requirements.

**AW2A.3 • 11:15**  
*OSNR Monitoring Technique Using Bragg Gratings Imprinted in High Birefringent Fibers, Ana Sousa1,2, Paulo S. Andre1,2; *Instituto de Telecomunicacoes, Portugal; *Physics, Aveiro Univ., Portugal. We propose a technique to monitor the optical signal to noise ratio, based on the use of high birefringence fibre Bragg gratings. This technique is effective with signals with OSNR up to 20 dB.

**AW2A.4 • 11:30**  
*Invited*  
Diverging applications for PON technologies, and future technology trends, Ed Harsteard1, Alcatel-Lucent, USA. Until recently, the history of PON has been about FTTH: evolving to higher speeds while reducing costs to satisfy the requirements for residential access. That has begun to change. In this manuscript, the divergence of the PON application space and what it means for PON technology evolution will be surveyed.

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10:30–12:30  
**SpW2B • Coherent System Implementation**  
*Alan Lau; Hong Kong Polytechnic Univ., Hong Kong, Presider*

**SpW2B.1 • 10:30**  
*Invited*  
Digital sub-banding - a signal processing architecture radically improving OFDM coherent optical receivers, Mohsen Nazarathy1, Alex Tolmacch1; *School of Electronic Engineering, Dublin City Univ., Ireland. We review a digital sub-banding ASIC/FPGA DSP architecture for optical OFDM receivers achieving record low complexity and high performance by digitally demultiplexing the received signal into multiple frequency-domain sub-bands to be processed in parallel.

**SpW2B.2 • 11:00**  
A Novel Phase Modulation Detection Technique For Coherent Self-Heterodyne Optical Receiver, Tim Huynh1, Lim Nguyen1, Liam P. Barry1; *Ecole Polytechnique Fédérale de Lausanne, Switzerland; *Centre for High Performance Computing, John Curtin School of Science and Technology, Australian National University, Australia. We propose a new self-heterodyne coherent receiver structure based on phase modulation detection that potentially simplifies the front-end of a coherent optical receiver. The scheme has been demonstrated via simulations and experimentally for 10 Gb/s DPQPSK.

**SpW2B.3 • 11:15**  
Joint Equalization and Polarization-Time Coding Detection to Mitigate PMD and PDL Impairments Souha Ben Karaja1,2, Chaya Rekaya-Ben Ohmae3, Yves Jasours4, Hichem Besbes5; *COMLEEC, Telecom ParisTech, France; *COSIM, Sup’Com, Tunisia. We propose new criteria to joint linear time-domain equalization and ML detection supporting polarization-time codes and avoiding noise enhancement induced by PDL effect. An almost full-mitigation of PMD and PDL impairments is demonstrated.

**SpW2B.4 • 11:30**  
Recent advances in signal processing for real-time implementation - 40Gb/s, 100Gb/s and beyond, Maximus Kuschnerov1, O. Aganze1, V. Veljanovski1, J. Slovak1, M. Herrmann1, C. Hofer1, U. Bauer1, T. Rieger1, S. Camatel1, P. Voois2, N. Swenson2, M. Bohn1, T. Rieger1, S. Camatel1, P. Voois2, N. Swenson2, M. Bohn1; *Nokia Siemens Networks, Germany; *Clairephy Communications Inc., USA. The progress of signal processing is presented for coherent optic product applications. Requirements are discussed for present and future products. Common pitfalls in system testing are described.

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10:30–12:30  
**IW2C • Nanophotonics for Energy Conversion and Applications**  
*Zeno Gaburro, Harvard Univ., USA, Presider*

**IW2C.1 • 10:30**  
*Invited*  
Template-Stripped Plasmonic Films For Photovoltaics, David Norris1, ETH Zurich, Switzerland. Template stripping is a simple and versatile process for creating smooth patterned films from various materials. We demonstrate improved plasmonic performance for template-striped metals and discuss the use of such films for photovoltaic applications.

**IW2C.2 • 11:00**  
Efficiency Improvement in Ultrathin Plasmonic Organic Bulk Heterojunction Solar Cells, Sha Sha2,3, Palash Gangopadhyay2, Robert A. Norwood1; *College of Optical Sciences, Univ. of Arizona, USA. An NP plasmonic effect enhances light absorption and thus the efficiency of organic BHJ solar cells. Using an optimized 20% surface coverage of Au NPs followed by only 50nm of P3HT:PCBM increases the efficiency by 30%.

**IW2C.3 • 11:15**  
Temporal and Spatial Imaging of Energy Flow at the Nanoscale via Molecular Plasmonics, Gary Wiederrecht1, Jasmina Hranisavljevic1; *Center for Nanoscale Materials, Argonne National Laboratory, USA. Efforts to spatially and temporally resolve photoinduced energy and charge transfer in hybrid plasmonic nanostructures are discussed. The ability to use these nanostructures to characterize photoinduced energy and charge transfer processes important for solar energy conversion is described.

**IW2C.4 • 11:30**  
Highly Sensitive SOI Optical Sensors with Porous Si, Zhixuan Xie1,2, Muratza Aksyuk1,2, Stanley C. Davis1, Kenneth H. Sandhage1, Ali Adibi1; *Georgia Institute of Technology, USA; *School of Electrical and Computer Engineering, Georgia Institute of Technology, USA. We demonstrate microring resonators using a thin layer of porous silicon (pore size ~30 nm) as the cladding. With a loaded Q factor of 25,000, this new type of resonators is promising for bio/chemical sensing.

**IW2C.5 • 11:45**  
Wide Stiffness Range Cavity Optomechanical Sensors for Atomic Force Microscopy, Yuxiang Liu1,2, Housen Miao1,2, Vladimir Aksyuk1, Karthik Srinivasan1; *Center for Nanoscale Science & Technology, National Institute of Standards & Techm, USA; *Institute for Research in Electronics and Applied Physics, Univ. of Maryland, USA. We present chip-based sensors that integrate nanomechanical cantilevers with near-field optical readout for atomic force microscopy. Cantilever stiffness is varied over four orders of magnitude while maintaining fm/Hz^(1/2) displacement sensitivity, indicating potential in wide-ranging applications.
Polariton Solitons, including violation of Bell’s inequality. Downconversion and correlated quantum walks in waveguide arrays, simulate bi-photon generation through spontaneous parametric non-linear optical processes.

Condensed matter physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Germany; Australian National University, Australia. We suggest and demonstrate experimentally that evolution of classical light can simulate bi-photon generation through spontaneous parametric downconversion and correlated quantum walks in waveguide arrays, including violation of Bell’s inequality.

Nail Akhmediev, Australian National Univ., Australia. Abstract not available.

Markus Gräfe1, Alexander S. Solntsev2, Markus Greiner3, Antonio Picozzi1; 1Laboratoire Interdisciplinaire Carnet de Bourgogne, France; 2Laboratoire de Physique de la Matière Condensée, Ecole Normale Supérieure, France. We investigate dispersive shock dynamics in quadratic media.

We investigate dispersive shock dynamics in quadratic media.

Ferrara Univ., Italy. We investigate dispersive shock dynamics in quadratic media.

University of Bath, UK. We investigate dispersive shock dynamics in quadratic media.

Harvesting the Full Absorption in Cladding-Pumped Fibers, Michalis N. Zervas1,2; 1Optoelectronics research Centre, Univ. of Southampton, UK; 2SPI Lasers, UK. We investigate the wavelength and length dependence of the pump absorption along cladding-pumped single as well as coupled multimode fibers showing strong departures from Beer’s law.

Invited

High power, linearly polarized, continuously tunable ytterbium-doped rod-type photonic crystal fiber laser, Romain BOYON1, Jerome Lhermite1, Laurent Sarger2, Eric Cormier1; 1CELIa, CNRS, France; 2LOMA, CNRS, France. An ytterbium-doped fiber laser continuously tunable from 976nm to 1210nm and delivering up to 30W of average power linearly-polarized is demonstrated. Moreover the bandwidth of our system can be tuned from 100pm to more than 1nm.

ML pulse Energies in Tm-doped Photonic Crystal Fiber, Pankaj Kshabwani1, Andrew Sims1, Lasse Leitik1, Jes Boeving1, Lawrence Shah1, Martin Richardson1; 1Univ. of Central Florida, CREOL, USA; 2NKT Photonics A/S, Denmark. We investigate the wavelength and length dependence of the pump absorption along cladding-pumped single as well as coupled multimode fibers showing strong departures from Beer’s law.

Invited

High efficiency 1908nm Tm-doped Fiber Laser Oscillator, Daniel J. Creeden1, Benjamin R. Johnson1, Scott D. Setzler1; 1Defense Science &Technology Organisation, Australia. We report a monolithic, high power, high efficiency oscillator in Tm-doped fiber operating in the 1908nm region. With this approach, we have generated >100W of power with over 47% optical efficiency and 20% electrical efficiency.

Invited

Apodized Point-by-Point Fiber Bragg Gratings In An All-Optical, Actively Q-switched All-Fibre Laser, Robert J. Williams1, Nemanja Jovanovic1,2; 1Graham Marshall1, M. J. Steel1, Michael J. Whalby1; 1Centre for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS), MQ Photonics Research Centre, Department of Physics and Astronomy, Macquarie Univ, Australia; 2Macquarie Univ, Research Centre in Astronomy, Astrophysics & Astrophotonics, Department of Physics and Astronomy, Macquarie Univ, Australia. We report an all-optical, actively Q-switched all-fibre laser utilizing an ultrafast laser-inscribed, wavelength-tunable, apodized fibre Bragg grating. The tailored spectrum of the apodized point by point gratings enables an order of magnitude improvement in pulse duration.

Invited

Continuously Tunable Chirped Microwave Pulse Generation Using an Optically Pumped Tilted Fibre Bragg Grating, Ramping Yao1, Hiva Shaboo1; 1Univ. of Ottawa, Canada. Photonic generation of a continuously tunable chirped microwave waveform using a tilted-fiber Bragg grating written in an erbium/ytterbium co-doped fiber is proposed. A chirped waveform with a tunable chirp rate from 1.8 to 7 GHz/ns is generated.

Invited

Phasemodulation of RF Signals Using a Fiber Bragg Grating with Step Group Delay Profile, Manik Ayatigale1, Dmitri Stepanyuk1, Jarred Zhao2; 1Defence Science &Technology Organisation, Australia. We propose a novel technique to achieve fixed or time varying phase shifts in radio-frequency (RF) signals using a single fiber Bragg grating (FBG) with a step group delay profile.

Invited

Applied Physics, Abbe Center of Photonics, Friedrich-Schiller-Universität Jena, Germany; Australian National University, Australia. We suggest and demonstrate experimentally that evolution of classical light can simulate bi-photon generation through spontaneous parametric downconversion and correlated quantum walks in waveguide arrays, including violation of Bell’s inequality.

Robert Keil 1, Andreas Tünnermann 1, Stefan Nolte 1, Alexander Picozzi 1; 1Laboratoire Interdisciplinaire Carnet de Bourgogne, France; 2Dipartimento di Ingegneria, Università di Brescia, Italy; 3Laboratoire de Physique de la Matière Condensée, Ecole Normale Supérieure, France. We investigate dispersive shock dynamics in quadratic media.
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

AW2A • PON Technology Trends—Continued

AW2A.5 • 12:00
Invited
Optical and Wireless Convergence, Milos Milosavljevic1, Wansu Lim1, Pandelis Kourtessis1, John Senior1; 2Univ of Hertfordshire, UK. This paper presents the requirements and possible solutions for wireless convergence in next generation PONs. System level simulation of LTE was performed to evaluate two different approaches for connecting eNBs to ONU.

SpW2B • Coherent System Implementation—Continued

SpW2B.5 • 12:00
Invited
1 Tb/s Coherent Transceiver, Kim Roberts1; 2Ciena Corporation, Canada. Abstract: CMOS DACs, spectral shaping of subcarriers, frequency selective optical switching, and polarization multiplexed (PM) 16-QAM allows 1 Tb/s to be transmitted within 200 GHz of optical spectrum alongside commercial 180 Gb/s WDM signals.

IW2C • Nanophotonics for Energy Conversion and Applications—Continued

IW2C.6 • 12:00
Dispersion engineering of modified annular photonic crystals and their use in polarization independent optical devices, Mirbek Turdubay; Electrical and Electronics Engineering, TORR Economics and Technology Univ, Turkey. A novel type of PC named MAPC is studied for bandgap engineering and polarization-independent device applications. By introducing asymmetry to the unit-cell of PC, conventional EFCs for the second-band is transformed into tilted rectangular shapes.

12:30–13:30  Lunch Break, On Your Own

13:30–15:30

AW3A • Indoor Networks

Rene Schnegrow; Karlsruhe Inst. of Technology, Germany, Presider

AW3A.1 • 13:30
Invited
Wireless Networks Indoor Application, Green Broadband Wireless Networks, Ampulavanipilla Nirmalathas1, 2Univ of Melbourne, Australia. Abstract not available

AW3A.2 • 14:00
Invited
Accurate Localization Technique for Smart Fiber-Wireless In-House Networks, Edward Tanglonggar1, Solomon Abraha1, Antonino Crivellaro2, Chiho Okonkwo1, Roberto Gaudino2, Ton Koonen1; 1COBRA Research Institute, Eindhoven Univ. of Technology, Netherlands; 2Dipartimento di Elettronica, Politecnico di Torino, Italy. The use of a RoF scheme for localization purposes of mobile stations for in-house networks is presented. Using impulse radio UWB over SMF and time-of-arrival localization method, mobile stations can be localized within centimeters accuracy.

SpW3B • High Capacity System

SpW3B.1 • 13:30
Invited
Spectrally Efficient Transmission: a Comparison between Nyquist-WDM and CO-OFDM Approaches, Gabriella Bocchi1, 2Politecnico di Torino, Italy. We compare Nyquist-WDM and CO-OFDM techniques for the generation of superchannels based on PM-16QAM modulation. We analyze by simulation the robustness to optical filtering and to crosstalk induced by adjacent superchannels.

SpW3B.2 • 14:00
Reduction of crosstalk-induced OSNR penalties in high bit rate optical spatially multiplexed systems, Matthias Weithäuser1, Simon Akhtar1, Martin Finkenbusch1, Peter Krummrich1; 1TU-Dortmund (LS-HFT), Germany. We investigate and compare the performance of various optimization techniques for reduction of crosstalk-induced OSNR penalties in spatially multiplexed systems by optical MIMO equalization. Residual penalties were greatly reduced using RLS and matrix inversion optimizers.

SpW3B.3 • 14:15
Mitigation of combined PMD- and crosstalk-induced signal distortions in spatially-multiplexed multi-core fiber networks, Matthias Weithäuser1, Martin Finkenbusch1, Simon Akhtar1, Peter Krummrich1; 1TU-Dortmund (LS-HFT), Germany. We investigate the performance of optical equalization of combined PMD- and crosstalk-induced distortions in 112 Gbit/s multi core fiber systems. The residual mean OSNR penalties are reduced to < 0.1 dB.

SpW3B.4 • 14:30
Reduction of crosstalk-induced OSNR penalties in high bit rate optical spatially multiplexed systems, Matthias Weithäuser1, Simon Akhtar1, Martin Finkenbusch1, Peter Krummrich1; 1TU-Dortmund (LS-HFT), Germany. We investigate and compare the performance of various optimization techniques for reduction of crosstalk-induced OSNR penalties in spatially multiplexed systems by optical MIMO equalization. Residual penalties were greatly reduced using RLS and matrix inversion optimizers.

IW3C • Photonic Crystals

IW3C.1 • 13:30
Invited
Electrically driven photonic crystal nanocavity devices, Gary Shamba1, Bryan Ellis1, Jan Petykiewicz1, Akca Mayur1, Marie Mayer1, Tomas Sarmiento1, James Harris1, Eugene Haller1, Jihana Vuckovic1; 1Stanford Univ., USA; 2Materials Science, UC Berkeley, USA. We demonstrate electrically driven photonic crystal cavity lasers and LEDs with record low control energies. Our lateral injection platform opens the door to new opportunities in active control of photonic crystal devices.

IW3C.2 • 14:00
Invited
Integrated ultralow-power nanophotonic devices on InP photonic crystals, Kengo Nonaka1, Akihiko Shinya1, Shunji Matsumoto2, Tomonari Sato1, Yasuuma Suzuki1, Toru Segawa2, Ryo Takahashi1, Masaya Notomi1; 1NTT Photonics Laboratories, Japan; 2NTT Photonics Laboratories, Japan; ‘NTT Photonics Laboratories, Japan; ‘NTT Photonics Laboratories, Japan; ‘NTT Photonics Laboratories, Japan. Photonic crystal nanocavities are expected to greatly reduce the size and energy consumption of various optical devices. We have demonstrated this feature in all-optical switches and random access memories for on-chip nanophotonic integration.
Analytic theory of fiber-optic Raman polarizers, Victor V. Kozlov1,2, Javier Nuno3, Juan D. Ania-Castanon3, Stefan Wabnitz1; 1Department of Information Engineering, Universita degli Studi di Brescia, Italy; 2Department of Physics, St. Petersburg State Univ., Russian Federation; 3Instituto de Optica, Consejo Superior de Investigaciones Cientificas, Spain.

The Raman polarizer is a Raman amplifier which not only amplifies but also repolarizes light. We propose a relatively simple and analytically tractable model, the ideal Raman polarizer, for describing the operation of this device.

Radiative decay of bright solitons in nonlocal nonlinear media with random noise, Fabian Maucher1, Wieslaw Z. Królikowski2, Stefan Skupin2, Max Planck Institute for the Physics of Complex Systems, Germany; 2Institute of Condensed Matter Theory and Optics, Friedrich Schiller Univ., Germany; 3Laser Physics Centre, RSPhysSE, Australian National Univ., Australia. We show that radiative decay of bright solitons decreases dramatically with the nonlocality-induced finite correlation length of the random noise. We give an analytical expression for the soliton life-time in the weakly nonlocal regime.

Light with no spatial scale: diffraction cancellation, anti-diffractive, scale-free instability and subwavelength beam propagation in dipolar glasses, E Delhez1,2, Aharon Agranat1, Claudio Conti1, 1Physics, Univ. of Roma La Sapienza, Italy; 2IFCN-CNRS, Univ. of Roma La Sapienza, Italy; 3Applied Physics, Hebrew Unv. of Jerusalem, Israel. We discuss the experiments and theory of scale-free optical propagation and diffraction cancellation in nanodisordered ferroelectrics, where light beams manifest a variety of effects that are incompatible with known linear and nonlinear phenomenology, such as subwavelength beam propagation.

Do optical event horizons really exist? The physics of nonlinear reflection at a soliton boundary, Goery Genty1, Miro Erkintalo2, John M. Dudley1; 1Tampere Univ. of Technology, Finland; 2Univ. of Auckland, New Zealand. We discuss the physics of optical event horizons and clarify how the observed horizon dynamics can be interpreted in the framework of wave mixing processes between a soliton and an incident linear dispersive wave.

Longitudinal and periodic modulation of the dispersion of an optical fiber: a new degree of freedom in nonlinear optics, Artem Mussatov1, Maxime Droques1, Alexandre Kulinski1, Gerard Bouwhuis2, Gilbert Martinelli3; 1IRflex Corporation, USA; 2IPCF-CNR, Univ. of Roma La Sapienza, Italy; 3Applied Physics, Hebrew Unv. of Jerusalem, Israel. We investigate experimentally the MI process in a dispersion oscillating fiber. An important number of unstable frequencies over 10 THz are generated that then lead to a new degree of freedom for tailoring nonlinear effects.
In this paper we experimentally investigate the impact of polarization state on high-speed indoor optical wireless communication system. Our findings indicate that ~0.7 dB variation in the receiver sensitivity will be introduced.

We demonstrated that duobinary provides the best performances, for the transmission of Gigabit Ethernet signal over SI-POF. We compared the performances of 2-PAM and duobinary modulation formats [4] and showed that duobinary provides the best performances, even after long distance transmission.

These concurrent sessions are grouped across two pages. Please review both pages for complete session information.
Invited

Mark, Denmark; 2Univ. of Karlsruhe, Germany; 3Australian National
University, Australia. We investigate propagation and spatial localization
of light in nonlocal media with competing nonlinearities. We show
that the competing focusing and defocusing nonlinearities enable
coexistence of dark or bright spatial solitons in the same medium
by varying the intensity of the beam.

Bertrand Kohler1, Julien Fatome1, Christophe Finot1, Guy Millot1,
Goery Genet2, Nail N. Akhmediev3, Benjamin Wetzel1, Frederic
Dias1, John M. Dudley4; 2Laboratoire Interdisciplinaire Carnot de
Bourgogne, France; 3Tampere Univ. of Technology, Finland; 4Institut FEMTO-ST,
France; 5Univ. College Dublin, Ireland.

Rogue wave clusters with atom-like structures, David J. Kedziora1,
Adrián Ankeiwicz1, Nail N. Akhmediev1; 1Australian National
University, Australia. We study the hierarchy of rational solutions of
the nonlinear Schrödinger equation that are higher-order rogue
waves in this model. This analysis reveals the existence of clusters,
analogous to atoms with their shells of electrons.

Kuznetsov-Ma Soliton Dynamics in Nonlinear Fiber Optics,
Bertrand Kohler1, Julien Fatome1, Christophe Finot1, Guy Millot1,
Goery Genet2, Nail N. Akhmediev3, Benjamin Wetzel1, Frederic
Dias1, John M. Dudley4; 2Laboratoire Interdisciplinaire Carnot de
Bourgogne, France; 3Tampere Univ. of Technology, Finland; 4Institut FEMTO-ST,
France; 5Univ. College Dublin, Ireland. The Kuznetsov-Ma (KM) soliton is
a solution of the nonlinear Schrödinger equation derived in 1977
but never observed experimentally. Here we report experiments
showing KM soliton dynamics in nonlinear breather evolution
in optical fiber.

Dissipative rogue wave generation from a mode-locked fiber
laser experiment, caroline Lecaplain1, Philippe Greul2, Jose-Marie
Soto-Crespin1, Nail N. Akhmediev1; 1YCB UMR 6381, Universite de
Bourgogne, France; 2Instituto de Optica, CSIC, Spain; 3The Australian
National Univ., Australia. Rare events of extremely high optical
intensity are experimentally recorded at the output of a mode-locked
fiber laser operating in a chaotic multiple-pulse regime. These fluctua-
tions result from ceaseless nonlinear interactions between pulses.

A seven core fiber DFB, Paul Westbrook1, Kazi S. Abedin1, Thierry
Taunay1, Michael Finster1, Tristan Krempp1, Jerome Porquete1; 1OFS
Laboratories, USA. We demonstrate fiber DFB lasers in a seven core
Er doped fiber. DFB grating cavities were fabricated in all cores at once via a single UV exposure. Lasing was observed in all seven cores.

Simulation of two-photon absorption in Raman DFB lasers,
Tristan Krempp1, Kazi S. Abedin1, Paul Westbrook1; 1OFS Laborato-
ries, USA. We present a sufficient step-solver for the nonlinear
coupled mode equations with two-photon absorption to investigate
the feasibility of Raman DFB lasers in highly nonlinear materials
such as chalcogenide glasses.

Ultra-Wide Range Wavelength Conversion Using FWM in a Ra-
mann DFB Fiber Laser, Jindan Shi1, Shaif-ul Alam1, Morten Ibsen1;
1Optoelectronics Research Centre, Univ. of Southampton, UK. We
demonstrate for the first time to our knowledge, four-wave-mixing
(FWM) in a 30cm-long center π phase-shifted Raman distributed-
feedback (DFB) fiber laser. The FWM-to-signal conversion ef-
ciciency is ~24dB and the wavelength conversion range is 94.1nm.
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<th>Time</th>
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<td>16:00–18:00</td>
<td><strong>AW4A • OFDM- and WDM-PON Technologies</strong></td>
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<td><strong>Platte</strong></td>
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<td><strong>Signal Processing in Photonics Communications</strong></td>
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<td><strong>Colorado II</strong></td>
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<td>16:00–18:00</td>
<td><strong>IW4C • Bionanophotonics and Si Nanophotonics</strong></td>
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<td><strong>Gary Wiederrich; Argonne National Laboratory, USA, Presider</strong></td>
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**AW4A.1 • 16:00**

**Invited**

**Uplink Solutions for Future Access Networks**, Rene M. Schmogrow, Philipp C. Schindler, David Hillerkuss, Christian Koos, Wolfgang Freude, Juerg Leuthold; Institute of Photonics and Quantum Electronics, Karlsruhe Institute of Technology, Germany; Institute for Microstructure Technology, Karlsruhe Institute of Technology, Germany. We demonstrate an uplink with an optical carrier (seed) sent to the optical network unit over 75 km of SMF. Two ONUs transmit either 10 Gbit/s OFDM or sinc-shaped Nyquist pulses.

**AW4A.2 • 16:30**

**Invited**

**Linearity Improvement of Directly Modulated PONs by Digital Pre-Distortion of Coexisting OFDM-based Signals**, Tiago F. Alves, José Monge, Adolfo Cartaxo; IST/Instituto de Telecomunicações, Portugal. Digital pre-distortion of five OFDM-based wired-wireless signals for compensation of directly-modulated PONs nonlinearity is demonstrated experimentally. This technique leads to EVM-compliant levels in all signals and to EVM improvements that reach 5.7 dB in UWB signals.

**AW4A.3 • 16:45**

**Invited**

**Remote Heterodyne Reception of OFDM-QPSK as Downlink-Solution for Future Access Networks**, Philipp Schindler, Rene M. Schmogrow, David Hillerkuss, Moshe Nazarathy, Shalva Ben-Ezra, Christian Koos, Wolfgang Freude, Juerg Leuthold; Institute of Photonics and Quantum Electronics, Karlsruhe Institute of Technology, Germany; Institute of Technology, Israel; Fimsar, Israel. We demonstrate transmission of 46.5 Gbit/s OFDM-QPSK signals over a distance of 100 km within an optical bandwidth of 25 GHz, and heterodyne detection of the OFDM subcarriers with a remotely supplied local optical oscillator.

**AW4A.4 • 17:00**

**Invited**

**An OFDM-PON with non-preselected ONUs: dimensioning and experimental results**, Iván Cano, María C. Santos, Xavier Escayola, Vicente Polo, Josep Prat; Universitat Politècnica de Catalunya, Spain. An OFDM-PON with a simple centralized wavelength control of low-cost non-preselected independent ONU sources is presented, dimensioned, and tested experimentally. The rejection ratio is reduced to less than 1% increasing the cost-effectiveness of the access network.

**IW4C.1 • 16:00**

**Invited**

**Subwavelength Photonics for Biosensing**, Brian T. Cunningham; Univ of Illinois at Urbana-Champaign, USA. Nanostructured surfaces are applied towards point-of-care diagnostic biosensing. Photonic crystal enhanced fluorescence is used for detection of cancer biomarkers in serum. Metal nanodomes integrated with biomedical tubing to monitor intravenously delivered drugs and urinary metabolites.

**IW4C.2 • 16:30**

**Invited**

**λ-size Silicon Modulator**, Volker J. Sorger, Noberto D. Lanzillotti-Kimura, Ren-Min Ma, Xiang Zhang; Univ of California, Berkeley, USA; Materials Sciences Division, Lawrence Berkeley National Laboratory, USA. We report an experimental demonstration of a 3A-size, silicon waveguide-integrated electro-optic modulator with a record high extinction ratio exceeding 1dB/μm, extremely low insertion loss (~1dB) in the ON-state, and an ultra-broadband (>0.5 μm) bandwidth based on free-carrier switching in ITO.

**IW4C.3 • 16:45**

**Invited**

**Ultralow-Power 160-Gb/s All-Optical Demultiplexing in Hydrogenated Amorphous Silicon Waveguides**, Ke-Yao Wang, Keith G. Petrić, Mark A. Foster, Amy C. Foster; Electrical and Computer Engineering, Johns Hopkins Univ., USA. We demonstrate demultiplexing of 160-Gb/s OTDM data signals to 10 Gb/s using four-wave mixing in hydrogenated amorphous silicon nanowaveguides. We observe error-free (BER < 10-9) operation with record-low switching powers for an integrated device.

**IW4C.4 • 17:00**

**Invited**

**Polarization Insensitive Wavelength Conversion Based on Four-Wave Mixing in a Silicon Nanowire**, Minhao Pu, Hao Hu, Christophe Peucheret, Leif K. Oxenløwe, Palle Jeppesen; DTU Fotonik, Photonics Engineering, Danmarks Tekniske Universitet, Denmark. We experimentally demonstrate, for the first time, polarization-insensitive wavelength conversion of a 10 Gb/s NRZ-OOK data signal based on four-wave mixing in a silicon nanowire with bit-error rate measurements.

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**Wednesday, 20 June**

**Arkansas**

Access Networks and In-house Communications

**Platte**

Signal Processing in Photonics Communications

**Colorado II**

Integrated Photonics Research, Silicon and Nano Photonics
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

**16:00–18:00**

**NP Postdeadline Paper Session**

**16:00–17:15**

**BW4E • Applications of Gratings and Poled Glass: FBG Applications to Optical Signal Processing**

Sophie LaRochelle; Universite Laval, Canada, Presider

**BW4E.1 • 16:00**

100 nm Wide Fiber Bragg Grating Dispersion Compensator Around Zero Dispersion Wavelength, Francois Trepanier1; Michel Morin1, Guillaume Brochu1, Yves Painchaud1, Desmond C. Adler1, Weilgang Wieser1, Robert Huber1; TeraXion Inc, Canada; St. Jude Medical, USA; Ludwig Maximilians Univ., Germany. Nonlinearly chirped fiber Bragg gratings compensate 600 ps of chromatic dispersion from 4 km of SMF-28 fiber around the zero dispersion wavelength with less than 10 ps of residual delay over a 100 nm bandwidth.

**BW4E.2 • 16:15**

Tunable Fractional Order Temporal Differentiator Using an Optically Pumped Tilted Fiber Bragg Grating, Jianping Yao1, Hiva Shahiri1; Univ. of Ottawa, Canada. An optically tunable photonic fractional temporal differentiator using a tilted-fiber-Bragg-grating written in an erbium/ytterbium co-doped fiber is proposed. The temporal differentiation of a Gaussian pulse with a bandwidth of 26 GHz at different orders is demonstrated.

**BW4E.3 • 16:30**

Design of picosecond flat-top optical pulse generator using a linearly-chirped fiber Bragg grating in Transmission, Maria K. Ferranandez-Ruiz1,2, Alejandro Casballar1, Jose Aza-ras1,2; Energie, Matériaux et Télécommunications, Institut National de la Recherche Scientifique, Canada; Departamento de Ingenieria Electronica, E.T.S. de Ingenieros, Spain. A picosecond rectangular pulse-shaper based on a linearly-chirped fiber Bragg grating in transmission is presented. The design exploits the space-to-frequency mapping and the degree of freedom in the reflection spectral phase specifications.

**BW4E.4 • 16:45**

Long period fiber grating designs for real-time ultra-fast Hilbert transformations, Reza Ashraf1,2, Jose Azana1; INRS-EMT (Institut National de la Recherche Scientifique - Energie, Matériaux et Télécommunications), Canada. A novel all-optical design for implementing THz-bandwidth Hilbert transformers based on a uniform-period long-period grating (LPG) with a properly designed grating apodization profile is proposed and numerically demonstrated.

**BW4E.5 • 17:00**

Ultrafast optical pulse shaping by exploiting the first-order Born approximation in long period gratings, Reza Ashraf1,2, Jose Azana1; INRS-EMT (Institut National de la Recherche Scientifique - Energie, Matériaux et Télécommunications), Canada. A novel general approach for THz-bandwidth optical filter synthesis, particularly interesting for ultrafast optical pulse shaping, based on the first-order Born approximation in long period gratings is proposed and numerically validated.

**16:00–18:00**

**SW4F • Lasers, Components and Fiber Characterization**

Iyad Dajani; US Air Force Research Laboratory, USA, Presider

**SW4F.1 • 16:00**

Making lower energy photons from fiber lasers, Stuart D. Jackson1; Institute of Photonics and Optical Science, Australia. I will briefly review progress in the development of high power longer wavelength fibre lasers with a special emphasis on fibre design for efficient performance.

**SW4F.2 • 16:30**

Flattened fundamental mode in optical Fibers, arnaud mussot1, Constance Valentin1, Yves Quiquempois1, Geraud Bouwmans1, Laurent Bigot1, Marc Douay1, Pierre Calvet1; Energie, Matériaux et Télécommunications, Institut National de la Recherche Scientifique, Canada; Departamento de Ingenieria Electronica, E.T.S. de Ingenieros, Spain. We present the design and the fabrication of a microstructured fiber that delivers a flat-top intensity profile. Characterization of this fiber shows that it is suitable for applications such as high-power amplification or micro-machining.

**SW4F.3 • 16:45**

Phase-locking a fiber laser array by phase contrast filtering and nonlinearity, Francois Jeux1, Vincent Kernene1, Julien Guillot1, Alain J. Bartholy1; XLIM Research Institute, CNRS / Université de Limoges, France; CEA, France. A new compound cavity is proposed to passively phase-lock an array of fiber lasers. Simulations show that the scheme enhances combining efficiency. Preliminary experiments with four lasers will be reported demonstrating the expected operation.

**SW4F.4 • 17:00**

Field-flattened high-order modes, Mike Messerly1; Lawrence Livermore National Laboratory, USA. We present a method for designing circularly symmetric waveguides that support a field-flattened higher order mode and show that adding these flattened, concentric rings does not alter the effective index or flattened nature of the mode.
AW4A • OFDM- and WDM-PON Technologies—Continued

AW4A.5 • 17:15
Wired-Wireless OFDM Signals Coexistence in LR-PONs Using Two Centralized Compensation Stages, Tiago F. Alves¹, Maria Morant¹, Adolfo Cartaxo¹, Roberto Llorente¹; ¹IST/Instituto de Telecomunicações, Portugal; ²Nanophotonics Technology Centre, Universidade Politécnica de València, Spain. Transmission in coexistence of five OFDM signals along LR-PONs employing two centralized compensation stages is demonstrated experimentally. All OFDM signals are EVM-compliant with EVM fluctuations below 1dB for OLT-ONU distances between 75km and 125km.

AW4A.6 • 17:30
Exploiting Faraday rotation in Reflective PON architectures, Stefano Straullu¹, Giuseppe Rizzarelli¹, Valer Ferrere¹, Roberto Gaudino¹, Silvio Abbracé¹, Fabrizio Forghieri¹; ¹ISMR, Italy; ²Politecnico di Torino, Italy; ³Cixo Photonics, Italy. We experimentally investigate on reflective PON architectures that includes Faraday rotation at the ONU, showing an increased resilience to back-scattering induced impairments.

AW4A.7 • 17:45
Uncooled operation of directly-modulated and polarization insensitive self-seeded Fabry-Perot laser diodes, Marco Presi¹, Andrea Chiuchiarelli¹, Raffaele Corsini¹, Pallab Choudhury¹, Ernesto Ciaramella¹; ¹Institute of Communication, Information and Perception Technologies, Scuola Superiore Sant’Anna, Italy. We report an experimental characterization of uncooled operation (0-60°C) of directly-modulated self-seeded Fabry-Perot laser diodes. Error-free 1.25Gb/s operations across the C-band have been obtained with sensitivities compatible with power budget of short reach WDM-PON.

BGPP Postdeadline Paper Session

IW4C.5 • 17:15
Trimming of Athermal Silicon Resonators, Vivek Raghunathan¹, Stefano Grillanda¹, Vivek Singh², Antonio Canzian², Francesco Morichetti³, Anuradha Agarwal¹, Jung Michel¹, Andrea Melloni¹, Lionel C. Kimerling¹; ¹Materials Science and Engineering, Massachusetts Institute of Technology, USA; ²Electronics and Information, Politecnico di Milano, Italy. Thin photosensitive layer of As2S3 sandwiched in between a-Si core and negative thermo-optic polymer over-cladding enables trimming of athermal rings. Exposure to visible light can shift their resonances by 195GHz at trimming rates around 1GHz/min.

IW4C.6 • 17:30
Demodulation of 40 Gb/s DPSK Signals Using a Silicon Microring Resonator with Electro-Optic Wavelength Tuning, Gordon K. P. Lei¹,², Ke Xu¹,², Stanley M. G. Lo¹,², Chester Shu¹,², Hon K. Tsang¹,²; ¹Electronic Engineering, The Chinese Univ. of Hong Kong, Hong Kong; ²Center for Advanced Research in Photonics, The Chinese Univ. of Hong Kong, Hong Kong. We demonstrate demodulation of 40 Gb/s DPSK signals using a silicon microring resonator with electro-optic wavelength tuning. Error-free operations have been achieved with a 3.5-dB receiver sensitivity variation over the full tuning range.

IW4C.7 • 17:45
Ultra-Compact High-Speed Electro-Optic Switch Utilizing Hybrid Metal-Silicon Waveguides, Eric Dudley¹, Wounjhang Park¹; ¹USA. This paper presents a design for an ultra-compact electro-optic switch based on hybrid waveguide technology. At 1V drive voltage, switching at speeds up to 30Gbits/sec can be achieved in a device that is 30 μm long.

18:30–21:30 Networking Dinner (tentative), Cheyenne Courtyard
These concurrent sessions are grouped across two pages. Please review both pages for complete session information.

NP Postdeadline Papers—Continued

BGPP Postdeadline Papers

SW4F • Lasers, Components and Fiber Characterization—Continued

**SW4F5 • 17:15**
Low-Loss Coupling Between Single-Mode Optical Fibers with Very Different Mode-Field Diameters, Arash Mafi1, Peter Hofmann1,3, Clemence Jollivet Salvin2, N. Peyghambarian3, Axel Schulzgen2; 1Electrical Engineering, Univ. of Wisconsin Milwaukee, USA; 2The College of Optics and Photonics, Univ. of Central Florida, USA; 3College of Optical Sciences, Univ. of Arizona, USA. We show that short segments of graded-index optical fiber can provide broadband, very low-loss coupling between single-mode optical fibers with very different mode-field diameters.

**SW4F6 • 17:30**
Residual Dispersion Compensation with a Spiral PCF, Yousaf O. Azabi1, Arti Agrawal1, B.M.Azizur Rahman1, Kenneth Grat-tan1; School of Engineering and Mathematical Sciences, City Univ. London, UK. We propose a novel Archimedean spiral PCF design for residual dispersion compensation. The proposed fiber can be fabricated using sheet rolling techniques, and shows $D \sim -149\text{ps/nm/km}$ in the range (1.3-1.7μm).

**SW4F7 • 17:45**
Geometric Control of Crystallography in Semiconductor Core Optical Fiber, Stephanie Morris1, Colin McMillen1, Thomas Hawkins1, Paul Foy1, Roger Stolen1, John Ballato1, Robert Rice2; 1The Center for Optical Materials Science and Engineering Technologies (COMSET) and the School of Materials Science and Engineering, Clemson Univ., USA; 2Dreamcatchers Consulting, USA. Crystalline semiconductor core optical fibers have become a topic of recent interest. This work focuses on the role that the core geometry can play on the crystallinity and crystallography of crystalline semiconductor core optical fibers.

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18:30–21:30 Networking Dinner, Cheyenne Courtyard
08:30–10:00
**NTh1A • Novel Nonlinear Materials**

**Thibaut Sylvestre**, Université de Franche-Comté, France, Presider

**NTh1A.1 • 08:30**

*Four Wave Mixing in Silicon-Organic Waveguides*, Manfred Eich\(^1\); Technische Universität Hamburg-Harburg, Germany.

In order to achieve high conversion efficiencies in micro photonic waveguides we functionalize silicon waveguides with novel third order nonlinear polymers. Such structures are envisaged for high efficient entangled photon sources and parametric amplifiers.

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**NTh1A.2 • 09:00**

*Materials for Loss-Based Switching in Silicon-Organic Hybrid Devices*, Joel M. Hales\(^1\), Hyeongeu Kim\(^1\), Anthony DeSimone\(^1\), Henry Wen\(^1\), Taige Hou\(^1\), Alex Jen\(^1\), Seth Marder\(^1\), Michal Lipson\(^1\), Alexander L. Gaeta\(^1\), Joseph W. Perry\(^1\); School of Engineering and Applied Physics, Cornell Univ., USA;

**NTh1A.3 • 09:15**

*Surface Optical Nonlinearity in GaP Nanopillar Waveguides*, Marcin Swillo\(^1\), Reza Sanatitina\(^1\), Srinivasan Anand\(^1\); Royal Institute of Technology (KTH), Sweden.

Second harmonic generation in GaP nanopillars is investigated by polarization measurements and light confinement analysis. Effective thickness of the nonlinear surface region is ~10nm and the corresponding nonlinear coefficient 20 times larger than in bulk.

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**NTh1A.4 • 09:30**

*Dual-Arm Z-scan for measuring nonlinearities of solutes in solution*, Manuel R. Ferdinandus\(^1\), Matthew Reichert\(^1\), Trenton R. Ensley\(^1\), Dmitry A. Fishman\(^1\), Scott Webster\(^1\), David J. Hagan\(^1\), Eric W. Van Stryland\(^1\); CREOL, The College of Optics and Photonics, Univ. of Central Florida, USA.

Performing identical and simultaneous Z-scans on two samples (solvent and solvent plus solute), the effects of solvent n\(^2\) can be essentially eliminated, thus overcoming a longstanding problem in organic dye nonlinear characterization.

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**NTh1A.5 • 09:45**

*Towards mode-locked fiber laser using topological insulators*, François Bernard\(^1\); OPERA photonique, Université Libre de Bruxelles, Belgium.

Topological insulators have lately been extensively studied. Their optical properties though have not been well described yet. We recently highlighted that a topological insulator exhibits saturable absorber-like behavior when placed in a 1550 nm laser beam.
10:30–12:30

**NTh2A • Nonlinear Effects in Optical Waveguides**

**John Harvey, Univ. of Auckland, New Zealand, Presider**

**NTh2A.1 • 10:30**

**Four-Wave Mixing Fiber Source for Coherent Raman Scattering Microscopy, Simon Lefrancois**, Dan Fir, Gary R. Holton; Lingjie Kong, William J. Wadsworth, Patrick Schneider, Robert Herda, Armin Zach, Sunney X. Xie, Frank W. Wise; Applied Physics, Cornell Univ., USA; Chemistry and Chemical Biology, Harvard Univ., USA; Physics, Univ. of Bath, UK; TOPICA Photonics AG, Germany.

We present a two-color picosecond fiber laser system based on four-wave mixing in photonic crystal fiber. Seeding the process overcomes pulse walk-off and noise. 1 μm pulses are converted to 800 nm for CARS microscopy.

**NTh2A.2 • 10:45**

**Integrated liquid-core optical fiber for nonlinear liquid photonics, Kanzh Kieu**, Yegeniy Merzlyak, Lukas Schneebeli, Joel M. Halter, Joseph W. Perry, Robert A. Norwood, N. Perghambarian; College of Optical Sciences, Univ. of Arizona, USA; Georgia Technology Institute, USA. We have developed a technique that allows splicing of liquid core optical fiber (LCOF) to standard single-mode optical fiber with low loss (<1dB). As an example, we performed inverse Raman spectroscopy in a CCM filled LCOF that is spliced to SMF28 on both sides.

**NTh2A.3 • 11:00**

**Supercontinuum generation with picosecond ultraviolet pulses in a solid-core photonic crystal fiber, Thibaut Sylvestre**, Université de Franche-Comté, France. Black light supercontinuum generation is demonstrated as a result of picosecond pumping a solid-core photonic crystal fiber at 355nm through the combined effects of intermodal four-wave mixing and cascaded Raman scattering.

**NTh2A.4 • 11:15**

**Counting photon numbers of Bragg-Scattering FWM frequency conversion at telecom wavelengths, Katarzyna Krupa**, Alessandro Tonello, Victor V. Kozlov, Vincent Couderc, Philippe Di Bin, Stefan Wabnitz; Université de Limoges, XLIM, UMR CNRS 7525, France; Department of Physics, St.-Petersburg State Univ., Russian Federation; Dipartimento di Ingegneria dell’Informazione, Università di Brescia, Italy. We experimentally study Bragg Scattering Four-Wave Mixing in nonlinear fiber at telecom wavelengths with photon counters. We discuss frequency conversion of attenuated laser under different pump polarizations. Performances are limited by Raman noise.

**NTh2A.5 • 11:30**

**Experimental demonstration of all纤 continous wave optical parametric amplifier operating at 1 μm, arnaud musset**, Alexandre Kudinski, Laure Lago, Damien Bigourd, Thibaut Sylvestre, Min Lee, Emmanuel Hagimont; phlam, France; CEA, France; femto-st, France. We report the first experimental demonstration of an all纤 optical parametric amplifier operating at 1 μm with a broadband of 16 nm and a high gain of 25 dB.

**NTh2A.6 • 11:45**

**Octave-spanning Infrared Supercontinuum Generation in Robust Chalcogenide Nano-tapers, Sorosh Hababak*, Mohamad U. Pirzadeh, Dat Nguyen, Peter De Jeur, Ayman E. Abouraddy**; Univ. of Central Florida, CRJIO, USA. We fabricate robust step-index chalcogenide nano-tapers. Using picosecond pulses at 1.55 μm, we generate octave-spanning low-power-threshold near-infrared and mid-infrared supercontinuum (0.85-2.35 μm).

**NTh2A.7 • 12:00**

**Generation of Photon Pairs in Cubic Nonlinear Waveguide Arrays, Alexander S. Solntsev**, Andrey A. Sukhorukov, Dragomiro Neshev, Yuri S. Kivshar; Australian National Univ., Australia. We analyze the quantum statistics of photon pair generation through spontaneous four wave mixing in nonlinear waveguide arrays and predict pump power-controlled transition between bunching and anti-bunching correlations due to self-focusing of the pump beam.

**NTh2A.8 • 12:15**

**All-optical fiber-based devices for ultrafast amplitude jitter magnification, Charles-Henri Hage**, Bertrand Kohler, Julien Fatome, Christophe Finot; Laboratoire Interdisciplinaire CARNOT de Bourgogne, France. We propose two fiber-based architectures that enable the all-optical magnification of ultrafast amplitude fluctuations of picosecond or femtosecond pulse trains. An increase of the fluctuations by more than one order of magnitude is experimentally achieved.

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**10:30–12:00**

**SpTh2B • Monitoring**

**Chao Lu, Hong Kong Polytechnic Univ., Hong Kong, Presider**

**SpTh2B.1 • 10:30**

Performance monitoring through signal processing in current and future optical communication systems, Alan P. Lau, Fabian N. Hauke, Trevor B. Anderson; Hong Kong; Huawei Technologies Dusseldorf GmbH, European Research Center, Germany; National ICT Australia, Victorian Research Laboratory, Univ. of Melbourne, Australia; Monitoring Division, Univ. of Melbourne, Australia; Dept. of Electronic and Information Engineering, The Photonics Research Center, The Hong Kong Polytechnic Univ., Hong Kong. We review the current status of Optical Performance Monitoring (OPM) in deployed optical networks and discuss on emerging OPM trends and challenges brought about by the migration towards coherent communications with digital coherent receivers.

**SpTh2B.2 • 11:00**

PDL-aware In-band OSNR Monitoring based on the Spectral Properties of Concatenated CAZAC Sequences, Fabis Pittalà, Fabian N. Hauke, Yabin Ye, Neil G. Guerrero, Idelfonso T. Monroy; Josef A. Nossek; European Research Center, Huawei Technologies Co Ltd, Germany; Fotonic, Technical Univ. of Denmark, Denmark; Institute for Circuit Theory and Signal Processing, Technische Universität München, Germany. A novel method for accurate in-band OSNR monitoring based on analysis of the power spectral density of concatenated received CAZAC sequences is demonstrated over a wide range of combined linear distortions.

**SpTh2B.3 • 11:15**

Accurate Blind Chromatic Dispersion Estimation in Long-haul 112Gbit/s PM-QPSK WDM Coherent Systems, Vitor Ribeiro, Stefano Ranzini, Julio Oliveira, Vitor Nascimento, Eduardo Magalhães; Photonics, CPQD, Brazil. Chromatic dispersion can vary due to optical network reconfigurations and hence blind estimators are desired. We propose an improved CD estimation method evaluated experimentally exhibiting good estimation accuracy and robustness to optical filtering and noise.

**SpTh2B.4 • 11:30**

Natural Expression of the Best-Match Search Godard Clock-Tone Algorithm for Blind Chromatic Dispersion Estimation in Digital Coherent Receivers, Christian Malouin, Philip Thomas, Bo Zhang, Jason O’Neil, Ted Schmidt; Juniper Networks Inc., USA. We reveal the natural expression of the “best-match search” Godard clock-tone algorithm for blind chromatic dispersion estimation. The complexity is reduced by more than 2 orders of magnitude compared to the conventional method.

**SpTh2B.5 • 11:45**

PDL Monitoring based on the Eigenvalues Spread of a Data-Aided Zero-Forcing Frequency Domain Equalizer, Fabio Pittalà, Fabian N. Hauke, Yabin Ye, Neil G. Guerrero, Idelfonso T. Monroy, Josef A. Nossek; European Research Center, Huawei Technologies Co Ltd, Germany; Fotonic, Technical Univ. of Denmark, Denmark; Institute for Circuit Theory and Signal Processing, Technische Universität München, Germany. Precise and robust PDL monitoring is demonstrated over a wide range of combined channel impairments. The PDL value is extracted from the zero forcing filter matrix estimated by using short CAZAC training sequences.
In addition to the Technical Digest CD, full Technical Attendees now have an alternate way to access the digest papers at the meeting. Access the papers through Optics InfoBase:
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**Session Changes**

The BGPP session JM1B will begin on Monday, 18 June at 08:00 in White River. The session will be preceded by opening comments beginning at 07:50.

Presentations NW1C.4 and NW1C.5 are reversed in the program. NW1C.4, *Longitudinal Power Distribution in a Random DFB Fiber Laser*, will be presented by Dmitriy Churkin from 09:15-09:30 on Wednesday, 20 June. NW1C.5, *A Novel Extraction Algorithm for Spectral Phase Interferometry*, presented by Alessia Pasquazi will be from 09:30 - 09:45.

The NP and BGPP Postdeadline sessions have merged and will now be held on Wednesday, 20 June from 16:00 – 17:36 in Colorado I as session JW4D. Postdeadline books will be available at the registration desk.

SPPCom will not be having a Postdeadline Session. Instead, they will host a workshop in Platte from 16:00-18:00. Details of the workshop appear below in the New Events section.

An additional poster presentation has been added during Monday’s Joint Poster session: JW5A.58

**Optically-induced, Bandwidth-tunable, Chirped Volume Bragg Gratings**, Sebastian Kroesen1,2, Wolfgang Horn1,2, Cornelia Denz2
1, Westfälische Wilhelms-Universität, Institut für Angewandte Physik, Germany; 2Westfälische Wilhelms-Universität, Center for Nonlinear Science (CeNoS), Germany. We demonstrate reconfigurable chirped volume Bragg gratings centered at λ=1542 nm in photorefractive lithium niobate. The reflection bandwidth and chirp rate can be controlled by an adaptive lens system. The dispersion characteristics are obtained by the modulation phase shift method.

**Presenter Changes**

Sebastian Jakobs will be presenting the invited talk NTh1A.1, entitled *Four Wave Mixing in Silicon-Organic Hybrid Waveguides*.

Alex Clark will be presenting the postdeadline paper NW4D.6 entitled *Ultra-low Raman Noise Correlated Photon-Pair Generation in a Dispersion Engineered As2S3 Waveguide*.

**New Events**

**Networking Cookout**
Wednesday, 20 June
18:30 – 20:30, The Courtyard
Ticketed event – This event is not included in the Congress registration fees. Join us at this great event! Come meet with leaders of the optics and photonics community in a great informal and fun setting. Enjoy the sunset as you grab dinner, drinks and lively conversation! For $20 USD for full technical registrants, $10 USD for students.

**SPPCom Workshop: Trends in Linear and Non-linear Digital Signal Processing for Communication Over all Degrees of Freedom of Light**
Wednesday, 20 June
16:00-18:00, Platte
This workshop will consist of one hour of invited talks, followed by an open-forum discussion. Attendees are invited to converse with the speakers, make comments or ask questions. Speakers will include the following individuals:

- **Trends in High Spectral Efficiency Transmission**, Gabriella Bosco, Politecnico di Torino, Italy
- **Trends in High-speed Digital Signal Processing for Optical Communications**, Maxim Kuschnerov, Univ. of Melbourne, Australia
- **What Does the Future Hold for All-optical OFDM?**, Jeurg Leuthold, Karlsruhe Institute of Technology, Germany
- **Trends in Photonic Integrated Circuits for Coherent Optical Communications**, Jeff Rahn, Infinera Corp., USA
- **Trends in High-speed Optical Transport**, Kim Roberts, Ciena Corporation, Canada

Other speakers and topics will also be presented during the Workshop.

**Withdrawn**

**Title:** Widely and Continuously Tunable Narrow-band Photonic Filters with MEMS Integration
**Contact:** Guanquan Liang
**Abstract ID:** ITu3B.6

**Title:** Observation of all-optical Berezinskii-Krosterlitz-Thouless crossover in a photonic lattice
**Contact:** Guohai Situ
**Abstract ID:** NTu4D.7

**Title:** High Power Passive Components for kW Lasers
**Contact:** Bertrand Gauvreau
**Abstract ID:** SM2E.2

**Presider Changes**

Igor Tsukerman will now be presiding over session IM4B: Theory, Modeling & Simulations III, on Monday, 18 June.
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