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Kurt Bernardo, Wolf, UNAM, Mexico
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6. Biophotonics and Biomedical Applications
Laura Lechuga, CIN2, Spain, Chair
Francisco Javier Gonzalez-Contreras, CIACYT/UASLP, Mexico, Co-Chair
Josu Alvarez-Borrego, CICESE, Mexico
Carlos Lenz César, UNICAMP, Brazil
Joel Villatoro, Ikerbasque and UPV/EHU, Spain

7. Integrated and Silicon Photonics
Patrick LiKamWa, CREOL, USA, Chair
Govind P. Agrawal, Univ. of Rochester, USA, Co-Chair
Sasan Fathpour, CREOL, USA
Isaac Hernández-Calderon, CINVESTAV, Mexico

8. Designed Structures in Micro and Nano Dimensions for Photonics and Electronics
Rodrigo Amezcua, CREOL, USA, Chair
Stefan Maier, Imperial College, UK, Co-Chair
Ruben Barrera, UNAM, Mexico
Lee Byoungcho, National Univ., Korea
Jorge Gaspar-Armenta, Universidad de Sonora, Mexico
Edmundo Gutiérrez-Dominguez, INAOE, Mexico
Miguel J. Yacaman, Univ. of Texas, USA

9. Quantum and Nano Optics, Photonics and Electronics
Jose Javier Sánchez-Mondragón, INAOE, Mexico, Chair
Luis Davidovich, Universidade Federal do Rio de Janeiro, Brazil, Co-Chair
Herc Hnussenweig, Universidade Federal do Rio de Janeiro, Brazil, Honorary Chair
Alain Aspect, Institut d’ Optique, France
Juan Ignacio Cirac Sasturain, Max-Planck-Institut für Qantenoptik, Germany
Andrei Klimov, Universidad de Guadalajara, Mexico
Pierre Meystre, Univ. of Arizona, USA
Hector Manuel Moya Cessa, INAOE, Mexico
Paulo Alberto Nussenzveig, Instituto de Fisica USP, Brazil
Luis Orozco, Univ. of Maryland, USA
Miguel Orzag-Poza, Pontificia Universidad Católica de Chile, Chile
Juan Pablo, Paz, FCEyN, Argentina
Juan Pérez-Torres, ICFO, Spain
Carlos Saavedra, Universidad de Chile, Chile
Yanhua Shih, Univ. of Maryland Baltimore, USA

10. Optics and Photonics in Green Technologies
Elder De la Rosa, CIO, Mexico, Chair
Luis Armando Diaz, CIO, Mexico, Co-Chair
Ivan Moreno-Hernández, Universidad de Zacatecas, Mexico, Co-Chair

11. Nonlinear Optics
Cid Bartolomeu-de-Araujo, Federal Univ. of Pernambuco, Brazil, Chair
Robert W. Boyd, Univ. of Rochester, USA, Co-Chair
Gaetano Assanto, University of Rome, Italy
Demetrios Christodoulides, CREOL, USA
Joseph Haus, Univ. of Dayton, USA
Antonio Federico Muñoz-Flores, AlphaMicron, Inc, USA
Aristide Olaizola Marcado, Delaware State Univ., USA
Nasser Peyghambarian, Univ. of Arizona, USA
Raul Rangel-Rojo, CICESE, Mexico
Serguei Stepanov, CICESE, Mexico
Erick W. van Stryland, CREOL, USA

12. Optics and Photonics in Energy, Industry and Infrastructure
Fernando Mendoza-Santoyo, CIO, Mexico, Chair
Alexis Mendez, MCH Engineering LLC, USA, Co-Chair
Carlo Perez-Lopez, CIO, Mexico

13. Entrepreneurship
Jose Javier Sánchez-Mondragón, INAOE, Mexico, Co-Chair
Plenary Speakers

Alain Aspect, Institut d’Optique, France
Alain Aspect's first research was on Bell’s inequalities tests with pairs of correlated photons, and single photons quantum properties (1975-1986). He then moved to laser cooling of atoms, with Claude Cohen-Tannoudji, in particular laser cooling below the one photon recoil velocity. In 1992, he founded the Atom Optics Group at Institut d’Optique, whose main results are on Atom Lasers, Bose Einstein Condensation of metastable Helium, Anderson Localization of ultra-cold atoms in a laser speckle, and Quantum Atom Optics.

Cary Gunn, Genalyte, USA
Cary Gunn is the President, CEO and a founder of Genalyte. Dr. Gunn currently holds 81 issued US patents, with more in process. In 2003 he was recognized by MIT Technology Review as a Top Young Innovator, and in 2008 he received The Optical Society Adolph Lomb medal and the Berthold-Leibinger Foundation Innovation Prize. Dr. Gunn also co-founded Luxtera where he was responsible for technology development and served as CTO until 2007. Dr. Gunn received his PhD from Caltech in Electrical Engineering. Prior to Caltech, Dr. Gunn was an officer in the US Air Force, responsible for launching GPS satellites and is a graduate of the US Air Force Academy.

Gregory W. Forbes, QED Technologies, Australia
Greg Forbes has been based in Sydney Australia as Senior Scientist at QED Technologies (Rochester) since 2000. He develops concepts, algorithms, and processes that underpin QED’s sub-aperture polishing and stitched-interferometry systems. These systems have helped to transform the commercial production of high-precision optics. Following his PhD at the Australian National University, Greg was a Fulbright Fellow at the Optical Sciences Center (Tucson, 1984), a tenured faculty member of The Institute of Optics (Rochester, 1985-1994), and a Research Professor in Physics at Macquarie University (Sydney, 1994-2000). He is an OSA Fellow (1996) and was recently awarded OSA’s David Richardson Medal (2012).

Claude Fabre, Laboratoire Kastler-Brossel, Sorbonne Université-UPMC, France
Claude Fabre is a professor at the University Pierre et Marie Curie - Paris Sorbonne Universités. He is an OSA fellow and a senior member of the Institut Universitaire de France. He is a specialist of quantum optics, especially of the study of quantum correlations, entanglement and squeezing in various optical devices. His current researches concern the quantum aspects of highly multimode light, such as optical images or light pulses, and its applications to quantum information processing and quantum metrology.

Michal Lipson, Cornell University, USA
Michal Lipson is the Given Professor of Engineering at the School of Electrical and Computer Engineering at Cornell University. Her research focuses on novel on-chip Nanophotonics devices. She holds numerous patents on novel micron-size photonic structures for light manipulation, and is the author of nearly 200 technical papers in Physics and Optics journals. She has pioneered several of the critical building blocks for silicon photonics including the GHz silicon modulators. Professor Lipson’s honors and awards include the MacArthur Fellow, OSA Fellow, IEEE Fellow, IBM Faculty Award, and NSF Early Career Award.

Ernst Wintner, Vienna University of Technology, Austria
Ernst Wintner is professor at the Photonics Institute of Vienna University of Technology (TU). He received a PhD in 1976 from University of Vienna after having completed a thesis in metallurgy. He joined TU thereafter and changing to the field of Photonics. He was engaged in nonlinear optics of polymers, fiber optic sensors, solid-state lasers and ultra-short pulse generation including applications of the latter e.g. to materials processing and dentistry. During the last 15 years he was one of the pioneers of laser ignition of engines in the context of a cooperation with GE Jenbacher, Tyrol, Austria, the worldwide technology leader in MW gas engines. Besides this, he also pursued other projects of applied laser technology like the development of an optical microphone without membrane. Dr. Wintner authored 7 book chapters and was author/co-author of more than 250 publications. He was Visiting Scientist/Professor to several Universities like M.I.T., FSU Jena, ILE/Osaka University, Indian Institute of Technology Kanpur. He served in many professional institutions, among them the EPS Quantum Electronics Board.
Special Events

Conference Reception
Sunday, 16 November
18:30–19:30
La Perla Restaurant
Meet your fellow conference attendees during this informal reception. It will feature music and beverages. It is open to all attendees.

Tour to Chichen Itza
Wednesday, 19 November
08:30–16:00
Meet in the hotel Lobby no later than 08:15 to board the buses. The bus will leave at 08:30.
Optional Event - Extra fee and ticket required. Must sign up in advance, and we are not able to offer refunds.
On your free day join us on a tour to Chichen Itza - one of the Seven Wonders of the World!
This tour is an extraordinary visit to one of the most impressive worldwide archaeological site. This ancient ceremonial center was built in 445 BC, and is one of the most impressive sites in the Yucatan Peninsula. Experience the acoustics in the largest ball court in America. Walk the same path used by the Mayan priests to offer sacrifices to their gods in the sacred cenote. And enjoy the cenote Park Ki-Kil, where you can swim in the beautiful Mayan water or just take unforgettable pictures. Chichén Itzá, is ideal for people interested in learning one of the most important and richest cultures in the world.

Conference Banquet
Wednesday, 19 November
20:15–24:00
Del Prado
Join your colleagues for a festive evening featuring live music and Mariachi. The banquet is open to all full technical attendees. Conference attendees may purchase extra tickets in advance for their guest.

Poster Sessions
Monday, 17 November, 18:00–20:00
Tuesday, 18 November, 18:00–20:00
Thursday, 20 November, 18:00–20:00
Foyer and Exhibit Hall (Goya/Greco)
Poster presentations offer an effective way to communicate new research findings and provide a venue for lively and detailed discussions between presenters and interested viewers. Don't miss this opportunity to discuss current research one-on-one with presenters.
Exhibit Hall and Exhibitor Guide

Exhibit Hall
10:00–20:00
Goya/Greco

Visit the LAOP Exhibit Hall and get a glimpse of the latest optical innovations! The exhibit floor will feature companies representing a broad range of the best products and applications in the optics and photonics industry. Don’t miss this opportunity to learn about new products, find technical and business solutions and gain the most up-to-date market perspective of your industry.

<table>
<thead>
<tr>
<th>Date</th>
<th>Beverage Break</th>
<th>Poster Session</th>
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<tbody>
<tr>
<td>Monday, 17 November</td>
<td>10:00–10:30 18:30-17:30</td>
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<td>Tuesday, 18 November</td>
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<tr>
<td>Thursday, 20 November</td>
<td>10:00–10:30 18:30-17:30</td>
<td>16:00–18:00</td>
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Exhibitors/Sponsor Guide
(as of 20 October)

American Elements

1093 Broxton Avenue, Suite 2000
Los Angeles, CA 90024 USA
P: +1 310.208.0551
F: +1 310.208.0351
Email: customerservice@americanelements.com
URL: www.americanelements.com

American Elements is the world’s manufacturer of engineered and advanced materials with a catalogue of more than 12,000 products including high purity chemicals, semiconductors, metals and compounds for petrochemicals, photovoltaics, lasers, optics, solar energy and fuel cells. American Elements maintains manufacturing and research in the U.S., Mexico, Europe and China.

CENTRO DE INVESTIGACIONES EN ÓPTICA

Loma del Bosque 115, Col Lomas del Campestre
León, Guanajuato, Mexico
P: +52 477 441 42 00
URL www.cio.mx
Email: maestria@cio.mx
doctordad@cio.mx
anamoran@cio.mx

Develop applied and basic research for contributing to the generation of knowledge and innovation in the photonics and optics fields, to strengthen the technological leadership of México and promote the formation of new enterprises based on the scientific knowledge. To offer the best post graduate studies in optics and photonics and contribute to the development of a scientific and technological culture in our society.

CICESE

Carretera Ensenada- Tijuana No. 3918 Zona Playitas Ensenada, B.C. México C.P. 22860
Telefonos: (646) 175 05 00
Website: www.cicese.mx
email: camachol@cicese.mx
rrangel@cicese.mx

CICESE is one of the 27 research centers coordinated by Mexico’s National Council for Science and Technology (CONACYT) and is a recognized scientific institution at a national and international level. The Optics Department is primarily dedicated to lead basic and applied research in the areas of optics and optoelectronics, as well as training human resources at masters and doctoral level in these disciplines. The graduate program has currently research projects in lasers, nonlinear optics, optical waveguides and fibers, nonlinear microscopy, quantum optics, bio photonics, light scattering and diffraction and image processing.

EXALOS AG

Wagistrasse 21
Schlieren Switzerland, CH-8952
P. Switzerland: +41 43 444 6090
PUS: 215 669-4488
URL : www.exalos.com
Email: hsu@exalos.com

EXALOS is a technology driven company, which focuses on the design, development and sales of advanced light source solutions based on Superluminescent Light Emitting Diodes (SLEDs) and External Cavity Tunable Lasers (Swept Sources). We also offer Balanced Receivers to complement our light source products. EXALOS products are used in Medical and Industrial Imaging, Navigation, Sensing, Metrology, and Scientific applications. EXALOS is ISO 9001:2008 certified.
Micron Optics Inc.

1852 Century Place, Atlanta, GA 30345, USA
P: +1 404 325-0005
ULR www.micronoptics.com
Email: sales@micronoptics.com

Micron Optics is a world leader in the design, development and fabrication of optical sensing component and instruments. We offer a broad line of fiber Bragg grating (FBG) sensors and interrogators for diverse measuring, sensing and monitoring applications.

Nanoscribe GmbH

Hermann-von-Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany
P: +49 721 60 82 88 40
URL: www.nanoscribe.de
Email: info@nanoscribe.de

The German company Nanoscribe offers 3D printers for the micrometer scale and serves solutions and processes for specific applications to its scientific and industrial customers.

Based on the technique of direct laser writing, the laser lithography system Photonic Professional GT allows the fabrication of true three-dimensional structures with sub-micron feature sizes and a previously unavailable freedom of design.

Due to its in-depth knowhow in laser lithographic processes, Nanoscribe has established itself as the technological and global market leader in this field.

Northrop Grumman Cutting Edge Optronics

20 Point West Boulevard, Saint Charles, MO 63301 USA
P: 1.636.916.4900
URL: www.northropgrumman.com/ceolaser
Email: st-ceolaser-info@ngc.com

Northrop Grumman Cutting Edge Optronics is a leading supplier of high-power laser diodes, DPSS modules, laser diode drivers and complete DPSS laser systems. Many of our diode laser based products have become industry standards, and are used in a wide variety of commercial and military applications. The company is registered to ISO 9001:2008, and is located in St. Charles, MO.

Additional Exhibitors/Sponsors

INAHOE
Intercovamex
NKT PHOTONICS
Optiwave
Redondo Optics
Skill Tech
Tecnotalb
Tylor & Francis

OVZ Optics Limited

219 Westbrook Road, Ottawa, Ontario, K0A 1L0
P: +1-613-831-0981
Fax: +1-613-836-5089
URL: www.ozoptics.com
Email: sales@ozoptics.com

OZ’ Award Winning sensor is able to measure simultaneously strain and temperature along the entire length of a standard telecom fiber. It is ideal for monitoring large structures including oil & gas pipelines, bridges, power lines, dams, and security fences. The sensor could also be used in detecting fire, corrosion/erosion.

Onefive GmbH

In Boeden 139
Zurich, 8046 Switzerland
P: + 41 43.5383657
F: + 41 43.5383686
Email: contactus@onefive.com
URL: www.onefive.com

Onefive GmbH is a leading supplier of industrial-grade, low-noise femtosecond and picosecond laser modules. The company's strong expertise allows it to provide sub-100 fs ultra-low noise mode-locked lasers from pulse-on-demand up to 1.25 GHz repetition rate. A unique packaging technology offers compact, air-cooled and maintenance-free lasers for a wide range of applications.

VYTRAN LLC

1400 Campus Drive West, Morganville, NJ 07751
Phone number: +1 732 972 2880
Website www.vytran.com
Email: sales@vytran.com

Vytran is an innovative supplier of semi and fully automated fiber glass processing solutions. The company’s patented filament fusion technology is paired with machine vision and control capabilities to provide fiber fusion process unattainable with other fusion methods. Vytran’s splicing, cleaving, recoating and proof testing produce high reliability and strength with low loss fiber components. Vytran technologies are designed to reduce customers’ risk, and speed up their products to market.
Explanation of Session Codes

The first letter of the code designates the meeting. The second element denotes the day of the week (Monday=M, Tuesday=T, Thursday = Th, Friday = F). 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 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 LM2A.4 indicates that this paper is being presented on Monday (M) in the second series of sessions (2), and is the first parallel session (A) in that series and the fourth paper (4) presented in that session.

Plenary papers are noted with Plenary
Tutorial papers are noted with Tutorial
Invited papers are noted with Invited
Distinguished Young Researcher papers are noted with Distinguished Young Researcher
## Agenda of Sessions — Sunday, 16 November

<table>
<thead>
<tr>
<th>Time</th>
<th>Picasso</th>
<th>Murillo</th>
<th>Miro</th>
<th>Del Prado</th>
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<tbody>
<tr>
<td>15:00–19:00</td>
<td>Registration Open, Foyer</td>
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<tr>
<td>18:30–19:30</td>
<td>Welcome Reception, La Perla Restaurant</td>
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### Monday, 17 November

<table>
<thead>
<tr>
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<th>Del Prado</th>
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<tr>
<td>07:00–19:00</td>
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<tr>
<td>08:00–10:00</td>
<td>LM1A • Wave Optics and Photonics for Information Processing 1</td>
<td>LM1B • Quantum and Nano Optics, Photonics and Electronics 1</td>
<td>LM1C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 1</td>
<td>LM1D • Laser Science and Technology 1</td>
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<td>10:00–10:30</td>
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<td>10:30–12:30</td>
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<tr>
<td>12:30–14:30</td>
<td>LM2A • Wave Optics and Photonics for Information Processing 2</td>
<td>LM2B • Quantum and Nano Optics, Photonics and Electronics 2 (ends 14:00)</td>
<td>LM2C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 2 (ends 14:45)</td>
<td>LM2D • Laser Science and Technology 2</td>
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<tr>
<td>14:30–16:00</td>
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<tr>
<td>16:00–18:00</td>
<td>LM3A • Wave Optics and Photonics for Information Processing 3</td>
<td>LM3B • Quantum and Nano Optics, Photonics and Electronics 3 (ends 18:15)</td>
<td>LM3C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 3 (ends 18:15)</td>
<td>LM3D • Laser Science and Technology 3</td>
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<td>18:00–20:00</td>
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<td></td>
<td>LM4A • Poster Session, Foyer and Exhibit Hall (Goya/Greco)</td>
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## Agenda of Sessions — Tuesday, 18 November

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<th>Miro</th>
<th>Del Prado</th>
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<tr>
<td>07:00–19:00</td>
<td>Registration, Foyer (closed from 14:00–15:30)</td>
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<tr>
<td>08:00–10:00</td>
<td>LTu1A • Fiber Optics and Optical Communications 1 (ends at 09:45)</td>
<td>LTu1B • Quantum and Nano Optics, Photonics and Electronics 4</td>
<td>LTu1C • Laser Science and Technology 4</td>
<td>LTu1D • Nonlinear Optics 1</td>
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<tr>
<td>10:00–10:30</td>
<td>Break, Exhibit Hall (Goya/Greco)</td>
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<td>10:30–12:30</td>
<td>Plenary, Del Prado</td>
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<tr>
<td>12:30–14:30</td>
<td>LTu2A • Integrated and Silicon Photonics 1 (ends 14:45)</td>
<td>LTu2B • Quantum and Nano Optics, Photonics and Electronics 5</td>
<td>LTu2C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 4</td>
<td>LTu2D • Nonlinear Optics 2</td>
</tr>
<tr>
<td>14:30–16:00</td>
<td>Lunch, (on your own)</td>
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<tr>
<td>16:00–18:00</td>
<td>LTu3A • Integrated and Silicon Photonics 2</td>
<td>LTu3B • Quantum and Nano Optics, Photonics and Electronics 6</td>
<td>LTu3C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 5 (ends 18:15)</td>
<td>LTu3D • Fiber Optics and Optical Communications 2</td>
</tr>
<tr>
<td>18:00–20:00</td>
<td>LTu4A · Poster Session, Foyer and Exhibit Hall (Goya/Greco)</td>
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### Wednesday, 19 November

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:30–17:30</td>
<td>Tour to Chichen Itza</td>
</tr>
<tr>
<td></td>
<td><em>Meet in Hotel Lobby no later than 08:15.</em></td>
</tr>
<tr>
<td></td>
<td><em>This event requires a ticket that must be purchased in advanced for a separate fee.</em></td>
</tr>
<tr>
<td>19:00–20:00</td>
<td>Registration, Foyer</td>
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<td>20:15–24:00</td>
<td>Conference Banquet, Del Prado</td>
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# Agenda of Sessions — Thursday, 20 November

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<tr>
<th>Time</th>
<th>Picasso</th>
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<td>07:00–19:00</td>
<td>Registration, Foyer (closed from 14:00–15:30)</td>
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<tr>
<td>08:00–10:00</td>
<td>LTh1A • Quantum and Nano Optics, Photonics and Electronics 7</td>
<td>LTh1B • Instrumentation, Optical Design, Color and Vision 1</td>
<td>LTh1C • Fiber Optics and Optical Communications 3</td>
<td>LTh1D • Biophotonics and Biomedical Applications 1</td>
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<tr>
<td>10:00–10:30</td>
<td>Break, Exhibit Hall (Goya/Greco)</td>
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<td>10:30–12:30</td>
<td>Plenary, Del Prado</td>
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<td>12:30–14:30</td>
<td>LTh2A • Nonlinear Optics 3</td>
<td>LTh2B • Instrumentation, Optical Design, Color and Vision 2 (ends 14:45)</td>
<td>LTh2C • Fiber Optics and Optical Communications 4</td>
<td>LTh2D • Wave Optics and Photonics for Information Processing 4 (ends 14:45)</td>
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<td>14:30–16:00</td>
<td>Lunch, (on your own)</td>
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<td>16:00–18:00</td>
<td>LTh3A • Nonlinear Optics 4</td>
<td>LTh3B • Instrumentation, Optical Design, Color and Vision 3</td>
<td>LTh3C • Fiber Optics and Optical Communications 5</td>
<td>LTh3D • Biophotonics and Biomedical Applications 2</td>
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<td>18:00–20:00</td>
<td>LTh4A • Poster Session, Foyer and Exhibit Hall (Goya/Greco)</td>
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# Friday, 21 November

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<td>08:00–10:00</td>
<td>LF1A • Atomic Physics and Laser Spectroscopy</td>
<td>LF1B • Instrumentation, Optical Design, Color and Vision 4</td>
<td>LF1C • Fiber Optics and Optical Communications 6</td>
<td>LF1D • Biophotonics and Biomedical Applications 3 (ends at 09:45)</td>
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<td>10:00–10:30</td>
<td>Break, Foyer</td>
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<td>Closing Plenary, Del Prado</td>
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<td>12:30–14:30</td>
<td>LF2A • Atomic Physics and Laser Spectroscopy 2 (ends 14:45)</td>
<td>LF2B • Green Tech and Energy in Photonics</td>
<td>LF2C • Fiber Optics and Optical Communications 7 (ends at 14:15)</td>
<td>LF2D • Biophotonics and Biomedical Applications 4 (ends at 14:15)</td>
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LM1A.4 • 09:30
High Definition Sierpinski N-Gon Diffra-ctals, Jorge Alberto Ugalde Ontiveros1, Jaime Avendano-Lopez2, Sabino Chavez-Cerda3, 1Departamento de Fisica, Escuela Superior de Fisica y Matematicas, IPN, Mexico; 2Departamento de Optica, Instituto National de Astrofisica, Optica y Electronica, Mexico. A general closed analytical expression for Sierpinski polygon diffraction far field patterns has been obtained for the first time by extending the known 1D Fourier transform theorems to N-dimension.

LM1A.5 • 09:45
Far-field diffraction pattern of a Bessel-Gauss beam through a pentagonal aperture, Cristian Acevedo1, Yezid Torres Moreno2, Angela Guzman2, Carlos Fernando Diaz2, 1Industrial Santander Univ., Colombia; 2The College of Optics and Photonics, Univ. of Central Florida, USA. We report through of computer simulations and experimental measurements that the dark spots number in the pattern of the far-field diffraction intensity distribution by a non-equilateral pentagonal aperture is just equal to the integer value of the used Bessel-Gauss beam topological charge.

NOTES
Holography has been used as a metaphor for the coding and processing of information in the brain. We investigate holography-inspired coding and processing of information.

Holographic “Brain” Memory and Computation
Shlomi Dolev1, Ariel Hanemann1

1Ben Gurion Univ. of the Negev, Israel. Holography and information are tightly connected concepts. Holography has been used as a metaphor for the coding of information in the brain. We investigate holography-inspired coding and processing demonstrating important benefits.

12:30–14:14
LM2A • Wave Optics and Photonics for Information Processing 2
Presider: Miguel Alonso; Univ. of Rochester, USA

12:30–14:00
LM2B • Quantum and Nano Optics, Photonics and Electronics 2
Presider: Girish Agarwal; Oklahoma State Univ., USA

12:30–14:30
LM2C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 2
Presider: Thoroh De Souza; Universidade Presbiteriana Mackenzie, Brazil

12:30–14:45
LM2D • Laser Science and Technology 2
Presider: Wayne Knox; Univ. of Rochester, USA

Gratings Recording and Wave Mixing with sub-100 fs Light Pulses, Sergey G. Osdulov, Alexandr M. Shumelyuk, Holger Badorek, Stefan Naide, Kay-Michael Voit, Miro K. Imlau

1Inst. of Physics, National academy of sciences, Ukraine; 2Osnabrueck Univ., Germany. It is shown that with < 100 fs pulses the light waves of considerably different frequencies can form the interference fringes observable with the naked eye, that can be used further for permanent grating recording.

Odd-order aberration cancellation in entangled two-photon beams, Luisa Fippei, Marcelo Ferreira, Carlos Monken, Physik, Universidade Federal de Minas Gerais, Brazil. In this work we show that using two-photon correlation imaging and a suitably prepared source of photon pairs, odd-order optical aberrations of an imaging system can be cancelled out. The conditions under which this cancellation takes place are discussed.

Entanglement Witnesses and Detection of Nonlocal Superpositions, W. M. Pimenta, B. Marques, A. A. Maltsi, J. L. Lucio, J. Sperling, W. Vogel, Sebastian de Padua

1Universidade Federal de Minas Gerais, Brazil; 2Universidade de Guarujá, Mexico; 3Stockholm Univ., Sweden; 4Institut fur Physik, Universität Rostock, Germany. A complete characterization of entanglement in a two-qubit state generated using the transverse spatial correlations of two parametric down-converted photons is presented. We verify entanglement for a particular case of entanglement witness operators which are decomposed into a sum of local observables.

Second Harmonic Generation in Nanostructured Metamaterials, W. Luis Mochán, Bernardo S. Mendoza, Irina Solís

1Instituto de Física, Universidad Nacional Autónoma de México, Mexico; 2Osnabrueck Univ., Germany; 3Universidad Federal de Minas Gerais, Brazil. It is shown that these beams can provide useful schemes for soliton routing and steering.

Recent Advancements in Optical Orbital-Angular-Momentum Multiplexing, Alan E. Willner

1Dept. of Electrical Engineering, Univ. of Southern California, USA. This tutorial discusses recent advancements in OAM-multiplexed systems. High-capacity transmission of OAM-multiplexed data channels in free-space and fiber links is presented along with an overview of key challenges in OAM-based systems.

Angular-Momentum Multiplexing, Ajoy Kumar Kar

1Physics, Heriot-Watt Univ., UK. In my talk I will present how the ultrafast laser inscription technology can be used to develop compact waveguide lasers from near- to mid-IR in a range of optical materials.

Designing the Plasmonic Response of Metallic Nanoparticles, Cecilia Noguez

1Universidad Nacional Autónoma de México, Mexico. Metal nanoparticles exhibit remarkable optical response because their surface plasmon excitations strongly couple with external light. This conducts to new phenomena because surface plasmon resonances are localized and consequently they enhance the near electromagnetic field.

All Solid State Compact Waveguide Lasers, Apoy Kumar Kar

1Physics, Heriot-Watt Univ., UK. In my talk I will present how the ultrafast laser inscription technology can be used to develop compact waveguide lasers from near- to mid-IR in a range of optical materials.
Metallic Nanoparticle Containing Waveguides for Nonlinear Optics, Raul Rangel-Rojo1, Bonifacio A. Can-Uc1, Alicia Oliver2, Luis Rodriguez-Fernandez2; 1Optics, CICESE, Mexico; 2Instituto de Fisica, UNAM, Mexico. We present the study of the optical nonlinearities of elongated metallic nanoparticle-containing silica matrix. Results for the nonlinear response as well as direct pattern writing and channel waveguide formation by different methods are also presented.

UV LED charge control of an electrically isolated proof mass in a Gravitational Reference Sensor configuration at 255nm, Shailendhar Saraf1, Karthik Balakrishnan1, Shasha Buchman1, Robert Byer1, Dohy Faied2, John Hanson2, Belgacem Jaroux2, Chin Yang Lui1, Michael Soulage2; 1HEPL, Stanford Univ., USA; 2NASA, USA. Data from a satellite mission will show that compact, low-power AlGaN Ultraviolet LEDs operating at 255 nm are effective for precise control of the potential of an electrically isolated proof mass with applications in gravitational reference sensors.

Study of Archeological Mesoamerican Lapidary by Raman Spectroscopy: A Fast and Non-destructive Technique, Marco Antonio Meneses-Nava1, Jasinto Robles-Camacho1, Analía Sicardi-Segade1, Ricardo Sánchez-Hernández1, Oracio Barbosa-García1, Jose-Luis Maldonado-Rivera1, Gabriel Ramos-Ortiz1; 1Investigacion, Centro de Investigaciones en Optica AC, Mexico; 2Laboratorio de Arqueometria del Occidente, Centro INAH Michoacán, Mexico; 3Laboratorio de Geología de la Subdirección de Laboratorios y Apoyo Académico, INAH, Mexico. The use of Raman spectroscopy for characterization of archeological objects has been widely used because it is a non-destructive technique. In this context, Raman spectroscopy is used to identify minerals in lapidary from Mexican pre-Columbian cultures.
Monday, 17 November 2014

16:00–18:00
LM3A • Wave Optics and Photonics for Information Processing 3
Presider: Jorge Ojeda-Castanedo; Univ. of Guanajuato, Mexico
LM3A.1 • 16:00  Invited
Position and Momentum in the Maxwell fish-eye, Kurt Bernardo Wolf1; ‘Univ Nacional Autonoma de Mexico, Mexico. On the Maxwell fish-eye we know well the multipole basis of 2j + 1 independent “monochromatic” fields. We identify the basis of definite momentum given by the Sherman-Valbooy functions, while a new basis of the most definite position and normal derivative functions is proposed. These assignments are corroborated in the limit to the Helmholtz homogeneous medium.

LM3A.2 • 16:30
All You Wanted to Know About Optical Beams but Were Afraid to Ask, Sabino Chavez-Cerda1; 1Optics, Inst Nat Astrophysics Optica Electronica, Mexico. In recent years the appearance of the word beam in optics literature to refer to optical wave fields with very exotic characteristics has had an epidemic growth, but what really characterizes an optical beam?

LM3A.3 • 17:00  Invited
Title Classical Dynamics of a Mobile Mirror and the Electromagnetic Field, Luis Octavio Castaños Cervantes1, Ricardo Weder2; ‘Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas, Universidad Nacional Autonoma de Mexico, Mexico. We consider a mirror that interacts with the electromagnetic field through radiation pressure. Using a relativistic treatment we derive the exact equations for the field and the mirror. We also obtain first order approximate equations.

LM3A.4 • 17:30  Invited
Superposition Effect is a “local” Phenomenon when we Investigate the Processes Behind Release of Photo Electrons, Chandra Raychoudhuri1; ‘Univ of Connecticut, USA. The “locality” of superposition effect becomes evident when one explicitly models the light-matter stimulation and energy exchange processes using basic QM recipe of taking square modulus of simultaneous dipolar stimulations of the detecting molecules by all waves.

16:00–18:15
LM3B • Quantum and Nano Optics, Photonics and Electronics 3
Presider: Luiz Davidovich; Universidade Federal do Rio de Janeiro, Brazil
LM3B.1 • 16:00
Counterfactuality of “Counterfactuation” Communication, Lev Vaidman1; ‘Physics Dept., Tel-Aviv Univ., Israel. Quantum mechanics allows communication without passing photons, just by a possibility to pass them. I analyze such processes and argue that counterfactual communication is limited to only one value of a bit.

LM3B.2 • 16:45  Tutorial
The Quantum Path Most Taken, Andrew Jordan1; 1Physics and Astronomy, Univ. of Rochester, USA; Inst for Quantum Studies, Chapman Univ., USA. I will describe theory and experiments with superconducting qubits revealing how a quantum gets from state A to state B, while being both measured and driven simultaneously. This most probable path may be found using a principle of least action.

LM3B.3 • 17:00  Tutorial
An Introduction to Weak Values, John C. Howell1; ‘Univ. of Rochester, USA. I will give a brief background to weak values, discuss their implications and review some of the recent experiments employing weak value techniques including: weak value amplification, wave function measurement and technical noise suppression.

16:00–18:15
LM3C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 3
Presider: W. Luis Mochan; Univ Nacional Autonoma de Mexico, Mexico
LM3C.1 • 16:00  Invited
Ultrashort Pulse Generation based on 2D Materials, Thorah A. de Souza1; ‘Universidade Presbiteriana Mackenzie, Brazil. Two-dimensional atomic crystals such as graphene and MoS2 have been intensively investigated in physics and materials science. We will discuss their applications as a new class of saturable absorbers to generate ultrashort pulses.

LM3C.2 • 16:45  Tutorial
Broadband Low Phase Noise and RF-Free Optical Pulse Generation for Hybrid Integration, Amir S. Helmy1, Fangxin Li1; ‘Univ. of Toronto, Canada. We propose and demonstrate all-optical techniques conducive to hybrid integration for pulse generation based on gain-induced four-wave mixing with no feedback or RF sources. Robust, low-phase noise pulses are achieved with linewidths ~1 Hz.

LM3C.3 • 17:00  Tutorial
Modeling Mode Instabilities in High Power Fiber Amplifiers, Zeinab Sanjabi Eznaveh1, Gisela Lopez Galmiche1, Martin Richardson1, Rodrigo Amezquita1; ‘CREOL, College of Optics and Photonics, Univ. of Central Florida, USA. We present a time dependent high fidelity model for modal instabilities in high-power fiber amplifiers based on a beam propagation combining local rate equations with a time-dependent temperature solver and a quantum defect heating source.

LM3C.4 • 17:30  Tutorial
Nonlinear Pulse Reshaping in Optical Fibers, Igor A. Sukhovarov1, Oleksy V. Shulika1, Sergii O. Iakushev1, Jose A. Andrade Lucio1, Gabriel Ramos Ortiz2, Igor V. Guriev2; ‘DICIS, Universidad de Guanajuato, Mexico; Centro de Investigaciones en Optica, Mexico; National Univ. of Radio Electronics, Ukraine. The compact laser sources with ultra-broad spectrum or specially shaped pulse waveforms are significant for science and industry, and the need for these sources can be satisfied using the fiber-optic platform. We present results on transformation of ultrashort optical pulses in different types of optical fibers aiming synthesis of specially shaped pulses and single-pulse flat-top supercontinuum.

LM3C.5 • 18:00
Multi-Ghz Bullseye Optomechanical Cavity, Felipe G. Santos1, Yovanny Espinel1, Gustavo Lpez1, Debora Princepe1, Gustavo Waderhed2, Thiago Alegre1; ‘Applied Physics Dept., Gleb Wataghin Physics Inst., State Univ of Campinas, Brazil. We propose a new design for an optomechanical cavity based on a disk with a mechanical radial bandgap. This design allows for independent control of the mechanical and optical frequency and large optomechanical coupling.

16:00–18:00
LM3D • Laser Science and Technology 3
Presider: Raul Rangel-Rojro; CICESE, Mexico
LM3D.1 • 16:00  Tutorial
Ultrawideband Coherent Optical Signal Processing using Semiconductor Laser Based Optical Frequency Combs, Peter J. Delfyett1, ‘Univ. of Central Florida, USA. This tutorial covers the use of optical frequency combs for applications in optical communication and signal processing. We review the generation of combs, technologies for filtering and modulation, and explore architectures for detection, waveform generation, and matched filtering.

LM3D.2 • 16:45  Tutorial
Nanoscale Engineering Optical Nonlinearities and Nanolasers, Yeshaiahu Fainman1; ‘ECE, Univ. of California San Diego, USA. This paper discusses nonlinear materials and devices that recently have been demonstrated in our Lab and design, fabrication and testing of nanolasers constructed using metal-electric-semiconductor resonators confined in all three dimensions, operating at room temperature.

LM3D.3 • 17:00  Tutorial
Challenges to the Concept of Intermediate Band Solar Cells based on Quantum Dots, Ma- rio Dagenais1, Tan Li1; ‘Univ. of Maryland, USA. We demonstrate that implementing intermediate band solar cells using crystalline semiconductor quantum dots is very challenging. It is nearly impossible to significantly enhance the direct band-to-band current with the current going through the intermediate state.
Anisotropy Reduction Strategies for Transform-Optics Designs, Mateus A. Junqueira, Lucas H. Gabrielli, Danilo H. Spadoti

Broadband Absorbers Based on the Apodization of Nanometric Gratings, Joana Junior Isidio de Lima, Juarez Caetano da Silva, Vitaly Felix Rodrigues Esquerre


Supercells composed of apodized waveguides are investigated. In this work optical and thermal properties of high reflective surface were characterized with infrared photothermal radiometry and photoacoustic spectroscopy.


Unamplified 10-km transmission using direct-detection optical OFDM superchannel at 100 Gbps, Saul O. Vazquez, Pablo Torres-Ferrera, Ramon Gutierrez-Castrojgon, Ioannis Tomkos, Servando Lopez-Aguayo, Sergio C. Valdez, Sotero Almaguer-Valenzuela, E. Alanis, Carlos M. Cabrera

Simulation of a silicon photonics C-band and L-band OFDM demultiplexer, Yessica Rumioldo, FEEC, UNICAMP, Brazil. We report a compact filter spanning the C and L bands for demultiplexing an OFDM signal using the fast Fourier transform with 4 subcarriers with frequency separation of 25 GHz. The device is designed in a silicon photonics platform using compact 2+2 directional couplers.

Magnetic-field sensor based on a two core fiber and Fe3O4 magnetic fluid, Ivan Hernandez-Romano, Cristian J. De Matos, Universidad Presbiteriana Mackenzie, Brazil. A magnetic field sensor based on a two-core fiber and magnetic fluid is demonstrated. A sensitivity of 4.86 pm/oe was achieved by measuring the displacement of spectral features associated with intercore coupling with magnetic field.

Optical and Thermal Characterization of High Reflective Surface with Applications in Thermal-Solar Technology, Juan Daniel Macias, Jorge Andres Ramirez Rincon, Francisco Ivan Lima Tave, Oscar Eduardo Ares Muza, Genko Oskam, Ronaldo De Coas Gomez, Jose Alberto Alvarado Gil, CONVASTUV, Unidad Merida, Mexico. Selective solar absorbing coating consists of a high thermal reflectance layer and high solar absorption layer deposited over a substrate. In this work optical and thermal properties of high reflective surface were characterized with infrared photothermal radiometry and photoacoustic spectroscopy.

Comparison of 10 x 40 Gbps and 8 x 50 Gbps WDM system for next-generation Ethernet operating at 400 Gbps, Pablo Torres-Ferrera, Osvaldo Fernandez-Segura, Ramon Gutierrez-Castrojgon, Univ Nacional Autonoma de Mexico, Mexico. Technical feasibility of 1040 and 8x50 10-km pre-amplified systems is demonstrated for BER≤1E-13 with channel spacing of 800GHz and a minimum laser power of +7.7dBm. The latter system is recommended for implementing 400 GBE

Approximated Analysis of Multimode Interferometers Based on Non ConventionalWaveguides, Ana Julia Oliveira, Anderson Dourado-Sinando, Vitaly Felix Rodrigues Esquerre, Cosme Estauquito Rubio Mercedes, Universidade Federal da Bahia, Brazil. The coupling length of multimode-interferometers based on non-conventional waveguides has been calculated by using the finite-element and approximated methods, for different geometrical configurations in the optical telecommunication frequencies.

Variation of the Zero-Dispersion Wavelength with bending Radius in Dispersion Shifted Fibers, A. Alejandro-Molina, A. Leoncio-Molina, G.I. Molina, A. Alexander Perez Ramirez, Hug E. Hernandez Figueroa, Hug L. Fragignto, Departamento de Comunicaciones, Universidad Estadal de Campanas, Brazil. Department of Electrónica Quântica, Universidad Estadal de Campanas, Brazil. We analyze the dependence of the zero-dispersion wavelength, on the bending radius (Rb) in dispersion shifted fibers. We obtain good agreement between our simulations using the Finite Element Method (FEM) and measurements of zero-dispersion wavelength as a function of Rb.

Generation of attenuation and gain bands in a prism-excimer-lithium-thulium fibre optic system, Maribel Juarez, Centro de Investigaciones en Optica AC, Mexico. PrYb-doped fibre produced white light that passed through a spliced Ti:dumped fibre that generated attenuation and gain bands when pumped with IR. A laser cavity formed in this way might be intra-cavity modulated to produce pulses.

A ring cavity Erbium doped fiber laser with gain medium was experimentally designed in a silicon photonics platform using the Finite Element Method (FEM) and the z-scan technique at 532nm with 26ps pulses. A sensitivity of 4.86 pm/oe was achieved by measuring the displacement of spectral features associated with intercore coupling with magnetic field.

Bond-Hyperpolarizability Model, Andrea C. Monaldi, Andrea Cid Bartolomeu de Araujo, servando Lopez-Aguayo, Sergio C. Valdez, Sotero Almaguer-Valenzuela, E. Alanis, Carlos M. Cabrera

Variation of the Zero-Dispersion Wavelength for next-generation 100 Gbps Ethernet. Jhonattan Cordoba Ramirez, Ana Juliana da Silva, Tiago Lobato, Departamento de Ensenanza, Instituto Federal de Alagoas, Brazil; Instituto de Fisica, Universidad Federal de Alagoas, Brazil; Nucleo de Ciencias Exatas, Universidad Federal de Alagoas, Brazil; Centro de Tecnologia - CTIC, Universidad Federal de Alagoas, Brazil; Laboratorio de Computacion Cientifica y Visualizacion - LCCV, Universidad Federal de Alagoas, Brazil; Con-sidering nonlinear aniterior Kerr nonlinearity, the propagation of a partially coherent optical beam is theoretically investigated by using extensions of the nonlinear Schrodinger equation (NLSE) and a phase-diffusion model.

Group Theory Description of the Simplified Bond-Hyperpolarizability Model, Adalberto Alejo-Molina, Kurt Hingerl, Hendradi Hardi-henata, Julio De Jesus Monroy, Nerea Canales, Lamberto A. Coello, Centro de Investigacion en Ingenieria y Ciencias Aplicadas, Universidad Autonoma del Estado de Morelos, Mexico; Optica, Instituto Nacional de Astrofisica Optica y Electronica, Mexico. We discuss the symmetry group generated using the simplified bond-hyperpolarizability model (SBHM) for second harmonic generation (SHG) in silicon surfaces. We found that group theory (GT) and SBHM agree under certain conditions.
LMA4.22 Analysis of seismoacoustic activity based on using optical fiber classifier, Valery Korotkov, Victor M. Denisov, Andrey V. Timofeev, Optical-Electronic Devices and Systems, ITMO University, Russia. This paper presents results of development of the method of seismoacoustic activity based on use of vibrosensitive properties of optical fiber.

LMA4.23 Interaction of PC/PC Interface and Guided Modes in 2D Photonic Crystals, Francisco Marconi, Jorge A. Gaspar-Armenta, Felipe R. Mendietza, Alberto M. Suarez, Centro de Investigaciones en Optica, Mexico; Departamento de Investigación en Fisica, Universidad de Sonora, Mexico; Facultad de Ciencias Fisico-Matemática, Universidad Autónoma de Tamaulipas, Mexico. This paper presents new results of the interaction and coupling of electromagnetic intermode channels with photonic crystal waveguide modes is investigated.

LMA4.24 The Development of Magneto-optical Interconnect and Magneto-optical Computing, Maurice McGlashan-Powell, Univ. of Technology, Jamaica. This presentation delineates the research and development of an optical interconnect system or and optical plane based on the magneto-optic effect or Faraday Effect as well as the development of magneto-optical logic device and computing elements necessary to build a magneto-optical computer.

LMA4.25 Diffraction Properties of Polar Walsh Functions as Amplitude Masks Using a DMD, Vanessa García Pineda, Daniel Cátaro, María Isabel Álvarez, Erick Reyes, Juan Botero, Nelson Correa, Instituto Tecnológico Metropolitano, Colombia; Departamento de Ingeniería Electrónica y Telecomunicaciones, Universidad de Antioquia, Colombia. The diffraction properties of amplitude masks using polar Walsh functions as transmission were studied. A digital micromirror device was used for amplitude light modulation and potential applications in micromanipulation and imaging were discussed.

LMA4.26 Nonlinear phase shifts in a two-core fiber, Nestor Lozano-Cristosomo, Julio C. Garcia-Melgar, Daniel A May-Arrao, José Javier Sánchez-Mondragón, Gislad P. Agrawal, Departamento de Óptica, INAOE, Mexico; Departamento de Ingeniería Electrónica, Universidad Autónoma de Tamaulipas, Mexico. We derive an exact analytical expression for the nonlinear phase shift of an optical pulse propagating in a two-core fiber (TCF) with single-pulse excitation.

LMA4.27 Infrared properties of tellurite glasses co-doped with Er3+ and Yb3+, Roberto Nario García, Jesús J. Leal, Haggai Derssimma, Diego Marcon, Eugenio Rodriguez, K. Linganna, Elia De la Rosa, Grupo de Nanoafonomía y Materiales Avanzados, Centro de Investigaciones en Óptica, A.C., Mexico; Instituto Politécnico Nacional CICATA- Unidad Atlamex, Mexico; Universidad Federal do ABC, Brazil; Phys. Soc. Ver-Latecara, Univ. India E.T.H Zurich, co-doped tellurite glasses were fabricated. The thermal and optical properties of the tellurite glasses were studied. The presented glasses are potential candidates for the development of lasers and optical amplifiers.

LMA4.28ively induced metallic oxides by using femtosecond laser pulses at high repetition rates, Santiago Camacho-López, Marco A. Camacho-López, Miroslava Cano-Lara, Yasin Espada-Ba-Chui, René I. Rodríguez-Beltran, Optics, CICESE, Mexico; Facultad de Química, UAMex, Mexico. Is laser processing was performed in transition metals thin films. We demonstrated that it is possible to form a series of metallic oxides of well-defined stoichiometry and crystalline structure by finely tuning the laser irradiation parameters.

LMA4.29 Pulsed Laser Deposition of PbTe in Monopulse and Multipulse Regime, Fernando C. Aluia, Luis V. Ponce, Teresa Flores, Yonis Peñaloza, Instituto de Física, Benemérita Universidad Autónoma de Puebla, Mexico; Escuela de Ingeniería y Tecnología de Información, Tecnológico de Monterrey, Campus Puebla, Mexico. A chiral metamaterial, having a basis of four twisted U-shaped metal inclusion, is proposed. The designed metamaterial possesses negative refractive index with low losses in a wide frequency interval.

LMA4.30 Design of High-Image-Quality and Ultra- Efficient OLED Display with Micro-Lens Array Films, Hong Yan Liun, Chun-Che Ma, Shing-Jung Wu, National Taiwan Univ., Taiwan. Based on our calculation, blue light of OLED caused by micro-lens array films can be effectively re-directed by our design of pixel pitch and substrate thickness. This approach shows a possibility of applying MAO to OLED for display application without image degradation.

LMA4.31 Numerical analysis of gold nanorods as element of binary metasurface hologram for visible light, Daniel Maza-Lara, Miguel Eduardo Mora-Ramos, Univ Catolica de Chile, Chile. We numerically analyze straight gold nanorods as element of a binary-phase metasurface working in the visible regime. The designed hologram has resonance on 640 nm and wavelength band of ~ 130 nm.

LMA4.32 Carbon Paste Microelectrodes Microfabrication Using a Low-Cost Laser, Jeju López, Mathieu Hauetteville, Aaron Cruz-Ramírez, Departamento de Física, Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico. A simple fabrication method for carbon paste electrode fabrication on acrylic substrate is presented. Carbon paste is used to fill microman scale, laser-etched channels in the plastic for a low-cost alternative of microcircuits development on polymers.

LMA4.33 Characterization of a Yellow Emitting QD-LED, Carlos Basilio, Jorge Oliva, Tatiana Lopez-Luke, Alberto de la Rosa, Photonics, Centro de Investigaciones En Óptica A.C., Mexico. We report yellow electroluminescence of a QD-LED using a hybrid structure. AlQ3 was used as electron injection layer and CoFe QDS as emitters. The device has Commission Internationale de l’Enclairage (CIE) coordinates of (0.429, 0.493).

LMA4.34 Large Asymmetric Fluctuations in the Resonance Fluorescence of a Three-Level Atom, Hector M. Castro-Beltran, Luis Gutierrez, Eric R. Marquina-Cruz, Univ. Autónoma del Estado de Morelos, Mexico. The quadrupole fluctuations of the fluorescence of the weak transition of a biatomically driven V-type three-level atom are shown to be asymmetric and giant under conditional homodyne detection, signaling non-Gaussian fluctuations.

LMA4.35 Revisiting the Signal to Noise Ratio as a Criterion for the Detection Effectiveness of Remote Sensing Efficiency, Alexander Kanarikov, Carlo N. Revisiting the Signal to Noise Ratio as a Criterion for the Detection Effectiveness of Remote Sensing Efficiency, Mohammed Elsayed De La Rosa, Centro de Investigaciones en Optica AC, Mexico. This work presents the main criteria to be considered when Surface Enhancement Ramann Scattering substrate is used to detect low molecules concentrations. A comparison between hydrophilic and hydrophobic substrates is presented.

LMA4.36 Indirect-Exciton-Related Optical Properties in Atomic-Layer-Doped GaAs Structures, Miguel Eduardo Mora-Ramos, Facultad de Ciencias, Universidad Aut del Estado de Morelos, Mexico. The layered-exciton-related terahertz optical absorption in atomic-layer-doped GaAs structures is studied. Effective mass and the two-level rotating wave approximations are used to calculate electron-hole states and absorption coefficient, respectively.

LMA4.37 Superposition effect is always a detector’s response, hence LOCAL, wave amplitudes do not interact, Chandra Roychoudhuri, Physics, Univ. of Connecticut, USA. The superposition effects are local. The size of the photo detecting molecules is orders of magnitude smaller than wavelengths of light. Further, wave equations imply, wave amplitudes do not re-organize the amplitudes without detecting molecules.

LMA4.38 A plasmonic mode in a photonic crystal waveguide that involve a dispersive left handed material, Hector Perez, Alberto Mendoza, Universidad Michoacana de San Nicolas de Hidalgo, Mexico. We determine a plasmonic surface mode under TE polarization in a photonic crystal waveguide made of two PEC flat surfaces and a periodic array of circular inclusions of dispersive LHMs.
A novel deep-UV polymer for integrated photonics: from waveguides structures to taper-wavesguides coupled to cascade of multistage resonators used as thermal sensors, Rigoberto Castro1, Bruno Bechel2, Nolwenn Huby1, ‘Bio-médica, Centro de Investigaciones en Óptica, Mexico; 1IPR, Université de Rennes 1, France. An overview of current research on integrated photonics based on the new UV210 phot-oresist is given. We report the overall design, fabrication and characterization of waveguides structures, multistage microresonators and their potential as thermal sensors.

Asymmetrical propagation of light in triangular-lattice silicon photonic crystals, Davi Franco Régo1, Vitaly Felix Rodrigues Esquerre2, Instituto Federal de Bahia, Brazil; 2Universidade Federal de Bahia, Brazil. Photonic crystals are ideal for building devices that exhibit asymmetrical propagation of light. We demonstrate asymmetrical behavior of light on air-holes-on-silicon and silicon-rods-on-air triangular-lattice, linear, non-magnetic photonic crystals structures by an efficient numerical simulation.

Towards Quantum Process Tomography of an Optical Quantum Gate, Connor M. Kupchak1, Stony Brook, Stony Brook, USA. Here, we investigate the slowdown of low-light intensity pulses under the conditions of electromagnetically induced transparency (EIT) using homodyne tomography measurement techniques. This technique is necessary for performing quantum process tomography for characterizing quantum systems.

TLA interacting with two perpendicular cavities, Julia César García Melgarío1, José Javier Sánchez-Mondragón1, Nestor Lozano-Cristóstomo1, Inst Nat Astrophys Optica Electronics, Mexico. We describe a system formed by a TLA interacting with two perpendicular cavities. This configuration is a suitable tool for studying new phenomena such as coupling between cavities and collapses and revivals with Fock states.

Value of optical information space, Elena Zvereva1, Eugene Lebedko1, Kirill V. Trifonov2, Optical-Electronic Devices and Systems, ITMO University, Russia. Informational model of the signal optical-location space and determination of the informational value of the random parameters of the space for different distributions is considered in this text.

Polymeric Capillary Optical Resonator Sensors, Ruben Alexander Avila Padilla1, 2Laboratory of Optical and Information, University Popular of Cesar, Columbia; 1Institute of Physics, University of Campinas, Brazil. In this letter a humidity and pressure PMMA capillary Whispering-Gallery Resonator sensors are developed. The experimental results show a sensitivity of 0.07 nm/% RH for the humidity sensor and a sensitivity of 0.36 nm/bar for pressure sensor.

Embedded System for Fiber Bragg Gratings Peak Detection and Analysis, Fabio Junior Alves Batista1, Frederic Conrad Janzen1, Jose Ricardo Galvao1, Cicero Martelli1, PPGEE, Federal University of Technology - Parana, Brazil; 2CPGEI, Federal University of Technology - Parana, Brazil. This paper presents the development and results of an embedded software in an ARM Cortex A8 microcontroller for Fiber Bragg Gratings (FBG) peak detection, peak displacement analysis and I/O integration possibility.

Towards Quantum Process Tomography of an Optical Quantum Gate, Connor M. Kupchak1, Stony Brook, Stony Brook, USA. Here, we investigate the slowdown of low-light intensity pulses under the conditions of electromagnetically induced transparency (EIT) using homodyne tomography measurement techniques. This technique is necessary for performing quantum process tomography for characterizing quantum systems.
Development of Fiber Optic Micro-Tapers for Sensing Applications, Edward T. Connor1, yttr Corporation, USA. An automated approach for manufacturing micro and submicron tapers using a high precision glass processor with an integrated handling system is described. This approach produces tapers with tighter specifications, improved reliability, and high repeatability.

TLA Interacting with Two Perpendicular Cavities, J.C. Garcia-Melgarejo1, N. Lozano-Cisostomo2, P. Rodriguez-Montenegro2, J. Sanchez-Mondragon2, Instituto Nacional de Astrofisica, Optica y Electronica, Mexico. We describe a system formed by a TLA interacting with two perpendicular cavities. This configuration is a suitable tool for studying new QED phenomena such as coupling between cavities and collapses and revivals with Fock states.

Extremely Nondegenerate 2-Photon Processes for Mid-IR Detectors and Sources, David J. Hagan1, Eric W. Van Stryland2, Univ. of Central Florida, CREOL, USA. We demonstrate that highly nondegenerate 2-photon absorption in semiconductors, which is strongly enhanced over the degenerate case, allows sensitive gated Mid-IR detection and ranging. The inverse process of 2-photon emission offers potential for tunable mid-IR sources.
LTu1A • Fiber Optics and Optical Communications 1—Continued

LTu1A.4 • 09:15 Invited
Photonic Sensors: From Crude Oil to Engine Monitoring, Cicero Martelli1, Marco da Silva1, Jean C C da Silva1, Rigoberto Morales1, Daniel R. Pipa1, Erlon V. Silva1, Carlos R. Zamaraia2, Virginia Barontini1, Felipe Mezzadri1, Rodolfo Patyk1, Guilherme Dutra1, João Bazo1, Tiago Vendruscolo1; 1Graduate School on Electrical Engineering and Applied Computer Science, Federal Univ. of Technology - Parana, Brazil; 2Dept. of Mechanical Engineering, Federal Univ. of Technology - Parana, Brazil; 3Electrical and Electronic Engineering Dept., Public Univ. of Navarra, Spain. A variety of photonic sensors is used to monitor industrial processes related to oil and engine industries. Single point, quasi-distributed and distributed optical sensors are demonstrated to be robust and reliable tools for one, two and three dimensional imaging of physical.

LTu1B • Quantum and Nano Optics, Photonics and Electronics 4—Continued

LTu1B.3 • 09:15 Invited
Non-Markovianity through Accessible Information, Felipe F. Fanchini1, Göktağ Karpat1, Baris Çakmak2, Leonardo Castelano2, Gabriel Aguilar3, Oswaldo Jimenez Farias4, Stephen Walborn4, Paulo Souza Ribeiro4, Marcos de Oliveira4, 1Universidade Estadual Paulista, Brazil; 2Universidade Federal de São Carlos, Brazil; 3Universidade Federal do Rio de Janeiro, Brazil; 4Instituto de Física Gleb Wataghin, Brazil. We propose an entanglement-based measure of non-Markovianity by employing the concept of assisted knowledge, where the environment E, acquires information about a system S, by means of its measurement apparatus A. We demonstrate that the signatures of non-Markovianity can be captured by the nonmonotonic behavior of the assisted knowledge. We explore this scenario through an experimental implementation using an optical approach that allows full access to the state of the environment.

LTu1C • Laser Science and Technology 4—Continued

LTu1C.3 • 09:30 Three-Photon Pumped Anti-Stokes Emission in Random Lasers, Mariana T. Carvalho1, Christian T. Dominguez2, Cid Bartolomeu de Araujo1, Paras N. Prasad3, Anderson S. L. Gomes4; 1Departamento de Fisica, Universidade Federal de Pernambuco, Brazil; 2Laboratório de Óptica Biomédica e Imagem, Universidade Federal de Pernambuco, Brazil; 3Inst for Lasers, Photonics and Biophotonics, The State Univ. of New York, USA. We present two three-photon pumped RL Upconverted emission was obtained using a colloidal system (APPS+TiO2) and a ZnO-on-Si nanostructured film platform. We demonstrate the presence of intensity threshold and linewidth narrowing.

LTu1D • Nonlinear Optics 1—Continued

LTu1D.3 • 09:15 Tutorial
Liquid Crystal Lasers, Bahman Taheri1; 1AlphaMicron Inc., USA. In this talk we survey the development of lasing in liquid crystals with an emphasis on cholesteric liquid crystal systems. We present the current effort in the area and potential applications for the system.

10:00–10:30 Break, Exhibit Hall (Goya/Greco)
Tuesday, 18 November

10:30–12:30
Plenary Session 2

LTuP1 • 10:30  Plenary
An Atomic Hong-Ou-Mandel Experiment, Alain Aspect1; Institut d’Optique, France. The intriguing Hong-Ou-Mandel effect is due to quantum interferences between two photons amplitude. We have observed this effect with pairs of He\(^+\) atoms. This opens the path towards studying, with massive particles, yet more counterintuitive quantum effects based on such interferences.

LTuP2 • 11:15  Plenary
Pushing the Boundaries of Silicon Photonics, Michal Lipson1; School of Electrical and Computer Engineering, Cornell University, USA. Photonics on chip enables monolithic integration of optics and microelectronics for applications such as optical interconnects in which high data streams are required in a small footprint.

12:30–14:45
Picasso

LTu2A • Integrated and Silicon Photonics 1
Presider: Sasan Fathpour; Univ. of Central Florida, CREOL, USA

LTu2A.1 • 12:30  Tutorial
Chip-scale Filters, Switches and Mixers in Silicon Photonics, Shayam Mookherjea1; Univ. of California San Diego, USA. We present examples of silicon photonic devices using electro-optic or thermo-optic effects in waveguides, interferometers and compact micro-resonators for high dynamic range tunable filters, wide-bandwidth switches, and wavelength converters using carrier-swept fourwave mixing.

LTu2A.2 • 13:15  Tutorial
Silicon based Integrated Photonic Devices for optical Interconnects and Biosensing Application, Ray Chen; Univ. of Texas Austin, USA. On chip devices for intra-chip and inter-chip optical interconnects with clock-rate 0.88 THz at 1.55-micron are demonstrated. Utilization of slow light on photonic-crystal-waveguide for early breast and lung cancer detection and drug screening are presented.

12:30–14:30
Miro

LTu2B • Quantum and Nano Optics, Photonics and Electronics 5
Presider: Andrew Jordan; Univ. of Rochester, USA

LTu2B.1 • 12:30  Tutorial
Electromagnetic Vacuum, Single Photons and Plasmonics, Girish S. Agarwal1, Oklahoma State Univ., USA. The modification of the quantum vacuum by the plasmonic structures has profound implications for single photon processes like spontaneous emission, dipole-dipole interactions, spin orbit effects. These structures even though lossy exhibit two photon interference.

LTu2B.2 • 13:15  Invited
Macroscopility and Localization in the Measurement Space, Andrei B. Klimov1, Universidad de Guadalajara, Mexico. The concepts of macroscopicity and localization for large quantum systems is discussed and analyzed in relation with the asymptotic evolution in the measurement space under action of random and chaotic Hamiltonians.

LTu2B.3 • 13:15  Invited
Planar CMOS Compatible Photonics Molecules and Spectral Engineering, Newton C. Frateschi; Universidade Estadual de Campinas, Brazil. Silicon based planar photonic molecules are shown to be effective for spectral engineering. We demonstrate optical carrier recycling, potential for modulation beyond resonator line width, and efficient signal multicasting all with small footprint structures.

12:30–14:30
Del Prado

LTu2C • Designed Structures in Micro and Nano Dimensions for Photonics and Electronics 4
Presider: Cecilia Noguez; Univ Nacional Autonoma de Mexico, Mexico

LTu2C.1 • 12:30  Tutorial
Title TBD, Elder De la Rosa; Centro de Investigaciones en Optica AC, Mexico. Abstract not available.

LTu2C.2 • 12:45  Distinguished Young Researcher
Engineering light with plasmonic metasurfaces, Israel De Leon1, Sebastián A. Schulz1, Ebrahim Karimi1, Jeremy Upham2, Robert W. Boyd1; Physics, Univ. of Ottawa, Canada. The modification of the quantum vacuum by the plasmonic structures has profound implications for single photon processes like spontaneous emission, dipole-dipole interactions, spin orbit effects. These structures even though lossy exhibit two photon interference.

LTu2C.3 • 13:15  Invited
Second Harmonic Light Scattering from Symmetric and Asymmetric Dipole Nanotriangles, Domenica de Ceglia1, Maria Antonietta Vincenti2, Castantino De Angelis2, Andrea Locatelli1, Joseph W. Haus1, Michael Scalora1; Charles M. Bowden Research Center, AMRDEC, RDECOM, National Research Council, USA. We investigate second-harmonic scattering from symmetric and asymmetric metallic dipole nanoantennas with very small gaps. We clarify the role of field enhancement, antenna modes and symmetry on intensity and direction of the radiated second-harmonic light.

LTu2D • Nonlinear Optics 2
Presider: Anderson S. Gomes; Universidade Federal de Pernambuco, Brazil

LTu2D.1 • 12:30  Tutorial
Multipolar Nonlinear Optics with Metallic Nanoparticles, Emeric Bergmann1, Anthony Maurice1, Isabelle Russier-Antoine1, Christian Joinin1, Emmanuel Benichou1, Pierre F. Brevet1, Inst. itut Lumiere Matiere, ILM UMR CNRS 5306, Univ. Claude Bernard Lyon 1, France. The quadratic and cubic nonlinear optical responses from metallic nanoparticles with different sizes and shapes have been obtained at the level of ensembles and single particles. A multipolar analysis of this response is performed.

LTu2D.2 • 13:15  Invited
Second Harmonic Light Scattering from Symmetric and Asymmetric Dipole Nanotriangles, Domenica de Ceglia1, Maria Antonietta Vincenti2, Castantino De Angelis2, Andrea Locatelli1, Joseph W. Haus1, Michael Scalora1; Charles M. Bowden Research Center, AMRDEC, RDECOM, National Research Council, USA. We investigate second-harmonic scattering from symmetric and asymmetric metallic dipole nanoantennas with very small gaps. We clarify the role of field enhancement, antenna modes and symmetry on intensity and direction of the radiated second-harmonic light.
weberin these structures. The contribution of several factors is considered in the analysis of the refractive index change in these structures.

Photonic Design Assisted by Closed Form Propagators, Blas M. Rodríguez-Lara, F. Soto-Eguibar; "INAOE, Mexico. We explore the design of photonic devices, including, but not limited to, uni-, bi-directional and isospectral couplers and loaded multiplexors, in arrays of coupled waveguides influenced by analogies from quantum mechanics.

The Surface Plasmons Resonances in the Visible Range of a Sensor Element of SnO2 Thin Films, Narciso Muñoz-Aguirre, Jesus E. Rivero-López, Fernando Ortiz-Herrera, Elsa Y. Saucedo-Camacho, Lila Martínez-Pérez, Severino Muñoz-Aguirre; "Sección de Estudios de Posgrado e Investigación, Escuela Superior de Ingeniería Mecánica y Eléctrica-UA., Instituto Politécnico Nacional, Mexico; 2Unidad de Ingeniería Mecánica y Eléctrica-UA., Instituto Politécnico Nacional, Mexico; 3Centro de Investigación en Óptica, UNAM, Mexico. The Surface Plasmon Resonances of a sensor element of tin dioxide thin films in the range of 375-800 nm wavelengths will be presented. The Surface Plasmons Resonance spectra were measured at Attenuated Total Reflection experimental configuration.

Non-Conventional Receivers for Applications in Coherent Optical Communications, Francisco E. Becerra Chavez; "Physics, Univ. of New Mexico, USA. We demonstrate a non-conventional receiver discriminating multiple coherent states with error rates far below the ideal heterodyne measurement limit in the regime of many photons. We also discuss its potential for optical communications.

Real-Time Reflectance Anisotropy Spectroscopy of MBE AlAs/GaAs Interfaces, Lucy E. Tapia, Alfonso Lastras-Martínez, Luis Felipe Lastras-Martínez, Raul Eduardo Balderas-Nava, Jorge Ortega-Gallegos, Oscar Nuñez-Olvera; "Universidad Autónoma de San Luis Potosí, Mexico. We report on a study of the first stages of the MBE growth of AlAs/GaAs by real-time Reflectance anisotropy spectroscopy and Singular Value Decomposition analysis of spectroscopy line shapes.

Curved and Self-Healing Discharges Guided by Optical Beams, Matteo Clerici, Yi Hu, Philippe Lassonde, Carles Milian, Arnaud Couairon, Demetrios N. Christodoulides, Zhigang Chen, Luca Razzari, François Légaré; "School of Engineering and Physical Sciences, Heriot-Watt University, UK; 3Centre de Physique Theorique, CNRS, Ecole Polytechnique, France; 4College of Optics – CREOL, University of Central Florida, USA; 5Department of Physics and Astronomy, San Francisco State University, USA; 6TEDA Applied Physics School, Japan. We demonstrate that electric discharges can be laser guided along curved paths, avoiding obstacles in the line of sight. Furthermore we show that discharges guided by Airy beams have the ability to self heal in case of interruption.

Nonlinear interactions among higher order modes in microstructured fibers, Maria del Rocío Camacho, Raul Rangel-Rojo, Karina Garay-Palmett; "Departamento de Optica, Centro de Investigación Científica y de Educación Superior de Ensenada, Mexico. We have identified conditions for the generation of nonlinear processes that involve the interaction among higher-order modes in microstructured fibers. Experimental results demonstrate third harmonic generation on a microstructured fiber pumped with a Ti:Sapphire laser.

Direct femtosecond laser writing of patterns in silver nanoparticle system embedded in silica using nonlinear microscopy, Jacob Licea-Rodrigues, Israel Rocha-Mendoza, Raul Rangel-Rojo, Luis Rodriguez-Fernandez, Alicia Oliver; "CICESE, Mexico; 2Instituto de Física, UNAM, Mexico. We study the induction and characterization of structural modifications of composites containing elongated silver nanoparticles embedded in silica, using laser scanning nonlinear optical microscopy. Both the writing process and characterization are presented and discussed.
Based electronic-photonic circuit blocks with characteristics of the transistor laser, discusses a fundamental circuit element for electronic-light-emitting transistor (LET) shows promise as Light-Emitting Transistor,

Hybrid Silicon Photonic Platforms for Near- and Mid-Infrared Wavelengths, Sasan Fathpour1,2; CREOL, The College of Optics and Photonics, Univ. of Central Florida, CREOL, USA, 2Dept. of Electrical Engineering and Computer Science, Univ. of Central Florida, USA. The standard silicon-on-insulator (SOI) waveguide technology has certain shortcomings for near-infrared and more importantly mid-infrared applications. Demonstrated novel hybrid platforms on silicon substrates (namely, thin-film lithium niobate, silicon-on-nitride and air-clad) will be introduced and discussed.

On-chip optical squeezing and quantum correlations, Ark Dutt1, Kevin Luke2, Alexander L. Gaeta3,4, Paulo A. Nussenzveig3, Michel Lipson5,6; Cornell University - School of Electrical and Computer Engineering, USA; 5School of Applied and Engineering Physics, Cornell University, USA; 6Instituto de Física, Universidade de Sao Paulo, Brazil; 4Kavli Institute for Nanoscale Science, Cornell University, USA. We present optical twin-beam squeezing from a CMOS-compatible on-chip optical parametric oscillator operating above threshold. At higher pump powers, we observe correlations among modes in the generated frequency comb.

Quantum-classical Analogies in Photonic Lattices, Blas M. Rodríguez-Lara1, Hector Moya-Cessa7; 1Optics, INAOE, Mexico. We analyze classical propagation in several configurations of waveguide arrays and, by using Schroedinger-like equations, show that these systems may mimic quantum systems such as Lewis-Ermakov systems, SUSY and Majorana dynamics.

Presence of Fano-like resonances into the birefringence of plasmonic materials, Jorge-Alejandro Reyes-Esqueda1, Physics Inst., UNAM, Mexico. Experimental and modeling results show how the birefringence for anisotropic plasmonic nanocomposites vanishes at plasmon resonances, giving place to a Fano-like response dependent on the nanocomposite’s symmetry.

Silica Nanowires for UV Light Generation and Sensing, Gilberto Brambilla1; Optoelectronics Research Centre, Univ. of Southampton, UK. Because of the strong confinement and large refractive index contrast, silica nanowires can efficiently generate light in the UV through intermodal phase matching. Similarly, the fraction of power in the evanescent field allows for many applications in sensing.

Dicke Oscillation From Transparency to Turbidity, Ruben G. Barrera1, Edali Gutierrez-Reyes2, Augusto Garcia Valenzuela3; 1Univ Nacional Autónoma de Mexico, Mexico, 2Benemérita Univ Autónoma de Puebla, Mexico. After a brief review of the effective medium approach in colloidal optics we present extended Fresnel’s formulas for the reflection amplitudes that are valid for both transparent and turbid colloids.

Experimental and modeling results show how the birefringence for anisotropic plasmonic nanocomposites vanishes at plasmon resonances, giving place to a Fano-like response dependent on the nanocomposite’s symmetry.

Silica Nanowires for UV Light Generation and Sensing, Gilberto Brambilla1; Optoelectronics Research Centre, Univ. of Southampton, UK. Because of the strong confinement and large refractive index contrast, silica nanowires can efficiently generate light in the UV through intermodal phase matching. Similarly, the fraction of power in the evanescent field allows for many applications in sensing.
Silicon Carbide Photonics, Qing Lin1; 1Univ. of Rochester, USA. In this talk, we provide an overview of our recent progress in developing high-quality silicon carbide micro/nanophotonic devices and exploring nano-optomechanics and nonlinear photonics on this platform.

Touristic Option (Casa de los Azulejos)

LTu3A.3 • 17:15
Silicon Carbide Photonics, Qing Lin1; 1Univ. of Rochester, USA. In this talk, we provide an overview of our recent progress in developing high-quality silicon carbide micro/nanophotonic devices and exploring nano-optomechanics and nonlinear photonics on this platform.

Nanoparticles were synthesized through a plant extraction. Z-scan curves were reproduced with a model that takes into account the nonlocality of nanoparticles in colloidal solution. The nonlinear refractive index of silver nanoparticles in colloidal solution was measured. The results show that emission intensity increases in the color coordinate .

Nanoellipsoids, or nanoellipsoids, are inferred from the analytical solution. The quantum Rabi model is integrable due to a discrete (parity) symmetry. Qualitative aspects of its spectrum and dynamics are inferred from the analytical solution. The same mathematical technique can be applied to non-integrable generalizations with an arbitrary number of qubits.

Analytical Solution of the Rabi and Dicke Models: Daniel Brazil1; 1Inst. of Physics, Universidad Autónoma de Barcelona, Spain; 2Faculty of Science, University of Guelph, Canada. We use four-wave mixing in an atomic system to generate twin beams and study the effect of size of the spatial correlations, or coherence area.

Spatial Properties of Entangled Twin Beams, Alberto M. Márquez1,2; 1Brasilia School of Physics, Brazil. We report the results on the nonlinear optical response of SWCNTs deposited on an optical fiber using an experimental setup of a high-power pulsed erbium-doped fiber amplifier. We report the results on the nonlinear optical response of SWCNTs deposited on an optical fiber using an experimental setup of a high-power pulsed erbium-doped fiber amplifier.

Analytical Solution of the Rabi and Dicke Models: Daniel Brazil1; 1Inst. of Physics, Universidad Autónoma de Barcelona, Spain; 2Faculty of Science, University of Guelph, Canada. We use four-wave mixing in an atomic system to generate twin beams and study the effect of size of the spatial correlations, or coherence area.
Tuesday, 18 November

LTu4A.9 Simultaneous existence of the zero-$\chi$ and zero-$\theta$ gaps in metamaterial-polariton phononic superlattices, Edwin Moncada1, Jorge B. Salazar-Gomez1, Juan C. Granada E.1, Solange B. Cavalcanti1,2, Universidade de Dalca, Colombia; 1Instituto de Fysica, Universidade Federal de Alagoas, Brazil. We have found the possibility to have the simultaneous existence of the zero-$\chi$ and zero-$\theta$ gaps in phononic superlattices composed by alternating layers of negative refractive index metamaterial and polaritonic material.

LTu4A.10 Simple Technique for the Perfect Vortex Generation, Joaquin Garcia1, Carolina Rickenstorf Parras1, Andrey S. Ostrovsky1, 2Facultad de Ciencias Fisico Matematicas, Benemerita Univ Autonoma de Puebla, Mexico. We propose an improved technique for generating the perfect optical vortex, notable for the simplicity of its practical realization and the high quality of the results that is applied to an optical trapping experiment.

LTu4A.11 Random-Period LPG for Broadband Reshaping of Edibum-Doped Fiber Emission, Remeo Emmanuel1,_Nurredo Gomez1, Gilberto Anzueto Sanchez1, Alejandro Martinez-Rios1, Romeo Selva Aguilar1, Jesus Castrellon Urbe1, Tecnologia Electrica, Centro de Investigacion en Ingenieria y Ciencias Aplicadas, Mexico; 2Optica, Centro de Investigaciones en Optica, Mexico. Fabrication of a Random-Period LPG was used to study the laser emission of an Erbium-doped fiber superlattices by alternating layers of negative refractive index metamaterial and polaritonic material.

LTu4A.12 Random Laser Action in Dye Doped-films Deposited on Ga2O3 Arranged in a Surf-archike Nanostuctures, Christian T. Dominguez1, Andrey. S. Ostrovsky1, 1Facultad de Investigaciones en Óptica, A. C., Mexico; 2Centro de Investigaciones en Optica, Mexico. The light propagation in the microdonut electro-absorption resonator operating under the critical coupling condition. Good agreement with the simulation is obtained by changing the gain profile of the chemical potential. This configuration results in devices with small footprint.

LTu4A.13 Microfabricated induced by laser pulses in bismuth thin films, Adey Reyes1, Matheu Haetefuerle, Loren Romero Salazar1, Alejandro Esparta Garcia1, Oscar Oeza Mejia1, 1Facultad de Ciencias, Universidad Autonoma del Estado de Mexico, Mexico; 2Facultad de Ciencias, Universidad Autonoma Nacional de Mexico, Mexico; 3Centro de Ciencias Aplicadas y Desarrollo Tecnologico, Universidad Nacional Autonoma de Mexico, Mexico; 4Centro Conjunto de Investigacion en Quimica Sustentable, Universidad Autonoma del Estado de Mexico, Mexico. We present experimental results for the formation of microbumps in bismuth thin films using a low-cost laser processing technique. We observe that final results are strongly dependent of the irradiation parameters.

LTu4A.14 The Influence of Laser Irradiation in the Generation of Iron Oxide Films in Commercial Steel Plates, Martín Ortiz-Moreles1,2, Juan Soto-Benítez1,2, Claudio Fausto-Reyes1, Sofia A. Acosta-Ortiz1, Rosario Gonzalo-Mota1, Iliana Rosales-Candelas1, Centro de Investigaciones en Optica, Mexico; 2Instituto Tecnologico de Aguascalientes, Mexico; 3Lasertech S.A. de C.V., Mexico. Magnetite films were generated on commercial steel plates by laser irradiation. These films were characterized by Raman spectroscopy. It is possible to generate iron oxide films on steel plates by laser irradiation.

LTu4A.15 Optical and Thermal Characterization of High Reflection Surfaces with Applications in Thermal-Solar Technology, Jesus Daniel Maclias1, Jesus Andrez Ramirez Rincon1, Francisco Ivan Lizama Tanc1, Oscar Eduardo Ares Muzo1, 1Facultad de Ciencias Fisico Matematicas, Universidad Autonoma de Nuevo Leon, Mexico; 2Brazida reshapin of Spontaneous Excitation (ASE) and laser emission of an Erbium-doped fiber (EDF) by bending a random-period-long period fiber grating (RP-LPG) filter is presented.

LTu4A.16 Graphene-based SOI Micron Anode Resonator as a Platform for Electro-Absorption Modulators, Daniel Neves1, Daniel B. Mazulquim1, Luiz Neto1, 1Facultad de Ingenieria, Universidad Nacional de Pernambuco, Brazil; 2Centro de Investigaciones en Optica, Mexico; 3Instituto Tecnologico de Pernambuco, Brazil. We investigate a graphene-based SOI micron anode electro-absorption resonator operating under the critical coupling condition. Good modulation depth was obtained by changing graphene's chemical potential. This configuration results in devices with small footprint.

LTu4A.17 Rhodamine B Detection by SERS with Urchin-like Gold Nanostuctures in Water Solution, Andrea Cea1, Tzarraa Lopez-Luke1, Alejandro Torres-Castro1, Elder De La Rosa1, Centro de Investigaciones en Optica, Mexico; 2Centro de Investigacion de Nuevo Leon, Mexico. In this work, urchin-like gold nanostuctures obtained by a seed-mediated method, were coated with silica and analyzed as substrates to detect low concentrations of Rhodamine B in water solution, obtaining promising results for SERS applications.

LTu4A.18 Surface Modes In A Metal-2DPC Interface For TM Polarization, Jorge A. Gaspar-Armenta1,2, Francisco Villa1, 1Department de Investigacion, Universidad Nacional Autonoma de Mexico, Mexico; 2Centro de Investigaciones en Optica, A. C., Mexico. Dispersion relation of surface modes in a metal-2D polymeric crystal interface for TM polarization are analyzed and the finite difference time domain method. The mode inside the first bandgap shows small dispersion.

LTu4A.19 A New Approach to Solve the Inverse Scattering Problem Using a Differential Evolution Algorithm in Distributed Fiber Bragg Grating in Fiber Cladding, Daniel B. Mazulquim1, Leo Neron1, Cheman Kortes1, Alejandro S. Paterno1,2, Romeo Selvas-Aguilar1, 1Facultad de Ingenieria, Universidad Nacional de Pernambuco, Brazil; 2Instituto Tecnologico de Pernambuco, Brazil. We propose a simple technique based on a Michelson interferometer. The results open the possibility of tunable chromatic dispersion compensators.

LTu4A.20 Polariization performance of a liquid core fiber, Marco Arce del Hoyo1, Diana Tenti1,2, University of Nuevo Leon, Mexico. The output polarization state of a liquid core single-mode fiber was evaluated. Its variation with the temperature change induced by the light traveling along the core indicates it can be used as a polarization scrambler.

LTu4A.21 Direct measurement of ASE PDG in an EDFA with controlled birefringence and full knowledge of the polarization state of both the input signal and the pump, Luis Salcido1, Diana Tenti1,2, 1Optics, CICESE, Mexico. We present an experimental arrangement allowing the direct measurement of the amplified spontaneous emission PDG generated in the EDFA. PDG values were low and the degree of polarization of signal and pump was not degraded.

LTu4A.22 Analysis of Interfacial Properties of Confined Liquid-Glass Pairs Using Etched Optical Fibers, Violeta A. Marquez-Cruz1, Juan Hernandez-Cordero1, Instituto de Investigaciones en Materiales, Univ Nacional Autonoma de Mexico, Mexico. We demonstrate that interferometry can be used for measuring drop features which are determined by both, surface properties and substrate geometry. In particular, we assess the work of adhesion from different fiber-drop configurations.

LTu4A.23 Reliability of Strain and Temperature Measure- ments Based on Fiber Bragg Gratings Sensors in the Early Age of Concrete Shrinkage (2016-2018), Daniel Ceballos1, Diana Colao1, Felipe Galazara1, Juan David Cepeda1, Cristian Andrias1,2, Diana Andrias1,2, Margarita Varón1,2, 1High frequency electronics and communications research group, Universidad Nacional de Colombia, Colombia; 2Instituto de Telecomunicaciones y Aplicaciones Multimedia, Universidad Politecnica de Valencia, Spain. Reliability of optical fiber Bragg gratings sensors in the early age of concrete shrinkage is presented. The final results are obtained by applying an in situ technique of monitoring deformation of a He-Ne laser by grating in real-time.

LTu4A.24 Measurement of Vocal Folds Displacements using High-Spectral Digital Holographic Interfer- ometry, Maria-del-socorro Hernandez-Montes1, Fernando Medina2, Electronic Design, Universidade de Campinas, Brazil; 3Instituto de Investigaciones en Optica AC, Mexico. An application of high spectral digital holographic interferometry to vocal fold displacement measurement is presented. Vocal Fold displacements are found to be within the range of 0.1 nm - 0.1 mm and the data provided can be of help to increase knowledge on this folded tissue.

LTu4A.25 Chromatic Dispersion Measurement in Side- Hole PCF, Daniel Alejandro Catalo Ochoa1, Vanessa Garcia1, Nelson Coreza1, Erick Reyes1, 1Physics and Mathematics, Autonomous University of New Leon, Mexico; 2Instituto Tecnologico de Pernambuco, Brazil. In this paper the measurement of chromatic dispersion in a novel Side-hole PCF is presented. We chose a simple technique based on a Michelson interferometer. The results open the possibility of tunable chromatic dispersion compensators.

LTu4A.26 Transmitting Atomic Frequency Standards in Optical Fiber Networks, Brazil, ERICK SANTOS1, 1Facultad de Ingenieria, Universidad Nacional Autonoma del Estado de Mexico, Mexico. The optical and thermal properties of high reflection surfaces were characterized with infrared photothermal radiometry and photoacoustic spectroscopy.

LTu4A.27 UV Photodegradation of Biomolecules and Polymers by an Interferometric Technique, Anup Sharma1, 1School of Physics, Frontier Institute of Technology, Sao Paulo, Brazil. We present a simple technique based on UVA laser interferometry. Photodegradation rate is measured by monitoring diffraction of a He-Ne laser by grating in real-time.

LTu4A.28 Measurement of Spectral Folds Displacements using High-Spectral Digital Holographic Interfer- ometry, Maria-del-socorro Hernandez-Montes1, Fernando Medina2, Electronic Design, Universidade de Campinas, Brazil; 3Instituto de Investigaciones en Optica AC, Mexico. An application of high spectral digital holographic interferometry to vocal fold displacement measurement is presented. Vocal Fold displacements are found to be within the range of 0.1 nm - 0.1 mm and the data provided can be of help to increase knowledge on this folded tissue.
Counterpropagating Sagnac optical tweezers as an efficient method for 3D trapping in air, Ivan Galinskiy1, Jose Luis Meza1, Matheu HaueteRuelle1, Universidad Nacional Autónoma de México, Mexico. We constructed a double counter-propagating Sagnac optical tweezers setup using a DVD-RW optical head as the laser source. We demonstrated its efficiency for trapping aerosol particles and show the possibility of measuring particle oscillations.

Characterization of intralipid-10% in the range of 400-700 nm using Light Emitting Diodes, Luis Quintanar1, Elder Rojas-Villafañe1, Suren Stolkal1, José Manuel de la Roza1, Laboratorio de Biofotonica, ESIME ZAC Instituto Politecnico Nacional, Mexico. The optical coefficients of Intralipid-10% have been measured at seven different wavelengths in the visible range using light emitting diodes instead of lasers. Light fluence in phantoms were measure to compare against Monte Carlo simulations.

Theoretical study of iridescence in the jewel beetle (Coloperta Buprestisde), Cristian J. Mora Montano1, Herbert Vink Posada1, Paul Sergio Soares Guimaraes1, Universidad Nacional de Colombia, Colombia; 1Universidade Federal de Minas Gerais, Brazil. We investigated iridescence of the jewel beetle (Coloperta Buprestisde). We obtained FIB images of the internal structure of Elytron beetle and we modeled the structure as a photonic crystal. Through the scattering matrix method the average reflectivity of the structure is estimated.

Novel Semiconductor Optical Amplification Module depth with Low Data-Packet Error for High-Speed Systems, Jesus Alba-Sánchez1, Ramon Gutierrez-Castañon1, 1Inst.of Engineering, Universidad Nacional Autónoma de Mexico-UNAM, Mexico. Through the use of simulations, low amplitude jitter is demonstrated in a proposed SOA-based amplification module that uses a modulated holding beam. The novel sub-system exhibits very good Q-factor for practical amplification levels and for a 25 Gbit/s NRZ data signal.

Novel pumping schemes based on red, diode-laser excitation of fiber lasers for emission in UV, blue and IR, Maribel Jareas2, Centro de Investigaciones en Óptica AC, Mexico. In this work we demonstrate new pumping schemes for lasers based on Tm3+: ZBLAN optical fibers using commercial pumping sources for making fiber lasers in visible (450 nm), infrared (800nm) and ultraviolet (360 nm).

Optoelectronic flexible logic-gate using a chaotic erbium doped fiber laser, experimental results, Juan Hugo Garcia Lopez1, Rider Jaime Roaeta1, Universidad de Guadalajara, Mexico. We implement a dynamically flexible logic-gate using a chaotic erbium doped fiber lasers. Experimental results are presented, which demonstrate the ability to change the type of logic-gate by modifying a threshold control parameter.

Fiber-optic Mach-Zehnder Interferometric Temperature Sensor, Luis C. Cortés1, Daniel Toral-Acosta1, Romeo Selvas-Aguilar1, Alejandro Martinez-Rios1, Arturo Castillo-Guzman1, Daniel Ceballos-Herrera1, Research Center for Physical and Mathematical Sciences, Universidad Autónoma de Nuevo Leon, Mexico; 1Optical Fibers, Centro de Investigaciones en Optica, Mexico. We design an optical sensor based on a Mach-Zehnder all fiber configuration is proposed. The interferometer was fabricated by double tapering a single mode fiber and tested on surrounding liquid media whose temperature was varied showing a high sensitivity of 0.035%/°C.

Polymeric Capillary Optical Resonator Sensors, Duber A. Avila Padilla1, Laboratory optics and informatic, University Popular of Cesar - UNICESAR, Colombia; 1Institute of Physics ‘Gleb Wataghin’, University of Campinas – UNICAMP, Brazil. In this letter we understand and pressure PMMA capillary Whispering-Gallery Resonator sensors are developed. The experimental results shows a sensitivity of 0.07 mm/°R for the humidity sensor and a sensitivity of 0.36 mmbar/°C for pressure sensor.

Anisotropic Elastic-optic Effect in Optical Fibers under Axial Strain: Experimental Observation by means of Whispering Gallery Modes Resonances, Xavier Rosellís-Meche1, Martina Delgado-Pinar1, Antonio Díez1, University of Valencia, Spain; 1Centro de Investigaciones en Optica, Mexico. The experimental characterization of the refractive index anisotropy generated by the elasto optic effect in a conventional optical fiber under axial strain by using WGMs resonances and their tunability with strain.

A comparative study of the optical properties exhibited by organic nanoparticles, inspired by reprecipitation and laser ablation methods, Jorge E. Alba-Rosas1, Laura Aparicio-Ixta1, Gabriel Ramos-Oroz1, Mario Rodriguez1, Jose-Luis Mendoza-Rivera1, Gerardo Gutierrez-Jareas1, J.E. Alba-Rosas1, Centro de Investigaciones en Optica, Mexico; 1Departamento de Ingeniería Física, Universidad de Guanajuato, Mexico. Usually organic nanoparticles (o-NPs) are synthesized by precipitation/microemulsion methods. In this work, o-NPs intended for two-photon fluorescent microscopy were synthesized using reprecipitation and laser ablation methods. A comparative study of their optical properties is presented.

Laser-induced cavity bubble reconstruction based on the Fresnel optical propagation, Luis F. Devia-Cruz1, Victoria Ramos1, Santiago Camacho-Lopez2, 1Víctor Ruiz-Cortes1, Francisco Pérez-Gutiérrez1, Guillermo Aguilar1, Optica, CICESE, Mexico; 2Facultad de Ingeniería, Universidad Autónoma de San Luis Potosí, Mexico; 1Mecatrónica, Ingeniería, Universidad de California, USA. The cavity bubble modifies the direct light transmission, which is observed as an electrical signal response. In order to reconstruct the cavity bubble radius dynamics with a high temporal resolution, an algorithm based on the Fresnel optical propagation method is proposed in this work.

Molecular hydrogen physisorption on boron nitride nanotubes probed by second harmonic generation, Ramon V. Salazar-Apaza1, Raúl A. Vázquez1, Nordurot Acosta1, Romeo Selvas-Aguilar1, Centro de Investigaciones en Optica, Mexico. We present an ab initio calculations of second harmonic generation response of single-walled zigzag pristine boron nitride nanotubes (BNNTs) and BNNTs modified by the molecular hydrogen adsorption.

Holographic tracking of strain solitons as a tool for NDT of laminated composites, Irina Semenova1, Alexander Samsonov1, Andrey Belashov1, Ioffe Physical Technical Institute, Russia. We propose a NDT approach aimed to detect delamination areas in adhesively bonded layered structures. The proposed approach is based on phase holographic detection of the evolution of bulk strain solitons generated in such structures.

Design Hartmann null screens to test planar-convex aspheric lens, Gabriel Castillo1, Diana Castan Ricardo1, Maximino Avendano-Alejo1, CCADET/UNAM, Mexico. A new method to design Hartmann null screens to test aspheric lenses is presented. It is based on the exact ray tracing equation, consider a plane wavefront impinging on the lens.

Modelling of Actively Mode Locked Laser Based on a Fiber Gires-Tournois interferometer, Andres Gonzalez Garcia1, Balbaldar Ibarra-Escamilla1, Evgeny A. Kuzin2, Felipe M. Maya Orodezie1, Olivier Pottiez2, Gerardo Gonzalez Garcia1, Maro Wilson3, 1Mechatronics Engineering, Instituto Tecnológico Superior de Guanajuato, Mexico; 2Instituto de Astrofísica Óptica y Electrónica, Mexico; 3Centro de Investigaciones en Óptica, Mexico; 1Applied Physics, Centro de Investigación y de Estudios Avanzados, Unidad Mérida, Mexico; 2Laboratorio de Física de Los Láseres, Atomes y Moleculés, Université Lille, France. We present an actively mode locked fiber laser: introducing a Tournois interferometer, as a filter and dispersion compensation. The results show, is possible to obtain pulse in order ~ 5ps, useful for OTDR and ultrafast communications.

Latin America Optics & Photonics Conference • 16–21 November 2014
Some Interesting Facts About Polarization, Daniel Malacara Hernandez; Centro de Investigaciones en Optica AC, Mexico. Polarization phenomena had been fully described in many optics text books for many decades, or even centuries. However, most elementary or medium level optics books ignore some important facts about polarization. In this presentation we describe some of the little known facts. The fact that a perfectly monochromatic light beam is always perfectly polarized but a perfectly polarized beam does not have to be perfectly monochromatic, has some interesting consequences that will be here described.

LTh1B.2 • 08:30 — Tutorial
Mirages, Malaysia Air Flight 370 and other Interesting Optical Phenomena, Duncan T. Moore; Univ. of Rochester, USA. What do ocean, optical, seismic, and acoustic waves have in common? In most materials the composition varies as a function of x, y, and z. This talk will tie together these four phenomena and describe one of the difficulties of locating Malaysia Air Flight 370.

LTh1B.3 • 09:15 — Tutorial
Testing of Aspheric Optical Surfaces, James C. Wyant; College of Optical Sciences, Univ. of Arizona, USA. Aspheric surfaces are common in modern optical systems. Being able to measure the quality of aspheric optical surfaces is essential in optical manufacturing. The paper will describe and compare techniques used to measure aspheric surfaces.

LTh1C.1 • 08:00 — Tutorial
Optical Systems: What Determined Their Evolutionary Path?, Andrew R. Chraplyvy; Bell Labs, Alcatel-Lucent, USA. The evolution of lightwave communication systems was not a haphazard journey. In fact, it can be argued that there was just one unique evolutionary path. Anecdotal evidence for this perhaps controversial assertion will be presented.

LTh1C.2 • 08:45 — Tutorial
Space-Division Multiplexing for Optical Fiber Communications, Guifang Li; Univ. of Central Florida, USA. Space-division multiplexing is becoming a new frontier in optical communications. This tutorial will start with the motivation for SDM, followed by a general description of the channel characteristics of the few-mode fiber and the necessity of multiple-input-multiple-output equalization. Then, we will discuss enable passive and active technologies that can make SDM practical.

LTh1C.3 • 09:30 — Tutorial
Speed and Noise Limits of Semiconductor Optical Amplifier Space Switches and Wavelength-Reuse Schemes, Enadlo Nokie; Universidad del Perú, Peru. We introduce a hand-held and low-cost biosensor based on plasmonic microarrays and lens-free on-chip imaging for label-free and high-throughput biodetection. Our technology, 60g in weight and 7.5cm in height, is highly suitable for point-of-care applications.

LTh1D.3 • 09:30 — Tutorial
Hand-Held and High-Throughput Biosensor with Plasmonics and Lens-Free Imaging, Hatice Altyuz, Arif Cetin, Hatice Altyuz, Arif Cetin, Ali Metin T. Coskun, Betty Galaretka, Min Huang, David Herman, Aydogan Ozcan; University of California San Diego, USA. We introduce a hand-held and low-cost biosensor based on plasmonic microarrays and lens-free on-chip imaging for label-free and high-throughput biodetection. Our technology, 60g in weight and 7.5cm in height, is highly suitable for point-of-care applications.
Easily see revivals in gases.

**New Fiber Lasers based on Nonlinear Optics**

LTh2A • 12:30

*Nasser Peyghambarian*, 1 *Optical Sciences*, Univ. of Arizona, USA.

Nonlinear optics sources in near IR and mid IR will be summarized.

**Nonlinear Dynamics of Actively Q-switched Fiber Lasers**

LTh2C • 13:15

*Yun O. Barmanov*, 1 *Optical Sciences*, Univ. of Arizona, USA.

Different kinds of Q-switch dynamics of actively Q-switched fiber lasers, which depend of the active fiber length / gain and repetition rate of the laser dynamics is determined by the existence or absence of narrow-line CW lasing when the Q-cell is blocked.

**Advantage of the Wave Nature of Electrons**

LTh2B • 13:00

*Jose M. Padilla Miranda*, 1 *Optical Metrology*, Centro Inv. Optica AC, Mexico.

Electron Holographic Interferometry (EHI) is a measurement tool in electron microscopes that is widely used to characterize the physical and mechanical properties of nanomaterials and structures thereof. We present state of the art EHI applications on novel nanoparticles.

**Nonlinear Fiber-Optics with Incoherent Sources**

LTh2C • 12:30

*Andres Gil Molina*, 1 *Optical Sciences*, Univ. of Arizona, USA.

We have generated by parametric down-conversion and fully characterized an ultrafast highly multimode frequency comb with strong genuine multipartite quantum entanglement between its different frequency components. Such a quantum state of light has promising applications in wavelength multiplexed quantum information processing and computing.

**Remote Labs for Optical Metrology: From the Lab to the Cloud**

LTh2D • 13:15

*Wolfgang Osten*, 1 *Institut für Technische Optik*, Germany.

Remote Labs for Optical Metrology: From the Lab to the Cloud, Wolfgang Osten; 1 *Institut für Technische Optik*, Germany. The tutorial reviews the idea of remote Labs and illustrates the potential of the approach on selected examples with special focus on the field of optical metrology. The concept of remote metrology is extended beyond the simple exchange of data between distant Labs and the remote access to experimental facilities embedded in modern educational concepts. An architecture that provides the opportunity to communicate with and eventually control the physical set-up of a remote metrology system is described. It is shown that such a concept can be implemented within cloud computing environments, and may extend their current performance by the access to experimental facilities.

**Parametrically Generated Frequency Combs**

LTh2P • 11:15

*Jonathan Roslund*, 1 *Universidade Estadual de Campinas*, Brazil; 2 *Padtec S.A.*, Brazil.

We have generated by parametric down-conversion and fully characterized an ultrafast highly multimode frequency comb with strong genuine multipartite quantum entanglement between its different frequency components. Such a quantum state of light has promising applications in wavelength multiplexed quantum information processing and computing.

**Plenary Tutorial**

LTh2A • 12:30

Methods for Nonlinear Refraction and Absorption Measurements

1 *Hunghua Hu*, 2 *Trent Ensley*, 3 *Matthew Reichert*, 1 *Optical Sciences*, Univ. of Arizona, USA; 2 *College of Optical Sciences*, Univ. of Arizona, USA; 3 *Optical Metrology*, Centro Inv. Optica AC, Mexico. We recently developed two new sensitive methods for nonlinear material property measurements, one of which, based on “Beam Deflection”, shows a sensitivity of A/20,000 to induced phase distortion and can easily see revivals in gases.
acoustic modes.

...the dispersion relation of the fundamental frequency shift behavior is qualitatively explained arising from Rayleigh acoustic waves in silica.

...multi-GHz elastic modes may strongly interact... We show that the...investigate Brillouin optomechanical interactions in a silicon microcavity.

...common path interferometry is reported that determines the phase from a series of N interferograms with arbitrary phase steps. Examples are shown that demonstrate the high accuracy of this method.

...by a dispersion scanner, a multilength LED-based illuminator, and a compact spectrometer, Andrés Vega-Pérez1, Hugo A. Bandas-Gamboa1, Cesar Costa1; 1Dept. of Automation and Industrial Control, Escuela Politecnica Nacional, Ecuador; 2Dept. of Computer Science, Escuela Politecnica Nacional, Ecuador; 3Dept. of Physics, Escuela Politecnica Nacional, Ecuador.

...the development of true 3D display technologies and systems, namely 3D displays that...the current stereo displays, including novel near-eye displays, volumetric displays and dynamic holographic displays.

...Recent progress in Research on True 3D Displays at Beijing Inst.of Technology, Yongtian Wang1, Dongdong Weng2, Dewen Cheng3; 1Beijing Engineering Research Center of Mixed Reality and Advanced Display, Beijing Inst.of Technology, China. Progress is made on the...and systems, namely 3D displays that remove the convergence and accommodation conflict in the current stereo displays, including novel near-eye displays, volumetric displays and dynamic holographic displays.

...High-sensitivity Curvature Sensor based on Two-Core Fiber, Jose R. Guzman-Sepulveda1, Miguel A. Fuentes-Fuentes2, Jose Javier Sanchez-Mondragon2; 1Inst.of Micromechanics and Photonics, Univ. of Central Florida, USA; 2Optica, INAOE, Mexico. A curvature sensor based on two-core fiber is presented. The sensor reports a highly sensitive linear response in the small-curvature regime, from 0 to 0.27 m-1, with sensitivity of -137.87 nm/m-1.

...High-sensitivity Curvature Sensor based on Two-Core Fiber, Jose R. Guzman-Sepulveda1, Miguel A. Fuentes-Fuentes2, Jose Javier Sanchez-Mondragon2; 1Inst.of Micromechanics and Photonics, Univ. of Central Florida, USA; 2Optica, INAOE, Mexico. A curvature sensor based on two-core fiber is presented. The sensor reports a highly sensitive linear response in the small-curvature regime, from 0 to 0.27 m-1, with sensitivity of -137.87 nm/m-1.

...High-sensitivity Curvature Sensor based on Two-Core Fiber, Jose R. Guzman-Sepulveda1, Miguel A. Fuentes-Fuentes2, Jose Javier Sanchez-Mondragon2; 1Inst.of Micromechanics and Photonics, Univ. of Central Florida, USA; 2Optica, INAOE, Mexico. A curvature sensor based on two-core fiber is presented. The sensor reports a highly sensitive linear response in the small-curvature regime, from 0 to 0.27 m-1, with sensitivity of -137.87 nm/m-1.

...High-sensitivity Curvature Sensor based on Two-Core Fiber, Jose R. Guzman-Sepulveda1, Miguel A. Fuentes-Fuentes2, Jose Javier Sanchez-Mondragon2; 1Inst.of Micromechanics and Photonics, Univ. of Central Florida, USA; 2Optica, INAOE, Mexico. A curvature sensor based on two-core fiber is presented. The sensor reports a highly sensitive linear response in the small-curvature regime, from 0 to 0.27 m-1, with sensitivity of -137.87 nm/m-1.
Photoresponsive liquid crystal systems in which PtLCs are reviewed and discussed; a family of rubber lasers.

Liquid crystal elastomers are rubbers with orientationally ordered constituents. Due to their periodic structure, cholesteric liquid crystal elastomers can give rise to distributed feedback lasing. We discuss such readily tunable rubber lasers.

Polarimetry of light using analysis of the nonlinear voltage-retardance relationship for liquid-crystal variable retarders, Juan M. López-Téllez, Neil C. Bruce; Centro de Ciencias Aplicadas y Desarrollo Tecnológico, Universidad Nacional Autónoma de México, Mexico. We present a method for using liquid-crystal variable retarders (LCVRs) with controllably varying voltage to measure both, the Stokes vector of a light beam and the complete Mueller matrix of a general sample.

Single beam thermal diffusivity measurements in liquid samples by means of frequency-resolved thermal lensing approach, Luis G. Rodriguez1, Jaime Paez2, Evelyn Granizo1, Jose Paz1, Jaime Cardenas1, Cesar Costa1; 1Physics, Escuela Politecnica Nacional, Ecuador, 2Chemistry, Universidad Simon Bolivar, Venezuela, Bolivarian Republic of; Grupo Ecuatoriano para el Estudio Experimental y Teórico de Nanosistemas (GETNano), Escuela Politecnica Nacional, Ecuador. We present a theoretical and experimental frequency-resolved thermal lensing approach based on the thermoreflectance and Fresnel diffraction theories. The approach is validated by measuring the thermal diffusion coefficients of classical solvent and dyes.

Optical Study of Short-Term Polymerization Kinetics for Dental Resin Cement, Fernando Saccon1, Fernanda Martiun Dala Rosa de Oliveira1, Luis M Muller Fabris1, Sheng S. Shen2, Marcia Muller1, José L. Fabris1; 1Graduate Program in Electrical and Computer Engineering, Federal Univ. of Technology - Parana, Brazil, 2Physica Dept., Federal Univ. of Paraná, Brazil. This work shows the time behavior presented by the temperature, dilation and/or contraction strain and thickness of dual-cure dental resin cement measured by using optical techniques.

Biomedical Applications made Possible with Supercontinuum Technology, Husain Imam1; NKT Photonics Inc, USA. Commercial supercontinuum technology has become important in biophotonics, providing light that is broad as a lamp and bright as a laser. The talk will show how the technology is being applied in various biomedical applications.

Surface Waves on Optical Fibers for Biochemical Sensing and Plasmonics, Jacques Albert1; Christophe Caucheteur2; 1Electronics, Carleton Univ., Canada; 2Electromagnetism and Telecommunications, Université de Mons, Belgium. Tilted Bragg gratings in single mode fibers couple light to cladding modes and evanescent surface waves that have well defined polarization states and propagation constants. The grating narrowband resonances provide sensing probes with pm-level resolution.
Miro

Analytic aspheric coefficients to reduce the spherical aberration, Gabriel Castillo-Santiago1, Maximino Avendaño-Alejop, J. Rufino Díaz-Urber1, ‘Sistemas Ópticos, CCADET, Mexico. We provide analytic aspheric terms to reduce spherical aberration in aspheric lenses, obtained through an expansion in Taylor’s series from exact ray tracing equations, considering a plane wavefront impinging on the aspheric plane-convex lens.

Picasso

Optical parametric oscillator based on aperiodically poled lithium niobate that emits two synchronized pulses, Roger S. Cudney1, Luis A. Rios1, Miriam Carrillo-Fuentes1, ‘Optics, CICESE, Mexico. An OPO using an APLN crystal emitting two pulses of nearly identical wavelengths is presented. The wavelengths of these pulses are around 1.4 μm and their separation can be varied between 0.8 and 5 THz.

Murillo

Characterizing a conical null-screen by using a reference spherical surface, Manuel Campos-García1, César Cosio-Guerrero1, Oliver Huerta-Carranza1, Amilcar Estrada-Molina1, ‘Univ Nacional Autonoma de Mexico, Mexico, 2Facultad de Ciencias, Universidad Nacional Autónoma de Mexico, Mexico, 3Optics, Universidad del Istmo, Mexico. We report the characterization of a conical null-screen. We design a conical null-screen with an array of drop-shaped spots. The reference is a sphere with radius 7.8 mm and diameter 11 mm.

Del Prado

Low Cost All Optical Discrete Multi-Tone Modulation Using a Fabry-Perot Laser Comb, Ana M. Cardenas1, Gabriel Villarreal1, ‘Optics, Universidad del Istmo, Mexico; 2Facultad de Ciencias, Universidad Nacional Autónoma de Mexico, Mexico, 3 Physics, Universidad del Istmo, Mexico. We present preliminary results of a swordfish bone measurements using the fringe projection technique. A phase correlation algorithm for phase shifting profilometry is compared in performance with the classic Fourier transform approach for phase extraction.

LTh3B • Fiber Optics and Optical Communications 5—Continued

LTh3C.3 • 17:15 Invited

Optical Sensing Based in Plasmonics and the Metamaterials Enhancement Factor, Jose Luis Santos1, Hamed Moayed1, Ivo Leite1, Luis Coelho1, Diana Viegas1, Ariel Guerrero1, ‘Universidade do Porto, Portugal. The recent burst of R&D activity in Plasmonics, associated with the possibility of materials nanostructuring which enables the access to metamaterials, has been strongly impacting many branches of optics such as, data recording and sensing. This talk details the factors that turned the combination Plasmonics and Metamaterials a huge opportunity to optical sensing.

LTh3B.6 • 17:15

Fringe projection profilometry applications: measurement of a swordfish bone, Alejandra Serrano1, Adriana Nava-Vega1, Esteban Luna2, Javier Salinas-Luna1, ‘Engineering, UABC, Mexico; 2Astronomy, UNAM, Mexico. We present preliminary results of a swordfish bone measurements using the fringe projection technique. A phase correlation algorithm for phase shifting profilometry is compared in performance with the classic Fourier transform approach for phase extraction.

LTh3D • Biophotonics and Biomedical Applications 2—Continued

LTh3D.3 • 17:30 Invited

Cellular-resolution Optical Coherence Tomography, Chien-Chung Tsai1, Yuan-Shu Ho1, Chia-Kai Chang1, Kuang-Yu Hsu1, Ming-Yi Lin1, Jeng-Wu Tsui1, Sheng-Lung Huang1, 2, ‘Graduate Inst of Photonics and Optoelectronics, National Taiwan Univ., Taiwan; 2Dept. of Dermatology, National Taiwan Univ., Taiwan; 3Dept. of Electrical Engineering, National Taiwan Univ., Taiwan. Non-invasive, label free, and high-speed imaging of cells and tissues with sub-micron resolution could help unveil functions of living organisms, and facilitate early disease/cancer diagnosis. Single cell analyses and in-vivo epidermis/dermis evaluation are discussed.

Thursday, 20 November
Two shots Phase shifting interferometry for slope measurements of non-birefringent transmissive phase samples, José-Antonio Martínez-Dominguez1, Belen Lopez2, Marco Antonio Sandoval-Hernández1, Luis-Antonio Bonilla-Jiménez1, Francisco-Javier Sánchez-González1, Noel-Ivan Toto-Arellano1, Amalia Martínez-García1, Victor Flores-Muñoz1, Esteban Velez-Juárez1, Roberto Marquez-Islas1, Augusto V. Vázquez-Estrada1, Humberto Contreras-Tello1, Augusto C. Bruce1, Antonio Rodríguez-Rosales1, Jesús Garduño-Mejía1, Roberto Ortiga-Martínez1, Celia Sánchez-Pérez1, Esteban Velez-Juárez1, Noel-Ivan Toto-Arellano1, Casimiro A. Baldwin1, Sciences / Physics Section, Pontificia Universidad Católica del Perú, Perú. Using the LIBS spectroscopy technique were detected and identified 10 elements or compounds in different wavelengths (1064 nm, 532 nm and 266 nm) of laser pulses.

Portable LIBS System based on an Ultra Compact Solid State Laser applied to the analysis of Cu on fish, Fernando C. Álvarez1, Teresa Flores1, Luis V. Ponce1, Lecher Moreira Osorio2, Laboratorio de Ablación, Limpieza y Restauración con laser, Centro de investigaciones Opticas, Argentina; Laboratorio de Tecnología Laser, Instituto Politécnico Nacional, Mexico. We show the application of an ultra compact solid state laser newly developed. The laser is used to build an ultra portable LIBS instrument and applied to the analysis of Cu on fish.

Detection of Atomic Lines Carbon in Agricultural Soils of the Peru by LIBS, Eder R. Arroyo-Jiménez1, Augusto C. Bruce1, Celia Sánchez-Pérez1, Esteban Velez-Juárez1, Roberto Marquez-Islas1, Sciences / Physics Section, Pontificia Universidad Católica del Perú, Perú. Using the LIBS spectroscopy technique were detected and identified 10 elements or compounds in different wavelengths (1064 nm, 532 nm and 266 nm) of laser pulses.

Characterization of a phase modulator for atomic interferometry, Ma. Nieves Arias1, Valhade Abdey1, Eduardo Gomez1, Instituto de Fisica de la USLP, Mexico. A fiber phase modulator is a good option to produce phase locked beams for stimulated Raman transitions. We characterize the phase and amplitude noise of the modulator for its use on atomic interferometry.

Complete design of a prototyping for a portable USB spectrometer, Felipe Ademir Alén Hernandez2, Mathieu Hautefeuille1, Eduardi Ruiz1, Antonio M. Juárez Reyes1, Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico. This work presents the design of a compact USB spectrometer implemented with a cheap microcontroller unit core. A full array detector acquisition in 15ms is reported.

Real-time 3D reconstruction of the human torso using a Kinect sensor, José Fernando1, Carlos R. Contreras2, Jaime E. Meneses3, Univer-sidad Industrial de Santander, Colombia. Using a Microsoft Kinect sensor a 3D reconstruction of the human torso in real-time is obtained, further was performed an meteorological analysis where an estimate of the error in reconstruction has been achieved.

Bovine pericardium tensile tests, Natalanel Cuando-Espita1, Francisco Sánchez-Arvalo1, Juan Hernandez-Cordero2, Instituto de Investigaciones en Materiales, Universidad Nacional Autónoma de México, Mexico; Instituto de Investigaciones en Materiales, Universidad Nacional Autónoma de México, Mexico. We used enhanced backscattering measurements to study the mean-free-path (MFP) in a sample of bovine pericardium undergoing tensile tests. The results show that the optical data correlate well with the mechanical features of the tissue.
LTh4A.23 Robustness of multimode fiber focusing through wavefront shaping, Antonio Miguel Carvaca Aguirre1, Rafael Piestun2; 1Electrical, Computer and Energy Engineering, Univ. of Colombo at Boulder USA; We study the robustness of a focus created through a multimode fiber using wavefront shaping. The focus enhancement can withstand up to 2mm translation of the fiber in any direction with less than 50% reduction.

LTh4A.24 Evaluation of squamous cell skin carcinoma using ATR-FTIR spectroscopy associated to cluster analysis, Cassio Lima1, Viviane Goulart2, Denise Zezelli1; 1Center for Lasers and Applications, IFPP, Brazil. Cluster Analysis were used as an objective tool to discriminate a type of optical signal of normal and tumor skin. The results shown satisfactory separation in samples analyzed, highlighting the potential of the technique for diagnostic purposes.

LTh4A.25 Cell Imaging Technique Using Quantum Dots by Wet Chemical Synthesis, Elsa I. Cepea-Pérez1, Tzaarara López-Luke1, Eldar De La Rosa1, Leonardo Perez-Mayen1, 1GNAFOMA, Centro de Investigaciones en Óptica, A.C., Mexico; 2Universidad Autónoma de Zacatecas, Mexico. We show the usefulness and potential of Quantum Dots synthesized in water by wet chemical synthesis for cell imaging applications.

LTh4A.26 Synthesis and characterization of gold star-shaped nanoparticles for biomedical applications, Juan Carlos Martinez Espinosa1, Ana Karen Zavala1, Victor Hugo Romero1, Miguel José Yacaman1, 1Centro de Investigaciones en Óptica, A.C., Mexico; 2Universidad Autónoma de Zacatecas, Mexico. The results of this work will be reported in detail in our oral presentation.

LTh4A.27 Kinetics Of Photobleaching Of Methylen Blue In A Collagen Matrix In the Absence and Presence of Isolated Rat Liver Mitochondria, Giovanna Leopre1, 1Universidade Federal do ABC, Brazil. Collagen matrix stimulates the cytoskeleton network and mitochondrion is the real organelle. Was demonstrated that the compartmentalization of Methylen Blue can modulates the photobleaching, due to Methylen Blue aggregate states and by interaction with biomolecules.

LTh4A.28 Interactive mesh and curvature analysis of a 3D point cloud obtained by the fringe projection technique, Joseph Vergel1, Carlos R. Contreras2, Jaime E. Meneses3; 1Escuela de Fisica, Universidad Industrial de Santander, Colombia. The FPT provides 3D reconstructions with a large number of points. However, the algorithms presented here reduced the point cloud using analyzing of curvatures of topography and further characterize the areas with particular curvatures.

LTh4A.29 Embedded System for Fiber Bragg Gratings Peak Detection and Analysis, Fabio Junior Alves Batista1, Frederic Conrad Janzen1, 1, 2Universidade Tecnológica Federal do Paraná, Brazil. We present this device and results of an embedded software in an ARM Cortex M8 microcontroller for Fiber Bragg Gratings (FBGs) peak detection, peak displacement analysis and I/O integration possibility.

LTh4A.30 Understanding the carbon nanotubes translocation in giant vesicles, Said aranda-espinosa1, 1Universidad Autónoma de Zacatecas, Mexico. In this work we propose an environment of carbon nanotubes (CNT) internalization into live cells. This is considered critical both from a fundamental point of view and for further engineering of CNT-based delivery systems.

LTh4A.31 Digital Holographic Interferometry to measure changes in the concentrations of liquid biological, Tonatuh Saucedo1, Brenda Mireya Guzman Vadina2, 1Sonía Azucena Saucedo-Araya1, 1Said aranda-espinosa1, 2Jesus Lopez1, 1Universidad Autónoma de Zacatecas, Mexico; 2Universidad Nacional Autónoma de México, Mexico. We present a Digital Holographic Interferometry (DHI) system to measure low variations of concentrations from solutions of Plasmid and RNAs. The system is simple, robust and provide good accurate measurement.

LTh4A.32 Laser System for Mapping the Depth of a Polarizing Film Immersed in an Ophthalmic Lens, Irving Caballero-Quintana1, Diddia P. Salas-Peimbert1, Gerardo Trujillo-Schiaffino1, 1Universidad Autónoma de Zacatecas, Mexico; 2Universidad Nacional Autónoma de México, Mexico; 3Remote Sensing Department, Instituto Nacional de Pesquisas Espaciais, Brazil. We present a non-destructive laser system for measuring the depth of a polarizing film immersed in an ophthalmic lens based on the double reflection of a laser line by the front surface and the surface of the polarizer.

LTh4A.33 Design of a null-screen for characterizing a parabolic trough solar concentrator, Manuel Campos-García1, Victor Ivan Moreno-Oliva1, Edén Ramón-Hernández1, 1Universidad Nacional Autónoma de México, Mexico; 2Universidad del Istmo, Mexico; 3Universidad Tecnológica de la Mixteca, Mexico. We present a null-screen design for the reflection surface of a Parabolic Trough Solar Collector by considering the caustic associated with the reflected, this allows determine the null-screen dimensions.

LTh4A.34 Lensless microscopy for shining light sources, Ivan Moreno1, Priscilla Castillo1, 1Universidad Autónoma de México, Universidad Autónoma de Zacatecas, Mexico. To characterize the distribution of emission of a lighting source, we demonstrate a new microscopy technique that does not use any lens, and is not limited to any light power emission, neither to a small depth of field.

LTh4A.35 Effect of smart-phone screen brightness on color reproduction: camera-display system, Jorge A. Rios-Viramontes1, Ivan Moreno1, 1Universidad Autónoma de Zacatecas, Mexico; 2Universidad de Ingeniería Eléctrica, Universidad Autónoma de Zacatecas, Mexico. Energy consumption in mobile systems heavily depends on the display brightness. We investigate the effect of mobile phone screen brightness level on color reproduction of the whole system camera-display.

LTh4A.36 Degradation of HDPE and LDPE films using UV-B radiation, Rosario Gonzalez-Mota1, Ahiza Martinez-Martinez1, 1Universidad Tecnológica de la Mixteca, Mexico; 2Universidad de Ingeniería Eléctrica, Universidad Autónoma de Zacatecas, Mexico. Energy conversion in mobile systems heavily depends on the display brightness. We investigate the effect of mobile phone screen brightness level on color reproduction of the whole system camera-display.

LTh4A.37 Quantum Dots Solar Cells of CdS Deposited by Chemical Bath Method, Alejandro Martinez1, Tzarara López-Luke1, 1Universidad Autónoma de Zacatecas, Mexico; 2Universidad Tecnológica de la Mixteca, Mexico. We report a novel technique for the synthesis of quantum dot solar cells, and measure the power conversion efficiency of the cells.

LTh4A.38 Non-destructive measurements on ballistic materials using high speed interferometry, Jorge Sanchez Preciado1, Carlos Perez Lopez1, Rodolfo Radillo Ruiz1, Sergio Aleman Moreno1, 1Centro de Investigaciones en Óptica, A.C., Mexico; 2Centro de Investigaciones en Óptica, A.C., Mexico. We propose a non-destructive method to characterize ballistic materials using high speed interferometry and laser Doppler vibrometry. By determining the settling time on a transient test, we are able to classify three types of weaving patterns.

LTh4A.39 Effect of PnF in hybrid quantum dots solar cells, Diego Esperza1, 1Universidad Autónoma de Zacatecas, Mexico; 2Universidad Nacional Autónoma de México, Mexico. We report the effect of PnF in hybrid quantum dots solar cells.

LTh4A.40 Thermal Mapping of a Radiator in a Hydroelectric Generator using Fiber Bragg Gratings, Felipe Mazzolai1, 1Centro de Investigaciones en Óptica, A.C., Mexico; 2Universidad Nacional Autónoma de México, Mexico. We present a thermal mapping of a Hydroelectric Generator using FBG.

LTh4A.41 Generation of complex structures, Marcelino Anguiano1, tecnológico de Chihuahua Dept, Mexico. We studied the optical properties of the combination between a tilted collimated light beam and the wave emergent from an axicon. The resulting optical beam is an asymmetric beam, whose shape gives them quasi-nondiffracting properties.

LTh4A.42 The Spectral Behavior of Electromagnetic Radiation Absorbing Material Between 350 and 1500nm, Nelson Rosi1, Jose E. Oliveira1, Mirabel C. Rezende1, 1, Elizabetha C. Moraes1, 2; 1Computer and Electronic Engineering Departamento, Instituto Tecnológico de Aeronáutica, Brazil; 2Remote Sensing Department, Instituto Nacional de Pesquisas Espaciais, Brazil. We experimentally investigate the spectral behavior of an electromagnetic radiation absorbing material (RAM) between 350 and 1500nm. Based on laboratory radiometric techniques was showed a good performance of it on camouflage capabilities.

LTh4A.43 The Algorithm for Transformation of Images from Omnidirectional Cameras, Vasiliiy Lazareenko1, Sergey N. Yaryshev1, 1, 2, 3Remote Sensing Department, Instituto Nacional de Pesquisas Espaciais, Brazil; 2Remote Sensing Department, Instituto Nacional de Pesquisas Espaciais, Brazil; 3Remote Sensing Department, Instituto Nacional de Pesquisas Espaciais, Brazil. The algorithm for transformation of omnidirectional camera images to the classic model of pinhole camera. To solve this problem, we developed an algorithm that can be used for transformation of omnidirectional camera images to classical pinhole camera model.

LTh4A.44 Experimental Implementation of a Proposal to Measure the Number of Wavelengths Contained Between Two Flat-Parallel Surfaces, Victor M. Rico Botero1, 1Centro de Investigaciones en Óptica, A.C., Mexico; 2Universidad Autónoma de Zacatecas, Mexico. In this work, we propose measuring the distance between two flat-parallel reflective surfaces using a Tyman-Green interferometer at two different wavelengths. Image processing of digital phase shifting of the interference pattern generated are shown.

LTh4A.45 Accuracy Test for a Corneal Topographer Based on Null-Screen Method: Preliminary Results, Amílcar Estrada-Molina1, J. Rufino Diaz-Uribé2, 1Univ Nacional Autonoma de Mexico, Mexico. The accuracy test of a corneal topographer based on null-screen method is presented. This accuracy test is conducted by testing a calibration sphere. The accuracy found was of 5.8 μm, for differences of elevation, 75 μm and 81 μm for sagittal and meridional radius.

Foyer and Exhibit Hall (Goya/Greco)

Thursday, 20 November
LTh4A.46
Investigation of optical-electronic autocollimator with quadrangular pyramidal reflector for measuring the angular position of the object, Anastasia Moseeva1, Igor Konyakhin1;2; Optical and Electronic Devices and Systems, ITMO University, Russia. Discusses the problem of the increase to tens of meters working distance of the optical-electronic autocollimators when determining the angular position of objects. To solve this problem it is proposed to use a quadrangular pyramid-shaped reflector.

LTh4A.47
Design of the Model for Researching of the Appliances Optical Systems Elements Polarization Properties, Anna Trushkina1, Victoria A. Rybova1, Valery V. Korotaev1;2; OEDS, ITMO University, Russia. The scheme of the device for experimental studies of the optical systems elements polarization properties is designed. The theoretical concepts and the experiment methodology were given. The tests confirming the theoretical calculations are performed.

LTh4A.48
Modified Self-Image Produced by Cylindrical Lenses in Infinite Fringe Moire Deflectometry, Adriana Hernandez-Lopez1, Gerardo Triuljillo-Schaffino1, Didia P. Salas-Peimbert1, Marcelino Anguiano1, Luis F. Corral-Martinez1, Ismael A. Garduno-Vilches1; Instituto Tecnologico de Chihuahua, Mexico. We present a method to measure the inclination and period of the lines in a modified self-image produced by a cylindrical lens in infinite fringe moire deflectometry using a theoretical model based on geometrical analysis.

LTh4A.49
Trihedral Reflectors for Three-Axis Angular Autocollimation Measurements, Igor Konyakhin1, Renpu Li1, Andrey Smekhov1; Optical and Electronic Devices and Systems, ITMO University, Russia. New features of trihedral optical reflectors with facets in the shape of cylinder segments are presented. Autocollimator with the trihedral reflector measures the three-axis angular position for monitoring angular displacements at science and industrial applications.

LTh4A.50
Optical-electronic system for alignment control, Maxim Kleshchenok1, Valery Korotaev1; Optical-Electronic Devices and Systems, ITMO University, Russia. This paper presents results of the theoretical and experimental analysis of the errors of autoreflection schemes for alignment control based on corner-cube retroreflectors, which investigated the influence of the most significant factors.

LTh4A.51
V-groove Highly Birefringence Liquid Core Waveguide, Tavakol Nazari1, Kyunghwan Oh1, Jinyoung Park1, Boram Joo1, Bjorn Paulson1, Sahar Hosseinzadeh Kassani1, Ji-Hyun Hwang1, Reza Khazaee-Niahd1, Om Suwal1, Yonsei University, South Korea. We report the development of a new kind of micro-optical waveguide based on a liquid core in a V-groove glass and air cladding. This work demonstrates numerically and experimentally high birefringence in this optical waveguide.

LTh4A.52
Multispectral analysis of laser mirror coating by special apparatus for analyzing of flat objects optical characteristics and parameters, Elena Gorbunova1, Aleksandr Chertov2, Vladimir Peretyagin1, Valery Korotaev2; ITMO University, Russia. This article deals with the representation of the results obtained during multispectral analysis of multilayer mirror coating by specialized apparatus. The possibility of discovering the location, depth and the cause of the defect is shown.

LTh4A.53
Measurement of Change in Refractive Index in Au/PET using Digital Holographic Interferometry, Karen Hernandez Vidal1, Raul Eduardo Balderas Navarro1, Gustavo Ramirez Flores1; San Luis Potosi, Mexico. We described on measurement of change in refractive index for bent Au/PET with digital holographic interferometer. The results obtained show that the changes are proportionality to the reciprocal of the radius.

LTh4A.54
System for power turbine’s blade defectoscopy, Apekhtin Dmitrii1; University ITMO, Russia. System that will allow visual and measuring control of blades shape is proposed. The physical model of control method is developed. Experimental data with metal object that similar to blade are presented. The results of experiments for calculation measurement error are presented.

LTh4A.55
Optical and Photocatalytic studies of long persistent Bi co-doped Sr4Al14O25: Eu,Dy, Carlos Rodriguez Garcia2,; Luis A. Diaz-Torres2, Cesar Alvarez Casillas1, Maricela Guzman1; Centro de Investigaciones en Optica A.C., Mexico; Universidad Autonoma de Coahuila, Mexico; Centro Universitario de Ciencias Exactas e Ingenierias, Benemérita Universidad de Guadalajara, Mexico. Optical and photocatalytic properties of the blue long afterglow Sr4Al14O25: Eu,Dy,Bi nanopowder, with orthorhombic phase, were studied in detail as function of x doping concentration of Bi3+ (x = 0.0, 0.5, 3.0, and 12.0 mol%).
We show that quantum noise in the spectral domain usually corresponds to a mixed quantum measurement, and cannot be undone. We report on squeezed states produced by optical components and systems. The null methods are used to compensate the asphericity of wave fronts introduced, contrary to the general expectation that it should decrease. Finally, we consider how a defocus aberration degrades an image. However, we show that the axial irradiance of a beam focused with a small Fresnel number is higher than the focal-point value. We also show that the axial irradiance increases when spherical aberration is introduced, contrary to the general expectation that it should decrease. Finally, we consider two-point resolution and show how a defocus aberration changes the relative illumination of the images of two coherent points.
LF1A • Atomic Physics and Laser Spectroscopy 1—Continued

Ultra-high Flux Atom Lasers, Wolf von Klitzing1, Vasili Boipas1; Nikolaos K. Efremidis1, Michael Morrissey1, Paul Condylis1, Mark Baker1, 1IESL-FORTH, Foundation for Research and Technology-Hellas, Greece; 2Physics Dept., Univ. of Crete, Greece; 3Applied Mathematics Dept., Univ. of Crete, Greece; 4Centre for Quantum Technologies, National Univ. of Singapore, Singapore; 5ELI-Beamlines, Czech Republic; 6School of Mathematics and Physics, The Univ. of Queensland, Australia. We present a novel type of atom laser, which uses strong RF-fields to produce ultra-high flux matter-wave beams from a magnetically trapped Bose-Einstein Condensates (FP7-ICT-601180).

LF1B • Instrumentation, Optical Design, Color and Vision 4—Continued

Optical Surface Evaluation by Correlating Bronchigram Images, Alberto Cordero-Díaz1, Jorge González-García1, 1Postdoc in Fisica Aplicada, Benemérita Universidad Autónoma de Puebla, Mexico; 2Instituto de Física y Matemáticas, Universidad Tecnológica de la Mixteca, Mexico. This procedure correlates experimental and simulated bronchigram images in order to estimate conic constant, paraxial curvature radius and error function of any reflecting surface. No interference orders and integration are used.

Optical Testing of Solar Concentrators With Null Screens, J. Rufino Díaz-Uribe1, Manuel Camacho-García2, 1Centro de Ciencias Aplicadas y Desarrollo Tecnológico, Univ Nacional Autonoma de Mexico, Mexico. A general approach to the optical characterization of solar concentrators based on the Null Screen Methods is presented. The use of displays to generate color coded and to apply the DyPoS method is described for parabolic through, dish, and heliostats.

Optical Simulation of Gecko eye, Francisco-J Reniero-C1, 1Instituto Nacional de Astrofísica, Optica y Electrónica, Mexico. The uni-pupil of the gecko eye (Tarentola chazaliae), in maximum illumination condition, is transformed into four small pupils. Since, the spectral range of gecko is from UV to VIS, its eye can be considered as a multiple focus optics system. Optical simulation are discussed on this presentation.

LF1C • Fiber Optics and Optical Communications 6—Continued

Identification and Retrieval of Particles with Microstructured Optical Fibers, Sebastián Estcherry1, Azita Sudiman1, Fredrik Laurell1, Walter Margulis2, 1Dept. of Optical Fibers, Acreo Swedish ICT AB, Sweden; 2Dept. of Applied Physics, Royal Inst of Technology, Sweden. A system where laser light is coupled into a fiber with longitudinal holes is used to identify and collect fluorescent particles from a solution, mimicking automatic fiber-based separation of tagged cancer cells in the body.

Transmission of CE-OFDM Signals over 300 m of MMF Using VCSEL, pos-Garcia1, Oliver Huerta-Carranza1, 1Electrical Engineering, Federal University of Minas Gerais, Brazil; 2Facultad de Ingenieria, UNACAR, Mexico; 3Postgrad studies, TESCO, Mexico. Optical limits imposed on dense wavelength division multiplexing, ultra-high bit rate Telecommunication systems by non-linear phenomena and amplified spontaneous emission are analyzed and experimentally studied. A full set of results is included in the presentation.

Bi-Spectral Hi-Speed Imaging in Infrared, Gonzalo Peet1, Manja Stojanovic1, 1Centro de Investigaciones en Optica, Mexico. We have demonstrated and evaluated an optical setup to obtain two simultaneous infrared images of the same scene with a single IR camera. The simultaneous images were obtained over 1000 bi-spectral images per second of a combustion flame.

LF1D • Biophotonics and Biomedical Applications 3—Continued

Laser Ignition of Engines: Technology, Benefits and Challenges, Ernst Wintner1, Ernst Wintner1, Technische Universität Wien, Austria. Laser plasma generated via ns-solid-state lasers is employed advantageously for the ignition of internal combustion engines, jet engines and, nowadays, for rocket engines. Application to MW gas engines is close to commercial maturity, while requirements for car engines represent highest challenges to technology.

Optical Surface Characterization as a Demonstration of Versatile Analytical Tools that are Easily Underestimated, Gregory W. Forbes1, 1QED Technologies Inc, Australia. Precision optics possess increasingly complex desired surface shapes. Production challenges associated with lack of local spherical symmetry mean that as-built shapes are even more complex, so analytical tools for specifying and characterising them become essential.

Del Prado

10:30–12:30  Closing Plenary Session

LFP1 • 10:30 Plenary

Laser Ignition of Engines: Technology, Benefits and Challenges, Ernst Wintner1, Technische Universität Wien, Austria. Laser plasma generated via ns-solid-state lasers is employed advantageously for the ignition of internal combustion engines, jet engines and, nowadays, for rocket engines. Application to MW gas engines is close to commercial maturity, while requirements for car engines represent highest challenges to technology.

LFP2 • 11:15 Plenary

Optical Surface Characterization as a Demonstration of Versatile Analytical Tools that are Easily Underestimated, Gregory W. Forbes1, QED Technologies Inc, Australia. Precision optics possess increasingly complex desired surface shapes. Production challenges associated with lack of local spherical symmetry mean that as-built shapes are even more complex, so analytical tools for specifying and characterising them become essential.
**LF2A.4 • 14:00** Distinguished Young Researcher
Towards Quantum Simulation with Ultracold Fermi Gases, Jorge A. Seman Harutinian\textsuperscript{1,2}, Alessia Burchianti\textsuperscript{2}, Giacomo Vallolina\textsuperscript{2}, Massimo Inguscio\textsuperscript{3}, Matteo Zaccanti\textsuperscript{2}, Giacomo Roati\textsuperscript{2,3}.

We present the progress of our ultracold fermions experiment and how we intend to use it as a quantum simulator.

**LF2B.4 • 14:00**

Quasi-Distributed Temperature Measurement for Hydroelectric Generators Bearings via use of Fiber Bragg Gratings, Ulryan J. Dreyer\textsuperscript{1}, Erlon V. Silva\textsuperscript{1}, Andre Biffe de Renzo\textsuperscript{1}, Valmir Oliveira\textsuperscript{1}, Daniel R. Piga\textsuperscript{1}, Hypolito J. Kalinowski\textsuperscript{1}, Cicero Martelli\textsuperscript{1}, Jean Carlos Cardozo da Silva\textsuperscript{1}, Tractebel Energia, Brazil. This work presents a temperature sensor based on quasi-distributed Fiber Bragg gratings applied to hydroelectric power plants utilities. The calculated uncertainty of each FBG meets the requirements for temperature monitoring of hydroelectric generator bearings.

**LF2C.4 • 14:00**

Nonlinear atomic spectroscopy in a random porous medium, Santiago Villalba\textsuperscript{1}, Lorenzo Lenci\textsuperscript{1}, Athanasios Lalizas\textsuperscript{1}, Daniel Bloch\textsuperscript{2}, Arturo Lezama\textsuperscript{1}, Horacio Falache\textsuperscript{1}, Physic Inst., Facultad de Ingeniería, Universidad de la República, Uruguay; Laboratoire de Physique des Lasers, Université Paris 13, France. We studied a novel spectroscopy setup where alkali atoms are infused in random micro-porous glass and the light probing the atoms have a diffuse nature after the propagation in this strong scattering medium.

**LF2D.4 • 14:00**

Line Intensity, N2-Broadening and Pressure Shift Measurements in the $\nu_3$-band of $^{12}$CH$_4$ using a cw-OPO, Mohammad Jannah\textsuperscript{1}, Marco Polo Moreno de Souza\textsuperscript{1}, Leih Nguyen\textsuperscript{1}, Malo Cadoret\textsuperscript{1}, Flavia C. Cruz\textsuperscript{1}, Jean-Jacques Zondy\textsuperscript{1}, Conservatoire Nat’l des Arts et Mètres, France; Universidade Federal de Rondônia, Brazil; Universidade Estadual de Campinas, Brazil. Linestrengths, and nitrogen-collision-induced broadening and pressure shift coefficients of methane’s $\nu_3$-band singlet lines near 3.3 μm have been measured from direct absorption spectroscopy using a tunable cw OPO spectrometer.
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