Slow and Fast Light (SL)
Topical Meeting and Tabletop Exhibit

Technical Conference: July 12-17, 2009
Exhibition: July 13-15, 2009
Hilton Hawaiian Village Beach Resort & Spa
Honolulu, Hawaii, USA

PDP Submissions Deadline: June 17, 2009, 12:00 p.m. noon EDT (16.00 GMT)
Housing Deadline: June 9, 2009
Pre-Registration Deadline: June 18, 2009

Part of Advances in Optical Sciences::
OSA Optics & Photonics Congress

Featuring Three Collocated Topical Meetings:

Integrated Photonics and Nanophotonics Research and Application (IPNRA)
Nonlinear Optics (NLO)
Slow and Fast Light (SL)

2009 Meeting Chairs

General Chairs
Robert W. Boyd, *Univ. of Rochester, USA*
Jesper Mørk, *Technical Univ. of Denmark*, *Denmark*

Program Chairs
Jacob B. Khurgin, *Johns Hopkins Univ., USA*
Luc Thévenaz, *École Polytechnique Fédérale de Lausanne, Switzerland*

About SL

We have been accustomed to thinking of the speed of light as a constant. Yet, over the past few years, it has become clear that the tools exist to slow down, speed up or even completely stop light propagation. This realization has certainly had a profound impact on the optics community from the point of view of fundamental science and has led to the suggestion and exploration of a number of practical applications within various areas.

This topical meeting will bring together physicists and engineers in order to present and discuss the latest achievements within the area of light-speed control. Exciting issues to be discussed include the physics and interpretation of various light-control schemes as well as the potentials and fundamental limitations of possible applications. The area is closely connected to research within structurally engineered materials, such as metamaterials, that allow fundamental control of light-matter interaction. The meeting will provide a forum for vital discussion among experimental and theoretical scientists.

Topics to Be Considered

- **Physics of Light Control:**
  - Electromagnetically induced transparency
  - Coherent population oscillations
  - Four-wave mixing and parametric processes
  - Absorption or gain saturation
  - Stimulated Brillouin and Raman scattering
  - Passive and active manipulation in periodic structures and resonators
  - New schemes and physical effects
- **Materials and Engineered Structures for Light Control:**
  - Metamaterials, including plasmonic structures
  - Photonic crystal waveguides and periodic structures
  - Micro resonators
  - Optical fibers including holey fibers
  - Semiconductor nanostructures, including quantum wells and quantum dots
  - Saturable optical amplifiers and absorbers
  - BEC and hot vapor cells
  - Crystals and other solid-state materials
  - New materials and structures
- **Applications:**
  - Optical communications; all-optical buffers, routers, etc.
  - Microwave photonics; microwave filters and phased array systems
  - Quantum optics
  - Sampling systems
  - Enhanced optical nonlinear response
  - Sensors and improved measurement systems
  - Figures-of-merit and fundamental limitations
  - New applications
- **Implementation Techniques:**
  - Experimental techniques
  - Theoretical techniques
  - Effective numerical simulation techniques

About Slow and Fast Light (SL)

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Submissions Deadline: March 10, 2009, 12:00 p.m. noon EST (16.00 GMT)
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Sponsor: The Optical Society

Meeting Topics to Be Considered:

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Program Committee

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Luc Thévenaz, *École Polytechnique Fédérale de Lausanne, Switzerland*

Program Committee

Toshihiko Baba, *Yokohama Natl. Univ., Japan*
John Howell, *Univ. of Rochester, USA*
Thomas Krauss, *Univ. of St Andrews, UK*
Francesco Morichetti, *Politecnico di Milano, Italy*
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Yuri Rostovtsev, *Texas A&M Univ., USA*
Moshe Shuker, *Technion – Israel Inst. of Technology, Israel*
Rod Tucker, *Univ. of Melbourne, Australia*
Hailin Wang, *Univ. of Oregon, USA*

Exhibitors

SL

Tabletop Exhibit:
July 13-15, 2009

Topical Meeting:
July 12-17, 2009

Slow and Fast Light 2009 Exhibit Space Reservation Contract

Exhibit Space Reservation Contract (PDF, 58KB)

Note: You need Adobe Acrobat to view the PDF files above. If you do not already have this software, you can download Adobe Acrobat for free at the Adobe Web site.

Tabletop exhibit space will be $1,090 for Corporate Members and $1,250 for non-members and will include:

- One complimentary registration list
- One complimentary technical registration and two exhibit personnel registrations
- One copy of the meeting's proceedings

If you have questions about exhibiting at this topical meeting, please contact our exhibit sales staff at 202.416.1428 202.416.1428 or exhibitsales@osa.org.

Sponsorship Opportunities at SL 2009

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To find out more about one of the sponsorship opportunities listed above or to discuss a customized SL promotional package or sponsorship, please contact Anne Jones at 202.416.1942 202.416.1942 or email exhibitsales@osa.org

Exhibitor Listings

ADVANCES in OPTICAL SCIENCES
2009 OSA OPTICS AND PHOTONICS CONGRESS

July 12-17, 2009
Honolulu, Hawaii USA

Collated Meetings:

Integrated Photonics and Nanophotonics Research and Applications (IPNRA)

Nonlinear Optics (NLO)

Slow and Fast Light (SL)

Altos Photonics
201 S. Wallace, Ste. B2C
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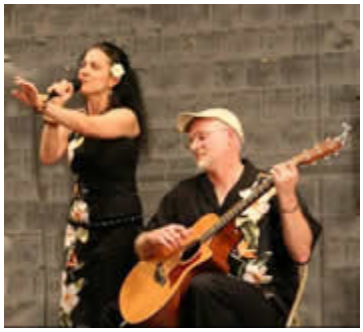
Size doesn't matter.
It's how you measure it.

Thank you to the following organizations that provided grant funding:

- Air Force Office of Science Research (AFOSR)
- National Science Foundation (NSF)
- OSA Foundation

Special Events

Hawaiian Cultural Workshop for the OPC Summer Congress in Traditional & Modern Hula and Chants with Ka'iulani Visiko



Dates: Monday, July 13 and Tuesday, July 14, 2009
Time: 9:00–11:30 a.m.
Location: Hibiscus Suite, Kalia Executive Conference Center
There will be a 15 minute coffee break with Wayne “Kimo” Knox at 10:00 a.m.

On Tuesday, July 14, 2009, there will be an opportunity to perform what you learned in the workshop at the Conference Luau during Kimo and Ka'iulani's Cocktail Hour Concert.
Location: Rooftop of the Mid-Pacific Conference Center
****Note: Luau admission ticket required to participate. Additional tickets may be purchased at Registration until 6:30 p.m., Monday, July 13, 2009.****

For Ka'iulani's Workshop you'll need:

- Tank top or t-shirt
- Shorts or sarong
- Bare feet
- Notepad and pencil
- Much ALOHA and FUN!!

Open to members, family, and friends (Children 12 years old and under must have a parent present at all times).

For more information and any questions, visit www.GalleryKauai.com or contact Kimo and Ka'iulani by email, or call +1 585.313.1195 +1 585.313.1195 (cell).

Invited Speakers

Joint Slow and Fast Light (SL)/Integrated Photonics and Nanophotonics Research and Applications (IPNRA) Session: Slow Light Effects in Integrated Photonics Structures

JMA1, **Dispersion-Controlled Slow Light in Photonic Crystal Waveguides**, Toshihiko Baba[1,2], Hirokazu Sasaki[1,2], Jun Adachi[1,2], Norihiro Ishikura[1], Yohei Hamachi[1,2], Koshiro Yamada[1], Yuji Saito[1,2]; *[1]Yokohama Natl. Univ., Japan, [2]CREST, JST, Japan*

JMA2, **Processing Light in Coupled Ring Resonators**, Francesco Morichetti[1,2], Carlo Ferrari[1], Antonio Canciamilla[1], Matteo Torregiani[1], Andrea Melloni[1], Antonio Samarelli[3], Richard De La Rue[3], Marc Sorel[3]; *[1]POLICOM - DEI Politecnico di Milano, Italy, [2]Fondazione Politecnico di Milano, Italy, [3]Dept. of Electronics and Electrical Engineering, Univ. of Glasgow, UK*

JMA5, **Ultra-Compact Switches and Modulators Based on Slow Light in Photonic Crystals**, Thomas F. Krauss[1], Daryl M. Beggs[1], Thomas P. White[1], Liam O'Faolain[1], Tobias Kampfrath[2], L. (Kobus) Kuipers[2]; *[1]Univ. of St. Andrews, UK, [2]FOM Inst. AMOLF, Netherlands*

Joint Slow and Fast Light (SL)/Nonlinear Optics (NLO) Session: Slow Light Applications in Nonlinear Optics

JWB1, **Slow Light Enhanced Nonlinear Effects in Silicon Photonic Crystal Waveguides**, Cristelle Monat[1], B. Corcoran[1], C. Grillet[1], M. Ebnali-Heidari[1], D. J. Moss[1], B. J. Eggleton[1], T. P. White[2], L. O'Faolain[2], T. F. Krauss[2]; *[1]Univ. of Sydney, Australia, [2]Univ. of St. Andrews, UK*

JWB4, **Modulation of Single Photons and Biphotons**, Steve Harris; *Stanford Univ., USA*

JWB5, **Broadband Optical Delay and Filtering in Spectrally Structured Materials**, Wm. Randall Babbitt, Zeb W. Barber; *Montana State Univ., USA*

Invited Speakers

SMA4, **Fast Light in Optical Fiber for Trap-Door Data Buffering**, Selim M. Shahriar, Honam Yum; *Northwestern Univ., USA*

SMB1, **Stabilizing SBS Slow Light Delay in Fibers Using a Faraday Rotator Mirror**, Mark Bashkansky, David Walker, Fredrik Fatemi, Armen Gulian, Michael Steiner; *NRL, USA*

SMB4, **Noise Properties of Semiconductor Optical Amplifiers Based Slow Light Elements**, Gadi Eisenstein; *Technion-Israel Inst. of Technology, Israel*

SMC2, **Polarization Properties of Stimulated Brillouin Scattering and Their Implications on Slow and Fast Light**, Moshe Tur[1], Avi Zadok[2], Elad Zilka[1], Avishay Eyal[1], Luc Thevenaz[3]; *[1]Tel Aviv Univ., Israel, [2]Caltech, USA, [3]École Polytechnique Fédérale de Lausanne, Switzerland*

SMC6, **Stored Light and Photonic Signal Processing via Stimulated Brillouin Scattering**, Dan Gauthier; *Duke Univ., USA*

STuA1, **Diffusion of Slow-Light in Vapor**, Nir Davidson[1], O. Firstenberg[2], M. Shuker[2], R. Pugatch[1], A. Ron[2]; *[1]Weizmann Inst. of Science, Israel, [2]Technion-Israel Inst. of Technology, Israel*

STuA4, **Slow and Stored Light Manipulations at High Atomic Densities**, Irina Novikova[1], Nathaniel B. Phillips[1], Alexey V. Gorshkov[2]; *[1]College of William & Mary, USA, [2]Harvard Univ., USA*

STuB1, **Slow and Fast Light through Nonlinear Wave Mixing in Liquid Crystal Light Valves**, Stefania Residori[1], U. Bortolozzo[1], J. P. Huignard[2]; *[1]Univ. de Nice Sophia-Antipolis, France, [2]Thales Res. & Technology, France*

STuC3, **Slow Light in Coupled Ring Resonators and PhC: A Comparison**, Andrea Melloni[1], F. Morichetti[2], T. F. Krauss[3]; *[1]Politecnico di Milano, Italy, [2]Fondazione Politecnico di Milano, Italy, [3]Univ. of St. Andrews, UK*

STuC6, **Slotted Photonic Crystal Devices: Slow Light and Applications**, Andrea Di Falco, Liam O'Faolain, Thomas F. Krauss; *Univ. of St. Andrews, UK*

SWA3, **Manipulating Slow Light by Ultrahigh-*Q* Nanocavities and their Coupled Arrays**, Masaya Notomi, T. Tanabe, E. Kuramochi, H. Taniyama; *NTT Basic Res. Labs, Japan*

SWA6, **Dynamic Control of Q Factor of Nanocavity for Stopping of Light**, Susumu Noda, Yoshinori Tanaka, Jeremy Upham, Yasushi Takahashi, Takashi Asano; *Kyoto Univ., Japan*

	Tapa I	Tapa II	Tapa III	Honolulu I-II	Honolulu III
Sunday, July 12					
3:00 p.m.–6:00 p.m.	**Registration Open,** *Palace Lounge*				
Monday, July 13					
7:00 a.m.–6:30 p.m.	**Registration Open,** *Palace Lounge*				
8:00 a.m.–10:00 a.m.	**NMA • Nonlinear Optics in Semiconductors, Glasses and Crystals**	**NMB • Spatial Effects**			**SMA • Fundamental Issues**
8:00 a.m.–8:45 a.m.			**IMA • IPNRA Plenary**		
9:00 a.m.–10:00 a.m.			**IMB • Highlights of IPNRA 2009 Contributed Papers**		
10:00 a.m.–10:30 a.m.	**Coffee Break/Exhibits,** *Palace Lounge*				
10:00 a.m.–4:30 p.m.	**Exhibits Open,** *Palace Lounge*				
10:30 a.m.–12:30 p.m.	**NMC • Nonlinear Optics Plenary I**		**IMC • Silicon Photonics and Hybrid Material Integrated Devices**	**IMD • Filter Technologies**	**SMB • Applications I**
12:30 p.m.–2:00 p.m.	**Lunch** (on your own)				
2:00 p.m.–4:00 p.m.	**NMD • Photonic Crystals and Periodic Nanomaterials**	**NME • Plasmonics**	**JMA • Joint IPNRA/SL Session: Slow Light Effects in Integrated Photonics Structures**	**IME • Nanophotonic Sources**	
4:00 p.m.–4:30 p.m.	**Coffee Break/Exhibits,** *Palace Lounge*				
4:30 p.m.–6:30 p.m.			**IMF • Q-Dot Emitters, PhC Lasers, Microcavities, Coupling**	**IMG • Modeling and Simulation**	**SMC • Fiber-Based Slow Light**
Tuesday, July 14					
7:30 a.m.–6:30 p.m.	**Registration Open,** *Palace Lounge*				
8:00 a.m.–10:00 a.m.	**NTuA • Entanglement, Squeezing and Quantum Memories**	**ITuA • Sensitive Nanophotonics**	**JTuA • Joint IPNRA/NLO Session: Nonlinear Integrated Photonics**	**STuA • Atomic Systems**	
10:00 a.m.–10:30 a.m.	**Coffee Break/Exhibits,** *Palace Lounge*				
10:00 a.m.–11:30 a.m.	**JTuB • Joint Poster Session I,** *Palace Lounge*				
10:00 a.m.–1:00 p.m.	**Exhibits Open,** *Palace Lounge*				
11:30 a.m.–1:00 p.m.	**NTuB • Nonlinear Optics Plenary II**	**ITuB • Photonic Devices and Integration I**	**ITuC • Silicon Nanophotonics**	**STuB • Applications II**	
1:00 p.m.–2:30 p.m.	**Lunch (on your own)**				
2:30 p.m.–4:30 p.m.	**NTuC • Nonlinear Optics in Microresonators**	**ITuD • Modeling and Simulation II**	**ITuE • Novel Waveguides and Photonic Sensors**	**STuC • Photonic Structures and Semiconductors**	
4:30 p.m.–5:00 p.m.	**Coffee Break,** *Palace Lounge*				
5:00 p.m.–6:30 p.m.	**Postdeadline Paper Sessions,** *See Postdeadline Papers book for schedule and locations*				
7:00 p.m.–10:00 p.m.	**Conference Luau,** *Lagoon Green*				

	Tapa I	Tapa II	Tapa III	Honolulu I-II
Wednesday, July 15				
7:30 a.m.–4:30 p.m.	**Registration Open,** *Palace Lounge*			
8:00 a.m.–10:00 a.m.	**NWA • Terahertz and Ultrafast**	**NWB • Novel Effects in Atoms, Molecules and Metals**	**IWA • Photonic Devices and Integration II**	**SWA • Photonic Structures**
10:00 a.m.–10:30 a.m.	**Coffee Break/Exhibits,** *Palace Lounge*			
10:00 a.m.–11:30 a.m.	**JWA • Joint Poster Session II,** *Palace Lounge*			
10:00 a.m.–2:30 p.m.	**Exhibits Open,** *Palace Lounge*			
11:30 a.m.–1:30 p.m.	**NWC • Current Trends in Nonlinear Optical Materials**	**NWD • Advances in Frequency Conversion, High Energy Lasers, and Laser Dynamics**	**IWB • Resonator Circuits and their Applications**	**JWB • Joint NLO/SL Session: Slow Light Applications in Nonlinear Optics**
1:30 p.m.–2:30 p.m.	**Lunch** (on your own)			
2:30 p.m.–4:30 p.m.	**IWC • Modeling and Simulation III**	**IWD • 3-D Photonic Crystals, Novel Fabrication Techniques**		
7:30 p.m.–9:00 p.m.	**Registration Open,** *Palace Lounge*			
7:30 p.m.–9:30 p.m.	**NWE • Squeezing and Biphoton States**			
Thursday, July 16				
7:30 a.m.–1:00 p.m.	**Registration Open,** *Palace Lounge*			
8:00 a.m.–10:15 a.m.	**NThA • Parametric Processes and Oscillators**			
10:15 a.m.–10:45 a.m.	**Coffee Break,** *Palace Lounge*			
10:45 a.m.–1:00 p.m.	**NThB • Advances in Quasi-Phase-Matched Interactions**			
7:30 p.m.–9:00 p.m.	**Registration Open,** *Palace Lounge*			
7:30 p.m.–9:30 p.m.	**NThC • Generating E&M Radiation: Visible, UV, X-Ray and Gamma Rays**			
Friday, July 17				
7:30 a.m.–1:00 p.m.	**Registration Open,** *Palace Lounge*			
8:00 a.m.–10:15 a.m.	**NFA • Self Focusing and Filaments**			
10:15 a.m.–10:45 a.m.	**Coffee Break,** *Palace Lounge*			
10:45 a.m.–1:00 p.m.	**NFB • Applications of Nonlinear Optics**			

Key to Shading	
IPNRA Sessions	
NLO Sessions	No Shading
SL Sessions	
Joint Sessions	

Slow and Fast Light (SL) Abstracts

•Sunday, July 12, 2009•

Palace Lounge
3:00 p.m.–6:00 p.m.
Registration Open

•Monday, July 13, 2009•

Palace Lounge
7:00 a.m.–6:30 p.m.
Registration Open

SMA • Fundamental Issues

Honolulu III
8:00 a.m.–10:00 a.m.
Moshe Shuker; Technion-Israel Inst. of Technology, Israel, Presider

SMA1 • 8:00 a.m.
Fast-Light and the Speed of Information Transfer, *Michael Z. Feng, Wayne V. Sorin, Rodney S. Tucker; Univ. of Melbourne, Australia.* We show that in a gain-assisted fast-light transmission link with a thermal-noise-limited receiver, the speed of information transfer can exceed the speed of light in a vacuum.

SMA2 • 8:15 a.m.
Do Pulses in Negative Group Velocity Material Carry Negative Electromagnetic Energy, *Noam Kaminski, Meir Orenstein; Technion-Israel Inst. of Technology, Israel.* Negative dispersion can be exhibited in resonant materials with gain (or loss). The resulting causal pulses exhibiting "fast light" can be analytically interpreted as carrying negative electromagnetic energy, exploiting the stored energy in the medium.

SMA3 • 8:30 a.m.
Material Slow Light Does Not Enhance Beer-Lambert Absorption, *Sanghoon Chin[1], Isabelle Dicaire[1], Jean-Charles Beugnot[1], Stella Foaleng-Mafang[1], Miguel Gonzalez-Herraez[2], Luc Thévenaz[1]; [1]École Polytechnique Fédéral de Lausanne, Switzerland, [2]Dept. of Electronics, Univ. of Alcala de Henares, Spain.* We experimentally demonstrate that material slow light does not enhance Beer-Lambert absorption. A 26% group velocity reduction induced by stimulated Brillouin scattering in a gas-filled microstructured fiber caused no observable change in the measured absorption.

SMA4 • 8:45 a.m. **Invited**
Fast Light in Optical Fiber for Trap-Door Data Buffering, *Selim M. Shahriar, Honam Yum; Northwestern Univ., USA.* Constraints encountered in data-buffering via slow light are circumvented by using a trap-door technique based on fast light. We will describe the model and our experimental efforts to realize this buffer using Brillouin gain in optical fiber.

SMA5 • 9:15 a.m.
Free Energies of Dielectrics, *Scott A. Glasgow, Michael Ware; Brigham Young Univ., USA.* We compute the real-time maximal and minimum free energies in linear dielectrics. These arise as solutions to classical Riemann-Hilbert problems. Connections to slow and fast light and to the real-time thermodynamics of dielectrics are made.

SMA6 • 9:30 a.m.
Pulses with Non Analytical Points Described by Functions with Compact Support: The Information Velocity in a Fast-Light Medium, *Wagner F. Silva[1], Marcio A. R. Alencar[1], Dilson P. Caetano[1], Adan J. Corcho[2], Jandir M. Hickmann[1]; [1]Optics and Materials Group - OPTMA, Inst. of Physics, Univ. Federal de Alagoas, Brazil, [2]Inst. of Mathematics, Univ. Federal de Alagoas, Brazil.* A new approach to associate information to non analytical points of optical pulses is investigated. These pulses propagation through a dispersive medium is numerically studied and the information velocity is characterized for superluminal propagation.

SMA7 • 9:45 a.m.
Effect Reminiscent of Slow Light in Saturable Bacteriorhodopsin-Based Materials, *Elena Korchemskaya[1,2], Dmitrij Stepanchikov[3], Nikolaj Burykin[2], Tatyana Dyukova[4]; [1]Inst. of Physics, Natl. Acad. of Sciences, Ukraine, [2]Inst. of Applied Optics, Natl. Acad. of Sciences, Ukraine, [3]Zhytomir State Univ., Ukraine, [4]Inst. of Theoretical and Experimental Biophysics, Russian Acad. of Sciences, Russian Federation.* We demonstrate that a pulse delay can be reached merely due to nonuniform photobleaching in depth of low-saturable bacteriorhodopsin materials.

Palace Lounge
10:00 a.m.–10:30 a.m.
Coffee Break/Exhibits (Exhibits open 10:00 a.m.–4:30 p.m.)

SMB • Applications I

Honolulu III
10:30 a.m.–12:30 p.m.
Francesco Morichetti; Politecnico di Milano, Italy, Presider

SMB1 • 10:30 a.m. **Invited**

Stabilizing SBS Slow Light Delay in Fibers Using a Faraday Rotator Mirror, *Mark Bashkansky, David Walker, Fredrik Fatemi, Armen Gulian, Michael Steiner; NRL, USA.* Stokes gain and delay in stimulated Brillouin scattering in fibers is strongly affected by polarization changes due to unavoidable fiber disturbances. We demonstrate the use of a Faraday rotator mirror to counteract polarization fluctuations.

SMB2 • 11:00 a.m.
Controlling the Sensitivity of an Optical Cavity with Slow and Fast Light, *David D. Smith[1,2], Krishna Myneni[2,3], Jamiu A. Odutola[4], Jean-Claude Diels[5]; [1]NASA Marshall Space Flight Ctr., USA, [2]Univ. of Alabama in Huntsville, USA, [3]U.S. Army, USA, [4]Alabama A&M Univ., USA, [5]Univ. of New Mexico, USA.* We measure mode pushing in a Fabry-Perot cavity by a dispersive medium and find that the scale factor increases more than the mode width. We discuss the conditions that result in such enhanced cavity sensitivities.

SMB3 • 11:15 a.m.
Influence of Slow Light Effect in Semiconductor Amplifiers on the Dynamic Range of Microwave-Photonics Links, *Perrine Berger[1,2], Mehdi Alouini[1,3], Jérôme Bourderionnet[1], Fabien Bretenaker[2], Daniel Dolfi[1]; [1]Thales Res. & Technology, France, [2]Lab Aimé Cotton, France, [3]Inst. de Physique de Rennes, France.* We propose a theoretical and experimental analysis of the dynamic range of a SOA-based photonic-microwave link. The dynamic range is found constant versus RF frequency, in particular near the gain dip associated with slowlight effects.

SMB4 • 11:30 a.m. **Invited**

Noise Properties of Semiconductor Optical Amplifiers Based Slow Light Elements, *Gadi Eisenstein; Technion-Israel Inst. of Technology, Israel.* Semiconductor optical amplifiers acting as slow light elements offer large phase shifts provided that their output spectra are filtered prior to detection. The filtering affects their noise properties which are described in this paper.

SMB5 • 12:00 p.m.
Picometer Displacement Detection by Using Wave Mixing in a Liquid Crystal Light Valve, *Umberto Bortolozzo[1], Stefania Residori[1], Jean-Pierre Huignard[2]; [1]Inst. Non Linéaire de Nice, CNRS, Univ. de Nice Sophia-Antipolis, France, [2]Thales Res. & Technology, France.* The large dispersion and narrow frequency bandwidth of the two-wave mixing in liquid crystal light valve is used to realize an adaptive holographic interferometer, by which displacements as small as a few picometers are detected.

SMB6 • 12:15 p.m.
Experimental Demonstration of 360° Tunable RF Phase Shift Using Slow and Fast Light Effects, *Weiqi Xue[1], Salvador Sales[2], José Capmany[2], Jesper Mørk[1]; [1]DTU Fotonik, Technical Univ. of Denmark, Denmark, [2]Univ. Politécnica de Valencia, Spain.* A microwave photonic phase shifter realizing 360° phase shift over a bandwidth of more than 10GHz is demonstrated using optical filtering assisted slow and fast light effects in a cascaded structure of semiconductor optical amplifiers.

12:30 p.m.–2:00 p.m.
Lunch (on your own)

JMA • Joint IPNRA/SL Session: Slow Light Effects in Integrated Photonics Structures

Tapa III
2:00 p.m.–4:00 p.m.
Wayne Sorin; Univ. of Melbourne, Australia, Presider

JMA1 • 2:00 p.m. **Invited**

Dispersion-Controlled Slow Light in Photonic Crystal Waveguides, *Toshihiko Baba[1,2], Hirokazu Sasaki[1,2], Jun Adachi[1,2], Norihiro Ishikura[1], Yohei Hamachi[1,2], Koshiro Yamada[1], Yuji Saito[1,2]; [1]Yokohama Natl. Univ., Japan, [2]CREST, JST, Japan.* Photonic crystal slow light waveguides are demonstrated with a large delay-bandwidth product over 100, picosecond pulse transmission and tunable delay. The nonlinear enhancement based on the slow light pulse is also presented.

JMA2 • 2:30 p.m. **Invited**

Processing Light in Coupled Ring Resonators, *Francesco Morichetti[1,2], Carlo Ferrari[1], Antonio Canciamilla[1], Matteo Torregiani[1], Andrea Melloni[1], Antonio Samarelli[3], Richard De La Rue[3], Marc Sorel[3]; [1]POLICOM - DEI Politecnico di Milano, Italy, [2]Fondazione Politecnico di Milano, Italy, [3]Dept. of Electronics and Electrical Engineering, Univ. of Glasgow, UK.* The state-of-the-art of coupled resonator optical waveguides made of chains of ring resonators in glass and SOI platforms is reviewed. Issues concerning technology, design, limits and applications in the linear and nonlinear regime are discussed.

JMA3 • 3:00 p.m.
All Optical Switching in Silicon-on-Insulator Photonic Wire Nano-Cavities, *Michele Belotti[1], Matteo Galli[1], Dario Gerace[1], Lucio C. Andreani[1], Giorgio Guizzetti[1], Ahmad R. Md Zain[2], Nigel P. Johnson[2], Marc Sorel[2], Richard M. De La Rue[2]; [1]Univ. degli Studi di Pavia, Italy, [2]Univ. of Glasgow, UK.* All optical switching in a silicon-on-insulator wire with a 1-D photonic crystal nanocavity with ultra-high quality factor operating at telecom wavelengths is presented. Switching is performed with control pulse energy of only 20 fJ.

JMA4 • 3:15 p.m.
Recent Advances in 'Trapped Rainbow' Techniques for Stopping Light, *Kosmas Tsakmakidis, Ortwin Hess; Advanced Technology Inst., Univ. of Surrey, UK.* We provide an overview of 'trapped rainbow' techniques for stopping light. We show that guided modes with real propagation constant and complex frequency can be 'trapped rainbow'-stopped even in the presence of waveguide losses.

JMA5 • 3:30 p.m. **Invited**
Ultracompact Switches and Modulators Based on Slow Light in Photonic Crystals, *Thomas F. Krauss[1], Daryl M. Beggs[1], Thomas P. White[1], Liam O'Faolain[1], Tobias Kampfrath[2], L.(Kobus) Kuipers[2]; [1]Univ. of St. Andrews, UK, [2]FOM Inst. AMOLF, Netherlands.* Photonic crystal slow light waveguides enable modulators with high speed and large bandwidth. Group indices of 30-40 are achieved with low loss and we demonstrate modulators of <100 μm length with switching times of 3ps.

Palace Lounge
4:00 p.m.–4:30 p.m.
Coffee Break/Exhibits

SMC • Fiber-Based Slow Light

Honolulu III
4:30 p.m.–6:30 p.m.
Hailin Wang; Univ. of Oregon, USA, Presider

SMC1 • 4:30 p.m.
Optical Pulse Capture and Release in Coupled Semiconductor Laser Arrays, *Yuval Yifat, Jacob Scheuer; Tel Aviv Univ., Israel.* We present a method for optical pulse capture and release using an array of slightly coupled semiconductor lasers. The pulse is seeded into one of the array's lasers, losing phase information while enabling accurate release.

SMC2 • 4:45 p.m. **Invited**
Polarization Properties of Stimulated Brillouin Scattering and Their Implications on Slow and Fast Light, *Moshe Tur[1], Avi Zadok[2], Elad Zilka[1], Avishay Eyal[1], Luc Thévenaz[3]; [1]Tel Aviv Univ., Israel, [2]Caltech, USA, [3]École Polytechnique Fédérale de Lausanne, Switzerland.*
Vector formalism for stimulated Brillouin scattering amplification in birefringent fibers is used to model the fiber as an equivalent, pseudo-linear, polarization-dependent gain medium. Implications on slow and fast light setups are discussed.

SMC3 • 5:15 p.m.
Zero-Broadening, Zero-Distortion SBS-Based Slow Light—An Overview, *Thomas Schneider, Andrzej Wiatrek, Ronny Henker; Hochschule für Telekommunikation, Germany.* In the last few months several "Zero-Broadening" slow light methods were presented. By cascading any wanted delay could be possible. Here we present new results, compare these methods and discuss the underlying physics.

SMC4 • 5:30 p.m.
1.4 Bit Delay and Pulse Compression Based on Brillouin Optical Signal Processing, *Andrzej Wiatrek, Ronny Henker, Stefan Preußler, Thomas Schneider; Hochschule für Telekommunikation Leipzig, Germany.* We discuss a novel method for pulse delaying by manipulation of the pulse spectrum itself via optical signal processing. Besides a high fractional delay, the typical side effect of pulse broadening is totally cancelled.

SMC5 • 5:45 p.m.
The Fiber Microcoil Optical Gyroscope, *Jacob Scheuer; Tel Aviv Univ., Israel.* We study the propagation of electromagnetic waves in rotating optical microcoil. The combination of slow-light and conventional propagation enhance the Sagnac phase shift by orders of magnitudes enabling the realization of highly-compact optical rotation sensors.

SMC6 • 6:00 p.m. **Invited**
Stored Light and Photonic Signal Processing via Stimulated Brillouin Scattering, *Daniel Gauthier; Duke Univ., USA.* Abstract not available.

•Tuesday, July 14, 2009•

Palace Lounge
7:30 a.m.–6:30 p.m.
Registration Open

STuA • Atomic Systems

Honolulu I-II
8:00 a.m.–10:00 a.m.
Jesper Mørk; Technical Univ. of Denmark, Denmark, Presider

STuA1 • 8:00 a.m. **Invited**
Diffusion of Slow-Light in Vapor, *Nir Davidson[1], O. Firstenberg[2], M. Shuker[2], R. Pugatch[1], A. Ron[2]; [1]Weizmann Inst. of Science, Israel, [2]Technion-Israel Inst. of Technology, Israel.* We study theoretically and experimentally the propagation of slow light in hot atomic vapor and present novel spatial and spectral effects associated with the diffuse atomic motion.

STuA2 • 8:30 a.m.
Slow and Stopped Images, *Praveen Vudya Setu, D. Starling, Ryan M. Camacho, C. J. Broadbent, John C. Howell; Univ. of Rochester, USA.* We report on the slowing and stopping of images in a warm Rb vapor.

STuA3 • 8:45 a.m.
Electromagnetically Induced Transparency in an Integrated Rubidium Vapor Cell, *Bin Wu[1], John Hulbert[2], Katherine Hurd[2], Mark Oehlberg[1], Aaron Hawkins[2], Holger Schmidt[1]; [1]Univ. of California at Santa Cruz, USA, [2]Brigham Young Univ., USA.* Electromagnetically induced transparency in rubidium atoms on a waveguide-based silicon chip is demonstrated. A transparency of 12% is achieved with a coupling laser power of 133μW. Further improvements by modified waveguide design are discussed.

STuA4 • 9:00 a.m. **Invited**
Slow and Stored Light Manipulations at High Atomic Densities, *Irina Novikova[1], Nathaniel B. Phillips[1], Alexey V. Gorshkov[2]; [1]College of William & Mary, USA, [2]Harvard Univ., USA.* We present analysis of pulse propagation dynamics under the electromagnetically induced transparency conditions. We demonstrate optimal storage of an optical pulse of arbitrary shape, and discuss the mechanisms limiting the efficiency at high optical depths.

STuA5 • 9:30 a.m.
Ultraslow Matched-Pulse Propagation in Na Vapor, *Masaharu Mitsunaga, Nobuhito Hayashi, Junji Okuma, Akihiko Fujisawa; Kumamoto Univ., Japan.* We have observed ultraslow propagation of matched pulses in a parametric amplifying sodium vapor. A fractional delay of >1 and a gain of 28 have been simultaneously achieved for both the probe and Stokes pulses.

STuA6 • 9:45 a.m.
Stationary Light Using Spin Coherence Gratings, *Byoung S. Ham, J. Hahn; Inha Univ., Republic of Korea.* We have observed very long trapping of ultraslow light pulse far beyond the conventional limitation of spin coherence relaxation time in an optical medium using double electromagnetically induced transparency-based spin coherence gratings.

Palace Lounge
10:00 a.m.–10:30 a.m.
Coffee Break/Exhibits (Exhibits open 10:00 a.m.–1:00 p.m.)

JTuB • Joint Poster Session I

Palace Lounge
10:00 a.m.–11:30 a.m.

JTuB25
Modulation and Measurement of Time-Energy Entangled Photons, *Chinmay N. Belthangady, Shengwang Du, Chih-Sung Chuu, Guang-Yu Yin, Stephen E. Harris; Stanford Univ., USA.* We describe a proof-of-principle experiment demonstrating a Fourier technique for measuring the shape of biphoton wavepackets that vary rapidly as compared to the speed of available photon detectors. The technique uses synchronously driven telecommunication modulators.

JTuB26
Middle Band Zero Group Velocities in a SCARECROW Waveguide Structure, *Ori Weiss, Jacob Scheuer; Tel Aviv Univ., Israel.* SCARECROW structure is presented. Degeneracy Removal of SCISSOR by ring to ring coupling shows band split and middle Brillouin zone zero group velocities. Pulse propagation, finite and infinite structures are discussed.

JTuB27
Compact Optically-Fed Microwave True-Time Delay Using Liquid Crystal Photonic Bandgap Fiber Device, *Lei Wei[1], Weiqi Xue[1], Yaohui Chen[1], Thomas Tanggaard Alkeskjold[2], Bjarklev Anders[1]; [1]DTU Fotonik, Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark, [2]Crystal Fibre A/S, Denmark.* Electrically tunable liquid crystal photonic bandgap fiber device based optically-fed microwave true-time delay is demonstrated. A maximum ~60° phase shift and an averaged ~7.2ps true time delay are obtained over the modulation frequency range 1GHz-19GHz.

JTuB28
Tunable Optical Delay Line Using Semiconductor Laser for 10 Gbit/s Data Signal, *Fang-Ming Wu[1], Peng-Chun Peng[2], Ruei-Long Lan[3], Jye-Hong Chen[4], Chun-Ting Lin[4], Sien Chi[5]; [1]Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Hsinchu, Taiwan, R. O. C., Taiwan, [2]Dept. of Electro-Optical Engineering, Natl. Taipei Univ. of Technology, Taiwan, [3]Dept. of Electrical Engineering, Natl. Chi Nan Univ., Taiwan, [4]Dept. of Photonics and Inst. of Electro-Optical Engineering, Natl. Chiao Tung Univ., Taiwan, [5]Dept. of Electrical Engineering, Yuan-Ze Univ., Taiwan.* This work experimentally demonstrates a tunable optical delay line using a vertical-cavity surface-emitting laser (VCSEL). Tunable delays for 10 Gbit/s data signal are achieved by adjusting the driving current of VCSEL.

JTuB1–JTuB12 can be found in the Integrated Photonics and Nanophotonics Research and Applications (IPNRA) abstracts.
JTuB13–JTuB24 can be found in the Nonlinear Optics (NLO) abstracts.

STuB • Applications II

Honolulu I-II
11:30 a.m.–1:00 p.m.
John Howell; Univ. of Rochester, USA, Presider

STuB1 • 11:30 a.m. **Invited**
Slow and Fast Light through Nonlinear Wave Mixing in Liquid Crystal Light Valves, *Stefania Residori[1], U. Bortolozzo[1], J. P. Huignard[2]; [1]Univ. de Nice Sophia-Antipolis, France, [2]Thales Res. & Technology, France.* The large dispersive properties of wave mixing in liquid crystal light-valves allow obtaining fast and slow light with tunable group velocities. A slow light interferometer is shown by using this process in the light-valve.

STuB2 • 12:00 p.m.
Diffraction Elimination of Slow Images, *Ofer Firstenberg[1], Moshe Shuker[1], Amiram Ron[1], Nir Davidson[2]; [1]Technion-Israel Inst. of Technology, Israel, [2]Weizmann Inst. of Science, Israel.* We present a scheme for eliminating the optical diffraction of images imprinted on slow light in vapor. The elimination of diffraction occurs for arbitrary images all throughout their propagation. An initial experimental demonstration is presented.

STuB3 • 12:15 p.m.
The Far Off-Resonant Faraday Effect in a Slow-Light Medium: A Gigahertz Bandwidth Probe, *Paul Siddons, Charles S. Adams, Ifan G. Hughes; Durham Univ., UK.* The slow-light Faraday effect is the spectral displacement of the group index for opposite circular polarization for atoms in a magnetic field. We have demonstrated polarization rotation of a nanosecond pulse in Rb vapor.

STuB4 • 12:30 p.m.
Pulse Storage Using Wavelength Multiplexed Holograms in Photorefractive Crystal, *Myungjun Lee, Ravi Pant, Mark A. Neifeld; Univ. of Arizona, USA.* We present a technique for recording, storing, and retrieving a 10 Mbps pulse sequence based on the use of wavelength multiplexed holograms in a photorefractive KNSBN crystal.

STuB5 • 12:45 p.m.
Broadband Microwave Phase Shifter Based on High Speed Cross Gain Modulation in Quantum Dot Semiconductor Optical Amplifiers, *Yaohui Chen, Jesper Mørk; DTU Fotonik, Dept. of Photonics Engineering, Technical Univ. of Denmark, Denmark.* We present a scheme to achieve tunable ~180 degrees microwave phase shifts at frequencies exceeding 100 GHz based on high speed cross gain modulation in quantum dot semiconductor optical amplifiers.

1:00 p.m.–2:30 p.m.
Lunch (on your own)

STuC • Photonic Structures and Semiconductors

Honolulu I-II
2:30 p.m.–4:30 p.m.
Toshihiko Baba; Yokohama Natl. Univ., Japan, Presider

STuC1 • 2:30 p.m.
Shaping Paired Photons with Four-Wave Mixing and Slow Light, *Shengwang Du[1], Jianming Wen[2], Chinmay Belthangady[3]; [1]Dept. of Physics, Hong Kong Univ. of Science and Technology, Hong Kong, [2]Physics Dept., Univ. of Virginia, USA, [3]Edward L. Ginzton Lab, Stanford Univ., USA.* We show that the Glauber correlation function of paired photons generated in a double-lambda atomic ensemble can be controlled by modulating two injected classical laser fields, using slow light assisted four-wave mixing.

STuC2 • 2:45 p.m.
Single-Photon Traversal of Dielectric Bandgaps: Apparent Superluminality, Tunneling and Surface Modes, *Sergey V. Polyakov[1], Natalia Rutter[1,2], Natalia Malkova[1], Garnett Bryant[1], Paul Lett[1], Alan Migdall[1]; [1]NIST and Univ. of Maryland, USA, [2]Georgetown Univ., USA.* We investigate the optical Hartman saturation effect in multilayer dielectric stacks. We experimentally observe jumps of photon transversal times due to adding single quarter-wave layers and attribute them to appearance of surface modes.

STuC3 • 3:00 p.m. **Invited**
Slow Light in Coupled Ring Resonators and PhC: A Comparison, *Andrea Melloni[1], F. Morichetti[2], T. F. Krauss[3]; [1]Politecnico di Milano, Italy, [2]Fondazione Politecnico di Milano, Italy, [3]Univ. of St. Andrews, UK.* Although the light confinement mechanism in photonic crystal and classical waveguides is very different, at a higher abstraction level, namely at circuit level, they can be compared, both in the linear and nonlinear regime.

STuC4 • 3:30 p.m.
A Method to Achieve Large Tunable Delays Based on EIT in an Inhomogeneously Broadened Quantum Dot Medium, *Per Lunnemann, Jesper Mørk; Technical Univ. of Denmark, Denmark.* We propose a scheme for reducing the impact of inhomogeneous broadening on quantum dot based EIT for slow light. Field propagation calculations show superior performance in delay compared to traditionally investigated EIT schemes.

STuC5 • 3:45 p.m.
Slow Light via Electromagnetically-Induced Transparency in GaAs Multiple Quantum Wells in a Transient Regime, *Seong-Min Ma, Hua Xu, Byoung S. Ham; Inha Univ., Republic of Korea.* Slowed group velocity of light in GaAs/AlGaAs multiple quantum wells (MQWs) for ultrafast photonic applications is numerically estimated and discussed using a fourth-order Runge-Kutta method through observed electromagnetically-induced transparency (EIT) in a transient regime.

STuC6 • 4:00 p.m. **Invited**
Slotted Photonic Crystal Devices: Slow Light and Applications, *Andrea Di Falco, Liam O'Faolain, Thomas F. Krauss; Univ. of St. Andrews, UK.* Slotted photonic crystal geometries permit the confinement of light in very small air volumes. Tailoring their dispersion, we demonstrate and discuss slow light operation and two applications, a modulator for telecommunications and a chemical sensor.

4:30 p.m.–5:00 p.m., Coffee Break, *Palace Lounge*

5:00 p.m.–6:30 p.m., Postdeadline Paper Sessions, *See Postdeadline Papers book for schedule and locations*

7:00 p.m.–10:00 p.m., Conference Luau, *Lagoon Green*

•Wednesday, July 15, 2009•

Palace Lounge
7:30 a.m.–4:30 p.m.
Registration Open

SWA • Photonic Structures

Honolulu I-II
8:00 a.m.–10:00 a.m.
Thomas Krauss; Univ. of St. Andrews, UK, Presider

SWA1 • 8:00 a.m.
Record Wide Range Tuning of Slow Light Pulse in Photonic Crystal Coupled Waveguide via Turnup Chirping, *Jun Adachi, Norihiro Ishikura, Hirokazu Sasaki, Toshihiko Baba; Yokohama Natl. Univ., Japan.* We fabricated the high-quality photonic crystal coupled waveguide with turnup index chirping formed by local heating. The maximum tuning range of slow light pulse was 103 ps and tunable buffering capacity was 22.

SWA2 • 8:15 a.m.
Optical Control of the Localized-Surface-Plasmon-Resonance Enhancement of Evanescent Coupling, *Albert T. Rosenberger, Elijah Dale, Deepak Ganta, Razvan I. Stoian; Oklahoma State Univ., USA.* Significant enhancement of coupling from a tapered fiber into a microresonator results when surface plasmons are excited in gold nanorods on its surface. The enhancement may be rapidly controlled by an external light beam.

SWA3 • 8:30 a.m. **Invited**
Manipulating Slow Light by Ultrahigh-*Q* Nanocavities and their Coupled Arrays, *Masaya Notomi, T. Tanabe, E. Kuramochi, H. Taniyama; NTT Basic Res. Labs, Japan.* We investigate ultrahigh-*Q* nanocavities in photonic crystals for manipulating slow light. First, we study applicability of coupled nanocavities for realizing ultimate slow-light waveguides. Second, we exploit dynamic tuning of slow-light media for read/write processes.

SWA4 • 9:00 a.m.
Controlling Speed of Polarized Light in Birefringent Media, *Anil K. Patnaik, Paul S. Hsu, Sukesh Roy, James R. Gord; AFRL, USA.* For controlling the group velocity of polarized light, we envision the use of a homogeneous magnetic field in conjunction with a single resonant laser in an induced birefringent medium.

SWA5 • 9:15 a.m.
Slow Light Propagation in a Dynamic Cavity, *Jin-Hui Wu[1], Maurizio Artoni[2,3], Giuseppe La Rocca[4]; [1]College of Physics, Jilin Univ., China, [2]Univ. of Brescia, Italy, [3]European Lab for Nonlinear Spectroscopy, Italy, [4]Scuola Normale Superiore, Italy.* The interplay between a magnetic field and two traveling or standing-wave lasers is employed to devise a dynamic cavity for light confinement, during which the light pulse undergoes spatial oscillations at a slow velocity.

SWA6 • 9:30 a.m. **Invited**
Dynamic Control of Q Factor of Nanocavity for Stopping of Light, *Susumu Noda, Yoshinori Tanaka, Jeremy Upham, Yasushi Takahashi, Takashi Asano; Kyoto Univ., Japan.* First of all, we demonstrate ultra-high quality nanocavities with Q factors more than 3.5 million. Then, we show that Q factors can be dynamically increased and decreased within picosecond regime through time-domain measurements.

Palace Lounge
10:00 a.m.–10:30 a.m.
Coffee Break/Exhibits (Exhibits open 10:00 a.m.–2:30 p.m.)

JWA • Joint Poster Session II

Palace Lounge
10:00 a.m.–11:30 a.m.

JWA26
Phase-Controlled Slow and Fast Light in Current-Modulated Semiconductor Optical Amplifiers, *Sonia Melle, Miguel A. Antón, Fernando Carreño, Francisco Arrieta-Yañez, Oscar G. Calderon; Univ. Complutense de Madrid, Spain.* We present a theoretical study of the slow and fast light propagation in semiconductor optical amplifiers based on coherent population oscillations. By modulating the injection current we control the delay or advancement of light signals.

JWA27
Observation of Slow Light and Superluminal in Cs Atomic Vapor, *Yundong Zhang, Shuangqiang Liu, Hao Wu, Zhusong He, Ping Yuan; Harbin Inst. of Technology, China.* Slow light and superluminal were both observed in Cs atomic vapor without any couple field. By only changing the signal modulate frequency, the light propagation changes from superluminal to slow light.

JWA28
Delay Times of the Guided and Focused Modes of Ultraslow Light in an Atomic Bose-Einstein Condensate, *Devrim Tarhan[1], Alphan Sennaroglu[2], Özgür Müstecaplioglu[2]; [1]Physics Dept., Harran Univ.,Turkey, [2]Physics Dept., Koç Univ., Turkey.* We have calculated the delay times of the focused and guided modes of the ultraslow light in an atomic Bose-Einstein condensate by using an off-resonant electromagnetically induced transparency scheme.

JWA29
Pulse Width Depending Group Velocity on Erbium-Doped Fibers, *Francisco Arrieta-Yañez, Oscar G. Calderon, Sonia Melle, Fernando Carreño, Miguel Angle Anton; Univ. Complutense de Madrid, Spain.* We report a change in the propagation regime (subluminal-superluminal) of light pulses in a pumped erbium doped fiber. We explain this behavior as a propagation effect. A pulse-width separator based on this effect is proposed.

JWA1–JWA13 can be found in the Integrated Photonics and Nanophotonics Research and Applications (IPNRA) abstracts.
JWA14–JWA25 can be found in the Nonlinear Optics (NLO) abstracts.

JWB • Joint NLO/SL Session: Slow Light Applications in Nonlinear Optics

Honolulu I-II
11:30 a.m.–1:30 p.m.
Mark Allen Neifeld; Univ. of Arizona, USA, Presider

JWB1 • 11:30 a.m. **Invited**
Slow Light Enhanced Nonlinear Effects in Silicon Photonic Crystal Waveguides, *Christelle Monat[1], B. Corcoran[1], C. Grillet[1], M. Ebnali-Heidari[1], D. J. Moss[1], B. J. Eggleton[1], T. P. White[2], L. O'Faolain[2], T. F. Krauss[2]; [1]Univ. of Sydney, Australia, [2]Univ. of St. Andrews, UK.* We experimentally investigate the slow light enhancement of nonlinear effects such as self-phase modulation, two-photon absorption and free carriers, through dispersion-engineered silicon photonic crystal waveguides. We also observe emission of visible light through third-harmonic generation.

JWB2 • 12:00 p.m.
Complete Broadening Compensation in a Slow Light System Using a Non-Linear Regeneration Element, *Sanghoon Chin[1], Miguel Gonzalez-Herraez[2], Luc Thévenaz[1]; [1]École Polytechnique Fédéral de Lausanne, Switzerland, [2]Univ. of Alcalá de Henares, Spain.* We demonstrate experimentally a new configuration to realize zero-broadening slow light. The inevitable pulse broadening in the slow light medium was completely compensated by a nonlinear regeneration element. Experimental results show 1.3-bit delays without distortion.

JWB3 • 12:15 p.m.
Four-Wave Mixing in Slow Light Waveguides, *Vishnupriya Govindan, Steve Blair; Univ. of Utah, USA.* We study the effects of pulse distortion on four-wave mixing (FWM) for different slow-light architectures. REMZI has the highest FWM conversion. Distortion constraint limits the FWM conversion in CROW with higher number of stages.

JWB4 • 12:30 p.m. **Invited**
Modulation of Single Photons and Biphotons, *Steve Harris; Stanford Univ., USA.* We generate photons with sub-natural linewidths and temporal lengths that are sufficiently long that they may be easily modulated. Results include a new technique for measuring the temporal shape of biphotons.

JWB5 • 1:00 p.m. **Invited**
Broadband Optical Delay and Filtering in Spectrally Structured Materials, *Wm. Randall Babbitt, Zeb W. Barber; Montana State Univ., USA.* Spectrally structured optical materials have the ability to process broadband signals, including performing true-time-delay and spectral filtering. This paper reviews the theory and experimental results of spatial spectral holographic true time delay and filtering.

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

Integrated Photonics and Nanophotonics Research and Applications (IPNRA)/ Nonlinear Optics (NLO)/Slow and Fast Light (SL)
Postdeadline Paper Abstracts

•Monday, July 13, 2009•

NMD • Photonic Crystals and Periodic Nanomaterials

Tapa I
2:00 p.m.–4:00 p.m.
Steve Blair; Univ. of Utah, USA, Presider

PDNMD1 • 2:00 p.m.
Influence of Hole Sizes and Adhesion Layers on the Third-Harmonic Generation from Sub-Wavelength Apertures, *Xiaojin Jiao, Tingjun Xu, Steve Blair; Dept. of Electrical and Computer Engineering, Univ. of Utah, USA.* Third-harmonic generation from arrays of sub-wavelength apertures is measured. Strong angular dependence of THG is observed, which roughly corresponds to that of fundamental transmission. Influence of hole size and adhesion layers is also experimental studied.

•Tuesday, July 14, 2009•

NTuA • Entanglement, Squeezing and Quantum Memories

Tapa I
8:00 a.m.–10:00 a.m.
Akira Furusawa; Univ. of Tokyo, Japan, Presider

PDNTuA2 • 8:30 a.m.
Experimental Realization of a Multi-Player Quantum Game, *Joseph B. Altepeter[1], Matthew A. Hall[1], Milja Medic[1], Monika Patel[1], David A. Meyer[2], Prem Kumar[1]; [1]Northwestern Univ., USA, [2]Univ. of California at San Diego, USA.* We implement a multi-player quantum public-goods game using only bipartite entanglement and two-qubit logic. Within measurement error, the expectation per player follows predicted values as the number of players is increased.

PDPA • Nonlinear Optics Postdeadline Session I

Tapa I
5:00 p.m.–6:00 p.m.
Jens Rauschenberger; Max-Planck-Inst. of Quantum Optics, Germany, Presider

PDPA1 • 5:00 p.m.
40-Gbit/s Optical Data Exchange between WDM Channels Using Second-Order Nonlinearities in PPLN Waveguides, *Jian Wang, Scott Nuccio, Xiaoxia Wu, Omer Yilmaz, Lin Zhang, Irfan Fazal, Jeng-Yuan Yang, Yang Yue, Alan Willner; Univ. of Southern California, USA.* We demonstrate 40-Gbit/s optical data exchange between WDM channels based on second-order nonlinearities in a periodically-poled Lithium-niobate (PPLN) waveguide. Channel-selective data exchange of four WDM signals is shown, which introduces ~4 dB penalty.

PDPA2 • 5:15 p.m.
Experimental Verification of Two-Tone Amplification in Single Frequency Fiber Amplifiers, *Clint Zeringue, Iyad Dajani, Chunte Lu, Ahmed Lobad, Christopher Vergien; AFRL, USA.* We present experimental verification of a novel technique to suppress SBS in narrow linewidth fiber amplifiers. This technique relies on seeding with a combination of broad- and narrow-linewidth laser beams allowing favorable laser gain competition.

PDPA3 • 5:30 p.m.
Wavelength Conversion and 9-Fold Multicasting of a 21.4 Gbit/s DPSK Data Channel Using Supercontinuum Generation, *Omer F. Yilmaz, Scott Nuccio, Zahra Bakhtiari, Xiaoxia Wu, Jian Wang, Lin Zhang, Alan Willner; Univ. of Southern California, USA.* We demonstrate wavelength conversion and 9-fold multicasting of a 21.4-Gbit/s DPSK signal using supercontinuum generation. Multicasting is accomplished using a polarization based periodic filter for spectral slicing. Power penalties <3dB are achieved for all channels.

PDPA4 • 5:45 p.m.
X-Ray View of Dressed Atoms, *Ernest Glover[1], Marc Hertlein[1], Steve Southworth[2], Tom Allison[3], Jeroen van Tilborg[1], Elliot Kanter[2], Bertold Krässig[2], H. R. Varma[2], Bruce Rude[1], Robin Santra[2,4], Ali Belkacem[1], Linda Young[2]; [1]Lawrence Berkeley Natl. Lab, USA, [2]Argonne Natl. Lab, USA, [3]Univ. of California at Berkeley, USA, [4]Univ. of Chicago, USA.* We report, to our knowledge, the first dressed absorption spectrum at an X-ray probe wavelength. An ultrafast optical pulse induces transparency for X-rays, demonstrating a promising route to femtosecond X-ray pulse shaping and measurement.

PDPB • Nonlinear Optics Postdeadline Session II

Tapa II
5:00 p.m.–6:15 p.m.
Concita Sibilia; INFM, Dept. di Energetica, Univ. di Roma, Italy, Presider

PDPB1 • 5:00 p.m.
Synthesis and Characterization of Sol-Gel Based Nanostructured Cr(III)Doped ITO Films on Glass, *Prasanta K. Biswas, Susmita Kundu, Sunirmal Jana, Dipten Bhattacharya; Central Glass and Ceramic Res. Inst., India.* Sol-gel based Cr(III) doped quantum sized (2-10 nm) indium tin oxide films were deposited on glass and cured at different temperatures. Absorption and photoluminescence study shows a strong quantum confinement effect and exciton phonon interaction.

PDPB2 • 5:15 p.m.
Two Photo-Absorption Property of Metal Complexes Tethered with Azo Dyes, *Ubaldo M. Neves[1], Leonardo De Boni[1], Cleber R. Mendonça[1], Zhihong Ye[2], Xiu R. Bu[2]; [1]Inst. de Física de São Carlos, Brazil, [2]Clark Atlanta Univ., USA.* Schiff base compounds have been prepared possessing azo dye units. The two-photon absorption properties are evaluated, which reveals the additive property as a result of non-detrimental dipole-dipole interaction between dye chromophores.

PDPB3 • 5:30 p.m.
Two-Photon-Fluorescence Correlation Measurements of Picosecond Optical Pulses Generated from a 405-nm GaInN Laser Diode, *Shunsuke Kono[1], Takao Miyajima[2], Masaru Kuramoto[2], Masao Ikeda[1,2], Hiroyuki Yokoyama[1]; [1]New Industry Creation Hatchery Ctr., Tohoku Univ., Japan, [2]Advanced Material Labs, Sony Corp., Japan.* Intensity auto-correlation measurements using two-photon fluorescence from a GaN crystal were performed on picosecond optical pulses from a 405-nm GaInN laser diode excited by intense electric pulses. The estimated pulse duration was 10 ps.

PDPB4 • 5:45 p.m.
Polarization-Diverse Parametric Processes in Zincblende Crystals, *Paulina S. Kuo[1], Konstantin L. Vodopyanov[2], Martin M. Fejer[2]; [1]NIST, USA, [2]Stanford Univ., USA.* Quasi-phasematched, non-birefringent nonlinear materials, like orientation-patterned GaAs, allow efficient mixing of diverse polarization states. We investigate parametric processes in these materials, including the six coupled-wave equations that describe them and implications for all-optical signal processing.

PDPB5 • 6:00 p.m.
Vortex Spatiotemporal Optical Solitons in Nonlinear Optical Fibers, *Robabeh Talebzadeh; Azarbaijan Univ. of Tarbiat Moallem, Iran, Islamic Republic of.* We investigate possibility of forming spatiotemporal vortex solitons in inhomogeneous dispersive nonlinear-optical fibers using a graded-index kerr medium. We use a variational approach to solve NLS-equation and show they can be stabilized under certain conditions.

PDPC • Joint IPNRA/SL Postdeadline Session

Honolulu I-II
5:00 p.m.–6:15 p.m.
Liming Zhang; Bell Labs, Alcatel-Lucent, USA

PDPC1 • 5:00 p.m.
Polarization Dependent Pulse Distortion in Stimulated Brillouin Scattering Slow Light Systems, *Avi Zadok[1], Sanghoon Chin[2], Elad Zilka[3], Avishay Eyal[3], Luc Thévenaz[2], Moshe Tur[3]; [1]Caltech, USA, [2]Ecole Polytechnique Fédérale de Lausanne, Switzerland, [3]Tel Aviv Univ., Israel.* Stimulated Brillouin scattering slow light delay is shown to introduce an inherent polarization mode dispersion, which can dominate the broadening and distortion of signal pulses. The effect is demonstrated in both simulations and experiments.

PDPC2 • 5:15 p.m.
High-*Q* Photonic Crystal Chalcogenide Cavities by Photosensitive Post Processing, *Michael W. Lee[1], Christian Grillet[1], Snjezana Tomljenovic-Hanic[1], Dave Moss[1], Benjamin J. Eggleton[1], Xin Gai[2], Steve Madden[2], Duck Y. Choi[2], Douglas Bulla[2], Barry Luther-Davies[2]; [1]CUDOS, School of Physics, Univ. of Sydney, Australia, [2]CUDOS, Laser Physics Ctr., Australian Natl. Univ., Australia.* We present the first demonstration of a high-*Q* (~60000) photonic crystal (PhC) cavity formed post-fabrication by locally modifying the refractive index of a PhC made of a photosensitive chalcogenide glass.

PDPC3 • 5:30 p.m.
Monolithic Dual-Mode DFB Laser for Tunable Continuous-Wave THz Generation, *Namje Kim[1], Jaeheon Shin[1], Chul Wook Lee[1], Eundeok Sim[1], Sang-Pil Han[1], Yongsoon Baek[1], Dae-Su Yee[2], Min Young Jeon[3], Kyung Hyun Park[1]; [1]Electronics and Telecommunications Res. Inst., Republic of Korea, [2]Ctr. for Safety Measurement, KRISS, Republic of Korea, [3]Chungnam Natl. Univ., Republic of Korea.* We report a monolithic dual-mode DFB laser operating in the 1550-nm range as an optical beat source for tunable THz generation. The THz emission from InGaAs photomixers is continuously tuned from 0.17 to 0.49 THz.

PDPC4 • 5:45 p.m.
Nano-Photonic Electro-Optic Polymer Modulator Based on Photonic Band Gap Engineering, *Xiaolong Wang[1], Swapnajit Chakravarty[1], Boem Suk Lee[2], Cheyun Lin[2], Jingdong Luo[3], Alex K.Y Jen[3], Ray T. Chen[2]; [1]Omega Optics, Inc., USA, [2]Microelectronics Res. Ctr., Univ. of Texas at Austin, USA, [3]Dept. of Materials Science and Engineering, Univ. of Washington, USA.* A nano-photonic electro-optic polymer modulator based on shifting the band diagram of the photonic crystal waveguide is presented. Simulations results show that the device is as short as 20μm and consumes only 25fJ/bit energy.

PDPC5 • 6:00 p.m.
Low-Voltage, Vertical-Junction, Depletion-Mode, Silicon Mach-Zehnder Modulator with Complementary Outputs, *Michael Watts, William A. Zortman, Douglas C. Trotter, Ralph W. Young, Anthony L. Lentine; Sandia Natl. Labs, USA.* We demonstrate a new silicon depletion-mode vertical *p-n* junction phase-modulator implemented in a lumped-element Mach-Zehnder modulator configuration enabling an ultra-low $V_{\pi}L$ of ~1V·cm and 10Gb/s non-return-to-zero (NRZ) data transmission with wide-open complementary output eye diagrams.

•Wednesday, July 15, 2009•

JWA • Joint Poster Session II

Palace Lounge
10:00 a.m.–11:30 a.m.

PDJWA30
Slow Light in a Parametrically Amplifying Medium, *Nobuhito Hayashi, Akihiko Fujisawa, Masaharu Mitsunaga; Kumamoto Univ., Japan.* We theoretically study propagation behavior of probe (signal) and Stokes (idler) pulses under a strong coupling beam. The analyses predict that both pulses are parametrically amplified and delayed by about a pulsewidth.

PDJWA31
Laser Induced Absorption Spectra Properties of Ethyl Red Doped Film and Its Applications for Optical Switch Based Two Beams Mutual Modulation, *Zhaofeng Hao[1,2], Wenqiang Lu[1], Chunping Zhang[1], Jianguo Tian[1]; [1]Nankai Univ., China, [2]Columbia Univ., USA.* The absorption spectra of the samples were measured and the difference of nonlinear refractive index distribution curve was simulated using the Kramers-Kronig relation. Additionally, the transmission intensity mutual modulations of the two beams were studied.

PDJWA32
Fano Resonances in Saturable Waveguide Arrays, *Uta Naether, Daniel E. Rivas, Manuel A. Larenas, Mario I. Molina, Rodrigo A. Vicencio; Univ. de Chile, Chile.* We study the main properties of nonlinear localized modes in a waveguide array with an embedded nonlinear saturable impurity. We scatter a wave against the modes, discovering transmission suppression, which we connect to Fano resonances.

PDJWA33
Chaos and Pulses Packages in Current Modulated VCSELs, *J.H. Talla Mbé, Sifeu Takougang Kingni, Paul Woafo; Univ. of Yaoundé I, Cameroon.* We numerically study the dynamics of VCSELs based on the current-dependent gain model subjected to current modulation. Striking dynamics appears: pulses packages and chaotic behaviour.

PDJWA34
Coherent Control of Fluorescence Intensity with Shaped Femtosecond Pulses in Organic Molecules, *P. H. D. Ferreira, L. Misoguti, C. R. Mendonça; Inst. de Física de São Carlos, Brazil.* This paper presents a study of the coherent control of fluorescence intensity by two-photon absorption via genetic algorithm in Y-shaped molecules. Using a spatial light modulator, we were able to enhance the fluorescence intensity of two of these molecules.

•Friday, July 17, 2009•

NFA • Self Focusing and Filaments

Tapa I
8:00 a.m.–10:15 a.m.
Jay E. Sharping; Univ. of California at Merced, USA, Presider

PDNFA2 • 8:30 a.m.
745 fs Resolution Single-Shot Recording at 2.1 Tsample/s and 104 Mframes/s Using Temporal Imaging, *Vincent J. Hernandez[1], Corey V. Bennett[1], Bryan D. Moran[1], Alexander D. Drobshoff[1], Carsten Langrock[2], Derek Chang[2], Martin M. Fejer[2], Morten Ibsen[3]; [1]Lawrence Livermore Natl. Lab, USA, [2]Stanford Univ., USA, [3]Optoelectronics Res. Ctr., Univ. of Southampton, UK.* We demonstrate temporal imaging with -42.6x time magnification of 200 ps frames with subpicosecond resolution for waveforms containing 2.5 Gb/s modulated picosecond pulses. 852 GHz signal bandwidth is captured single-shot at 104 MHz frame rates.

NFB • Applications of Nonlinear Optics

Tapa I
10:45 a.m.–1:00 p.m.
Daniel Gauthier; Duke Univ., USA, Presider

PDNFB8 • 12:45 p.m.
Fiber Based Multiphoton Microscope Using a Fiber Femtosecond Laser and MEMS Scanning Probe, *Gangjun Liu[1], Zhongping Chen[1], Khanh Kieu[2], Frank W. Wise[2]; [1]Univ. of California at Irvine, USA, [2]Dept. of Applied Physics, Cornell Univ., USA.* We developed a fiber based MPM that integrates an all-normal-dispersion femtosecond fiber laser, double cladding photonic crystal fiber, and a MEMS scanning probe. SHG and two photon excited fluorescence images of biological sample were demonstrated.

NOTES

Key to Authors and Presiders

(**Bold** denotes Presider or Presenting Author)

Advances in Optical Sciences:
OSA Optics & Photonics Congress
UPDATE SHEET

Withdrawals:

Integrated Photonics and Nanophotonics Research and Applications: IMG7, ITuD3, JWA2, JWA10
Nonlinear Optics: NMD1, NTuA2, JWA11, JWA25, NFA2
Slow and Fast Light: JWA28

Presentation Updates:

NFB8, **Three-Dimensional Microfabrication by Single Pulse Femtosecond Laser through Binary Phase Hologram,** *Masahiro Yamaji, Hayato Kawashima, Jun'ichi Suzuki, Shuhei Tanaka; New Glass Forum, Tsukuba Res. Consortium, Japan*, will be presented by Masahiro Yamaji at 8:15 a.m.–8:30 a.m. during session NFA, Self Focusing and Filaments.

Correction to Program:

The name of one of the authors of **IMF3**, **Single Quantum Dot Laser with Photonic Crystal Nanocavity**, is misspelled in the program book. The correct spelling is *Masahiro Nomura*.

An author was omitted from **IWD3**, **Fabrication of Large Area "Woodpile" Photonic Crystal Structures for Near IR**. The corrected author block is as follows: *Neilanjan Dutta[1], Peng Yao[1], Shouyuan Shi[1], Ahmed Sharkawy[2], Ozgenc Ebil[2], Eric Kelmelis[2], Dennis W. Prather[1], Elton Marchena[1]; [1]Univ. of Delaware, USA, [2]EM Photonics Inc., USA.*

Presider Updates:

Takunori Taira; Laser Res. Ctr. for Molecular Science, Inst. for Molecular Science, Japan will preside over session **NWA**, **Terahertz and Ultrafast**.

Michael E. Gehm; Univ. of Arizona, USA will preside over the joint Nonlinear Optics/Slow and Fast Light session **JWB**, **Slow Light Applications in Nonlinear Optics**.

Presenter Changes:

IMC1, **High Speed Modulation of Hybrid Silicon Evanescent Lasers**, will be presented by *Daoxin Dai; Univ. of California at Santa Barbara, USA.*

ITuE6, **Finite Thickness Metal-Insulator-Metal Structure for Waveguide Based Surface Plasmon Resonance Biosensing,** will be presented by *Jiwon Lee; Iowa State Univ., USA.*

NTuC2, **Coupling Dynamics of Quantum Dots in a Liquid-Crystal-Tunable Microdisk Resonator**, will be presented by *Cedrik Meier; Univ. of Paderborn, Germany.*

NWC3, **Integration of Extraordinary Nonlinear Optical Materials into Silicon Photonics, Plasmonics and Metamaterial Devices**, will be presented by *Philip A. Sullivan; Univ. of Washington, USA.*

NWD4, **Spectral Filtering Highly-Chirped Pulses in All-Normal Dispersion Fiber Lasers**, will be presented by *Nathan Kutz; Dept. of Applied Mathematics, Univ. of Washington, USA.*

NFA7, **Enhanced Third Harmonic Generation in Few-Cycle Femtosecond Filaments Modulated by Filament Non-Collinear Interaction**, will be presented by *Jian Wu; East China Normal Univ., China.*

NFB4, **Imaging Resolution Improvement Using Transverse Phase Amplification**, will be presented by *Igor Jovanovic; Purdue Univ., USA.*

POSTDEADLINE PRESENTATIONS: Please see the postdeadline papers book for times and locations of postdeadline paper presentations. Postdeadline papers will be presented throughout the week in various oral and poster sessions.

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