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CLEO: 2012
Invited Paper

Science & Innovations: Applications of Nonlinear Optics

Giant Enhancement of Stimulated Brillouin Scattering in the Sub-wavelength Limit

Nonlinear Optical Phenomena 7 May 2012 8:00 - 8:30 AM

We show that tremendous radiation pressures radically alter stimulated Brillouin scattering (SBS) at nanoscales. Coherent interplay between radiation pressure and electrostriction yield giant enhancement of SBS and highly tailorable nonlinearities.

Author(s): Peter T. Rakich[1], Charles M. Reinke[1], Ryan Camacho[1], Paul Davids[1], Zheng Wang[2]

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Presentations and Posters

QELS - Fundamental Science

Metamaterials and Complex Media

Toroidal photonic metamaterial

New Directions in Metamaterials 7 May 2012 11:30 - 11:45 AM

We present the first design of a photonic metamaterial demonstrating dominant toroidal dipolar response in the infrared part of the spectrum.

Author(s): Vassili Savinov[1], Vassili A. Fedotov[1], Wei Ting Chen[3], Yao-Wei Huang[3], Din Ping Tsai[3], David B. Burckel[2], Igal Brener[2], Nikolay I. Zheludev[1]

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Optical Interactions with Condensed Matter and Ultrafast Phenomena

Quantum-Well Electro-Absorption Sampling for Broadband THz Detection

Ultrafast THz Dynamics 8 May 2012 12:45 - 1:00 PM

Broad-band THz detection is demonstrated using GaAs/AlGaAs asymmetric double quantum-well structures. Transient electro-absorption modulation by the THz pulses is sampled coherently with detection bandwidth exceeding 10 THz.

Author(s): Chia-Yeh Li[1], Denis Seletskiy[1, 3], Jeffrey G. Cederberg[2], Mansoor Sheik-Bahae[1]

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Nonlinear Optics and Novel Phenomena

Intracavity Laser Cooling Using a VECSEL

High Field Phenomena & Laser Cooling 10 May 2012 4:30 - 4:45 PM

We demonstrate intracavity laser cooling inside of a VECSEL, where the temperature of a Yb:YLF crystal was lowered by 20 K. We outline future improvements, striving towards a compact, efficient cryocooler device.

Author(s): Alexander R. Albrecht[1, 2], Denis Seletskiy[1, 4], Christopher P. Hains[2], Jeffrey G. Cederberg[5], Alberto Di Lieto[3], Mauro Tonelli[3], Ganesh Balakrishnan[2], Mansoor Sheik-Bahae[1]

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Science & Innovations

Micro- and Nano-Photonic Devices

Automated Wavelength Recovery for Microring Resonators

Microresonators II 7 May 2012 10:30 - 10:45 AM

We lock an adiabatic microring resonator to a laser line with a lock-in time of 200µs using a digital control loop, thereby experimentally demonstrating the first automated and scalable wavelength recovery approach for microring resonators.

Author(s): Erman Timurdogan[1], Aleksandr Biberman[1], Douglas C. Trotter[2], Chen Sun[1], Michele Moresco[1], Vladimir Stojanovic[1], Michael R. Watts[1]

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Compact Nano-Antenna Emitters for Optical Phased Array Applications

Silicon Photonics II 8 May 2012 11:15 - 11:30 AM

We propose and experimentally demonstrate nano-antenna emitters coupled to a dielectric waveguide. Initial measured emitter efficiencies are 4.9-13% with simulations predicting >50% efficiencies with bandwidths exceeding 300nm.

Author(s): Katia Shtyrkova[1], Ami Yaacobi[1], Paul Davids[2], Douglas C. Trotter[2], Joel Wendt[2], Christopher DeRose[2], Rohan D. Kekatpure[2], Erich P. Ippen[1], Michael R. Watts[1]

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Non-Conservative Optical Forces on Single Particle in A Single-Mode Waveguide

Optomechanical Systems II 9 May 2012 5:45 – 6:00 PM

Optical forces have been traditionally decomposed into gradient force and scattering force. We show the limit of this decomposition and the non-conservative nature of optical forces, even for single particle confined in a single-mode waveguide.

Author(s): Zheng Wang[1], Peter Rakich[2]

1. Electrical & Computer Engineering, The University of Texas at Austin, Austin, TX, U.S. 2. Sandia National Laboratories, Albuquerque, NM, U.S.

Gallium Nitride Single-Mode Nanowire Lasers

Nanolasers 10 May 2012 5:30 - 5:45 PM

We obtained single-mode lasing in GaN nanowires by using a limited number of cavity modes and a narrow gain spectra. The fabrication was achieved by a top-down technique in high quality GaN films.

Author(s): Jeremy B. Wright[1], Qiming Li[1], Igal Brener[1, 2], Ting S. Luk[1, 2], George T. Wang[1], Weng W. Chow[1], Luke F. Lester[3]

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Electrically-Controlled Thermal Infrared Metamaterial Devices

Plasmonics and Light-Matter Interactions 11 May 2012 12:00 - 12:15 PM

We demonstrate electrically-controlled thermal mid-infrared metamaterials using depletion-type semiconductor devices. This electrical tuning can find novel applications in chip-scale active infrared devices.

Author(s): Young Chul Jun[1], Edward Gonzales[1], John Reno[1], Eric Shaner[1], Alon Gabbay[1], Igal Brener[1]

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Poster Session I 9 May 2012 1:00 - 3:00 PM

Multi-Cavity Far Infrared 2D Plasmonic Phenomena with Inhomogeneous Screening

We have observed coherent interaction of coupled far infrared 2D plasma cavities in a GaAs/AlGaAs FET. These results have been modeled with a transmission line formalism that treats both unscreened and screened 2D plasmons.

Author(s): Gregory C. Dyer[1], Gregory Aizin[2], S. James Allen[3], J. M. Hensley[4], B. D. Casse[4], Albert Grine[1], John Reno[1], Eric Shaner[1]

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Rectified Diode Response of a Quantum Cascade Laser Integrated Terahertz Transceiver

We characterized the rectified response of a diode integrated on a terahertz quantum cascade laser transceiver. The diode response is consistent with its I-V characteristics and reflects the complex Fabry-Perot laser cavity mode spectrum.

Author(s): Gregory C. Dyer[1], Christopher Nordquist[1], Michael Cich[1], Albert Grine[1], Charles Fuller[1], John Reno[1], Michael C. Wanke[1]

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Applications & Technology

Industrial

Large Area, Broadband, and Polarization-Sensitive Photodetectors Based on Aligned Carbon Nanotubes

Graphene & Carbon Advanced Photonics Materials 8 May 2012 12:00 - 12:15 PM

We have studied the photoresponse of highly aligned carbon nanotube devices in the visible, near-infrared, and mid-infrared. Using different metal combinations for electrodes, we designed detectors that work up to 10 µm under global illumination.

Author(s): Sebastien Nanot[1], Cary L. Pint[1], Aron W. Cummings[2], Francois Leonard[2], Robert H. Hauge[1], Junichiro Kono[1]

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Poster Session I 9 May 2012 1:00 - 3:00 PM

A short-standoff bistatic lidar system for aerosol cloud backscatter cross section measurement

A short-standoff bistatic lidar system coupled with an aerosol chamber was built to measure aerosol optical backscatter and laser induced fluorescence cross-sections. Results show good sensitivity across all channels with high signal-to-noise ratio.

Author(s): Randal L. Schmitt[1], Crystal C. Glen[1], Shane M. Sickafoose[1], Richard N. Shagam[1], Josh Santarpia[1], John E. Brockman[1], Thomas A. Reichardt[2], Michael V. Pack[1], Victor Chavez[1], Craig Boney[1], Brandon Servantes[1]

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Joint Science & Innovations and Applications & Technology

Internal quantum efficiency in light-emitting diodes based on the width of efficiency-versus-carrier-concentration curve

Wide Bandgap Light-emitting Diodes 9 May 2012 4:30 – 4:45 PM

Based on the ABC model, we derive a relationship between the internal quantum efficiency (IQE) and the width of the efficiency-versus-carrier-concentration curve. We determine the IQE of LEDs at temperatures ranging from 100K to 300K.

Author(s): Guan-Bo Lin[1], Qifeng Shan[2], Andrew J. Birkel[2], Jaehee Cho[1], E. Fred Schubert[1, 2], Daniel D. Koleske[3], Mary H. Crawford[3]

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