Photonic Metamaterials: From Random to Periodic

June 4-7, 2007

Snow King Resort
Jackson Hole, Wyoming

Hotel Reservation Deadline: May 11, 2007
Pre-Registration Deadline: May 10, 2007

Due to increasing delays in securing visas to the US, we strongly encourage international attendees to begin this process as early as possible (but no later than three months before the meeting) to ensure timely processing. Please refer to the Letter of Invitation section of this website for additional information.

Program Committee

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Satoshi Kawata; *Osaka Univ., Japan*
Ad Lagendijk; *FOM Inst for Atomic and Molecular Physics, Netherlands*
Evgenii Narimanov; *Princeton Univ., USA*
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Ping Sheng; *Hong Kong Univ., Hong Kong*
Douglas Stone; *Yale Univ., USA*
Bart van Tiggelen; *CNRS Division Technique INSU/SDU, France*
Yurii Vlasov; *IBM, TJ Watson Res. Ctr., USA*
Arjun Yodh; *Univ. of Pennsylvania, USA*
Xiang Zhang; *Univ. of California at Berkeley, USA*
Nikolay Zheludev; *Univ. of Southampton, UK*

About Photonic Metamaterials: from Random to Periodic

June 4 - 7, 2007

The proposed meeting on “Photonic Metamaterials: From Random to Periodic” will feature presentations on timely and exciting topics within the scope of the Topical Group by the same name. The meeting will consider fundamental and applied aspects of waves in structured, periodic and disordered metamaterials and in natural materials as well as those synthesized using traditional techniques of crystal growth, organic and inorganic chemistry.

The meeting will discuss the fabrication and photonic properties of metamaterials including negative-index materials, photonic and plasmonic band gap materials and novel composites with unusual optical properties. These materials can provide subwavelength focusing of light and precise light guiding within micro- and nano-fabricated structures and the slowing of light. They afford control of spontaneous emission and lasing in fabricated and self-assembled structures.

The meeting will also deal with scattering and imaging in turbulent and static disordered media. The meeting will treat the statistical nature of wave propagation and photon localization in random media. Partial coherence, coherent backscattering, random lasing, and temporal, spectral and spatial correlation within the speckle pattern will also be discussed. Advances in remote sensing, propagation and active imaging in the atmosphere and in bodies of water, and scattering from aerosols, as well as multiple scattering from dilute cold gases, will be of interest. The role of diffusing photons and of residual optical coherence in medical and biological tissues will be considered as well. Because of the strong parallels between electromagnetic radiation and other classical, as well as quantum waves, the meeting will explore analogies with the propagation of acoustic, electronic and matter waves, and with quantum and dynamical localization and chaos. The meeting will also consider quantum optics in photonic metamaterials and photon localization in gases.

Important Dates

Hotel Reservation Deadline: May 11, 2007
Pre-Registration Deadline: May 10, 2007

Meeting Topics to Be Considered

- Fundamental and applied aspects of waves in structured, periodic and disordered metamaterials
- Fabrication and photonic properties of metamaterials including photonic and plasmonic band gap materials, negative-index materials and novel composites with unusual optical properties
- Wave propagation and localization in random media
- Imaging in turbulent and static disordered media including the atmosphere and ocean, and medical and biological tissues
- Partial coherence, coherent backscattering, random lasing, and temporal, spectral and spatial correlation; multiple scattering from dilute cold gases
- Analogies between the propagation of electromagnetic, acoustic, electronic and matter waves with dynamical localization and chaos

Invited Speakers

MA1, Negative Refraction and Light Pressure, *Victor Veselago; Moscow Inst. of Physics and Technology, Russian Federation.*

MB1, Random Laser Modes, *Ad Lagendijk; FOM Inst. for Atomic and Molecular Physics, The Netherlands.*

MB2, Anderson Localization in Open Random Media, *Sergey E. Skipetrov, N. Cherroret, B. A. van Tiggelen; Ctr. Natl. de la Recherche Scientifique, France.*

MC1, Using Surface Plasmons for Nanophotonics, *Sergey I. Bozhevolnyi; Aalborg Univ., Denmark.*

MD1, To Be Determined, *Evgenii Narimanov; Princeton Univ., USA.*

MD2, Imaging Below Diffraction Limit Using Superlens and Hyperlens, *Xiang Zhang; Univ. of California at Berkeley, USA.*

TuA1, Anderson Localization in Disordered 2D Photonic Lattices, *Tal Schwartz, Guy Bartal, Shmuel Fishman, Mordechai Segev; Technion -- Israel Inst. of Technology, Israel.*

TuA2, Scaling Behavior of the Anderson Localization Transition of Light
C. M. Aegerter, M. Störzer, S. Fiebig, W. Bührer, Georg Maret; Univ. of Konstanz, Germany.

TuC1, What is the Smallest Volume in which Light can be Focused Efficiently?
Josh Conway, Shantha Vedantam, Hyojune Lee, Japeck Tang, Eli Yablonovitch; Electrical Engineering Dept., Univ. of California at Los Angeles, USA.

TuC2, To Be Determined, *Axel Scherer; Caltech, USA.*

TuD1, Cloaking: A New Phenomenon in Electromagnetism and Elasticity, *Graeme W. Milton; Univ. of Utah, USA.*

WA1, Plasmonics: The Missing Link between Nanoelectronics and Microphotonics, *Mark Brongersma; Stanford Univ., USA.*

WA2, Far-Field Subwavelength Focusing of Light and Plasmons by the Talbot Effect , *Fu Min Huang[1], Mark Dennis[1], F. Javier Garcia de Abajo[2], Nikolay Zheludev[1]; [1]Univ. of Southampton, United Kingdom, [2]Inst. de Optica, Spain.*

WB1, Magnetic, Double-Negative, Chiral and Nonlinear Photonic Metamaterials, *Martin Wegener[1], S. Linden[1], C. M. Soukoulis[2,3]; [1]Karlsruhe Univ., Germany, [2]Ames Lab, Iowa State Univ., USA, [3]Dept. of Physics and Astronomy, Iowa State Univ., USA.*

WB2, Near-field Characterization of Photonic Nanostructures: From Hot Spot Imaging to Superlens Studies, *Rainer Hillenbrand; Max-Planck Inst. fur Biochemie, Germany.*

WC1, Speckle Pattern Evolution of Diffusive and Localized Waves, *Azriel Z. Genack1, S. Zhang[1], B. Hu1, P. Sebbah[1,2]; [1]Queens College of CUNY, USA, [2]Lab de Physique de la Matière Condensée, CNRS, Univ. de Nice Sophia-Antipolis, France.*

WC2, Zero-Point Momentum in Complex Media, *Bart Van Tiggelen[1], Geert L.J.A. Rikken[2]; [1]CNRS/Lab de Physique et Modélisation, France, [2]LCMP/CNRA/INSA/UPS, France.*

WD1, Silicon Nanophotonics for On-Chip Optical Interconnects, *Yurii Vlasov; IBM, TJ Watson Res. Ctr., USA.*

WD2, Anomalous Refraction in Silicon-Based 2-Dimensional Photonic Crystal Structures, *Won Park; Univ. of Colorado, USA.*

ThA1, Filters and Feedbacks in Metamaterial Nanocircuits, *Nader Engheta, Andrea Alù; Univ. of Pennsylvania, USA.*

ThC1, Photon Correlations Induced by Randomness in a Quantum Mesoscopic Gas, *Eric Y. Akkermans; Technion- Israel Inst. of Technology, Israel.*

Agenda of Sessions

Monday, June 4, 2007		
7:00 a.m. - 5:00 p.m.	**Registration Open**	*Lodge Room Entry Foyer*
8:30 a.m.– 10:10 a.m.	**MA • Meta I**	*Lodge Room*
10:10 a.m.–10:40 a.m.	**Coffee Break**	*Pavilion*
10:40 a.m.– 12:40 p.m.	**MB • Random Media I**	*Lodge Room*
12:30 p.m. –2:30 p.m.	**Lunch (on your own)**	
2:30 p.m.– 4:10 p.m.	**MC • Nanophotonics and PhC I**	*Lodge Room*
4:10 p.m.–4:40 p.m.	**Coffee Break**	*Pavilion*
4:40 p.m.– 6:20 p.m.	**MD • Super/Hyper-Lens**	*Lodge Room*
Tuesday, June 5, 2007		
7:30 a.m.-5:00 p.m.	**Registration Open**	*Lodge Room Entry Foyer*
8:30 a.m.– 10:10 a.m.	**TuA • Random Media II**	*Lodge Room*
10:10 a.m.–10:40 a.m.	**Coffee Break**	*Pavilion*
10:40 a.m.– 12:40 p.m.	**TuB • Poster Session**	*Pavilion*
12:30 p.m. –2:30 p.m.	**Lunch (on your own)**	
2:30 p.m.– 4:10 p.m.	**TuC • Nanophotonics and PhC II**	*Lodge Room*
4:10 p.m.–4:40 p.m.	**Coffee Break**	*Pavilion*
4:40 p.m.– 6:20 p.m.	**TuD • Meta and Cloaking**	*Lodge Room*
6:30 p.m.– 8:00 p.m.	**Reception**	*Grand Teton*
Wednesday, June 6, 2007		
7:30 a.m.-5:00 p.m.	**Registration Open**	*Lodge Room Entry Foyer*
8:30 a.m.– 10:10 a.m.	**WA • Nanophotonics and Meta**	*Lodge Room*
10:10 a.m–10:40 a.m.	**Coffee Break**	*Pavilion*
10:40 a.m.– 12:40 p.m.	**WB • Meta and Superlens**	*Lodge Room*
12:40 p.m.–2:30 p.m.	**Lunch (on your own)**	
2:30 p.m.– 4:10 p.m.	**WC • Random Media III**	*Lodge Room*
4:10 p.m.–4:40 p.m.	**Coffee Break**	*Pavilion*
4:40 p.m.– 6:20 p.m.	**WD • Meta/Nanophotonics**	*Lodge Room*
Thursday, June 7, 2007		
8:00 a.m.-5:00 p.m.	**Registration Open**	*Lodge Room Entry Foyer*
8:30 a.m.– 10:10 a.m.	**ThA • Meta and Random Media**	*Lodge Room*
10:10 a.m.–10:40 a.m.	**Coffee Break**	*Pavilion*
10:40 a.m.– 12:40 p.m.	**ThB • Postdeadline Session**	*Lodge Room*
12:40 p.m.–2:30 p.m.	**Lunch (on your own)**	
2:30 p.m.– 4:10 p.m.	**ThC • Random Media IV**	*Lodge Room*
4:10 p.m.–4:40 p.m.	**Coffee Break**	*Pavilion*
4:40 p.m.– 6:40 p.m.	**ThD • Closing Session**	*Lodge Room*

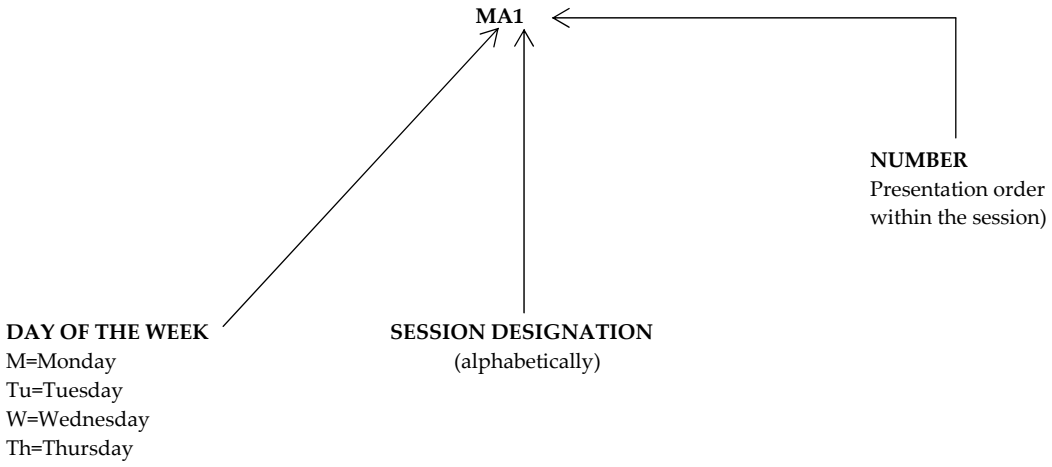
Explanation of Session Codes

The first part of the code designates the day of the week (Monday=M, Tuesday=Tu, Wednesday=W).

The next part indicates the session within the particular day the talk is being given. Each day begins with the letter A and continues alphabetically.

The number on the end of the code signals the position of the talk within the session (first, second, third, etc.).

For example, a presentation numbered MA1 indicates that this paper is being presented on Monday during the 1st session (A) and that it is the first paper presented in session MA.



•Sunday, June 3, 2007•

Lodge Room Entry Foyer
3:00 p.m.–6:00 p.m.
Registration Open

•Monday, June 4, 2007•

Lodge Room Entry Foyer
7:00 a.m.–5:00 p.m.
Registration Open

MA • Meta I

Lodge Room
8:30 a.m.–10:10 a.m.
MA • Meta I
Vladimir M. Shalaev; Purdue Univ., USA, Presider

MA1 • 8:30 a.m. Invited
Negative Refraction and Light Pressure, *Victor Veselago; Moscow Inst. of Physics and Technology, Russian Federation.* The propagation of electromagnetic wave through transparent material is considered. It is shown that expression P=hk is not applicable for radiation inside the media.

MA2 • 9:10 a.m.
Photonic Chiral Metamaterials, *Vassili A. Fedotov[1], Eric Plum[1], Alexander S. Schwanecke[1], Yifang Chen[2], Vyacheslav V. Khardikov[3], Sergey L. Prosvirnin[3], Nikolay I. Zheludev[1]; [1]Optoelectronics Res. Ctr., Univ. of Southampton, UK, [2]Central Microstructure Facility, Rutherford Appleton Lab, UK, [3]Inst. of Radio Astronomy, Natl. Acad. of Sciences of Ukraine, Ukraine.* We report first results on the development of photonic planar and layered 2-D- and 3-D-chiral metamaterials with intriguing properties including giant rotary power and asymmetric transmission.

MA3 • 9:30 a.m.
Double Negative Index Metamaterial: Simultaneous Negative Permeability and Permittivity at 812 nm, *Uday K. Chettiar, Alexander V. Kildishev, Hsiao-Kuan Yuan, Wenshan Cai, Shumin Xiao, Vladimir P. Drachev, Vladimir M. Shalaev; Purdue Univ., USA.* A negative index metamaterial demonstrating n=-1.0+0.8i with both negative effective permittivity and permeability at 813 nm of linearly polarized light is fabricated. It also exhibits a negative refractive index at 772 nm for orthogonal polarization.

MA4 • 9:50 a.m.
Metamagnetics for Visible Wavelengths (491 - 754 nm), *Hsiao-Kuan Yuan[1], Wenshan Cai[1], Uday K. Chettiar[1], Vashista De Silva[1], Alexander V. Kildishev[1], Alexandra Boltasseva[2], Vladimir P. Drachev[1], Vladimir M. Shalaev[1]; [1]School of Electrical and Computer Engineering and Birck Nanotechnology Ctr., Purdue Univ., USA, [2]Dept. of Communications, Optics and Materials, Technical Univ. of Denmark, Denmark.* We designed, fabricated and experimentally validated a representative number of periodic arrays of magnetically resonant silver nanostrips. Our studies confirmed that the coupled-strip design can provide controllable magnetic responses in the entire visible range.

Pavilion
10:10 a.m.–10:40 a.m.
Coffee Break

MB • Random Media I

Lodge Room
10:40 a.m.–12:40 p.m.
MB • Random Media I
Diederik S. Wiersma; European Lab for Non Linear Spectroscopy, Italy, Presider

MB1 • 10:40 a.m. Invited
Random Laser Modes, *Ad Lagendijk; FOM Inst. for Atomic and Molecular Physics, Netherlands.* Abstract not available.

MB2 • 11:20 a.m. Invited
Anderson Localization in Open Random Media, *Sergey E. Skipetrov, N. Cherroret, B. A. van Tiggelen; Ctr. Natl. de la Recherche Scientifique, France.* Self-consistent theory of localization is applied to study time- and position-dependent transport coefficients for waves in open random media. We propose new experiments that should give a better insight into the Anderson localization of light.

MB3 • 12:00 p.m.
Light Transport through Mie Resonances in Photonic Glasses, *Riccardo Sapienza[1], David P. D. García[1], Maria Dolores Martín[2], Jacopo Bertolotti[3], Alvaro Blanco[1], Stefano Gottardo[3], Luis Viña[2], Diederik S. Wiersma[3], Ceferino Lopez[1]; [1]Inst. de Ciencia de Materiales, Spain, [2]Dept. de Física de Materiales, Univ. Autónoma de Madrid, Spain, [3]European Lab for Nonlinear Spectroscopy, Italy.* We present novel photonic materials, photonic glasses, as solid, disordered assemblies of monodisperse dielectric spheres, and the first measurements of resonances in the energy velocity of the diffused light, mean free paths and diffusion constant.

MB4 • 12:20 p.m.
Anderson Localization, Wave Diffusion and the Effect of Nonlinearity in Randomized Photonic Lattices, *Yoav Lahini[1], Assaf Avidan[1], Francesca Pozzi[2], Marc Sorel[2], Roberto Morandotti[3], Yaron Silberberg[1]; [1]Weizmann Inst. of Science, Israel, [2]Univ. of Glasgow, UK, [3]Inst. Natl. de la Recherche Scientifique, Canada.* We present direct experimental measurements of Anderson localized modes and of the different regimes of transport in randomized photonic lattices. In particular, we investigate the effect of nonlinearity on Anderson localization.

12:40 p.m.–2:30 p.m.
Lunch (on your own)

MC • Nanophotonics and PhC I

Lodge Room
2:30 p.m.–4:10 p.m.
MC • Nanophotonics and PhC I
Eli Yablonovitch; Electrical Engineering Dept., Univ. of California at Los Angeles, USA, Presider

MC1 • 2:30 p.m. Invited
Using Surface Plasmons for Nanophotonics, *Sergey I. Bozhevolnyi; Aalborg Univ., Denmark.* Metal nanostructures supporting surface plasmon polariton (SPP) modes are considered for nanophotonic applications, including nano-sized strip and gap resonant antennas making use of slow SPPs and waveguide components using dielectric-loaded and channel SPPs.

MC2 • 3:10 p.m.
Initial Designs of Coated Nano-particle Lasers and Simulations of their Performance, *Joshua A. Gordon[1], Richard W. Ziolkowski[2]; [1]College of Optical Sciences, Univ. of Arizona, USA, [2]Electrical and Computer Engineering, Univ. of Arizona, USA.* The optical properties of coated nanometer-sized spherical particles comprised of a gain medium core covered with a concentric plasmonic shell are investigated. Numerically predicted super-resonant radiative scattering suggests the possibility of realizing highly sub-wavelength lasers.

MC3 • 3:30 p.m.
Towards Anderson Localization of Light in Photonic Crystals, *Costanza Toninelli[1], D. S. Wiersma[1], Sajeev John[2], Nicolas Tétreault[3], Geoffry A. Ozin[3]; [1]LENS, Italy, [2]Dept. of Physics, Univ. of Toronto, Canada, [3]Dept. of Chemistry, Univ. of Toronto, Canada.* In this paper we present the measurement of the diffusion constant in a three-dimensional photonic crystal, possessing a full bandgap. The extremely small value reported can be ascribed to a renormalization by interference effects.

MC4 • 3:50 p.m.
Organic Photonic Crystal Microcavities for a Room-Temperature Single-Photon Source on Demand, *Svetlana G. Lukishova[1], Luke J. Bissell[1], Vinod Menon[2], Nikesh Valappil[2], Robert W. Boyd[1], Carlos R. Stroud, Jr[1]; [1]Inst. of Optics, Univ. of Rochester, USA, [2]Dept. of Physics, Queens College –CUNY, USA.* A single-photon source based on single CdSe quantum-dot fluorescence in a chiral-photonic-bandgap liquid-crystal host manifests itself in observed fluorescence antibunching. Single quantum-dot fluorescence imaging inside different types of organic photonic bandgap microcavities is also presented.

Pavilion
4:10 p.m.–4:40 p.m.
Coffee Break

MD • Super/Hyper-Lens

Lodge Room
4:40 p.m.–6:20 p.m.
MD • Super/Hyper-Lens
Victor G. Veselago; Moscow Inst. of Physics and Technology, Russian Federation, Presider

MD1 • 4:40 p.m. **Invited**
To Be Determined, *Evgenii Narimanov; Princeton Univ., USA.* Abstract not available.

MD2 • 5:20 p.m. **Invited**
Imaging Below Diffraction Limit Using Superlens and Hyperlens, *Xiang Zhang; Univ. of California at Berkeley, USA.* Abstract not available.

MD3 • 6:00 p.m.
Magnifying Superlens in the Visible Frequency Range, *Igor I. Smolyaninov, Yu-Ju Hung, Christopher C. Davis; Univ. of Maryland, USA.* We demonstrate a magnifying superlens which can be integrated into a conventional far-field optical microscope. Our design is based on a multilayer plasmonic metamaterial consisting of alternating layers of positive and negative refractive index.

NOTES

•Tuesday, June 5, 2007•

Lodge Room Entry Foyer
7:30 a.m.–5:00 p.m.
Registration Open

TuA • Random Media II

Lodge Room
8:30 a.m.–10:10 a.m.
TuA • Random Media II
Azriel Z. Genack; Queens College of CUNY, USA, Presider

TuA1 • 8:30 a.m. Invited
Anderson Localization in Disordered 2-D Photonic Lattices, *Tal Schwartz, Guy Bartal, Shmuel Fishman, Mordechai Segev; Technion–Israel Inst. of Technology, Israel.* We present the first observation of Anderson Localization in disordered photonic lattices. We study the combined effects of nonlinearity and disorder, under normal and anomalous dispersion.

TuA2 • 9:10 a.m. Invited
Scaling Behavior of the Anderson Localization Transition of Light, *C. M. Aegerter, M. Störzer, S. Fiebig, W. Bührer, Georg Maret; Univ. of Konstanz, Germany.* Pulsed transmission measurements on colloidal titania reveal a time dependent photon diffusion constant $D(t)\sim t^{-\alpha}$. The scaling of α and of the localization length with kl^* provides evidence for a transition to Anderson localization of light.

TuA3 • 9:50 a.m.
Anderson Localisation of Light in the Presence of Metamaterials, *Ara A. Asatryan[1], Lindsay C. Botten[1], Michael A. Byrne[1], Valentin D. Freilikher[2], Sergei A. Gredeskul[3], Ross C. McPhedran[4], Ilya V. Shadrivov[5], Yuri S. Kivshar[5]; [1]Univ. of Technology, Sydney, Australia, [2]Bar-Ilan Univ., Israel, [3]Ben Gurion Univ. of the Negev, Israel, [4]Univ. of Sydney, Australia, [5]Australian Natl. Univ., Australia.* We consider localisation in 1D stacks of alternating normal and meta-material layers and show that at long wavelengths the localisation length is much longer than for corresponding homogeneous samples, and that transmission resonances are absent.

Pavilion
10:10 a.m.–10:40 a.m.
Coffee Break

TuB • Poster Session

Pavilion
10:40 a.m.–12:40 p.m.
TuB • Poster Session

TuB1
Surface Modes in Photonic Band-Gap Fibers, *James A. West, Karl W. Koch; Corning Inc, USA.* We describe a class of modes that appear in optical fibers with periodic claddings. These bound modes are localized near the core-cladding interface and are related to surface modes encountered in semi-infinite planar periodic structures.

TuB2
Statistics of Lasing Peaks and ASE Spikes from Amplifying Random Media, *Xiaohua Wu, Hui Cao; Northwestern Univ., USA.* We studied experimentally the ensemble-averaged spectral correlation functions and statistical distributions of spectral spacing and intensity of ASE spikes and lasing peaks from weakly scattering systems under local pumping. Their differences revealed distinct physical mechanisms.

TuB3
Four-Wave Mixing in Negative Refractive Index Media, *Aref Chowdhury, Marjan Saboktakin, John A. Tataronis; Bell Labs, Alcatel-Lucent, USA.* We analyze four-wave mixing in negative refractive index media where at least one of the interacting waves has a negative index of refraction and explore some of the different perfectly phase matched regimes.

TuB4
Effect of Local Pumping on Random Laser Modes, *Xiaohua Wu[1], Jonathan Andreasen[1], Hui Cao[1], Alexey Yamilov[2]; [1]Northwestern Univ., USA, [2]Univ. of Missouri--Rolla, USA.* We developed a numerical method to calculate the quasimodes and lasing modes in one-dimensional random systems. Local pumping could make the lasing modes differ drastically from the quasidmodes of a weakly scattering system.

TuB5
Two-Dimensional Dielectric and Metallo-Dielectric Periodic Photonic Structures, *Ion Tiginyanu[1], Eduard Monaico[2], Vladimir Sergentu[1], Veaceslav Ursaki[1], Michael Scalora[3]; [1]Acad. of Sciences of Moldova, Republic of Moldova, [2]Natl. Ctr. for Materials Study and Testing, Republic of Moldova, [3]Charles M. Bowden Res. Ctr., USA.* Nanotemplate fabrication on InP, GaP, and ZnSe is reported. We demonstrate the possibility to grow ordered arrays of metal nanowires and nanotubes using electrochemical deposition. Possible applications of developed 2-D metallo-dielectric periodic structures are discussed.

TuB6
Diffusion Approximation for Disordered Photonic Crystals, *Lev I. Deych[1], Mikhail Erementchouk[2], Alexander Lisyansky[1], Hui Cao[3]; [1]Dept. of Physics, Queens College, USA, [2]NanoScience Technology Ctr., Univ. of Central Florida, USA, [3]Dept. of Physics and Astronomy, Northwestern Univ., USA.* We develop a theoretical framework for description of diffusive radiative transport in disordered photonic crystals. We define an inhomogeneous equilibrium distribution of light intensity inside photonic crystals and derive the static limit of diffusion equation.

TuB7
Analysis of ZnO Random Laser Spectra under Nanosecond Pumping, *Mikhail Vladimirovich Ryzhkov[1], Valery Mikhailovich Markushev[1], Charus' Moiseevna Briskina[1], Hui Cao[2], Hongmei Zhong[3], Shao-Wei Wang[4], Wei Lu[4]; [1]Inst. of Radio Engineering and Electronics of RAS, Russian Federation, [2]Northwestern Univ., USA, [3]Shanghai Inst. of Ceramics, Chinese Acad. of Sciences, China, [4]Shanghai Inst. of Technical Physics, Chinese Acad. of Sciences, China.* Plausible origin of ZnO random laser spectra variations from shot to shot and its large line widths under nanosecond pumping are analyzed. Considered items are: spontaneous emission fluctuations and peculiarities of lasing time behavior.

TuB8
Guided Modes Supported by Nanoscale Metal-Dielectric Multilayers, *Ivan Avrutsky[1], Ildar Salakhutdinov[1], Justin Elser[2], Viktor Podolskiy[2]; [1]Wayne State Univ., USA, [2]Oregon State Univ., USA.* We discover that nanoscale metal-dielectric-multilayers support a family of guided modes strongly confined within the bulk of the multilayer - the bulk plasmon modes. We verify existence of bulk plasmons by measuring their modal indices.

TuB9
Negative Index Waveguide Arrays, *Andrei I. Maimistov[1], Natalia M. Litchinitser[2], Ildar R. Gabitov[3]; [1]Moscow Engineering Physics Inst., Russian Federation, [2]Univ. of Michigan, USA, [3]Univ. of Arizona, USA.* We investigate linear and nonlinear transmission properties of photonic lattices, or waveguide arrays, composed of waveguides filled with negative index material separated by positive index material layers. A wide range of initial conditions is investigated.

TuB10
Microwave Studies of Degenerate Band Edge Photonic Crystals, *Andrey A. Chabanov; Univ. of Texas at San Antonio, USA.* Novel photonic metamaterials have been engineered from spatially periodic, strongly birefringent dielectric materials and have been studied with microwaves to demonstrate extraordinary field amplitude growth within their structure at the photonic band edge transmission resonances.

TuB11
"Anti-Phase" Plasmonic and/or Metamaterial "Satellites" for Induced Transparency and Cloaking, *Mário G. Silveirinha, Andrea Alù, Nader Engheta; Univ. of Pennsylvania, USA.* Instead of totally covering an object with properly designed plasmonic shells in order to achieve cloaking, here we discuss the idea of using "anti-phase" scatterers placed near an object to get to the same goal.

TuB12
Terahertz Transmission through Aperiodic Aperture Arrays, *Amit K. Agrawal[1], Tatsunosuke Matsui[2], Z. Valy Vardeny[2], Ajay Nahata[1]; [1]Dept. of Electrical and Computer Engineering, Univ. of Utah, USA, [2]Physics Dept., Univ. of Utah, USA.* We demonstrate that sharp, well-defined transmission resonances occur with various classes of *aperiodic* aperture arrays, including quasiperiodic and *approximate* quasiperiodic structures. The resonance frequencies may be directly obtained from the associated aperture array structure factor.

TuB13
Coherent Backscattering from Resonant Disordered Media, *Jacopo Bertolotti[1], Riccardo Sapienza[2], P. David Garcia[2], Cefe Lopez[2], Diederik S. Wiersma[1]; [1]European Lab for Non-Linear Spectroscopy and INFM-BEC, Italy, [2]Inst. de Ciencia de Materiales de Madrid (CSIC) and CSIC-UVigo, Spain.* The presence of Mie resonances in random assemblies of dense packed monodisperse polystyrene spheres is studied. Ambiguities in transmission measurements are discussed and backscattering cone is presented as an optimal tool to study Mie resonances.

TuB14
Towards the Observation of the Photonic Hall Effect in Cold Atomic Clouds, *Benoît Grémaud[1], Dominique Delande[1], Olivier Sigwarth[1], Christian Miniatura[2]; [1]Lab Kastler Brossel, France, [2]Inst. Non-Linéaire de Nice, France.* Performing exact numerical simulations, the photonic Hall effect is found to exist in clouds of resonant Rayleigh scatterers in a magnetic field. Our results also suggest that it could be observed in cold atomic vapors.

TuB15
Photon Control by Plasmonic Metamaterials, *Takuo Tanaka[1,2], Satoshi Kawata[1,3]; [1]RIKEN (The Inst. of Physical and Chemical Res.), Japan, [2]JST PRESTO, Japan, [3]Osaka Univ., Japan.* Optical properties of split ring resonators is theoretically investigated. We also propose novel optical functional components that can transmit the light across the material boundary without any reflection at the interface.

TuB16
Nanoaperture Based Metamaterials, *Carsten Rockstuhl[1], Ekaterina Pshenay-Severin[1], Jörg Petschulat[1], Thomas Pertsch[1], Falk Lederer[1], Thomas Zentgraf[2], Todd P. Meyrath[2], Harald Giessen[2]; [1]Friedrich Schiller Univ. Jena, Germany, [2]Univ. of Stuttgart, Germany.* We investigate metamaterials consisting of holes in thin metallic sheets that resemble nanocavities or nanoapertures. Resonances of these structures relate to modes localized inside the nanocavities. Their impact on effective material parameters is discussed.

TuB17
Giant Field Enhancement and Plasmon Localization in Two-dimensional Deterministic Aperiodic Arrays of Metal Nanoparticles, *Ashwin Gopinath, Ning-Ning Feng, Luca Dal Negro; Boston Univ., USA.* We investigate the near-field electromagnetic coupling and the collective plasmon modes of deterministically generated two-dimensional aperiodic arrays of metal nanoparticles. We show that deep sub wavelength-localized states and large field enhancement effects can be achieved.

TuB18
Dynamically Frequency Tunable Terahertz Metamaterials, *John F. O'Hara[1], Hou-Tong Chen[1], Antoinette J. Taylor[1], Richard D. Averitt[2], Willie J. Padilla[3]; [1]Los Alamos Natl. Lab, USA, [2]Boston Univ., USA, [3]Boston College, USA.* We present novel terahertz metamaterials that feature frequency tunable resonant responses. Tunability is achieved by selective patterning of semiconductor regions within split-ring resonator structures. Simulations reveal non-linear frequency tuning as a function of conductivity.

TuB19
Photo-Induced Voltage in Perforated Metal-Dielectric-Metal Multilayer Structure, *Young-Geun Roh[1], Yusaburo Segawa[1], Sergei G. Tikhodeev[2], Teruya Ishihara[1,3]; [1]RIKEN, Japan, [2]General Physics Inst., Russian Federation, [3]Dept. of Physics, Tohoku Univ., Japan.* We investigated photo-induced voltage across perforated metal-dielectric-metal layered structure in experimental and numerical manner. Reversal of the sign of the induced voltage revealed negative direction of energy flow at the negative refractive index frequency.

TuB20
Factorization of Mesoscopic Intensity Correlations, *Alexey G. Yamilov[1], Andrey A. Chabanov[2], Azriel Z. Genack[3], Hui Cao[4]; [1]Univ. of Missouri-Rolla, USA, [2]Univ. of Texas at San Antonio, USA, [3]Queens College of CUNY, USA, [4]Northwestern Univ., USA.* Mesoscopic correlations of field intensity transmitted through disordered waveguides are shown to factorize into (i) the correlator of intensity normalized by the transmission, (ii) the correlator of transmission normalized by conductance, and (iii) the variance of dimensionless conductance.

TuB21
Paper Withdrawn

TuB22
Dynamics of Quasimodes in an Open and Dissipative Localized 1D Random Waveguide, *Patrick H. Sebbah[1,2], Bing Hu[2], Jerome Klosner[2], Azriel Z. Genack[2]; [1]CNRS, France, [2]Queens College, USA.* The time response to an incident narrow bandwidth pulse is measured inside a localized random system. Distinct dynamics in the spectral vicinity of isolated long-lived localized and extended short-lived multi-peaked modes underlay averaged pulse transmission.

TuB23
Optical Negative Index Metamerials with Low Losses: Nature-Inspired Methods for Optimal Design, *Zhengtong Liu[1], Uday K. Chettiar[1], Alexander V. Kildishev[1], Vladimir M. Shalaev[1], Do-Hoon Kwon[2], Zikri Bayraktar[2], Douglas H. Werner[2]; [1]Purdue Univ., USA, [2]Pennsylvania State Univ., USA.* The performance of an optical negative index metamaterial is optimized by simulated annealing, genetic algorithm, and particle swarm optimization methods. While these methods yield very similar designs, the particle swarm optimization shows the best performance.

TuB24
Novel Properties of Superconducting Metamaterials Investigated with Magneto-Optic and Scanning Laser Microscopies, *Michael Ricci[1], Alexander Zhuravel[2], Alexey Ustinov[3], Ruslan Prozorov[4], Steven M. Anlage[1]; [1]Univ. of Maryland, USA, [2]B. Verkin Inst. for Low Temperature Physics and Engineering, Ukraine, [3]Physics Inst. III, Univ. of Erlangen-Nuremberg, Germany, [4]Ames Lab, Dept. of Physics and Astronomy, Iowa State Univ., USA.* Low losses are required to demonstrate many unique properties of metamaterials. We have developed tunable and nonlinear superconducting metamaterials and demonstrated their low loss properties. We employ magneto-optic and scanning-laser microscopy to study their properties.

TuB25
Statistics of Phase Singularities in Electromagnetic Waves Transmitted through Random Media, *Sheng Zhang, Azriel Z. Genack; Queens College of City Univ. of New York, USA.* Phase singularities in the speckle patterns of transmitted wave from random media are measured. We find that the statistics of phase variation around the phase singularities is universal, while the vorticities reflect the mesoscopic fluctuations.

TuB26
Statistical Properties of Single Molecule Fluorescence in Disordered Media, *Luis S. Froufe-Pérez[1], Romain Pierrat[1], Juan Jose Saenz[2], Rémi Carminati[1]; [1]Lab EM2C, Ecole Centrale Paris, Ctr. Natl. de la Recherche Scientifique, France, [2]Dept. Fisica de la Materia Condensada, Univ. Autonoma de Madrid, Spain.* Statistics of fluorescence signals of single emitters in disordered clusters of nanoparticles are analyzed. We show that lifetime fluctuations are sensitive to local absorption and structure and that fluorescence signals can probe volume speckle patterns.

TuB27
Steady State and Dynamic Correlation of Localized Waves, *Jing Wang[1], Andrey A. Chabanov[2], Azriel Z. Genack[1]; [1]Dept. of Physics, Queens College of the City Univ. of New York, USA, [2]Dept. of Physics and Astronomy, The Univ. of Texas at San Antonio, USA.* The mesoscopic contribution to intensity correlation of localized microwave radiation with polarization rotation of the detector dwarfs the field factorization contribution but has the same form for diffusive and localized waves.

TuB28
Plasmonic Band Gap Materials for the Terahertz Spectral Region, *Benjamin Reinhard[1], Garik Torosyan[2], René Beigang[1,2]; [1]Univ. of Kaiserslautern, Germany, [2]Fraunhofer Inst. Physical Measurement Techniques, Germany.* Surface plasmon polaritons are excited with fs THz-pulses in 2- and 3-dimensional periodic metallic structures. Transmission properties are analyzed in terms of band gap models and good agreement between experiments and theory was found.

TuB29
Sub-wavelength Discrete Solitons in Nonlinear Metamaterials, *Guy Bartal, Yongmin Liu, Dentcho A. Genov, Xiang Zhang; Univ. of California at Berkeley, USA.* We present the first theoretical prediction of sub-wavelength discrete solitons in nonlinear periodic metamaterials. These solitons result from the three-fold interplay between periodicity, nonlinearity, and surface plasmons tunneling in nano-scaled nonlinear metallic waveguide array.

TuB30
3-D Tunable Hexagonal Photonic Crystal in the Ultraviolet Range, *Xiaohong Sun, Xiaoming Tao; Hong Kong Polytechnic Univ., Hong Kong.* A top-cut hexagon prism is designed for fabrication 3-D hexagonal PhC structures in HPDLC films. The PBG along z direction is in the UV range. Far-field diffraction patterns and electrical switching characteristics have been investigated.

TuB31
Spectral Phase Control of Remote Surface-Plasmon-Mediated Two-Photon-Induced Luminescence, *Jess M. Gunn, Melinda Ewald, Marcos Dantus; Michigan State Univ., USA.* We demonstrate and quantify the use of spectral phase modulation to control surface-plasmon-mediated two-photon-induced luminescence at distances tens of micrometers from the focal spot of a femtosecond laser.

TuB32
Weak Localization Effects in Second-Harmonic Light Scattering, *Claudio I. Valencia[1], Eugenio R. Mendez[2]; [1]Facultad de Ciencias, Univ. Autonoma de Baja California, Mexico, [2]CICESE, Div. de Fisica Aplicada, Mexico.* We report calculations that show the presence of coherent backscattering effects in the second-harmonic light scattered by random systems of particles. The scattering intensity distributions presents an intensity dip in the backscattering direction.

TuB33
Embedded, Gap, and Surface Soliton Trains in 2-D Photonic Lattices, *Xiaosheng Wang[1], Cibo Lou[1,2], Alex Samodurov[1], Jingjun Xu[2], Zhigang Chen[1,2], Jianke Yang[3,4]; [1]San Francisco State Univ., USA, [2]TEDA Applied Physical School, Nankai Univ., China, [3]Univ. of Vermont, USA, [4]Zhou Pei-Yuan Ctr. for Applied Mathematics, Tsinghua Univ., China.* Nonlinear propagation of 1D quasi-plane-waves in 2-D photonic lattices leads to first observations of embedded and gap soliton-trains arising from modes at band-edges or non-band-edges. Surface soliton-trains as periodic nonlinear Tamm states are also demonstrated.

TuB34
Negative Index Materials Based on Rods with Refractive Index Profile, *Eugen Foca[1], Juergen Carstensen[1], Helmut Foell[1], Vladimir V. Sergentu[2], Veaceslav V. Ursaki[2], Ion M. Tiginyanu[2], Frank Daschner[1], Reinhard Knoechel[1]; [1]Christian-Albrechts-Univ. of Kiel, Germany, [2]Inst. of Applied Physics, Moldavian Acad. of Sciences, Republic of Moldova.* Negative index materials can be fabricated using cylinders with a special distribution of the dielectric constant. We present the theoretical approach for building such materials as well as a experimental proof of the corresponding principle.

TuB35
Evaluation of Effective Electric Permittivity and Magnetic Permeability in Metamaterial Parallel Slab and Importance of the Skin Effect, *Yosuke Minowa[1], Masaya Nagai[1], Koichiro Tanaka[1], Takashi Fujii[2], Kazuyuki Hirao[3]; [1]Dept. of Physics, Kyoto Univ., Japan, [2]Murata Manufacturing Co., Ltd., Japan, [3]Dept. of Material Chemistry, Kyoto Univ., Japan.* We evaluate effective optical constants of the phosphor bronze wire grid using the terahertz time-domain spectroscopy. Evaluated results show a Drude-like electric permittivity with a plasma frequency reduced by 10^{-3}, and an unexpected magnetic permeability.

TuB36
Non Periodic Structures for Nonlinear Light Generation, *Xavier Vidal[1,2], Jordi Martorell[1,2]; [1]Inst. de Ciencies Fotoniques (ICFO), Spain, [2]Departament de Fisica i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain.* We show that to partially phase match second harmonic generation is possible in structures of randomly oriented domains. In certain conditions making the dispersion in domain size large has no negative effect for such generation.

TuB37
Frozen Mode Regime in Bounded Photonic Crystals, *Alex Figotin, Ilya Vitebskiy; Univ. of California at Irvine, USA.* Light incident on periodic structure with special dispersion relation can be converted into a frozen mode with huge amplitude and vanishing group velocity. We consider how this spectacular phenomenon is modified in bounded photonic crystals.

TuB38
Analog Experiments in Quantum Chaos, *Steven M. Anlage, Sameer Hemmady, Edward Ott, Thomas Antonsen; Univ. of Maryland, USA.* Wave chaotic analog experiments have proven very fruitful for examining important predictions of random matrix and related theories. We present results using a microwave cavity analog to study universal conductance fluctuations in chaotic quantum dots.

TuB39
Light Propagation and Localization in Active Optical Fibers with Disorder, *Elena I. Chaikina, Noemi Lizárraga, Eugenio R. Méndez; CICESE, Mexico.* We present a study of the propagation of light through fibers with random Bragg gratings. The fabricated samples were implemented as random laser system. Lasing spectrum was studied as a function of the pumping.

TuB40
Second Harmonic Generation of Self-Organized Gold Nanowires on Dielectric Substrate, *Alessandro Belardini[1], Maria Cristina Larciprete[1], Eugenio Fazio[1], Concita Sibilia[1], Mario Bertolotti[1], A. Toma[2], D. Chiappe[2], C. Boragno[2], Francesco Buatier de Mongeot[2]; [1]Dept. di Energetica, Univ. di Roma La Sapienza, Italy, [2]Dept. di Fisica, Univ. degli Studi di Genova, Italy.* Ordered arrays of size selected nanorods and nanowires are useful for applications in fields ranging from spintronics or plasmonic waveguides. as example. We investigated the second order optical properties of self-organised gold nanowires on glass.

12:40 p.m.–2:30 p.m.
Lunch (on your own)

TuC • Nanophotonics and PhC II

Lodge Room
2:30 p.m.–4:10 p.m.
TuC • Nanophotonics and PhC II
Yurii Vlasov; IBM, TJ Watson Res. Ctr., USA, Presider

TuC1 • 2:30 p.m. Invited
What is the Smallest Volume in which Light can be Focused Efficiently? *Josh Conway, Shantha Vedantam, Hyojune Lee, Japeck Tang, Eli Yablonovitch; Electrical Engineering Dept., Univ. of California at Los Angeles, USA.* We find that the limit of focusing is reached when the electromagnetic plasmonic group velocity v_g becomes as slow as the electron Fermi velocity, v_F.

TuC2 • 3:10 p.m. Invited
To Be Determined, *Axel Scherer; Caltech, USA.* Abstract not available.

TuC3 • 3:50 p.m.
Metal/Dielectric Photonic Crystal with Broadband Transparency for Propagating and Evanescent Waves, *Mark Bloemer[1], Giuseppe D'Aguanno[1], Nadia Mattiucci[1], Domenico de Ceglia[1], Michael Scalora[1], Neset Akozbek[2]; [1]US Army Res., Development and Engineering Command, USA, [2]Time Domain Corp, USA.* Strongly coupled metal/dielectric cavities with anti-reflection coatings at the entrance and exit faces provide a very broad transmission band for both the evanescent and propagating waves. Power lost through the super-resolution process is also examined.

Pavilion
4:10 p.m.–4:40 p.m.
Coffee Break

TuD • Meta and Cloaking

Lodge Room
4:40 p.m.– 6:20 p.m.
TuD • Meta and Cloaking
Martin Wegener; Karlsruhe Univ., Germany, Presider

TuD1 • 4:40 p.m. Invited
Cloaking: A New Phenomenon in Electromagnetism and Elasticity, *Graeme W. Milton; Univ. of Utah, USA.* We show how collections of polarizable dipoles become cloaked (invisible) to time harmonic electromagnetic fields when placed in the proximity of a low loss superlens, and how transformation based approaches to cloaking extend to elasticity.

TuD2 • 5:20 p.m.
Optical Cloak of Invisibility, *Wenshan Cai, Uday K. Chettiar, Alexander V. Kildishev, Vladimir M. Shalaev; Purdue Univ., USA.* We present the design and analysis of an optical cloak of invisibility with non-magnetic metamaterials. The general recipe for the implementation of such a device is provided. The cloaking performance is illustrated with finite-element simulations.

TuD3 • 5:40 p.m.
Multi-Frequency Cloaking with Metamaterial Layered Shells, *Andrea Alù, Nader Engheta; Univ. of Pennsylvania, USA.* Exploiting the anti-phase scattering properties of plasmonic materials, we have recently explored the concept of electromagnetic cloaking with plasmonic covers. Here we generalize this concept to multi-layered covers, providing possibility of cloaking at multiple frequencies.

TuD4 • 6:00 p.m.
Electrical Control of Terahertz Metamaterials, *Hou-Tong Chen[1], Willie J. Padilla[2], Joshua M. O. Zide[3], Arthur C. Gossard[3], Antoinette J. Taylor[1], Richard D. Averitt[4]; [1]Los Alamos Natl. Lab, USA, [2]Boston College, USA, [3]Univ. of California at Santa Barbara, USA, [4]Boston Univ., USA.* The metamaterials resonant response significantly enhances THz-wave/material interaction. We demonstrated real-time switchable THz metamaterial via external voltage bias to modify the metamaterial capacitive elements, thereby achieved effective control and manipulation of freely propagating terahertz waves.

NOTES

•Wednesday, June 6, 2007•

Lodge Room Entry Foyer
7:30 a.m.–5:00 p.m.
Registration Open

WA • Nanophotonics and Meta

Lodge Room
8:30 a.m.– 10:10 a.m.
WA • Nanophotonics and Meta
Sergey I. Bozhevolnyi; Aalborg Univ., Denmark, Presider

WA1 • 8:30 a.m. **Invited**
Plasmonics: The Missing Link between Nanoelectronics and Microphotonics, *Mark Brongersma; Stanford Univ., USA.* Abstract not available.

WA2 • 9:10 a.m. **Invited**
Far-Field Subwavelength Focusing of Light and Plasmons by the Talbot Effect , *Fu Min Huang[1], Mark Dennis[1], F. Javier Garcia de Abajo[2], Nikolay Zheludev[1]; [1]Univ. of Southampton, UK, [2]Inst. de Optica, Spain.* We demonstrate experimentally and theoretically that the Talbot effect on arrays of nano-holes may be used to achieve subwavelength localizations of optical and plasmonic fields.

WA3 • 9:50 a.m.
Patterning and Imaging at the Nanoscale with Far-field Optics via Absorbance Modulation, *Rajesh Menon, Hsin-Yu Tsai, Henry I. Smith; MIT, USA.* By illuminating an absorbance-modulation layer with a null at one wavelength, and a focused spot at another wavelength, it is possible to overcome the diffraction limit. We present preliminary experimental results, and rigorous theoretical simulations.

Pavilion
10:10 a.m.–10:40 a.m.
Coffee Break

WB • Meta and Superlens

Lodge Room
10:40 a.m.–12:40 p.m.
WB • Meta and Superlens
Evgenii Narimanov; Princeton Univ., USA, Presider

WB1 • 10:40 a.m. **Invited**
Magnetic, Double-Negative, Chiral and Nonlinear Photonic Metamaterials, *Martin Wegener[1], S. Linden[1], C. M. Soukoulis[2,3]; [1]Karlsruhe Univ., Germany, [2]Ames Lab, Iowa State Univ., USA, [3]Dept. of Physics and Astronomy, Iowa State Univ., USA.* We review recent progress regarding photonic metamaterials with highly unusual optical properties, including a negative index, magnetization waves, and strong circular dichroism. Furthermore, we discuss experiments on second- and third harmonic generation from magnetic metamaterials.

WB2 • 11:20 a.m. **Invited**
Near-field Characterization of Photonic Nanostructures: From Hot Spot Imaging to Superlens Studies, *Rainer Hillenbrand; Max-Planck Inst. fur Biochemie, Germany.* We demonstrate nanoscale resolved mapping of nanoparticle near-fields, surface polaritons and a SiC superlens by employing scattering-type near-field optical microscopy. Interferometric detection thereby yields both the local near-field optical amplitude and phase.

WB3 • 12:00 p.m.
Molecular Scale Imaging with a Smooth Superlens, *Pratik Chartuvedi[1], Wei Wu[2], Vijay Logeeswaran[2,3], Zhaoning Yu[2], Yi Xiong[4], Saif Islam[3], Shih-Yuan Wang[2], Xiang Zhang[4], Nicholas Fang[1]; [1]Univ. of Illinois at Urbana-Champaign, USA, [2]Quantum Science Res., Hewlett-Packard Labs, USA, [3]Dept. of Electrical and Computer Engineering, Univ. of California at Davis, USA, [4]NSF Ctr. for Nano-scale Science and Engineering, Univ. of California at Berkeley, USA.* We present the progress of optical superlensing with 30 nm feature resolution or one-twelfth of wavelength. This opens door to parallel and molecular scale imaging by optical means.

WB4 • 12:20 p.m.
Single Molecule Fluorescence Lifetime Control through Slabs of Metallic and Negative-Index Materials, *Luis S. Froufe, Rémi Carminati; Lab d'Energétique Moléculaire et Macroscopique, Ecole Centrale Paris, Ctr. Natl. de la Recherche Scientifique, France.* The fluorescence dynamics of a single emitter can be controlled at large distances through slabs of metallic and negative-index materials. This is achieved by positioning a metallic nanoparticle in the vicinity of the emitter image.

12:40 p.m.–2:30 p.m.
Lunch (on your own)

WC • Random Media III

Lodge Room
2:30 p.m.–4:10 p.m.
WC • Random Media III
Ad Lagendijk; FOM Inst for Atomic and Molecular Physics, Netherlands, Presider

WC1 • 2:30 p.m. **Invited**
Speckle Pattern Evolution of Diffusive and Localized Waves, *Azriel Z. Genack[1], S. Zhang[1], B. Hu[1], P. Sebbah[1,2]; [1]Queens College of CUNY, USA, [2]Lab de Physique de la Matière Condensée, CNRS, Univ. de Nice Sophia-Antipolis, France.* While the phase statistics within speckle patterns is generic, the statistics of the motion of phase singularities differs substantially for diffusive and localized waves reflecting the wave interaction with the underlying electromagnetic modes.

WC2 • 3:10 p.m. **Invited**
Zero-Point Momentum in Complex Media, *Bart van Tiggelen[1], Geert L.J.A. Rikken[2]; [1]CNRS/Lab de Physique et Modélisation, France, [2]LCMP/CNRA/INSA/UPS, France.* Zero-point fluctuations of the electromagnetic field carry energy. We consider the possibility whether they carry momentum, when external magnetic fields are applied. We apply dimensional regularization to address a dielectric sphere geometry.

WC3 • 3:50 p.m.
Lasing with Resonant Feedback in Weakly Scattering Random Systems*Patrick H. Sebbah[1], Christian Vanneste[1], Hui Cao[2]; [1]Lab de Physique de la Matière Condensée, CNRS, France, [2]Northwestern Univ., USA.* Laser action in active random media in the weak scattering regime is investigated. In this regime where the quasimodes are spatially and spectrally overlapped, single mode lasing occurs on single quasimodes of the passive system.

Pavilion
4:10 p.m. –4:40 p.m.
Coffee Break

WD • Meta/Nanophotonics

Lodge Room
4:40 p.m.–6:20 p.m.
WD • Meta/Nanophotonics
Nikolay Zheludev; Univ. of Southampton, UK, Presider

WD1 • 4:40 p.m. Invited
Silicon Nanophotonics for On-Chip Optical Interconnects
Yurii Vlasov; IBM, TJ Watson Res. Ctr., USA. Abstract not available.

WD2 • 5:20 p.m. Invited
Anomalous Refraction in Silicon-Based 2-Dimensional Photonic Crystal Structures, *Won Park; Univ. of Colorado, USA.* Silicon-based 2-dimensional slab photonic crystal structures were designed to exhibit anomalous refraction in the near-infrared region. Negative refraction and self-collimation were experimentally observed in the integrated device structures.

WD3 • 6:00 p.m.
Fabrication of 3-D Metal/Polymer Fine Structures for 3-D Plasmonic Metamaterials, *Nobuyuki Takeyasu[1], Takuo Tanaka[1,2], Satoshi Kawata[1,3]; [1]RIKEN, Japan, [2]JST PRESTO, Japan, [3]Osaka Univ., Japan.* Three-dimensional (3-D) metallic fine structures were fabricated with nano/ micrometer resolution. 3-D polymer structures were firstly prepared by two-photon absorption polymerization, and silver was deposited on the polymer templates through electrochemical metal deposition.

NOTES

•Thursday, June 7, 2007•

Lodge Room Entry Foyer
8:00 a.m.–5:00 p.m.
Registration Open

ThA • Meta and Random Media

Lodge Room
8:30 a.m.–10:10 a.m.
ThA • Meta and Random Media
Nicholas Fang; Univ. of Illinois at Urbana-Champaign, USA, Presider

ThA1 • 8:30 a.m. Invited
Filters and Feedbacks in Metamaterial Nanocircuits, *Nader Engheta, Andrea Alù; Univ. of Pennsylvania, USA.* Optical lumped nanofilters and circuit feedbacks may be envisioned by arranging collections of lumped nanocircuit modules made of photonic metamaterial nanostructures that form multielement optical nanocircuits. Analytical results and full-wave numerical simulations are presented.

ThA2 • 9:10 a.m.
Nonlinear Optical Switching from Lossy to Amplifying Negative-Index Metamaterials, *Alexander K. Popov[1], Vladimir M. Shalaev[2]; [1]Univ. of Wisconsin-Stevens Point, USA, [2]Purdue Univ., USA.* Extraordinary properties of parametric amplification and of quantum interference which enable compensation of losses and of cavity-free generation of counter-propagating entangled right- and left-handed photons controlled by an external laser are investigated.

ThA3 • 9:30 a.m.
Transmission and Reflection at the Interface Containing a Nonlinear Thin Film of Optical Metamaterial, *Natalia M. Litchinitser[1], Andrei I. Maimistov[2], Ildar R. Gabitov[3]; [1]Univ. of Michigan, USA, [2]Moscow Engineering Physics Inst., Russian Federation, [3]Univ. of Arizona, USA.* We theoretically investigate some peculiar temporal and spectral characteristics of optical pulses reflected and transmitted through a thin film of metamaterial with nonlinear polarization and magnetization placed at the interface of two conventional linear dielectrics.

ThA4 • 9:50 a.m.
Localization of Sound in an Open Three-Dimensional System , *John H. Page[1], Hefei Hu[1], Sergey Skipetrov[2], Bart A. van Tiggelen[2]; [1]Univ. of Manitoba, Canada, [2]Univ. Joseph Fourier, France.* We report signatures of the localization of ultrasonic waves in a disordered 3-D network of aluminum beads. We measure both intensity statistics and time-dependent transmission, and compare with theoretical predictions for the dynamics of localization.

Pavilion
10:10 a.m.–10:40 a.m.
Coffee Break

ThB. Postdeadline Session

Lodge Room
10:40 am - 12:40 pm
ThB. Postdeadline Session
Presider to Be Announced

ThC • Random Media IV

Lodge Room
2:30 p.m.–4:10 p.m.
ThC • Random Media IV
Mordechai Segev; Technion–Israel Inst. of Technology, Israel, Presider

ThC1 • 2:30 p.m. Invited
Photon Correlations Induced by Randomness in a Quantum Mesoscopic Gas, *Eric Y. Akkermans; Technion–Israel Inst. of Technology, Israel.* Abstract not available.

ThC2 • 3:10 p.m.
Theory of the Spatial Structure of Nonlinear Modes in Conventional and Random Lasers, *Haken E. Türeci[1], Li Ge[2], Stefan Rotter[2], A. Douglas Stone[2]; [1]ETH Zurich, Switzerland, [2]Yale Univ., USA.* A new formalism for calculating exact non-linear multi-mode lasing states for complex resonators is applied to a conventional edge-emitting laser and a 2-D random laser. Novel "composite" random lasing states are expected.

ThC3 • 3:30 p.m.
Random Laser Action from Mie Resonators, *Stefano Gottardo[1], Riccardo Sapienza[2], David García[2], Jacopo Bertolotti[1], Alvaro Blanco[2], Cefe Lopez[2], Diederik S. Wiersma[1]; [1]European Lab for Non-Linear Spectroscopy, Univ. of Florence, Italy, [2]Inst. de Ciencia de Materiales de Madrid, Spain.* Here we present the first observation of random lasing from a disordered assembly of monodisperse dielectric spheres. Laser mode competition is observed due to the resonant transport of Mie modes.

ThC4 • 3:50 p.m.
Light Transport in Cold Atoms: Dephasing Processes, *David Wilkowski[1], Robin Kaiser[1], Guillaume Labeyrie[1], Cord Müller[1], Christian Miniatura[1], Thomas Wellens[1], Benoit Gremaud[2], Dominique Delande[2]; [1]Univ. de Nice Sophia-Antipolis, France, [2]Univ. Pierre et Marie Curie, France.* We will present some experimental and theoretical studies on dephasing processes that affect CBS effects of light in cold atomic samples: residual motion and internal structure of the scatterers, saturation of the atomic optical transition.

Pavilion
4:10 p.m.–4:40 p.m.
Coffee Break

ThD • Closing Session

Lodge Room
4:40 p.m.–6:40 p.m.
ThD • Closing Session
Nader Engheta; Univ. of Pennsylvania, USA, Presider

ThD1 • 4:40 p.m.
Closing Summary I, *Diederik S. Wiersma; European Lab for Non Linear Spectroscopy, Italy.*

ThD2 • 5:20 p.m.
Closing Summary II, *Mark Brongersma; Stanford Univ., USA.*

ThD3 • 6:00 p.m.
Closing Summary III, *Vladimir M. Shalaev; Purdue Univ., USA.*

Key to Authors and Presiders