

# NANO OPTICS Seminar SS2010

Institute of Applied Physics, Friedrich Schiller University Jena

Version: 17.09.2010

- 01.04.2010**    **Wave propagation in binary waveguide arrays**  
**Thursday**    *Jan SPERRHAKE*  
10:00 am, seminar room IAP
- 09.04.2010**    **Optical modeling of needle like silicon surfaces produced by an ICP-RIE process**  
**Friday**    *Matthias KROLL*  
**Digital holography from shadowgraphic phase estimates**  
*Falk EILENBERGER*  
1:30 pm, seminar room IAP
- 19.04.2010**    **Photonics at Lomonosov Moscow State University**  
**Monday**    *Maxim SHCHERBAKOV, Moscow State University, Russia*  
1:30 pm, seminar room IAP
- 20.04.2010**    **Properties and applications of waveguide Bragg gratings in silica and highly nonlinear materials**  
**Tuesday**    *Irina KABAKOVA, CUDOS, University of Sydney, Australia*  
10:30 pm, seminar room IAP
- 26.04.2010**    **Overview about present activities**  
**Monday**    *Arkadi SHIPULIN*  
**Conference wrap-up: Photonics Europe**  
*participants of the conference*  
1:30 pm, seminar room IAP
- 03.05.2010**    **Moiré hyperlensing – a survey**  
**Monday**    *Joerg PETSCHULAT*  
1:30 pm, seminar room IAP
- 10.05.2010**    **Nematicons: spatial optical solitons in nematic liquid crystals**  
**Monday**    *Gaetano ASSANTO, University Roma Tre*  
1:30 pm, seminar room IAP
- 17.05.2010**    **Transition from discrete to continuous solitons in periodic media**  
**Monday**    *Falk EILENBERGER*  
1:30 pm, seminar room IAP
- 27.05.2010**    **Phase matching in lithium niobate disk microresonators**  
**Thursday**    *Carsten SCHMIDT*  
1:30 pm, seminar room IAP
- 31.05.2010**    **Nonlinear measurements of fishnet structures**  
**Monday**    *Jörg REINHOLD*  
1:30 pm, seminar room IAP
- 03.06.2010**    **3D Metamaterials: design, manufacturing and experimental methods for investigation**  
**Thursday**    *Katja PSHENAY-SEVERIN*  
11:00 am, seminar room IAP
- 07.06.2010**    **Interaction of light with nanoholes and nanoparticles**  
**Monday**    *Norik JANUNTS*  
1:30 pm, seminar room IAP

- 10.06.2010**  
**Thursday**     **Two SNOM tips on one sample: acoustic crosstalk and optical measurement**  
*Angela KLEIN*  
3:00 pm, seminar room IAP
- 14.06.2010**  
**Monday**     **Classical optomechanics of free moving nanoparticles interacting with whispering gallery modes of microspheres**  
*Lev DEYCH, Queens College of CUNY, NY, USA*  
1:30 pm, seminar room IAP
- 16.06.2010**  
**Wednesday**     **High efficiency harmonic generation in LiNbO<sub>3</sub> membranes**  
*Alexander SOLNTSEV, Australian National University, Canberra*  
1:30 pm, seminar room IAP
- 17.06.2010**  
**Thursday**     **Asymmetric transmission of linearly polarized light in low-symmetry meta-atoms**  
*Christian HELGERT*  
3:00 pm, seminar room IAP
- 21.06.2010**  
**Monday**     **Metamaterial designs for use in computer-generated holograms**  
*Benny WALTHER*  
1:30 pm, seminar room IAP
- 23.06.2010**  
**Wednesday**     **Chirality and metamaterials**  
*Eric PLUM, ORC, University of Southampton*  
10:00 am, seminar room IAP
- 28.06.2010**  
**Monday**     **Coupling between dielectric and plasmonic waveguides**  
*Michael STEINERT*  
1:30 pm, seminar room IAP
- 05.07.2010**  
**Monday**     **Metamaterials in waveguide geometries**  
*Thomas KAISER*  
1:30 pm, seminar room IAP
- 08.07.2010**  
**Thursday**     **Conference wrap up:  
CLEO - Conference on Lasers and Electro Optics  
NP - Nonlinear Photonics**  
*Frank SETZPFANDT*  
1:30 pm, seminar room IAP
- 12.07.2010**  
**Monday**     **Optical near-field characterization of photonic crystals**  
*S  verine DIZIAIN*  
1:30 pm, seminar room IAP
- 09.08.2010**  
**Monday**     **Towards ultrafast interactions of acoustic, magnetic and plasmonic transients in hybrid multilayer structures**  
*Vasily TEMNOV, Massachusetts Institute of Technology*  
1:30 pm, seminar room IAP
- 12.08.2010**  
**Thursday**     **The plasmonic Moir   lens – implications of a subwavelength walk-off**  
*J  rg PETSCHULAT*  
1:00 pm, seminar room IAP
- 16.08.2010**  
**Monday**     **Focusing and guiding of surface plasmon–polariton in subwavelength scale**  
*Khachatur NERKARARYAN, Yerevan State University, Armenia*  
1:30 pm, seminar room IAP
- 24.08.2010**  
**Tuesday**     **Double-SNOM system: acoustic interaction**  
*Angela KLEIN*  
1:30 pm, seminar room IAP

**06.09.2010 Analyzing and manipulating near-field interaction in metamaterials****Monday****David POWELL, Australian National University, Canberra**

1:30 pm, seminar room IAP

Abstract: The complex near-field interactions in metamaterials provide a unique opportunity to tailor their response by modifying the lattice structure. We show that a lateral offset between the layers of rings provides a convenient tuning mechanism. We also develop a semi-analytical approach based on calculating the interaction energy between a pair of resonators from their charge and current distribution at resonance. This allows us to predict the electrical and magnetic interaction constants, and to explain the observed shift in resonance.

**07.09.2010 Nanopillar lasers on silicon and high contrast subwavelength devices****Tuesday****Connie J. CHANG-HASNAIN, University of California, Berkeley**

1:30 pm, Carl Zeiss seminar room at Fraunhofer Institute

Abstract: Nanoscale semiconductors are promising platform for monolithic integration of materials with dissimilar lattice constants. In this talk, I will discuss the synthesis and characteristics of GaAs nanoneedles monolithically grown on Si with CMOS compatible temperature and process. I will review results on avalanche photodetectors with high gain and light emitting diodes. I will also discuss recent breakthrough of nanopillar lasers on silicon. This new material platform is excellent for active Si photonics.

A second part of my talk will be on high-contrast subwavelength optics as they open up a new window to manipulate wave guiding properties. I will discuss some extraordinary properties of high contrast gratings (HCG) including ultra broad band reflectors, resonators and a new integrated optics using HCG as a platform. I will discuss tunable and multi-wavelength VCSEL array fabricated using HCG instead of conventional distributed Bragg reflectors. The HCG-VCSELs will bring cost-effective solution to CWDM local area networks and WDM PON. The HCG also will bring guided-wave optics to an unexplored regime and find many useful applications in lasers, filters, waveguides, lenses, saturable absorber switches, and sensors.

**13.09.2010 Linear and nonlinear surface waves in modulated photonic lattices****Monday****Ivan GARANOVICH, Australian National University, Canberra**

1:30 pm, seminar room IAP

Abstract: We predict that interfaces of periodically curved optical waveguide arrays can support a novel type of surface states which exist in a certain region of modulation parameters associated with the band flattening. Such linear surface states appear in truncated but otherwise perfect (defect-free) lattices as a direct consequence of the periodic modulation of the lattice potential. We report on the experimental observation of such defect-free surface modes in curved waveguide arrays fabricated in fused silica by a laser direct-writing technique. Our results demonstrate that the degree of surface wave localization can be controlled by selecting the modulation amplitude.

We also describe theoretically and study experimentally nonlinear surface waves at the edge of a modulated waveguide array with a surface defect and a self-defocusing nonlinearity. We fabricate such structures in a LiNbO<sub>3</sub> crystal and demonstrate that the interplay of different surface modes enables novel means of light shaping and switching between different output waveguides.

**20.09.2010 Nanomaterials for bioimaging and optofluidics devices****Monday****Rachel GRANGE, EPFL, Lausanne**

1:30 pm, seminar room IAP

Abstract: We develop optical nanomaterials with outstanding nonlinear properties such as second-harmonic generation from dielectrics or plasmonics effect from core-shell particles. Those nanoparticles can be seen as coherent non bleaching biomarkers for imaging applications or as optoelectronics materials generating an electric field (photovoltaic effect) or a thermal response (pyroelectric effect) under laser illumination. They can be integrated in optical techniques or devices for biological applications, optofluidics applications with low volume, or all optical nanocircuits.

**21.09.2010 The influence of quasi phase matching on second harmonic generation****Tuesday****Roland SCHIEK, University of Applied Science, Regensburg**

1:30 pm, seminar room IAP

**27.09.2010 Time domain modeling of transient effects in microcavities****Monday****Nataliya SAKHNENKO, Kharkov National University, Ukraine**

1:30 pm, seminar room IAP

Abstract: A computationally straightforward and efficient method for obtaining the transient fields due to pulse excitation of the circular whispering gallery mode resonators will be presented. The method is based on the obtaining an analytical solution by the use of Laplace back and forward transformation in combination with the residues evaluation at singular points and a rapidly convergent integral along the branch cut in the complex plane. This approach guarantees an accurate back transforming of the functions and allows us to gain understanding and insight into the fundamental processes occurring in microcavities.

**04.10.2010 TBA****Monday****Anton SERGEYEV**

1:30 pm, seminar room IAP

**NANO OPTICS seminar, Institute of Applied Physics, Friedrich-Schiller-Universität Jena,**

**21/09/2010**

The seminar room of the Institute of Applied Physics is located at Campus Beutenberg, Albert-Einstein-Strasse 15, 07745 Jena. The seminar room is in the new part of the institute building in the first floor. External guests: please ring at the secretary's office from the main entrance to the institute (phone 47800).

The Carl Zeiss seminar room of the Fraunhofer Institute Jena is located at Campus Beutenberg, Albert-Einstein-Strasse 7, 07745 Jena. For further information please contact T. Pertsch ([thomas.pertsch@uni-jena.de](mailto:thomas.pertsch@uni-jena.de)).