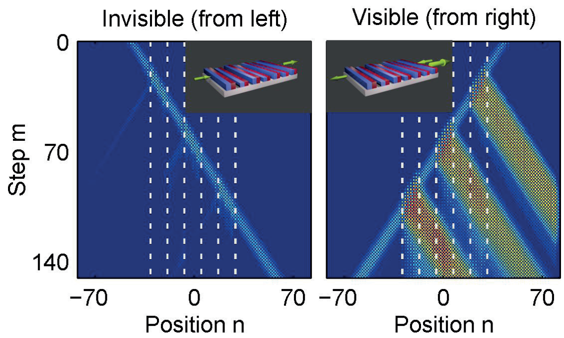
MAX PLANCK INSTITUTE

for the science of light

Newsletter

n°5 | October 2012

CONTROL OF LIGHT TRANSPORT BY STRUCTURING GAIN AND LOSS

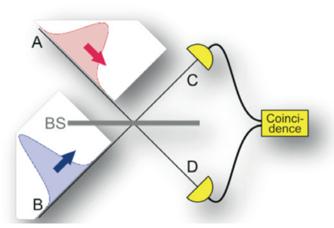


One of the major achievements in modern optics is the development of novel photonic materials by tailoring the refractive index distribution. But nature also offers the possibility of controlling the flow of light via optical gain and loss. If parity-time (PT) symmetry is maintained and the gain structure is antisymmetric compared to a symmetric index modulation, materials with new optical properties emerge. By transferring this idea from the spatial to the temporal domain, we have realized the first extended PT-symmetric photonic network. We find that, even when the gain and loss are well-balanced, the optical power is no longer constant but oscillates around a mean value. A phase transition between exponentially exploding and stable optical states is observed for strong gain modulation. We were further able to demonstrate that PT-symmetric elements embedded in a conventional material exhibit unidirectional invisibility (see figure). When illuminated from one side, the PT-symmetric scatterer strongly reflects, the reflected light being even more intense than the incident beam. From the other side, however, it just passes through the scatterer without being reflected – the structure becomes essentially invisible. ■

Contact: alois.regensburger@mpl.mpg.de
Group: *Leuchs Division (Peschel Group)*
Reference: A. Regensburger et al., Nature **488**, 167-171 (2012); News & Views article: Nature **488**, 163–164 (2012).

ALL PHOTONS ARE EQUAL BUT SOME PHOTONS ARE MORE EQUAL THAN OTHERS

Although particle indistinguishability (PI) has long been a central tenet of quantum mechanics, it is still not well understood; the large literature on the subject lies mostly at the interface between physics and philosophy. Despite lively research activity, some misconceptions still remain. For example, it is commonly thought that "... quantum mechanical particles … don't have enough degrees of freedom to enable one to mark each particle differently" [G. Baym: Lectures on Quantum Mechanics, (Westview Press, Boulder, 1990), p. 387]. We demonstrate that, contrary to popular belief, photons do have enough degrees of freedom to be



marked. From an analysis of Hong-Ou-Mandel interference we were able to introduce a novel parameter called the "rate of distinguishability", which furnishes a quantitative measure of the indistinguishability of photons prepared in a given state. Our results suggest that the strong concept of "PI" may need to be replaced with the weaker concept of "PI with respect to a given degree of freedom". ■

Contact: falk.toeppel@mpl.mpg.de
Group: *Leuchs Division*
Reference: F. Töppel et al., New J. Phys. **14** 093051 (2012).

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Message FROM THE DIRECTORS

It has been an exciting year at MPL. The Institute continues to grow, with more and more empty offices filling up with new people as the Sandoghdar division builds up in numbers. We hope soon to be able to announce the appointment of the director of the fourth division, thus bringing the Institute up to full strength.

Our newly established Distinguished Lecturer Series has taken off in great style (see page 6). We have started a tradition of recording topographical images of each lecturer, using a structured-illumination technique developed by Gerd Häusler's 3D imaging group (Leuchs Division) at the Friedrich-Alexander University (FAU) in Erlangen. In a few years time we should have a whole gallery of distinguished heads – in full 3D.

Another new venture is our Autumn Academy, the aim of which is to get the best undergraduate and Masters students from all over the world excited about optical sciences. Out of more than 80 applications, 25 students were selected and invited to Erlangen to enjoy a packed schedule of lectures by leading scientists, poster sessions, laboratory tours and social events. We were able to offer some assistance with travel expenses. We are grateful to Stephan Götzinger (Sandoghdar Division) for making this event such a resounding success. We plan to hold the Autumn Academy every year, so please consider suggesting to the best and brightest of your students that they attend in 2013.

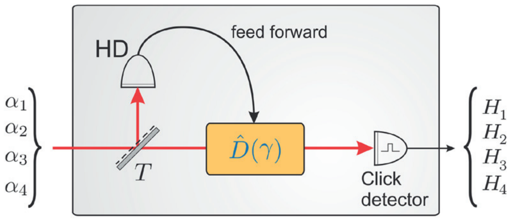
We are also very happy to report the appointment of Peter Hommelhoff, formerly a Max Planck Research Group Leader at the Max Planck Institute for Quantum Optics in Munich, as full professor (W3) in the Department of Physics at FAU and an associate member of MPL. We welcome him warmly.

With best regards,

RESEARCH *articles*

HYBRID RECEIVER FOR QPSK SIGNALS

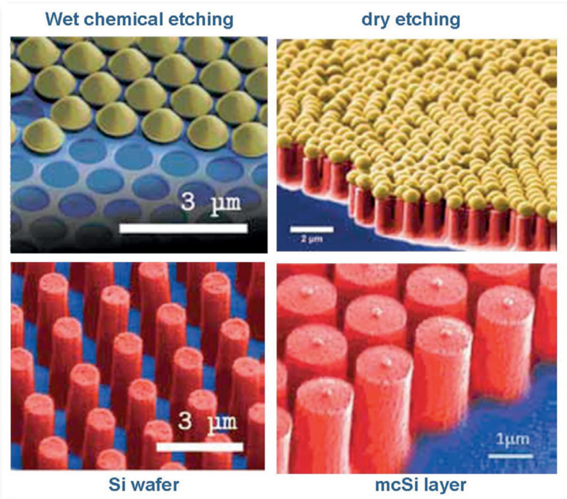
One of the most profound consequences of quantum mechanics is the impossibility of constructing a device that can perfectly discriminate between non-orthogonal quantum states. This result is of particular relevance in the field of optical communications, where information is typically encoded in coherent states. In the case of low signal power, as for instance after the influence of loss in optical fibers, these states exhibit significant non-orthogonality, ultimately limiting the channel capacity. In current-day networks a widely used encoding technique is four partite quadrature phase-shift keying (QPSK). The corresponding standard receiver is a heterodyne detector that obtains information about the signals in the continuous variable basis, which can be related to the wave-like properties of the quantum state. We were able to show experimentally that a hybrid receiver, which additionally retrieves information in the discrete particle-like basis, can achieve error probabilities below the heterodyne limit for any signal power. The receiver initially performs a homodyne detection on part of the state. The information gained is fed forward to a displacement stage prior to being finally identified by a click detector. ■



Contact: christian.mueller@mpl.mpg.de
Group: *Leuchs Division*
Reference: C. R. Müller et al., New J. Phys. **14**, 083009 (2012).

SI NANOROD-BASED THIN-FILM SOLAR CELLS ON GLASS

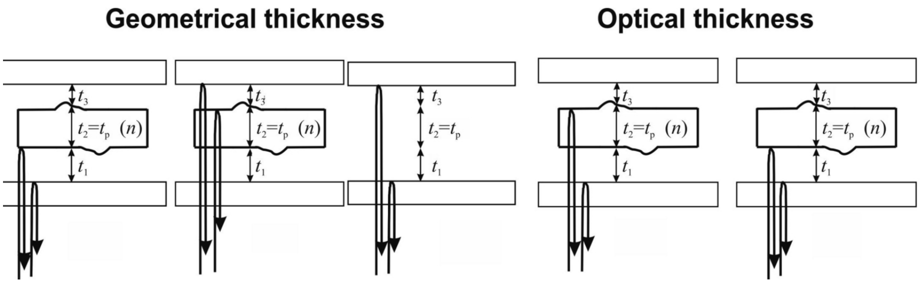
Advances in nanofabrication, for enhancing the efficiency of optical devices such as solar cells and photo-detectors, have attracted a lot of interest in recent years. A photo-conversion strategy employing nanorods (see figure) has emerged as a powerful way of overcoming some of the limitations of planar wafer-based or thin-film solar cells. But there are also some challenges to be tackled when it comes to putting NR solar cell concepts into practice. In ROD-SOL [details online at www.rodsol.eu], a 10-partner EU-FP7-funded project involving research institutes as well as equipment manufacturers and end-users from six countries, we have managed to realize a semiconductor-insulator-semiconductor solar cell based on Si NRs, no more than 2 µm in length, currently exhibiting a non-optimized efficiency of ~10%. Taking into account RODSOL manufacturing requirements, benchmarking of production costs has shown that already an efficiency ~15% would make this cell commercially competitive. The figure shows scanning electron micrographs of nanosphere lithography patterning (the polystyrene spheres are yellow) of multi-crystalline silicon layers on glass. The spheres serve as an etching mask for wet or dry etching of Si NRs (red) in the silicon layer. ■



Contact: silke.christiansen@mpl.mpg.de
Group: *Photonic Nanostructures TDSU*
Reference: S. W. Schmitt et al., Nanolett. **12**, 4050-4054 (2012).

INTERFEROMETRIC HOMOGENEITY TEST USING ADAPTIVE FREQUENCY COMB ILLUMINATION

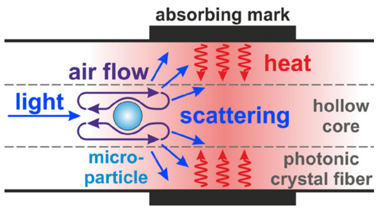
Homogeneity tests require the measurement of a glass sample in both reflected and transmitted light so as to separate the homogeneity variations from the geometric thickness variations of the sample. For laser illumination, however, the four boundaries of the glass sample and the two boundaries of the interferometer cavity give rise to six interference terms and a very complicated response. If the cavity lengths are incommensurate, however, it is possible to separate these single interference patterns from each other using specially designed light sources. In this work, we use a superluminescent diode in combination with a tunable Fabry-Perot filter to generate frequency comb illumination for a Fizeau interferometer. By combining measurements of the specimen inside and outside the interferometer, we are able to successfully separate material homogeneities from thickness variations (see figure). Furthermore, measurement of the empty interferometer eliminates phase contributions from the Fizeau plates, allowing absolute measurement of the inhomogeneities. The reproducibility of the procedure is of the order of 0.2 nm/mm peak-to-valley vallue and 0.03 nm/mm rms. ■



Contact: klaus.mantel@mpl.mpg.de
Group: *Interferometry TDSU*
Reference: I. Harder et al., Appl. Opt. **50**, 4942-4956 (2011).

FEAR OF THE DARK: A NOVEL OPTOTHERMAL TRAPPING MECHANISM

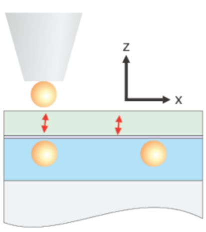
A microparticle, laser-trapped and propelled along a hollow photonic crystal fiber core, is observed to come to a halt just in front of a black mark painted on to the outer surface of the fiber. This apparent "fear of the dark" results from the intriguing competition between optical forces and viscous drag caused by a thermally-driven air flow. The order of events is as follows. Light scattered by the particle is absorbed by the black mark, causing local heating and creating a temperature gradient along the fiber. This drives a flow of air towards higher temperature along the core surface. This in turn creates counter-flow of air at the center of the core, thus producing a viscous drag force sufficient to balance the optical radiation force and bringing the particle to a standstill. In contrast to recently reported optothermal techniques, this trapping mechanism permits manipulation of non-absorbing particles. Also, since both radiation and viscous forces scale linearly with optical power, the effect is independent of the optical power. Particle trapping and control in narrow channels has various applications in lab-on-a-chip devices. ■

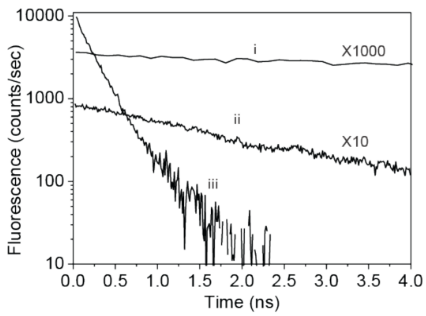


Contact: oliver.schmidt@mpl.mpg.de
Group: *Russell Division*
Reference: O. A. Schmidt et al., Phys. Rev. Lett. **109**, 024502 (2012)); Editors' suggestion & spotlighted in Physics **5**, 76 (2012) and Physics Today, July 2012.
http://physicsworld.com/cws/article/news/2012/jul/16/particle-trapped-with-light-and-heat

100X REDUCTION IN FLUORESCENCE LIFETIME OF A SINGLE MOLECULE

Spontaneous emission plays a central role in most optical phenomena, its rate being determined by the radiative decay of the excited state of the emitter. Because optical emitters are (sub)nanometer in size, the strength of their dipole moments is limited, yielding fluorescence lifetimes in the nanosecond range. If the lifetime can be shortened, the power that can be extracted from a single emitter is enhanced. Optical antennas made of two nanostructures promise lifetime modifications of several orders of magnitude. We have recently used scanning probe technology (see figure) to realize an antenna made of two gold nanospheres. Measurements of the fluorescence signal yielded enhancement factors of 3 for one sphere and 28 for two. Additionally, measurements of the fluorescence lifetime of a single molecule yielded 20 ns with no nanoparticle (figure, i), 1.5 ns when placed on a single gold nanoparticle (ii) and 180 ps when sandwiched between two nanoparticles (iii) – an enhancement factor of 111. The measurements were performed on a molecular system with near-unity intrinsic quantum efficiency; the antenna effect would be more dramatic for emitters with lower quantum efficiency. ■

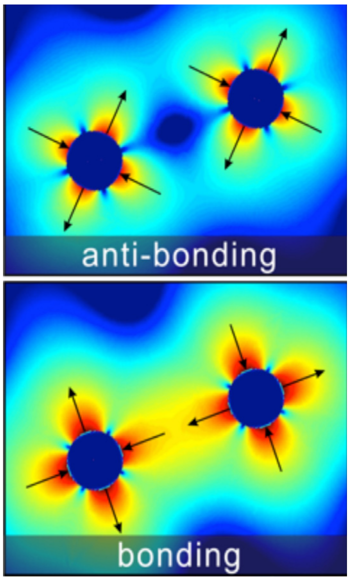




Contact: vahid.sandoghdar@mpl.mpg.de
Group: *Sandoghdar Division*
Reference: K.-G. Lee, et al., Optics Express **20**, 23331 (2012).

EXCITATION OF A NANOWIRE "MOLECULE" IN GOLD-FILLED PHOTONIC CRYSTAL FIBRE

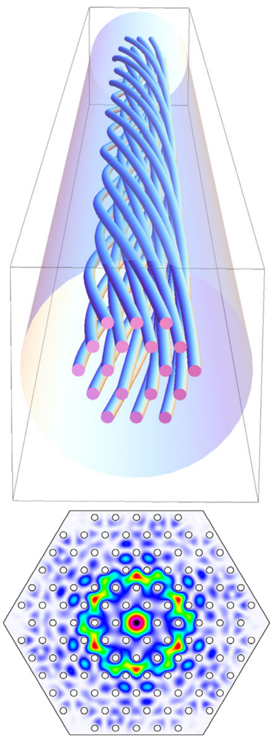
High pressure melt-filling of selected hollow channels with gold is now a routine procedure in photonic crystal fibres. The technique provides an elegant means of studying the optical properties of surface plasmon-polariton (SPP) modes guided on metallic nanowires embedded in the PCF cladding. In previous experiments we have shown that when light couples from the glass core to one of the SPP modes on a single gold nanowire, a dip appears in the transmission spectrum at a certain resonant wavelength λ_0. In recent experiments we have repeated this study with two adjacent gold nanowires. This nanowire pair behaves like a "diatomic molecule", supporting hybridized bonding and anti-bonding supermodes that phase match to the core mode at wavelengths lying on either side of λ_0, separated by 100 nm. The dispersion and attenuation of these hybrid modes is quite different from the SPP mode of a single gold nanowire. The results provide insight into multiwire plasmonic devices with potential applications as polarizers or filters in near-field optics, nonlinear plasmonics, optical sensing and telecommunications. ■



Contact: philip.russell@mpl.mpg.de
Group: *Russell Division*
Reference: H. W. Lee et al., Opt. Lett. **37**, 2946–2948 (2012); highlighted in Nat. Phot. **6**, 501 (2012).

ORBITAL ANGULAR MOMENTUM STATES IN HELICALLY TWISTED PCF

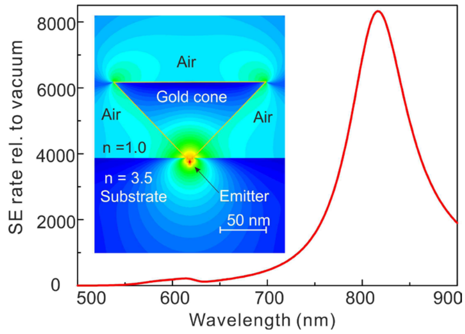
Spiral twisting offers novel opportunities for controlling the loss, dispersion, and polarization state of light in optical fibres with noncircular guiding cores. In a recent paper we reported an effect that appears in continuously twisted "endlessly single-mode" photonic crystal fibre. The samples were fabricated by mounting one end of a length of fibre at the centre of a motorized rotation stage, the other being rigidly fixed. A permanent twist was produced by rotating the stage while scanning a focused CO_2 laser beam (at a power level sufficient to soften the glass) along the fibre. Guided by the helical lattice of narrow interstitial glass strands, cladding light is forced to follow a spiral path. This diverts a fraction of the axial momentum flow into the azimuthal direction, leading to the formation of discrete orbital angular momentum states at wavelengths that scale linearly with the twist rate. Core-guided light phase-matches topologically to these leaky states, causing a series of dips in the transmitted spectrum. Twisted photonic crystal fibre has potential applications in, for example, band-rejection filters and dispersion control. ■



Contact: gordon.wong@mpl.mpg.de
Group: *Russell Division*
Reference: G. K. L. Wong et al., Science **337**, 446–449 (2012).

METALLODIELECTRIC OPTICAL ANTENNA FOR ULTRASTRONG ENHANCEMENT OF SPONTANEOUS EMISSION

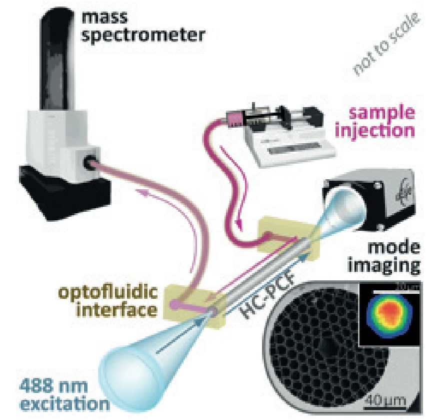
Modification of spontaneous emission has been a topic of theoretical and experimental research over the past four decades. Early efforts considered flat interfaces, Fabry-Perot resonators, photonic crystals and other structured dielectric materials. Recent reports have shown that metallic nanoparticles can enhance emission in analogy with antenna concepts from radio engineering. However, due to the dissipation in the metal, it is difficult to achieve ultrastrong enhancement of the emission without invoking quenching. Here we combine metallic antennas with planar dielectric structures and exploit design strategies from antennas and concepts from cavity QED to maximize the emission and minimize the losses. One realization of the metallodielectric antenna consists of a gold nanocone placed in contact with a high-index substrate where a single emitter is embedded right beneath the nanocone. As shown in the figure, we obtained nearly four orders of magnitude enhancement of the spontaneous emission while keeping a very large quantum efficiency. With such a simple arrangement, we bring about the prospect of triggered single-photon sources to the μW power level and also open the door to a paradigm where the radiative processes become comparable with or faster than many vibrational and phononic interactions, leading to unexplored regimes of photophysical dynamics. ■



Contact: xuewen.chen@mpl.mpg.de
Group: *Sandoghdar Division*
Reference: X. Chen et al., Phys. Rev. Lett. **108**, 233001 (2012).

OPTOFLUIDIC INTEGRATION OF HOLLOW-CORE PHOTONIC CRYSTAL FIBRES

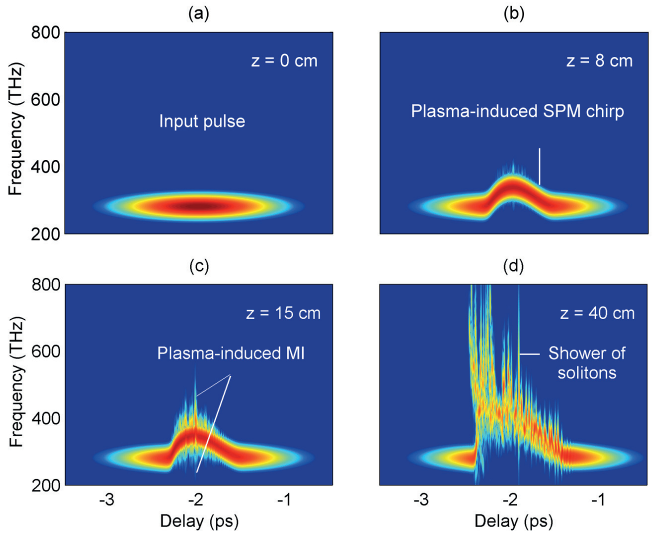
Liquid-filled hollow-core photonic crystal fibers (HC-PCFs) are perfect optofluidic channels, uniquely providing low-loss optical guidance in a liquid medium. The overlap between the fluid sample and the intense light field in the micron-sized core is many times greater than in conventional bio-analytical set-ups, facilitating highly-efficient photoactivation. We introduce an integrated analytical technology for photochemistry in which a HC-PCF nanoreactor is coupled through microfluidic circuitry to supplementary detectors. Applying a continuous flow through the fiber, we deliver the photochemical reaction products to a mass spectrometer in an online and rapid fashion. As proof of principle, the photolysis of vitamin B12 was studied. The observed reaction products were in excellent agreement with conventional methods. The small dimensions of both the HC-PCF core and the microfluidic circuit make the technique about 50× less sample- and time-consuming than cuvette-based approaches. The work is the result of an ongoing collaboration with the Department of Chemistry at the University of Warwick (UK). In future work we plan to identify short-lived reaction products from photoactivated anticancer complexes in order to unravel their mechanism of action. ■



Contact: sarah.unterkofler@mpl.mpg.de
Group: *Russell Division*
Reference: S. Unterkofler et al., Opt. Lett. **37**, 1952-1954 (2012).

UNCONVENTIONAL NONLINEAR OPTICAL EFFECTS IN FIBRE-BASED GAS PLASMAS

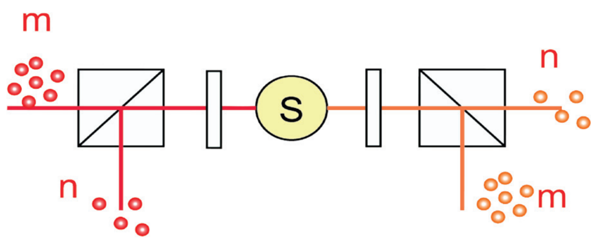
Hollow-core photonic crystal fibres (HC-PCFs) have pushed the fields of linear and nonlinear fiber optics well beyond the interaction of light with solid media. Filling HC-PCFs with ionizing noble gases, interesting phenomena have been observed in previous work when ultrashort pulses are launched into these fibres. Investigating the propagation of relatively long pulses at ionizing intensities has led to the prediction of several additional and surprising results. Firstly, a new kind of strongly asymmetric self-phase modulation takes place after a short propagation distance. At longer distances the simulations predict a new kind of "universal" modulational instability that can exist in either the anomalous or the normal dispersion regime and at any frequency. The final destiny of the propagating long pulse is disintegration into a multitude of blue-shifting solitary waves, forming a plasma-induced supercontinuum (see figure). These theoretical predictions highlight the stimulating new possibilities opened up by accessing the ionization regime in HC-PCFs. ■



Contact: fabio.biancalana@mpl.mpg.de
Group: *Nonlinear Photonic Nanostructures (MPRG)*
Reference: M. F. Saleh et al., Phys. Rev. Lett. **109**, 113902 (2012); Editors' suggestion.

BRIGHT SQUEEZED VACUUM: BUNCHING AND SUPERBUNCHING

Recently we have produced bright nonclassical states of light, manifesting the effects of photon bunching and super-bunching. Such states are of extreme interest in nonlinear optics. In the experiment these states are generated by single-mode selection of the bright squeezed vacuum produced by high-gain parametric down conversion. A single mode of down-converted radiation demonstrates photon bunching in the frequency-non-degenerate collinear regime, whereas in the frequency-degenerate collinear regime super-bunching is seen. The probability distributions for bunching and super-bunching are clearly distinguishable. The dashed curves are theoretical fits. Despite strong filtering the states remain macroscopic, containing on average 8000 photons per pulse. The number of modes in the prepared states was estimated from a measurement of the second-order intensity correlation function g(2). The measured values of g(2) were 1.8 (bunched) and 2.6 (super-bunched). Assuming that g(2) = 2 for the bunched and 3 for the super-bunched state, the effective number of modes is 1.25. ■

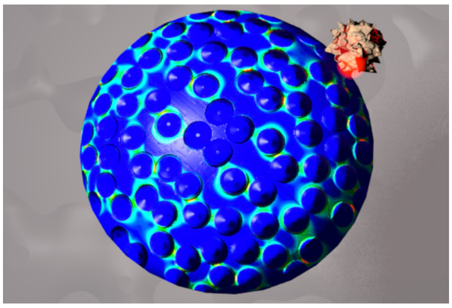


Phys Rev Lett front page, Vol 109 issue 15

Contact: maria.chekhova@mpl.mpg.de
Group: *Optical Technologies TDSU*
Reference: T. Sh. Iskhakov et al., Opt. Lett. **37**, 1919-1921 (2012).

HYBRID BIOSENSORS: DETECTING FEMTO MOLAR PROTEIN CONCENTRATION

Measuring proteins in real-time down to fM solution concentration levels, corresponding to only a few thousand of protein molecules, has been demonstrated for the first time using a hybrid photonic-plasmonic whispering gallery mode (WGM) biosensor. Its unprecedented sensitivity is due to optical trapping of proteins at highly sensitive plasmonic hotspots. WGM sensors derive their sensitivity from the use of high quality-factor (Q-factor) optical resonances to monitor wavelength shift signals upon binding of biomolecules or nanobeads to the resonator surface. Even a single virus can be de-

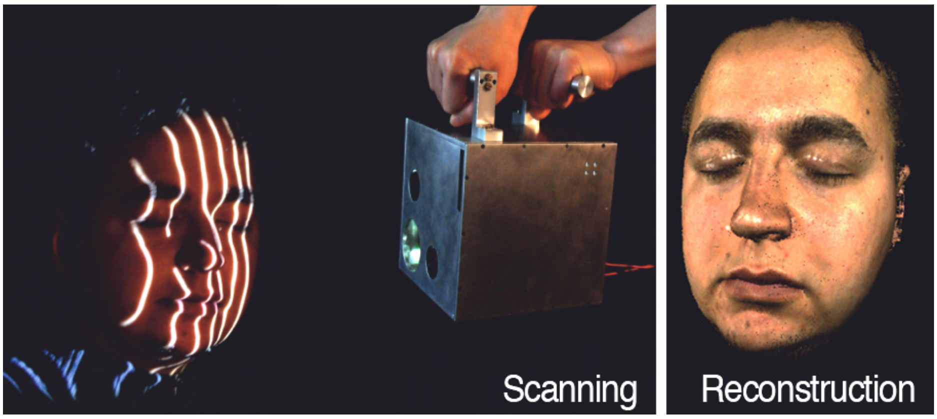


tected. In collaboration with Melik Demirel (Penn State), the Vollmer group is now proposing an alternative concept overcoming these problems. The idea is to trap protein molecules optically at the sites of plasmonic field enhancements in a randomly nano-textured gold layer. The stable integration of the microsphere WGM biosensor with a wetted gold layer is critical for detecting with ultra-high sensitivity. The silica microsphere cavity remains fixed on the Au layer. The Q-factor of the microsphere drops slightly but is still in the range of 100. After adding microliter volumes of bovine serum albumin solution an unexpectedly large and significant wavelength shift was observed. ■

Contact: frank.vollmer@mpl.mpg.de
Group: *Biophotonics and Biosensing (MPRG)*
Reference: J. Biophotonics **5**, 629–638 (2012)

"FLYING TRIANGULATION" – ACQUIRING ALL-AROUND 3D TOPOGRAPHY ON THE FLY

The recently developed optical measurement principle "Flying Triangulation" fills an important gap in 3D metrology, enabling the acquisition of the topography of moving objects. Immunity against relative motion between object and sensor also allows easy acquisition of complex objects – just by free hand-guided motion of the sensor around the object. No external tracking is necessary. The basic principle is as follows: A series of 3D profiles is acquired with a light-sectioning sensor. These profiles are already aligned to each other during the sensor movement, and the result is visualized in real time. Thus the user can spot missing areas and revisit them during the acquisition process. After a few seconds, a dense 3D model of the entire surface of

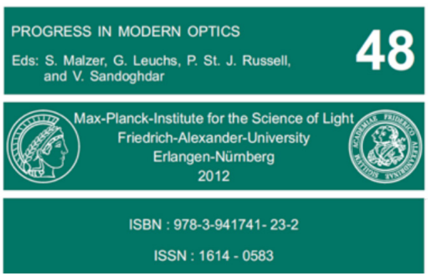


interest is obtained. The sensors work at the physical limits resulting in minimal measurement uncertainty with respect to the underlying measurement volume. The measurement principle is scalable, enabling precise measurements of a wide range of objects in fields such as medicine, art and reverse engineering. ■

Contact: svenja.ettl@physik.uni-erlangen.de
Group: *Leuchs Division – Häusler Group*
Reference: S. Ettl et al., Appl. Opt. **51**, 281-289 (2012).

PROGRESS IN MODERN OPTICS (PMO)

Since 2004 the doctoral theses of students at the Institute of Optics, Information and Photonics at FAU have been published in book form in a series entitled "Progress in Modern Optics" (ISBN 978-3-941741- 23-2). The 48th volume has just been printed. The publication is edited by Dr Stefan Malzer, who is based in the Physics Department at FAU. The full list of titles to date is available on the MPL website www.mpl.mpg.de in the publication section. ■



Contact: stefan.malzer@physik.uni-erlangen.de

MPL DISTINGUISHED LECTURER SERIES

In May 2012 we initiated a Distinguished Lecturer Series, aimed at interesting a broad audience. The colloquia are held every two weeks during the university semesters, and so far we have been delighted to welcome Jean-Jacques Greffet (Institut d'Optique, Paris), Harry Paul (Humboldt University, Berlin), Jörg Wachtrup (University of Stuttgart), Mikhail Lukin (Harvard), Thomas Ebbesen (University of Strasbourg) and Erich Ippen (MIT). ■

AUTUMN ACADEMY

Organised by Stephan Götzinger, the aim of this two-and-a-half day event is to encourage the best undergraduate and Masters students to consider doing a PhD in optics and photonics. The response was excellent; from more than 80 applications we selected 25 students and invited them to Erlangen for a packed schedule of lectures, poster sessions, laboratory tours and social events. Some assistance was offered for travel expenses. ■

EAM EXTENSION GRANTED

We would like to congratulate our friends at the University of Erlangen-Nuremberg on the success of their bid for a 6-year extension to the DFG-funded Cluster of Excellence for Engineering of Advanced Materials (EAM). We look forward to continuing fruitful collaborations. ■

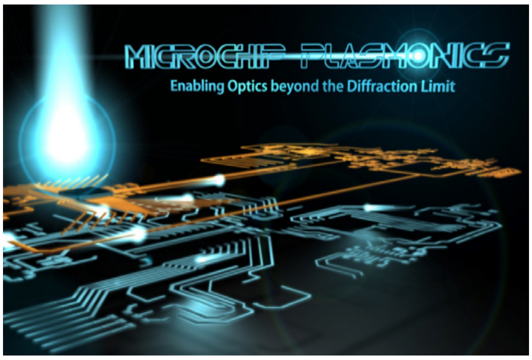
MEMBER OF THE CHEMISTRY, PHYSICS AND TECHNOLOGY SECTION

Dr Peter Banzer has been elected by the scientific staff to act as their representative at meetings of the Chemistry, Physics and Technology Section (CPTS) of the Max Planck Society. The appointment is for a period of three years. ■

NEWS ABOUT THE NEW BUILDING

Preparations for the new building continue apace. The Free State of Bavaria started preparing the site in March 2012 and the start for building the institute is planned for next spring. ■

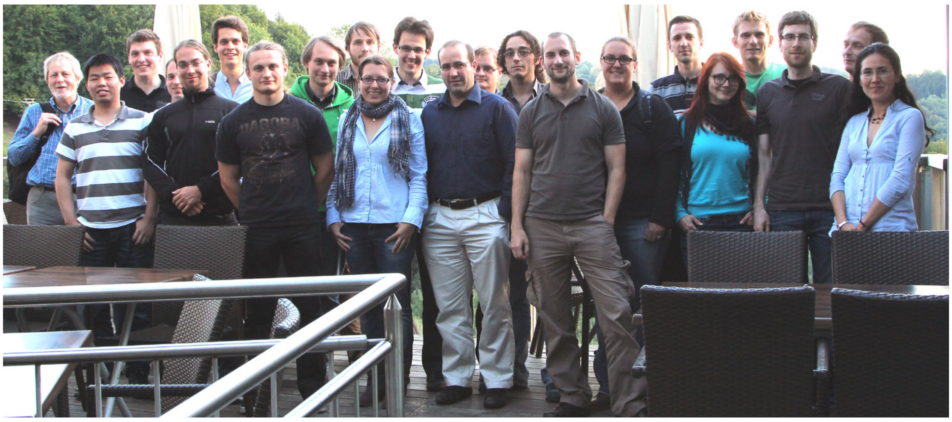
WORKSHOP: MICROCHIP PLASMONICS



An international workshop entitled "Microchip Plasmonics – Enabling Optics beyond the Diffraction Limit" took place in Erlangen on 29-31 August 2012. Its aim was to explore the future of microchip-based plasmonics. It was organised by Peter Banzer, Arian Kriesch, Ulf Peschel and Vahid Sandoghdar. ■

IMPRS ANNUAL MEETING

The third IMPRS Annual Meeting took place 17-20 September 2012 in Schnaittach-Osternohe, a small town deep in the countryside some 30 km east of Erlangen. We had a great line-up of invited speakers: Paul Corkum from the University of Ottawa, Claude Fabre from the Ecole National Supérieure in Paris, Jeremy Baumberg from the University of Cambridge and Andreas Tünnermann from the Fraunhofer Institute (IOF) in Jena. At the end of the meeting Oliver Schmidt received the award for the best student talk and poster prize was given to Sarah Unterkofler. ■



OUTSTANDING REVIEWER AWARD

Congratulations to Michael Frosz (Russell Division - LHS in the photograph) on receiving a 2012 OSA Outstanding Reviewer Award, which was presented to him at the Frontiers in Optics meeting in Rochester. ■

ELISABETH GIACOBINO AWARDED HUMBOLDT PRIZE

Professor Elisabeth Giacobino from the École Normal Superieure, Paris, has won the prestigious Gay-Lussac-Humboldt Award and will spend time as a guest professor at MPL, working on quantum communication research. ■

OSA VICE PRESIDENT 2013

At the 2012 Frontiers in Optics Meeting in Rochester, New York, Optical Society President Tony Heinz announced that OSA members have elected Philip Russell as their 2013 vice president. By accepting the vice presidency, Russell makes a four-year commitment to OSA's Board of Directors. ■

NEWS IN BRIEF

Howard Lee (Russell Division) has been awarded a prestigious postdoctoral fellowship by the Hong-Kong-based Croucher Foundation. He has joined Harry Atwater's group at Caltech.

Markus Schmidt (Russell Division) has been appointed full professor (W3) in the Department of Physics and Astronomy at the Friedrich-Schiller University in Jena, and will be closely associated with the Institute of Photonic Technology (IPHT).

Peter van Loock (MPRG leader) has been appointed associate professor (W2) at the University of Mainz.

Fabio Biancalana (MPRG leader) has accepted the position of Reader in the Physics Department at Heriot-Watt University in Riccarton, Edinburgh.

After a successful and much appreciated 6 years working in the fibre drawing TDSU, **Silke Rammler** is (alas) moving to a new job in Ulm – she will be sorely missed. We wish her all the best.

Christoph Marquardt has been appointed Alcatel-Lucent guest professor at the University of Erlangen-Nuremberg.

The **MPL website** has been completely re-designed. We hope you like it!

The IMPRS for Optics and Imaging (IMPRS-OPTIM) has changed its name to **IMPRS for the Physics of Light (IMPRS-PL)**.

Welcome to **Graeme Whyte**, from Jochen Guck's group at the University of Cambridge, who has joined the University of Erlangen-Nuremberg as Junior Professor, attached to the Cluster of Excellence (EAM). His interests are in biomedical physics, laser tweezers and microfluidics.

Welcome to **Peter Hommelhoff**, leader of a Max Planck Research Group at MPQ in Garching, who has accepted a full professorship (W3) in the Department of Physics at the University of Erlangen-Nuremberg. His interests are in ultrafast nano-optics and matter wave control.

THE FIRST MEETING OF THE MPL BOARD OF TRUSTEES

The constituent meeting of the MPL Board of Trustees took place in July 2012. Prof Wolfgang Heckl (Director General of the Deutsches Museum) was elected chairman and Prof Dr Erich Reinhardt (Chairman of the Medical Valley EMN Association) his deputy. During the meeting MPL's research activities were reviewed and the new building plans presented. ■

ADDITIONS TO THE INFRASTRUCTURE TEAM

Welcome to Andrea Weber and Georg-Andreas Güthlein, who have recently joined MPL, Andrea as a member of the accounting team and Georg as the institute caretaker. ■

FEDERAL ORDER OF MERIT FOR GERD LEUCHS

Gerd Leuchs has been awarded the Federal Cross of Merit (1st class) for his outstanding research contributions in optics and his pivotal role in the establishment of MPL. ■

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Günther-Scharowsky-Str. 1 / Building 24
D-91058 Erlangen

Enquiries:
MPLpresse@mpl.mpg.de

Coordination:
Selda Iyi

www.mpl.mpg.de