MAX PLANCK INSTITUTE
for the science of light

# Newsletter

n°10 | September 2016

## MAX PLANCK INSTITUTE FOR THE SCIENCE OF LIGHT: THE NEW BUILDING IS ALMOST READY!

Back in 2011 the architects Fritsch+ Tschaidse won the design competition for MPL's new building. In July 2013 we celebrated breaking ground followed in November 2014 by a colourful topping out ceremony. By November this year we expect to have completed the move to the new building in Staudtstrasse 2, right next to the southern campus of the Friedrich-Alexander-Universität Erlangen-Nürnberg

(FAU) and only a few hundred metres away from the Physics Department. Although we'll be saying goodbye to our old building (on the Siemens site), where we have been located for the last 8 years and where much has been achieved, we are looking forward hugely to enjoying the wonderful new MPL facilities. An opening celebration will take place on October 5th, attended by local politicians and dignitaries, representatives of the Max Planck Society and FAU as well as many colleagues and friends. ■

## Inside THIS ISSUE



## FLORIAN MARQUARDT APPOINTED AS MPL'S FOURTH DIRECTOR

We are delighted to report that Florian Marquardt has joined the MPL as its fourth director. The new MPL Theory Division deals with both the quantum and classical dynamics of systems relevant for modern optics research, especially at the interface between nanophysics and quantum optics. Topics include optomechanics, quantum optics in superconducting circuits, photonic transport, quantum many-body theory, nonequilibrium nonlinear dynamics, and decoherence. Florian Marquardt studied in Bayreuth (diploma 1998) before finishing his PhD in 2002 in Basel, Switzerland. From there, he moved to Yale University, USA. Returning to Germany in 2005, he led an Emmy-Noether group at the LMU Munich. For his contributions to optomechanics, he received the Walter-Schottky prize of the German Physical Society in 2009. A full professor at the FAU since 2010, he was appointed MPL director in August 2016. ■

# Message FROM THE DIRECTORS

The most important news for us this year is that Florian Marquardt has agreed to join us as director of MPL's theory division. Over the past several years the existing three directors have enjoyed interacting with Florian, who was based at the Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU). Indeed, his Chair of Theoretical Physics already had the status of an MPL-associated group. Now, with a full-fledged division, theory will be much more lively at MPL, to the mutual benefit of everyone. Moving on to other matters, the hand-over of MPL's new building, which will be located close to the physics department at FAU, has been delayed. We had hoped to start moving in in July but it turns out there will be a delay of several months, which means that we have had to renew the rental contract for our existing building at Günther-Scharowsky-Strasse. We are told that such delays are not unheard of so we are not worrying too much. Nevertheless the situation has caused lots of extra work for those of us closely involved in planning the move, so we would like to use this opportunity to thank them all, letting them know how much we appreciate their dedication and perseverance. Other news at MPL, again on the bright side, are that John Travers, Frank Vollmer and Matthew Foreman have all three accepted offers of faculty positions in the UK. Claudiu Genes from the University of Innsbruck has been awarded a Max Planck Research Group and will join us in January 2017. Finally, the preparations for the establishment of a fifth directorship are well on track. This appointment will be closely linked to the planned "Centre for Physics & Medicine", which will be operated jointly by FAU, Erlangen's University Hospital and MPL.

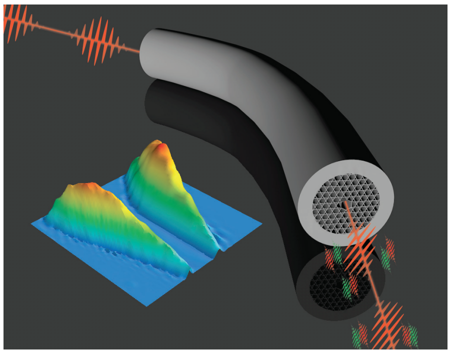
GERD LEUCHS PHILIP RUSSELL

VAHID SANDOGHDAR FLORIAN MARQUARDT

## RESEARCH *articles*

### HOLLOW-CORE PHOTONIC CRYSTAL FIBER SOURCE FOR VERY BRIGHT TWIN BEAMS

Quantum optical experiments rely critically on well-designed sources for correlated photons and twin beams. The number of available sources is however very limited. While most experiments use crystal-based parametric down conversion, there is increasing interest in fiber-based systems, which have the advantages of a well-defined spatial mode as well as wide flexibility in the design of the temporal mode structure. The photon-number correlations in such systems are however corrupted by an inelastic light-scattering process, inherent to any molecular system: Raman scattering. We have recently demonstrated a novel source of twin-beams based on a noble-gas-filled hollow-core photonic crystal fiber. The nonlinearity in this system is provided by high-pressure argon gas, which intrinsically prevents deleterious Raman scattering. The source allows the central twin-beam frequencies to be pressure-tuned and supports an exceptionally broad twin beam spectrum of ~50 THz, with less than five temporal modes. We observe twin-beam squeezing of up to 35% below the shot-noise level, for beams with brightness up to 2500 photons per mode. By eliminating Raman scattering, this system overcomes a central problem of fiber-based twin-beam sources. ■

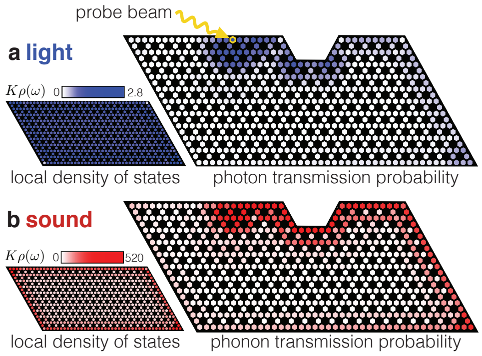


Contact: martin.finger@mpl.mpg.de
Group: *Russell Division and Chekhova Research Group*
Reference: M. A. Finger et al., Phys. Rev. Lett. **115**, 143602 (2015).

Highlighted as "Editor's Suggestion" in Phys. Rev. Lett., October 2, 2015; physics.aps.org, September 30, 2015; Optics & Photonics News, October 7, 2015.

### TOPOLOGICAL TRANSPORT OF LIGHT AND SOUND

Topology studies those properties which do not change under smooth deformations of an object. One well-known example is the number of holes, distinguishing a sphere from a torus. Such features are important, precisely because they are robust against perturbations. It is now understood that even waves propagating in periodic media can display topological robustness. Physically, it means that so-called "chiral" edge states develop at the boundary of such a medium. These travel only in a particular direction, with any transport in the opposite direction prohibited, and they are robust against disorder scattering. It had been an outstanding question how sound waves could be made to exhibit chiral edge states in a solid-state device. In a work published last year in PRX, the Marquardt Division explains how the optomechanical interaction between light and sound can be exploited to produce chiral sound waves. The light can be used at will to change the topological properties and redirect the sound waves on the chip. These ideas may be implemented in optomechanical crystal devices and contribute to fundamental studies of phonon transport. ■

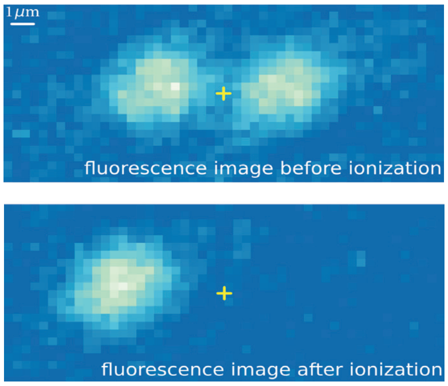



Contact: florian.marquardt@mpl.mpg.de
Group: *Marquardt Group (MPL associated group until July 2016)*
Reference: V. Peano et al., Phys. Rev. X **5**, 031011 (2015).

Highlighted in Nature Photonics, September 29, 2015.

## RESONANT PHOTO-IONIZATION OF $Yb^{+}$ TO $Yb^{2+}$

Trapping and controlling $Yb^{2+}$ ions enables tests of the temporal variation of physical constants as well as experiments

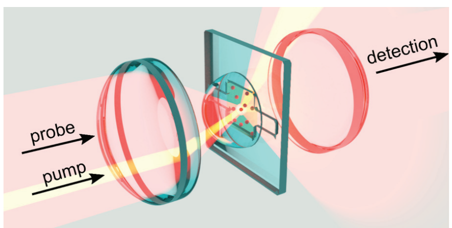



on efficient light-matter interactions in free space. In the second case, isotope $^{174}Yb^{2+}$ is of particular interest, since its internal level structure comprises an almost pure two-level system. We show resonant photo-ionization from $Yb^{+}$ to $Yb^{2+}$ for the first time. This is achieved by driving a transition from a metastable state in $^{174}Yb^{+}$ to an intermediate level with light at 245.4 nm. Implementing this experimentally, we achieve high ionization rates at very low laser powers, which facilitates high precision experiments due to the small perturbations they cause in the measurement apparatus. In order to witness double ionization of one ion we start by simultaneously trapping two $Yb^{+}$ions. If one of them is ionized to $Yb^{2+}$, this change in electrical charge will change the repulsion between the ions and thus their position and also change the motional dynamics of the two ions. Thus we have a way to detect ionization without having to drive a characteristic resonant transition of the doubly charged ion. ■

Contact: martin.fischer@mpl.mpg.de
Group: *Leuchs Division (4piPAC)*
Reference: S. Heugel et al., Journal of Physics B **49**, 015002 (2016).

## NONLINEAR OPTICS WITH A SINGLE MOLECULE AND ONLY A FEW PHOTONS

Photons do not usually interact. This is why in linear optics two laser beams can cross without clashing like two swords. In nonlinear optical materials, however, photons can interact with one another, opening the door to logic operations. This is of great interest in nano-quantum-optics, where one dreams of nanoscopic quantum networks. Normal nonlinear optics requires, however, intense laser pulses and macroscopic chunks of material containing huge numbers of atoms. One way to access the nonlinear regime with single molecules and single photons has been to use high-Q



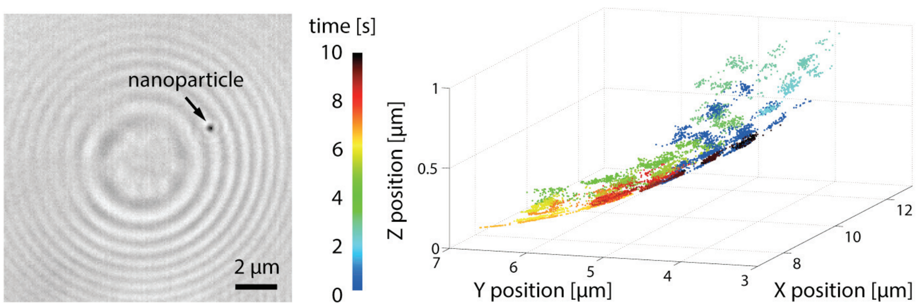

microcavities. We have recently succeeded in demonstrating nonlinear optical effects using a single molecule and only a few photons. The key has been to realize that tight focusing and the intrinsic nonlinearity of a quantum two-level system are actually sufficient. In the experiment, we focus two very weak laser beams onto a molecule in a crystal at liquid helium temperature. Depending on the parameters of one beam, the other could either be attenuated or amplified. We are also able to generate new frequencies. ■

Contact: benjamin.gmeiner@mpl.mpg.de
Group: *Sandoghdar Division*
Reference: A. Maser et al., Nature Photonics **10**, 450–453 (2016).

Highlighted in nanowerk.com, April 27, 2016; chemie.de & labo.de, April 28, 2016; phys.org & research-in-germany.org, April 29, 2016; myscience.de, March 2, 2016; areascience.tk, May 5, 2016; News & Views Nature Photonics, June 28, 2016; admiral.az, September 4, 2016.

## FLUORESCENCE-FREE VISUALIZATION OF LIPIDS AND PROTEINS AT HIGH SPATIAL AND TEMPORAL RESOLUTION

Fundamental understanding of biological systems requires methods that enable one to visualize processes down to the single molecule level at sufficient temporal and spatial resolution. About a decade ago, we introduced a powerful microscopy method based on the interferometric detection of light scattered from nanoparticles (iSCAT). Two years ago, we reported on iSCAT detection of single small proteins, pushing the sensitivity to the limit. We are now working on employing this technique in a wide range of applications with an emphasis on tracking biological molecules and nanoparticles in both two and three spatial dimensions. In particular, we have recorded 3D trajectories of lipids and nanoparticles on the surface of giant unilamellar vesicles (GUV, see figure) and are currently working on the extension




of these studies to the membranes of live cells. Another important advantage of iSCAT is that, because scattering does not saturate, it permits imaging at high framerates of up to 1 MHz. We have recently reported the observation of such trajectories on artificial lipid membranes. ■

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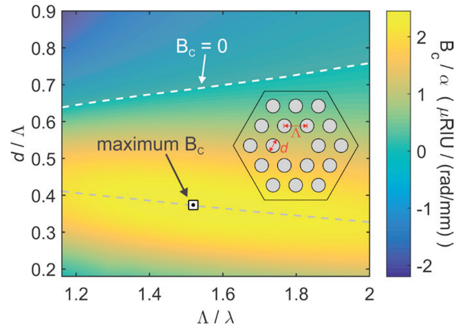
Group: *Sandoghdar Division*
Reference: S. Spindler, et al., Journal of Physics D: Applied Physics **49**, (2016).

## CURRENT SENSING USING TWISTED PCF

A desirable requirement for accurate fibre-based current sensing using the Faraday effect is circular birefringence, because it preserves left and right circular polarisation states against external perturbations. Previous work on fibre-based current sensors used spun linearly birefringent fibres, yielding non-degenerate left and right elliptically polarised eigenmodes. As a result of this compromise the current sensitivity was impaired. Recently we achieved record current sensitivity using continuously twisted solid-core photonic crystal fibre (PCF), which exhibits pure circular birefringence that is proportional to twist rate α (rad/m). By numerical analysis, we identified the optimum PCF geometry for

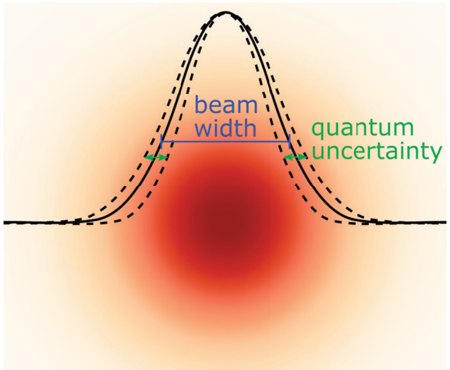



which the circular birefringence is maximum (see figure). This result was then confirmed experimentally by drawing PCFs with a range of different geometries. The current measurements showed excellent linearity over the working range in agreement with theory. Twisted PCF is therefore ideal for building magnetic field and current sensors based on the Faraday effect. ■

Contact: gordon.wong@mpl.mpg.de
Group: *Russell Division*
Reference: R. Beravat et al., Optics Letters **41**, TBC (2016).

## QUANTUM NOISE IN THE WIDTH OF OPTICAL BEAMS

Quantum mechanical effects limit the precision of optical measurements. By tailoring the quantum properties of light appropriately it is, however, possible to enhance the precision in particular measurements. Common ways of achieving this goal are, for example, the use of single photon states or the reduction of quantum noise in an appropriate quadrature. We are interested in quantum noise in the spatial distribution of light fields, which sets fundamental limits on imaging and beam focusing. In particular, we have investigated quantum fluctuations in the width of a laser beam. We find that the beam-width noise depends not only on the transverse spatial mode, but also on the quantum state. This is

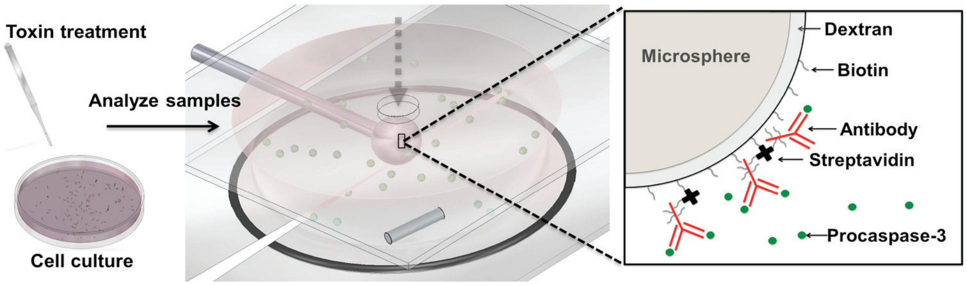



remarkable because it shows that the uncertainty in a geometrical characteristic depends on the quantum properties of the light. Moreover, we have discovered the interesting fact that the uncertainty in beam-width stems entirely from noise in the amplitude quadrature of one specific mode that is uniquely given by the field under investigation. Reducing the uncertainty in amplitude quadrature of this mode reduces the beam-width noise. ■

Contact: vanessa.chille@mpl.mpg.de
Group: *Leuchs Division*
Reference: V. Chille et al., Opt. Express **23**, 32777-32787 (2015).

## OPTICAL MICROCAVITIES DETECT NOVEL BIOMARKER FOR CELL DEATH AND APOPTOSIS

In a team-up with the Emil-Fischer Centre, Institute for Biochemistry at the FAU, and the Department of Molecular Neurology at the University Hospital Erlangen, the Biophotonics and Biosensing group has investigated the response of cells to toxins using optical microdevices (see figure). This is commonly done using biochemical tools for detecting intracellular markers for cell death, such as caspase proteins. This requires the introduction of labels by the permeabilization or complete lysis of cells. In this new study, a non-invasive optical tool has been introduced to monitor a caspase protein in the extracellular medium. The tool is based on highly sensitive optical micro-devices: whispering-

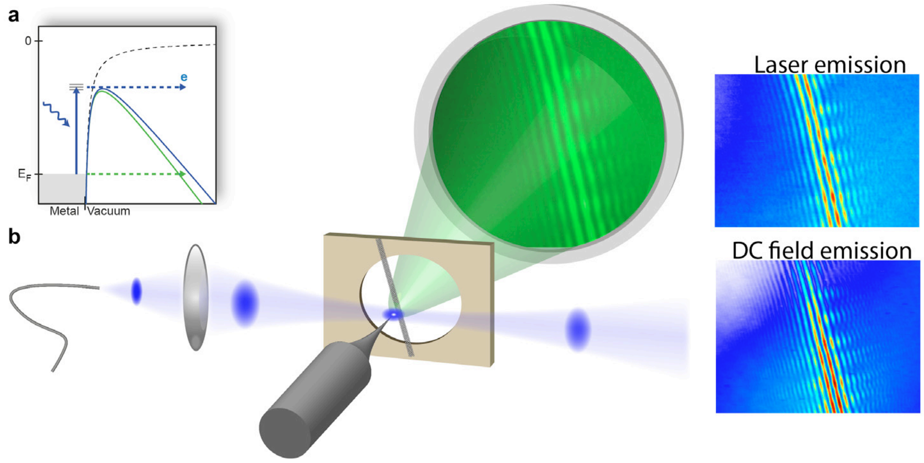



gallery mode biosensors (WGMB's). WGMB's are functionalized with antibodies for the specific and label-free detection of procaspase-3 released from human cells after introducing toxins. These studies provide evidence for procaspase-3 as a novel extracellular biomarker for cell death, with broad applications in cytotoxicity tests. Such tests could be administered on lab-on-chip and organ-on-chip devices, culminating to the first commercial method for non-invasive, rapid, real-time, and extracellular detection of cell death by procaspase-3 markers. ■

Contact: frank.vollmer@mpl.mpg.de
Group: *Biophotonics and Biosensing (MPRG)*
Reference: Y.-J. Chen et al., Nanotechnology **27**, 164001 (2016).

## LASER-TRIGGERED ELECTRONS ARE FULLY COHERENT

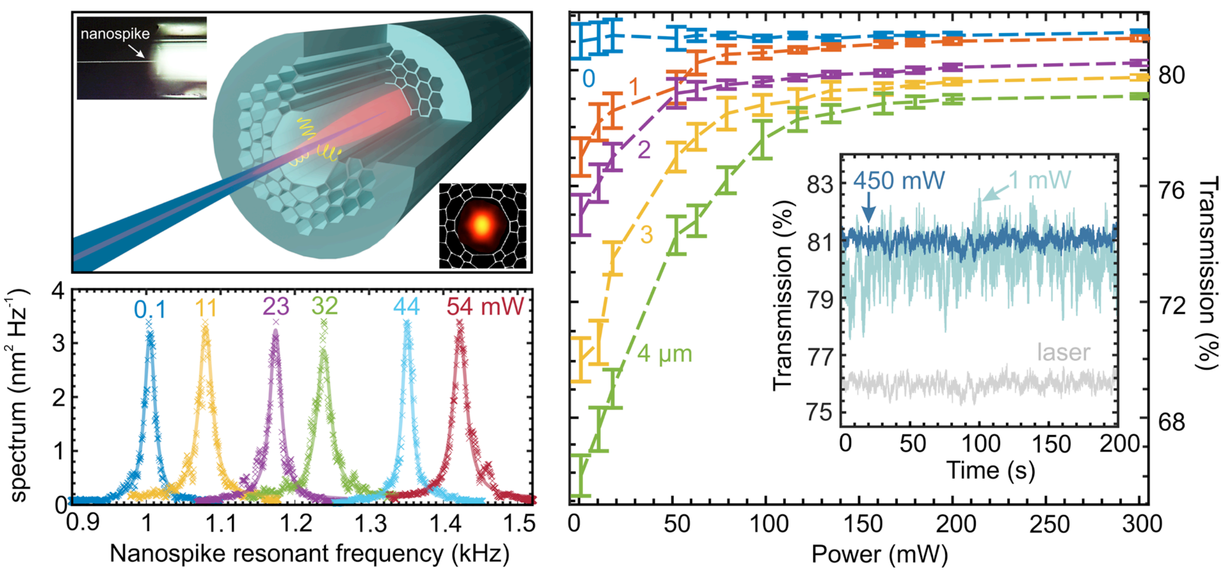
Everyone knows electron microscopes – why is that? They allow direct visualization of the nanocosmos, to the extent that atomic resolution can today be achieved routinely. This stunning imaging resolution is possible because coherent electron sources exist. Based on sharp needle tips, electron field emitters are employed to generate the most coherent electron beams attainable for many decades already. Recently, laser-triggered electron sources have been introduced that allow taking images of time-resolved processes. A question of great fundamental as well as applied interest is: Are laser-emitted electrons from sharp needle tips also coherent, so as to allow for high resolution imaging, for example? The Hommelhoff group at FAU has addressed this question. They have set up an insightful experiment: With a carbon nanotube acting as a matter wave beam splitter, a two-path interference experiment was realized, see image. The resulting interference pattern was detected, in one case for DC field emission, in the other for photo-emitted electrons. Both images show clear interference fringes, directly indicating the electron coherence. Hence photo-emitted electrons are (almost) as coherent as the most coherent electrons out there, namely field-emitted electrons. ■




Contact: peter.hommelhoff@physik.uni-erlangen.de
Group: *Hommelhoff Group (MPL associated group)*
Reference: D. Ehberger et al., Phys. Rev. Lett. **114**, 227601 (2015).

## SELF-ALIGNMENT OF GLASS FIBER NANOSPIKE BY OPTOMECHANICAL BACK-ACTION IN HOLLOW-CORE PCF

We recently demonstrated stable optical trapping of a mechanically compliant fused silica "nanospike" inside the core of a hollow-core photonic crystal fiber (HC-PCF). The silica nanospike was formed by tapering and etching a single-mode fiber (SMF). Over its ~ 50 µm insertion length inside the HC-PCF, the nanospike is subwavelength in diameter (less than 300 nm). Fed by light launched into the untapered SMF, the guided mode spreads out into the surrounding space as it travels along the nanospike, adiabatically evolving into an eigenmode of "nanospike plus hollow core" structure. As a result the nanospike "feels" the presence of the hollow core and becomes optomechanically trapped in the core center with the restoring force increasing with optical power. The optical trapping force acting on the nanospike is found to be one order of magnitude stronger than conventional optical tweezers, which was confirmed by the measurements of optical spring effect in vacuum. The system permits lens-less, reflection free, self-stabilized and self-aligned coupling from SMF to HC-PCF with a demonstrated efficiency of 87.8%, without need for electromechanical stabilization. ■

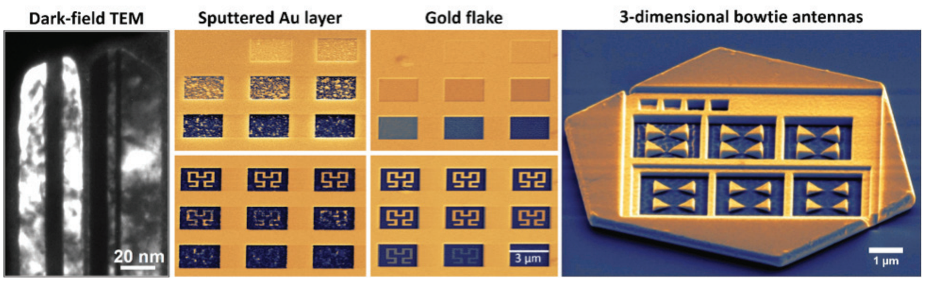



Contact: shangran.xie@mpl.mpg.de
Group: *Russell Division*
Reference: S. Xie et al., Optica **3**, 277-282 (2016).

Highlighted in phys.org, osa.org & sciencedaily.com, March 8, 2016; Optics & Photonics News, March 9, 2016; photonics.com, March 14, 2016; Electrooptics Magazine, March 23, 2016; laserfocusworld.com, May 9, 2016.

## MULTI-METHOD ANALYSIS OF COLLOIDAL GOLD PLATELETS

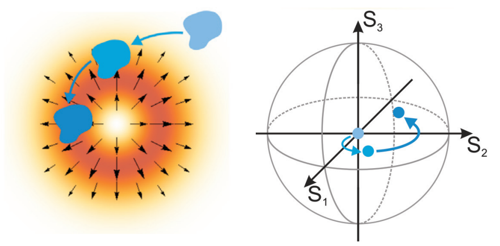
Wet-chemically grown ultraflat gold platelets with diameters of several ten microns are an ideal substrate for high-quality plasmonic and nano-photonic applications. Two- and three-dimensional nanostructures patterned into those crystalline platelets show a superior pattern fidelity down to few nanometres, in contrast to those made from deposited nanocrystalline gold layers. However, several details about the intrinsic platelet structure and their optical properties were still unknown until systematic investigations were presented in the Christiansen Group. In collaboration with co-workers from the FAU Erlangen and the TU Chemnitz, we have uncovered interesting secrets about the physical properties of this material. Cross-sectional dark-field transmission electron microscopy has proven the existence of twin boundaries parallel to the [111] surfaces, and micro-ellipsometry has unveiled the dielectric function of individual platelets. Finally, focused ion beam (FIB) milling was used to prepare single-crystalline layers of only 10 nm thickness from initially up to 10 times thicker platelets and Ga-FIB patterning was used to create high fidelity nanostructures. The results indicate that these platelets are an ideal platform for nano-photonic patterning and even smaller structures compared to the ones shown can be realized using He- or Ne-ions rather than Ga-ions. ■




Contact: bjoern.hoffmann@mpl.mpg.de
Group: *Christiansen Research Group*
Reference: B. Hoffmann et al., Nanoscale **8**, 4529 (2016).

## SINGLE-PIXEL POLARIZATION CAMERA FOR HIGH SPEED KINEMATIC SENSING

Classically entangled optical beams allow kinematic sensing with a single-pixel detector. In radially polarized beams of light, the spatial and polarization degrees of freedom are inseparably coupled, in a manner that is formally analogous to quantum entanglement. We recently demonstrated that this "classical entanglement" can be used to infer the spatial trajectory of an opaque object moving within the transverse plane of such a beam by measuring only variations in the global polarization state of the beam. Since polarization can be measured using single-diode bucket detectors, this allows position tracking with GHz temporal resolution, which is orders of magnitude faster than conventional spatial detector arrays. The method is capable of single-shot capture of nonrepeating events and can operate continuously without intrinsic frame-number limitations. Since we have also shown it to work in the focused regime, the method appears promising for measuring the kinematics of sub-wavelength-sized particles, in which case the high temporal bandwidth becomes especially valuable. ■

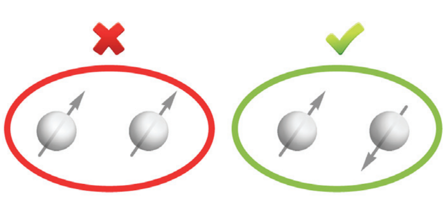



Contact: stefan.berg-johansen@mpl.mpg.de
Group: *Leuchs Division*
Reference: S. Berg-Johansen et al., Optica **2**, 864 (2015).

Highlighted in phys.org, November 23, 2015.

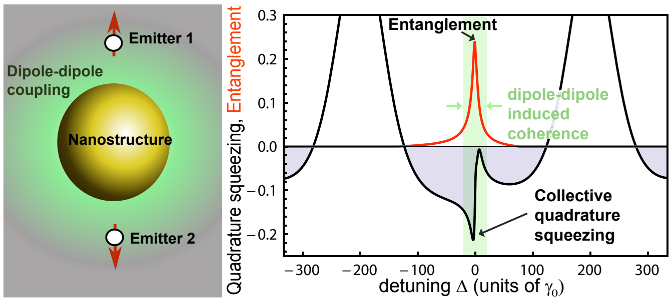
## QUANTUM UNIQUENESS

Apart from their fundamental interest, genuine quantum phenomena, such as entanglement or the violation of Bell's inequality, are crucial for the development of novel technologies, e.g., quantum cryptography and quantum computations. Recently, we have discovered another quantum phenomenon— "quantum uniqueness"—which can be interpreted as an extension of the famous "no-cloning" theorem. This forbids perfect copying of an unknown quantum state, since a single unknown quantum system cannot be fully characterized by any measurement. In the "quantum uniqueness", we go beyond the "no-cloning" theorem and ask whether one can create two quantum systems such that they will be absolutely identical for all possible measurements, i.e., can they be perfect copies in the operational sense? The answer turns out to be quite counter-intuitive: Pairwise application of identical (but a priori unknown) measurements cannot always lead to identical results, hence every quantum system is unique. Miraculously, "quantum uniqueness" forbids perfect correlations, but does not prevent perfect anti-correlations. In quantum mechanics correlations and anti-correlations therefore seem to play completely different roles, in contrast to classical physics. ■



Contact: denis.sych@mpl.mpg.de
Group: *Leuchs Division*
Reference: D. Sych et al., Foundations of Physics **45**, 1613 (2015).

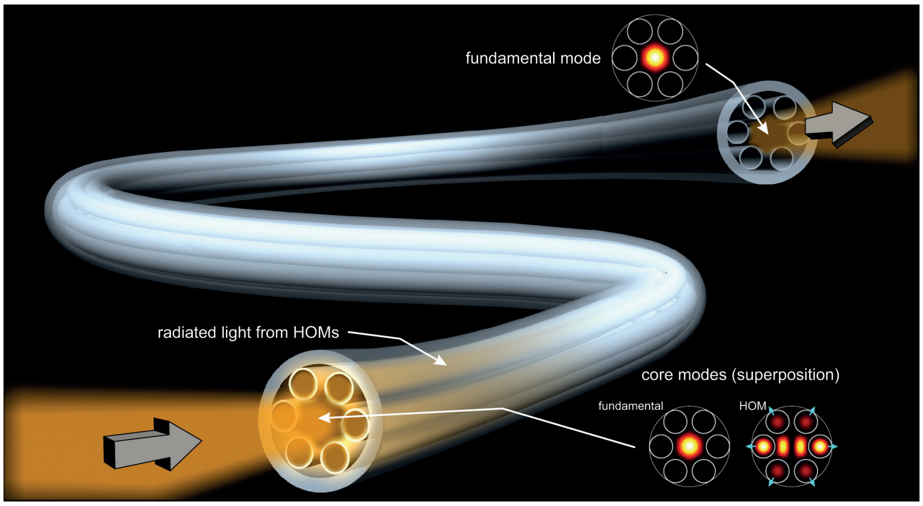
## NANOSTRUCTURES OPEN A CHANNEL FOR COUPLING STRONGLY-DETUNED QUANTUM EMITTERS




Nonclassical interactions between two solid-state emitters are uncommon and their control in nanophotonic structures remains an experimental challenge. A usual issue for coupling among emitters is the local variation of the environment, which shifts the optical transitions of each emitter to different frequencies and thus drastically suppresses their collective quantum correlations. To overcome this difficulty, we have explored broadband nanostructures as a means of supporting two-photon interactions between two far-detuned and spatially-separated emitters. We show how the coherence of this nonlinear process, mediated by dipole-dipole coupling in the nanostructure, provides significant entanglement between strongly detuned emitters, comparable to the values reachable in resonant cases. Importantly, we demonstrate that these nonclassical correlations are transferred to collective resonance fluorescence and can be witnessed by measuring quadrature squeezing (see figure). The generated squeezing surpasses the limits of the non-interacting emitters and thus provides clear evidence of bipartite entanglement. The work discusses an alternative mechanism for observing quantum correlations between solid-state emitters in nanophotonic devices and exploring connections between many-body entanglement and the nonclassical properties of light. ■

Contact: diego-martin.cano@mpl.mpg.de
Group: *Sandoghdar Division*
Reference: H.R. Haakh et al., ACS Photonics **2**, 1686 (2015).

## HOLLOW-CORE ENDLESSLY SINGLE-MODE PHOTONIC CRYSTAL FIBRE




Through their ability to guide light in low-index materials, hollow-core photonic crystal fibres (HC-PCFs) provide many opportunities beyond those of solid-core fibres, for example a high damage threshold, ultralow nonlinearity and flat dispersion. A drawback of HC-PCFs is that they are typically multimode. Because higher-order modes (HOMs) often have relatively low loss, HOM contamination is particularly acute in applications using relatively short fiber lengths. We have succeeded in designing & fabricating a HC-PCF in which HOMs resonantly couple to highly-leaky modes in the cladding, an effect that holds for all wavelengths in which the fundamental mode is confined with low loss. We showed that this HOM filtering effect depends on only one dimensionless shape parameter, akin to the well-known d/Λ parameter for endlessly single-mode solid-core PCF. We therefore denote this new type of PCF "hESM" (hollow-core endlessly single-mode). Fabricated hESM-PCFs show 15× higher HOM suppression compared to kagomé-style PCFs. They are very useful for applications in which $M^2 \sim 1$ beams are needed, such as chemical sensing, particle delivery, gas-based nonlinear optics and laser-machining. ■

Contact: patrick.uebel@mpl.mpg.de
Group: *Russell Division*
Reference: P. Uebel et al., Optics Letters **41** 1961-1964 (2016).

## OSA STUDENT CHAPTER AT THE BLAUE NACHT

The highlight of this year's OSA Student Chapter activities was the "light stage" at the "Blaue Nacht" (a famous public art event in Nuremberg). Visitors had the opportunity to attend to exciting short presentations and witness a number of different experiments with light, each with a different scientific focus. The talks were given by Thomas Bauer, Florian Marquardt, Gerhard Schunk and Christoph Marquardt. ■

## PROF CURTIS MENYUK

Curtis Menyuk is now back in Maryland, having spent a year at MPL as a Humboldt Research Awardee. He writes "Working for a year in the Russell Division at MPL was a great privilege. I am a theorist, and I depend on my experimental colleagues to turn my theoretical ideas into practice and — more importantly — to define the theoretical problems that are worth pursuing. Philip Russell has assembled an extraordinary team of talented young scientists working on a variety of interesting projects that are related to photonic crystal fibers. I had the opportunity to work on several of these, some of which in the past were only theoretical dreams. Aside from being a great experience scientifically, my visit was a great cultural experience despite my almost complete inability to speak German. On almost any weekend with good weather, I would get on my bicycle and go somewhere interesting. We found beautiful scenery, good food, friendly people, and interesting — albeit often tragic — history. In summary, it was a great experience scientifically and culturally. I look forward to visiting again in the future." ■

## IMPRS SYMPOSIUM 2016

In April MPL hosted a two-day symposium organised by students in the two International Max Planck Research Schools in Erlangen (IMPRS-Physics of Light) and Munich (IMPRS-Advanced Photonic Science), as well as the Max Planck/University of Ottawa Centre for Extreme and Quantum Photonics. Around 90 Masters and PhD students attended lectures by leading experts in many different fields of optics and photonics. ■

## ULTRALUMINA: AN MPL SPIN-OFF COMPANY

Recent breakthroughs at MPL in the generation of deep and vacuum ultraviolet light using gas-filled photonic crystal fibres have created substantial interest from research institutes and high-tech companies in photonics, metrology and the semiconductor industry. In mid-2015, assisted by Max-Planck-Innovation GmbH (the technology transfer organization of the Max Planck Society), a small team in the Russell division, led by former PhD student Patrick Uebel, won substantial funding from the highly competitive EXIST-Forschungstransfer programme. Managed by the BMWi (Federal Ministry for Economic Affairs and Energy), this programme supports high-risk company start-ups based at universities and research institutes. Since November 2015, the core *ultralumina* team has been working on a prototype, developing a business plan and seeking strategic investment, in preparation for the launch of the company in July 2016. ■

## NEWS IN BRIEF

- **Michael Förtsch** has won the Otto Hahn Medal of the Max Planck Society.
- **John Travers** has left MPL to take up a Readership at Heriot-Watt University in Edinburgh, Scotland.
- **Sebastian Schmitt** won second prize in the category "Dissertations" in this year's "Green Photonics" awards, presented by the Fraunhofer Society.
- **Frank Vollmer** is leaving MPL to take up a Professorship within the Living Systems Institute at the University of Exeter in the UK.
- **Matthew Foreman** is leaving MPL to take up a Royal Society University Research Fellowship in the Photonics Group at Imperial College London in the UK.

## KONSTANTIN TSAPENKO

It is with great regret that we report the death of Konstantin (Kostya) Tsapenko (from Moscow), a Masters student at FAU who did a research project at MPL. He won the prize for the best poster at the 2015 Siegman Summer School on Lasers, held in Amberg close to Erlangen. He died as a result of injuries incurred in a traffic accident while cycling in Erlangen last year. This is really sad news for all of us at MPL and a very great loss to the world of science. Kostya was a wonderful young man and a talented and passionate scientist. ■

## NEW PEOPLE IN INFRASTRUCTURE

We warmly welcome: Ralf Stadelmann and Carsten Rang, new members of the Technical Services team; Alexander Söllner, who joins the Mechanical Workshop; Anjali Puri and Ingrid Freudensprung, who will be responsible for Front Office & Meetings Management in the new building; Laura Heimann, a new member of Human Resources; Marina Weber, new assistant to the head of administration; Christina Bornschein, who joins the public relations office; and René Huber, who will be the warehouse specialist in the new building. ■

## HONORARY DOCTORATES

In April 2016 Gerd Leuchs was awarded an honorary doctorate by the Technical University of Denmark in Lyngby, followed in June 2016 by Philip Russell, who received his degree from the Universidad Internacional Menéndez Pelayo at the Magdalena Palace in Santander, Spain. ■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