



NEWS

from the **Science of Light**

Dear ,

Here you can find news about research and people from our institute.
Enjoy reading!

Yours sincerely,

Max Planck Institute for the Science of Light

Research

Improving quantum communication and quantum computing

Birgit Stiller and Silvia Viola-Kusminskiy of MPL are working towards making long-distance quantum communication and wireless communication more efficient as part of an EU Pathfinder research project named PALANTIRI. > **MORE**



Deciphering protein complexes with Angstrom optical resolution

Cryogenic optical localization in three dimensions (COLD) has been shown to be a viable option for deciphering protein complexes at Angstrom-level. However, previous work was severely limited regarding the number of resolved fluorophores. A new approach, titled 'polarCOLD' has now pushed the boundaries of this research to new levels. > **MORE**

Publications

Is there field enhancement in a homogenous medium?

Confining light energy to a small volume can be achieved by tight focusing, by coupling to nano scale resonators or by field enhancement in the vicinity of nano scale objects. In a perspective article, authors from MPL, Friedrich-Alexander-Universität Erlangen-Nuremberg, St. Petersburg State University and the Institute of Applied Physics at Nizhny Novgorod discuss the interaction of confined light with nano scale structures and finally speculate about a potential field enhancement in a homogeneous nonlinear medium.

Gerd Leuchs, Alexey V. Andrianov, Elena A. Anashkina, Alina A. Manshina, Peter Banzer and Markus Sondermann, Extreme Concentration and Nanoscale Interaction of

Quantum correlations and geometric patterns in phase space

There are several measurements of the degree to which the state of a composite quantum system is entangled, but this entanglement depends on how the system is partitioned. Researchers from MPL, the National Research Council of Canada, the University of Gdansk, and the Universidad Complutense de Madrid related quantumness to geometric properties of the state's phase space distribution function. The relevant case of symmetric states is discussed in detail. The extremal states are coherent states, which also present Majorana constellations with unusual symmetry properties.

Aaron Z. Goldberg, Markus Grassl, Gerd Leuchs, Luis L. Sanchez-Soto, *Quantumness beyond entanglement: The case of symmetric states*, *Physical Review A* 105, 022433 (2022).

Complex two-photon states from a resonant metasurface

Recently, the Chekhova group implemented spontaneous parametric down-conversion (SPDC) in a GaAs metasurface featuring bound states at the continuum (BIC) resonances. BIC resonances enhance the vacuum field, which leads to the amplification of spontaneous effects such as SPDC. A resonance at either signal or idler wavelength enhances photon pair emission at least 1000 times compared to an unpatterned GaAs layer. Moreover, the metasurface drives multiple SPDC processes simultaneously, an effect unachievable in common SPDC sources and which promises new opportunities in quantum state engineering.

T. Santiago, S. Gennaro, O. Mitrofanov, P. Vabishchevich, S. Addamane, D. Bethke, J. Reno, I. Brener, M. V. Chekhova, *Photon Pair Generation from Bound States in the Continuum in Nonlinear Metasurfaces*. CLEO 2022, FTh4B.3.

Events

International Year of Glass

On Friday, 1 July 2022, as part of the UN's International Year of Glass, public events such as lectures and demonstrations will be held at MPL and the Friedrich-Alexander-University Erlangen-Nuremberg (FAU). [> MORE](#)



Review: Long Night of Science

As part of the largest science festival in the region, the MPL opened its doors to the public. More than 1,000 interested people visited the institute during the Long Night of Science to learn more about the research at the MPL in a varied program with talks, demonstrations, and lab tours. [> MORE](#)

Review: WOMBAT Workshop in Erlangen

The 4th International Workshop on Optomechanics and Brillouin scattering: Fundamentals, Applications and Technology (WOMBAT) was held from 14th - 17th of June 2022 as an in-person event at MPL. [> MORE](#)

News

Paul Roth received Max Planck Society Dissertation Prize

Paul Roth received the Otto Hahn Medal of the Max Planck Society for outstanding scientific achievements in his doctoral thesis. He investigated applications of twisted photonic crystal fibres. [> MORE](#)

A nearly ideal research building

A working group on sustainable building from the Max Planck Society and the Technical University of Munich visited the MPL building as a positive example. [> MORE](#)



Jobs

Postdoctoral Position in Molecular Quantum Optics: You would like to work in a highly motivated research team that aims to understand and control the interaction of quantum emitters, in particular organic molecules, with their nanoscopic environment and with each other? [> MORE](#)

You would like to work in an open-minded team in an international environment and help facilitate groundbreaking research? We have open positions in **organization** and **administration!** [> MORE](#)

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Staudtstraße 2
91058 Erlangen
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