Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter

Monday, April 10, 2017 – 2:00 p.m.
CFEL Seminar room IV (Bldg. 99)

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Nano-Quantum-Optics: from single photons and emitters to cooperative effects

I plan to start this presentation with an overview of our work over the past decade on the efficient coupling of light and single quantum emitters, leading to the single-photon communication of two individual molecules at long distances [1]. In this context, we will also discuss new results on a high-efficiency triggered source of single photons [2] and coherent nonlinear optical phenomena, which let a single organic molecule act as an efficient switch for weak beams of light [3]. The long-term goal of these projects is to establish a platform for nano-quantum-optical operations and cooperative interactions in a mesoscopic system of photons and quantum emitters [4, 5]. In order to achieve this, we have developed novel microcavity [6] and chip-based nanoguide circuitry [7] for use at cryogenic conditions.

References:

[1] Y. Rezus, et al., Phys. Rev. Lett. 108, 093601 (2012).
[2] X-L. Chu, et al., Nature Photonics, 11, 58 (2017).
[3] A. Maser, et al., Nature Photonics 10, 450 (2016).
[4] S. Faez, et al., Phys. Rev. Lett. 113, 213601 (2014).
[5] H. Haakh, et al., Phys. Rev. A, 94, 053840 (2016).
[6] D. Wang, et al., Phys. Rev. X, under review.
[7] P. Türschmann, et al., submitted.

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Host: Angel Rubio