

Physikalisches Kolloquium



Thursday, 04.02.2016, 17:00, HS 100
Reception with coffee & cookies 16:45

Prof. Dr. Christoph Becher, Universität des Saarlandes:

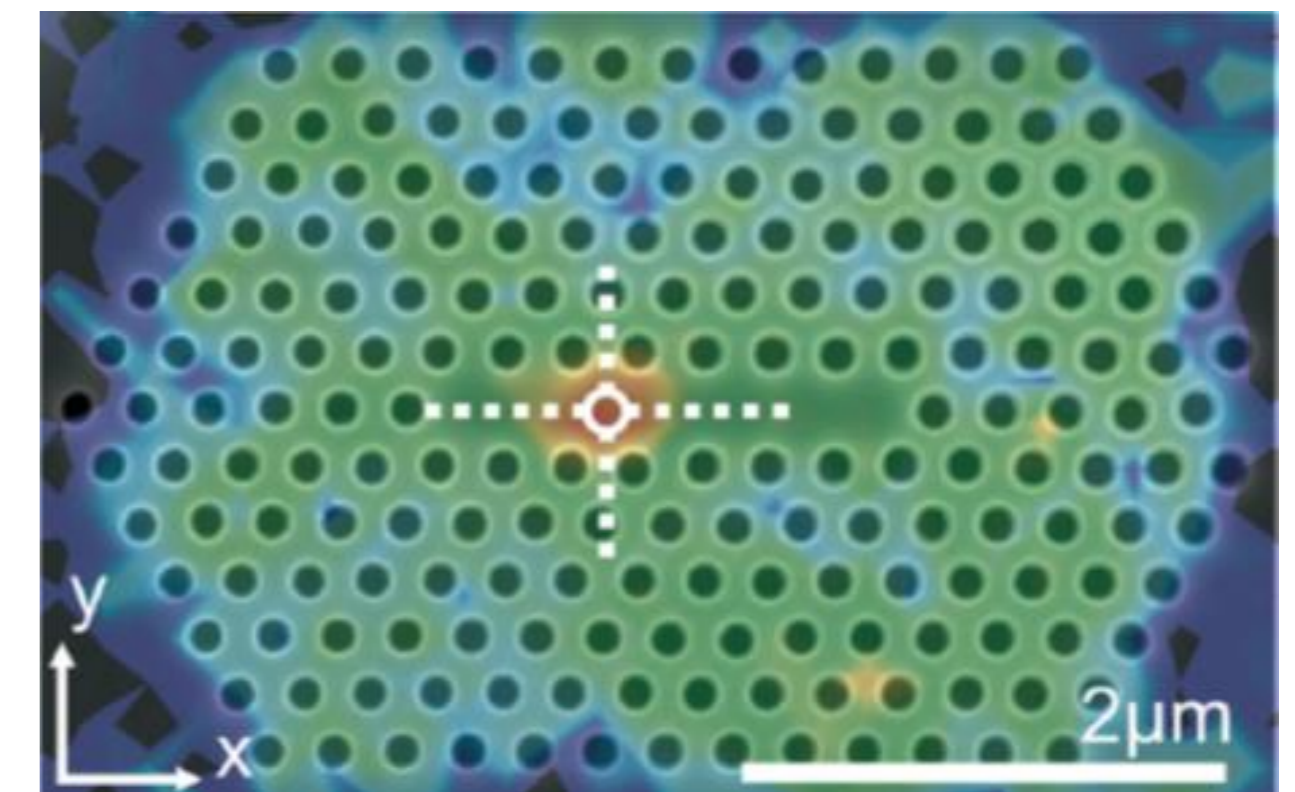
Diamonds in a new light: creating optical interfaces for single color centers

Abstract

Photonics is the science of generation, manipulation and detection of light for applications in transmission, storage and processing of information. In recent years, this field has been extended by concepts and methods employing the laws of quantum physics, enabling the realization of novel approaches like quantum computing and quantum communication. In this context, the notions of transmission, storage and processing of quantum information using optical methods are commonly named quantum photonics.

Color centers in diamond, i.e. atomic-scale, optically active defects in the diamond lattice, have received large recent attention as versatile tools for solid-state-based quantum technologies ranging from quantum information processing to quantum-enhanced sensing and metrology. They provide individually addressable spins with very long coherence times, narrow optical spectra and bright single-photon emission. A remaining issue is the creation of quantum photonic interfaces by coupling of single color centers in diamond to photons, providing efficient spin-readout and enabling integrated solid-state devices for quantum information processing and quantum sensing.

For interfacing to photons I will present two routes for the deterministic coupling of single nitrogen- (NV) or silicon-vacancy (SiV) color centers to optical cavities at the micro- and nano-scale using either fiber-based, tunable, Fabry-Perot-type resonators or photonic crystal cavities directly fabricated in the diamond material. We observe channeling of the spontaneous emission into the cavity modes, paving the way for high-speed single photon sources and optical interfaces for quantum information.



All of you interested in physics are cordially invited!