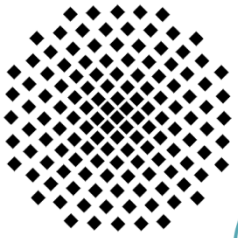
Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

Ansprechpartner: Prof. Harald Giessen
E-Mail: giessen@physik.uni-stuttgart.de
Telefon: 0711 - 685-65111



Dienstag, 31. Januar 2022	16:15 Uhr	V57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Peter Michler, Universität Stuttgart, Telefon: 0711 - 685-64660

Quantum- and nano-optics with tunable microcavities

David Hunger
KIT Karlsruhe

Abstract

Optical microcavities are a powerful tool to enhance light-matter interactions. This enables applications ranging from ultra-sensitive spectroscopy and sensing to quantum information. To achieve large cavity enhancement on a flexible platform, we have developed microscopic Fabry-Perot cavities based on laser-machined optical fibers.

In the context of sensing, we use microcavities for imaging and spectroscopy applications, as well as for sensing of dynamic properties of individual nanosystems. We have developed scanning cavity microscopy as a versatile method for spatially and spectrally resolved maps of various optical properties of a sample with ultra-high sensitivity. Simultaneous enhancement of absorptive, dispersive, and scattering signals promises intriguing potential for optical studies of nanomaterials, molecules and biological nanosystems.

For quantum information applications, we employ such cavities to realize efficient readout of individual spin-bearing quantum emitters by means of Purcell enhancement of fluorescence emission. We study solid state quantum emitters such as NV centers in diamond and rare earth ions, with the goal to realize a quantum repeater for long-distance quantum communication, and optically addressable multi-qubit registers as quantum computing nodes.