Seminarankündigung

Dienstag, 30. April 2019
13:00 Uhr

WSI, Seminarraum S 101

“Optical spin qubits and photonic interfaces in diamond”

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. They provide individually addressable spins with very long coherence times, narrow optical spectra and bright single-photon emission. However, identifying a spin impurity which combines all of these favorable properties still remains a challenge.
We will present the example of the Silicon vacancy (SiV) center which allows for optical addressing and ultrafast all-optical coherent manipulation of its orbital and spin states. However, this color center reaches long spin coherence times only in the limit of very low temperatures (<100mK) due to phonon-induced decoherence processes. A potential resort are vacancy defects with a heavier group-IV impurity atom, such as GeV, SnV and PbV centers, featuring a larger ground state splitting and thus less susceptibility against phonon-induced decoherence. As an example, we will report on spectroscopy of SnV centers.
A limitation of many current experiments with color centers in bulk diamond, however, is the typically small photon collection efficiency of a few percent only. More efficient interfacing can be achieved in general by controlling the local photon density of states (LDOS). Here, we will present a current route for LDOS control, i.e. planar optical antenna structures, consisting of layers of dielectric and metal films, which modify the dipole emission characteristics and provide moderate spontaneous emission enhancement (Purcell) factors to yield large collection efficiencies.

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