Seminarankündigung

Dienstag, 14. Mai 2019
13:00 Uhr

WSI, Seminarraum S 101

“A nanophotonic quantum network node in diamond”

Quantum optical networks have the potential to enable several applications including secure, long-distance communication, enhanced sensing and metrology, and distributed quantum computing. These networks require quantum nodes capable of storing quantum information for long times, performing single and multi-qubit gates with high-fidelity, and interfacing coherently with optical photons. We demonstrate such quantum network nodes based on silicon-vacancy (SiV) color-centers coupled to diamond nanocavities [1]. As a result of strong SiV-photon coupling, we observe controllable, spin-dependent cavity photon-mediated interactions between pairs of SiV centers in a single nanodevice [2]. By cooling devices down below 500 mK, we demonstrate exceptional spin coherence times of nanocavity-coupled SiV center spins exceeding 1 ms. Finally, we demonstrate high-fidelity ($F > 0.95$), universal control over a cavity-coupled two-qubit register consisting of an SiV center and a proximal 13C with coherence time approaching 1 s, forming the basis for a first-generation integrated quantum network.

[1] Sipahigil, Evans, Sukachev et. Al, Science 354 (2016)
[2] Evans, Bhaskar, Sukachev et. Al, Science 362 (2018)

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