Halbleiter-Nanophotonik

SFB 787

Einladung

Es spricht: **Prof. Alexander Kubanek**

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Zeit: **Donnerstag, 26. Februar 2015, 10:15 Uhr**

Ort: **Technische Universität Berlin**
Institut für Festkörperphysik
Hardenbergstraße 36, 10623 Berlin
Raum EW 561

Thema: **„Quantum Information and Quantum Optics with color center in diamond"**

Abstract:

Implementing an efficient, highly controllable light-matter interface is essential to realizing the goal of a solid-state quantum network. The nitrogen-vacancy (NV) center in diamond is a promising candidate for such an interface due to several favorable properties, such as long coherence times or single shot readout capabilities. Creating an optical link between remote NV centers was an outstanding challenge until the recent demonstration of photon-mediated spin-spin entanglement between NV centers separated by three meters. Here, I will present robust control of two remote NV centers demonstrating Hong-Ou-Mandel interference to verify the indistinguishability of photons produced by the remote NV centers. The NV center's application as quantum register depends on the ability to resonantly drive closed cycling transitions as well as closed lambda transitions with high fidelity. The fidelity can be degraded by phonon-induced mixing within the excited state manifold, which can provide an unwanted non-radiative decay channel. I will present detailed investigation (experimentally and theoretically) of phonon-induced mixing mechanism. Besides the importance to control phonon processes for applications of the NV center in Quantum Information the NV center's broad range of applications as a sensor relies on the ability to initialize and read out the electronic state with off-resonant laser light. Both, initialization and read out, rely on an inter-system crossing (ISC) process into a metastable state, a phonon-assisted shelving process that has not been fully explained. We have measured the ISC rate for different excited states and developed a model that unifies the phonon-induced mixing and ISC mechanisms. Finally, I will give an outlook into recent developments with color centers in diamond.

[1] "Quantum interference of single photons from remote nitrogen-vacancy centers in diamond", A. Sipahigil, M. L. Goldman, E. Togan, Y. Chu, M. Markham, D. J. Twitchen, A. S. Zibrov, A. Kubanek, M. D. Lukin, Physical Review Letters 108, 143601 (2012).
[2] "Phonon-Induced Population Dynamics and Intersystem Crossing in Nitrogen-Vacancy Centers", M. L. Goldman, A. Sipahigil, M. W. Doherty, N. Y. Yao, S. D. Bennett, M. Markham, D. J. Twitchen, N. B. Manson, A. Kubanek, M. D. Lukin, arXiv:1406.4065 (2014)

Gäste sind herzlich willkommen!

Prof. Dr. S. Reitzenstein