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Invitation
to a Joint Seminar by the Institutes of
Quantum Optics and Theoretical Physics

on Friday, August 18, 2017, 2pm
Ulm University
Albert-Einstein-Allee 11
N25/HS 8

Dominik Bucher
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Title: High resolution magnetic resonance spectroscopy with solid state spins

Abstract: Quantum sensors comprised of solid state electronic spins are sensitive detectors of nuclear magnetic resonance (NMR) signals, especially on small length scales. For example, nitrogen vacancy (NV) centers in diamond have been used to detect NMR signals from a few cubic nanometer volumes. However, the best reported spectral resolution for NV-detected NMR is insufficient to resolve key spectral parameters such as J-couplings or small chemical shifts, important for molecular structural analysis. In this talk I will present a new technique, combining a sensitive NV-ensemble magnetometer with a synchronized readout protocol to obtain NMR spectral resolution of ~ 3 Hz. I will present the first application of NV-detected NMR to thermally-polarized nuclear spins and the observation of NMR J-couplings and chemical shift of small molecules. These capabilities will enable analytical NMR spectroscopy at the scale of single cells, which will be discussed in the talk.

D. B. Bucher, D. R. Glenn, J. Lee, M. D. Lukin, H. Park, R. L. Walsworth, arXiv:1705.08887 (2017)

Hosts:
Prof. Dr. Fedor Jelezko, Institut für Quantenoptik, Universität Ulm,
Prof. Dr. Martin Plenio, Institut für Theoretische Physik, Universität Ulm