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# Seminar über Quanten-, Atom- und Neutronenphysik (QUANTUM)

Dec. 15, 2022 at 2 p.m.  
IPH Lorentzraum 05-127

Dr. Boris Naydenov  
Helmholtz Zentrum Berlin

## **EPR with small spin ensembles for applications in material science and quantum technology**

Electron Paramagnetic Resonance (EPR) is a well established technique with wide applications in various scientific fields, but with limited spin sensitivity. Here two approaches for measuring small ensembles of electron spins will be presented. In the first part of the talk a miniaturized EPR spectrometer based on a single chip (EPRoC) will be introduced, where the sample volume can be reduced down to few nanolitres. Recent results using rapid frequency sweeps for detection will be shown, which improve the signal to noise for samples with long relaxation times. In the second part of the talk Optically Detected Magnetic Resonance (ODMR) on Nitrogen-Vacancy centers (NVs) in diamond nano-structures will be shown. The NVs can be detected and controlled at the single spin level and they are well studied physical systems as they are very promising quantum sensors and qubits. The presented experiments with NV ensembles are the first steps towards the realization of a unforgeable quantum token, which is protected by the quantum non-cloning theorem.

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