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Nanoscale imaging magnetometry with single spins in diamond GOPALAKRISHNAN BALASUBRAMANIAN, JULIA TISLER, ROMAN KOLESOV, FEDOR JELEZKO, JOERG WRACHTRUP, 3. Physikalisches Institut, Universitaet Stuttgart, Germany — Single Nitrogen-Vacancy colour centers in diamond are gaining popularity because of its exceptional optical and spin properties. The single spin of the defect can be manipulated optically, providing a efficient way to entangle single electron spins and couple nuclear spins qubits in diamond.[1] Long spin coherence time of these single defects finds application as sensitive magnetic field probes. Using engineered diamond we can achieve ultrahigh sensitivity using which we will be able to detect a single external electron or nucelar spin.[2] Controlled creation of these color centers inside nanodiamonds offers diverse applications. By attaching these single spins to the tip of a scanning probe, we were able to perform sensitive scanning probe magnetometry at nanoscale.[3] Improving this device by using quantum grade diamond and synchronized NMR pulse sequences we would have the ability to perform nanoscale NMR/MRI of single molecules.
[1] Neumann, P. et al. Multipartite Entanglement Among Single Spins in Diamond. Science 320, 1326-1329 (2008).
[2] Maze, J. R. et al. Nanoscale magnetic sensing with an individual electronic spin in diamond. Nature 455, 644-647(2008).
[3] Balasubramanian, G. et al. Nanoscale imaging magnetometry with diamond spins under ambient conditions. Nature 455, 648-651(2008).

Gopalakrishnan Balasubramanian
Post Doctoral Research Scholar

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