



Magnetic sensing and MRI using NV centers in diamond

Nitrogen Vacancy (NV) centers in diamond have emerged over the past few years as well-controlled quantum systems, with promising applications ranging from quantum information science to magnetic sensing.

In this talk, I will first introduce the NV center system and the experimental methods used for measuring them and controlling their quantum spin dynamics. I will then present our work on using the NV centers as magnetic sensors, first in the context of measuring quantitative, vectorial magnetic fields of geological samples (as a new tool for paleomagnetometry, in collaboration with Prof. Ron Shaar, [1]). Then I will introduce NV-diamond based magnetic resonance imaging (MRI), a complementary approach to standard MRI with improved sensitivity and resolution [2]. Finally, I will present a new scheme for nuclear hyper-polarization using NVs, potentially relevant for enhanced MRI contrast and quantum thermodynamics research [3].

1. E. FARCHI, Y. EBERT, D. FARFURNIK, G. HAIM, R. SHAAR AND N. BAR-GILL, SPIN 7, 1740015 (2017).
2. DEVIENCE, S.J., ET AL., NAT. NANOTECHNOL. 10, 2, 129-134 (2015).
3. HOVAV, Y., NAYDENOV, B., JELEZKO, F. AND BAR-GILL, N., PHYS. REV. LETT. 120, 6, 060405 (2018)