

“Exploring the Quantum at the Nanoscale with Diamond”

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Defects in solid state systems have emerged as leading candidates for high precision measurements and quantum computing applications. In this talk, I will present a sensor based on the spin degree of freedom contained on the nitrogen-vacancy defect in diamond able to detect nanotesla magnetic fields with nanometre spatial resolution. This sensor might enable powerful applications, ranging from the detection of magnetic resonance signals from individual electron or nuclear spins in complex biological molecules to readout of classical or quantum bits of information encoded in an electron or nuclear spin memory. Recent progress and challenges in understanding the properties of defects in solids and their environment will be presented as crucial steps to successfully implement these applications.

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