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Optically detected magnetic field sensing
in diamond

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Abstract

The nitrogen vacancy colour centre in diamond is well known in literature due to its magnetic field dependent fluorescence emission. This dependence is usually exploited in combination with microwave electromagnetic fields to measure the magnitude of the magnetic field. Since the presence of a microwave field could restrict possible areas of application, microwave-free techniques based solely on the fluorescence intensity of nitrogen vacancy centres can provide an alternative.

Microwave-free sensing techniques however require a deeper understanding of the nitrogen-vacancy emission when an external magnetic field is applied. Our experiments investigate a broad range of magnetic field values and our preliminary observations, both experimental and theoretical, show a non-monotonic trend in the fluorescence emission. Such results improve our understanding of the emission properties of the nitrogen vacancy centre and should be taken in consideration for future magnetometry experiments, potentially leading to a different approach in magnetic field sensing at room temperature.

The speaker



Marco Capelli is a Ph.D. student at RMIT University in Melbourne and a member of the ARC Centre of Excellence for Nanoscale BioPhotonics. He received his master degree in Physics at the University of Torino on a thesis about the characterisation of nitrogen-vacancy centres in diamond, and he is currently studying their magnetic field sensing property for biological applications.