Optically detected electronic spin resonance of single emitters in hexagonal boron nitride under an angle-resolved magnetic field at room temperature

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Single-photon emitters in 2D hexagonal boron nitride (hBN) have emerged as a promising platform for room-temperature quantum optical technologies[1-3]. Recently, we reported coherent control of single electronic spins in hBN, identifying a spin-triplet ground state with large zero-field splitting and coherence times of up to microseconds under ambient conditions [4]. In this contribution, we build on this work and investigate the symmetry properties of these emitters using photoluminescence (PL) and optically detected magnetic resonance (ODMR) spectroscopy with angle-resolved magnetic fields. We combine these measurements with polarisation-dependent PL to study the relationship between the emission transition dipole and defect spin axis direction. In some cases, we find that continuous wave ODMR contrast of emitters is over 65%. Our results provide insight on the rich spin dynamics underpinning this novel solid-state qubit platform and further reveal the potential of van der Waals materials for quantum information and sensing, where their reduced dimensionality opens routes to new nanoscale devices and sensors.

References

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Figures

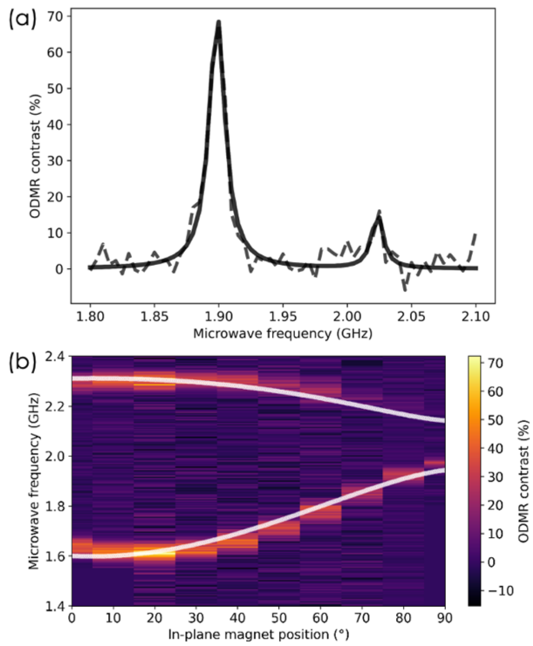

Figure 1: (a) ODMR spectrum of a single emitter at zero field. (b) ODMR spectra under an applied in-plane magnetic field. The white line represents a fit to an *S=1* ground state with zero-field splitting parameters extracted from (a).