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Detection and Manipulation of Single NV Centers in Diamond[1] S. SANGTAWESIN, T.O. BRUNDAGE, S.A. PERLMAN, J.R. PETTA, Department of Physics, Princeton University — We use a scanning confocal microscope to investigate the fluorescence emission from nitrogen vacancy (NV) centers in diamond, a promising building block for quantum computing due to its long coherence time at room temperature. We demonstrate detection and coherent manipulation of a single NV center spin in synthetic diamond. Rabi oscillation data shows a modulation in the amplitude that is accounted for by simulating NV center spin dynamics in the presence of a proximal ^{14}N nuclear spin. The hyperfine interaction opens up the possibility of coupling the electronic spin of an NV center to nearby nuclear spins, forming multi-qubit systems for quantum computation. For applications where a long coherence time is necessary, decoherence caused by the hyperfine interaction can be suppressed using a spin-echo pulse sequence, resulting in electron spin coherence times of over 1 μs at room temperature in type Ib diamond of high impurity content.

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