

Abstract Submitted  
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**Spectroscopy and coherent control of single nitrogen-vacancy (NV) centers** M. V. GURUDEV DUTT, LILIAN CHILDRESS, Harvard University, PHILIP HEMMER, Texas A&M University, ALEXANDER ZIBROV, Harvard University, FEDOR JELEZKO, University of Stuttgart, MIKHAIL LUKIN, Harvard University — The nitrogen vacancy (NV) center in diamond has received considerable attention in recent years because it offers the opportunity to coherently manipulate the spin and electronic transitions of a single quantum system in the solid state. We describe optical spectroscopic measurements of single NV centers at low temperatures, via resonant excitation within the zero-phonon line, and observations of extremely sharp ( $\sim 50 - 100$  MHz), stable spectral lines. We have also carried out experiments to measure the fine structure, determine the optical transition strengths, and perform coherent control on single NV centers. In particular, optically detected single spin Rabi nutations and Hahn echoes show long coherence times and coherent coupling to nuclear spins even at room temperature. NV centers represent a promising candidate for implementation of a recently proposed scheme for long distance communication. Experimental progress toward implementation of these ideas will be presented.

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