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Off-Resonant, Broadband Paramagnetic Resonance Spectroscopy via NV Centers in Diamond CAROLA M. PURSER, VIDYA P. BHALLAMUDI, NICOLAS SCOZZARO, CHRIS S. WOLFE, P. CHRIS HAMMEL, Ohio State Univ - Columbus — Nitrogen-Vacancy (NV) centers in diamond are attractive probes for ultrasensitive, room temperature, optically detected magnetic resonance at the nanoscale. Coherent pulsed magnetic resonance manipulation of an NV center spin enables sensitive target spin spectroscopy. We have detected the hyperfine spectrum of substitutional nitrogen (P1) centers in diamond over a broad field-frequency range using simple continuous-wave NV magnetic resonance. In contrast to previous work [1-2], we are able to measure the paramagnetic electron spin resonance spectra over a broad field-frequency range and far from level crossings of the NV and P1 spins. We report on progress towards understanding the physical mechanisms underlying this phenomenon. We modify the NV-P1 dipole coupling strength by changing the doping concentrations and measure this strength independently using pulsed magnetic resonance techniques. We show how the effect depends on the orientation of the external field relative to the NV axis. [1.] H.-J. Wang, C.S. Shin, S.J. Seltzer, C.E. Avalos, A. Pines and V.S. Bajaj, Nat. Comm. **5**, 4135 (2014). [2.] L.T. Hall, P. Kehayias, D.A. Simpson, A. Jarmola, A. Stacey, D. Budker and L.C.L. Hollenberg, Nat. Comm. **7**, 10211 (2016).

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