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Effect of magnetic field alignment on the electron spin decoherence in NV diamond L. PHAM, D. LE SAGE, J. MAZE, D. GLENN, P. STANWIX, T. YEUNG, L. YI, Y. ZHAO, Harvard-Smithsonian, P. CAPPELLARO, MIT, P. HEMMER, Texas A&M, M. LUKIN, A. YACOBY, Harvard, R. WALSWORTH, Harvard-Smithsonian — We present an experimental study of electron spin decoherence in ensembles of Nitrogen-Vacancy (NV) color centers in bulk diamond. By applying an external magnetic field over a range of orientations we investigate the mechanism that leads to spin decoherence. Results are in good agreement with recent theoretical modeling, suggesting that decoherence is determined by coupling to a spin bath dominated by a few nearby 13C nuclear spins. With careful alignment of the static magnetic field with the NV symmetry axis, the effect of these nearby nuclear spins is mitigated. We demonstrate T2 coherence times greater than 600 us for ensembles of NVs in CVD diamond, which may aid applications in precision magnetometry and quantum information.

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