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Optically-Induced ^{13}C Nuclear Spin Polarization through Nitrogen-Vacancy Centers in Diamond[1] JONATHAN KING, PATRICK COLES, JEFFREY REIMER, University of California-Berkeley — The spin-1 negatively charged nitrogen-vacancy (NV) center in diamond has received much attention for its long spin-coherence times and optical polarization into the m_s=0 sublevel. These properties make it attractive for applications such as quantum information processing and high-resolution magnetometry. Large nuclear polarizations in diamond may be useful to quench decoherence, as an initialization step for quantum computing, or as a platform for enhancement of nuclear magnetic resonance (NMR) signal in dilute spin systems. In this work, we demonstrate the polarization of the bulk ^{13}C nuclear spin system by interaction with the optically polarized NV center system at 9.4 Tesla and 5K nominal temperature. Large nuclear polarizations are observed through Faradaic detection of bulk ^{13}C NMR signals. The signals are opposite in sign to thermally-generated signals, indicating nuclear polarization into the m_I = -1/2 sublevel. We model the phenomenon and propose microscopic mechanism for the polarization.

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