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Electrically generated nuclear spin polarization in In_{.04}Ga_{.96}As CHRISTOPHER TROWBRIDGE, BENJAMIN NORMAN, University of Michigan Department of Physics, YUICHIRO K. KATO, Institute of Engineering Innovation, School of Engineering, The University of Tokyo, DAVID AWSCHALOM, Center for Spintronics and Quantum Computation, Univ. of California Santa Barbara, VANESSA SIH, University of Michigan Department of Physics — The promises of lower power consumption and simple interfacing to magnetic storage has driven interest in the development of spintronics, in which devices could take advantage of electron spin as a means to store, move, and process data. Due to its long lifetime in moderate fields, nuclear polarization could serve as intermediate timescale data storage in both classical spintronic and quantum computation schemes. Here, we investigate the role of nuclear spins in materials with electrically driven spin polarization. The electron spin polarization generated by electrical current in a non-magnetic semiconductor is transferred via dynamic nuclear polarization to the nuclei. The resulting nuclear field is interrogated using Larmor magnetometry. We measure nuclear field as a function of current, applied magnetic field, and temperature. Polarization decay dynamics and the role of nuclei in devices are also discussed.

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