

Abstract Submitted
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Electronic spin polarization and spin-dependent band structure in GaAs probed by optically-pumped NMR (OPNMR)¹ SOPHIA HAYES, KANNAN RAMASWAMY, STACY MUI, Washington U., SCOTT CROOKER, NHMFL, Los Alamos, XINGYUAN PAN, GARY SANDERS, CHRISTOPHER STANTON, Univ. of FL — Traditionally, magnetic fields have played an important role in determining the band structure of a material (de Haas-van Alphen techniques for metals and cyclotron resonance or magneto-absorption for semiconductors). We report optically pumped NMR (OPNMR) spectra of ⁶⁹Ga spins in bulk semi-insulating GaAs generated by a narrowband laser. OPNMR involves optical orientation of electrons in a semiconductor with NMR detection of the polarized nuclear spins to which they are coupled. These experiments resolve fine details of the spin-dependent electronic structure of the valence bands. By comparing the oscillations in the OPNMR signal intensity with theoretical calculations, we have mapped out the conduction band electronic spin polarization. We show that OPNMR experiments in combination with theoretical simulations have the potential to reveal information about spin polarization and electronic structure of bulk semiconductors with far greater sensitivity than conventional techniques such as magneto-absorption.

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