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Spin coherence times in n-type InSb thin films[1] R.L. KALLAHER, J.J. HEREMANS, Department of Physics, Virginia Tech, Blacksburg, VA — In order to investigate the spin coherence times in the narrow gap semiconductor InSb, low temperature magnetoresistance measurements were performed on Te-doped thin films of InSb in weak perpendicularly applied magnetic fields. The measured changes in the resistance, as a function of applied field, in these n-type films show anti-localization phenomena that occur as a consequence of the strong spin-orbit interaction present in InSb. Hence, the magnitude of both the spin and the phase coherence times of the electrons in InSb can be determined by fitting the measured magnetoresistance curves to a localization theory that includes the effects of spin-orbit scattering. Such fits reveal that for the Te-doping levels investigated, the spin coherence times vary from approximately 20 ps to 200 ps at low temperatures, with very weak or no temperature dependence below 10 K. Furthermore, by analyzing the spin coherence times in films with different Te doping densities, it is shown that the Elliot-Yafet mechanism is responsible for the spin decoherence in doped InSb at low temperatures.

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