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Current-induced spin polarization along spin orbit fields in strained InGaAs[1] BENJAMIN M. NORMAN, C.J. TROWBRIDGE, Department of Physics, University of Michigan, Ann Arbor, J. STEPHENS, A.C. GOSSARD, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, V. SIH, Department of Physics, University of Michigan, Ann Arbor
— Current-induced spin polarization is a phenomenon in which electron spins undergo a momentum-dependent net spin polarization [2], but the mechanism and how material parameters govern the magnitude of this effect remains an open question. Conductive channels are etched into strained n-doped InGaAs samples along the [110], [1$\bar{1}$0], [100] and [010] crystal axes with ohmic contacts at either end to allow control of electrical current. While the spin polarization direction is found to align along the direction of the measured spin-orbit effective magnetic fields [3], the magnitude of the spin polarization is not proportional to the magnitude of the spin-orbit fields. Surprisingly, crystal axes with the smallest spin-orbit fields appear to have the largest net spin polarization. Our measurements suggest that the longer spin dephasing time for smaller spin-orbit interactions may play a significant role.

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