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Current-induced spin polarization in anisotropic spin-orbit fields¹ BENJAMIN NORMAN, CHRISTOPHER TROWBRIDGE, Department of Physics, University of Michigan, Ann Arbor, MI 48109, DAVID AWSCHALOM, Institute for Molecular Engineering, University of Chicago, Chicago, IL 60637, VANESSA SIH, Department of Physics, University of Michigan, Ann Arbor, MI 48109 — Currentinduced spin polarization is a phenomenon in which carrier spins are oriented when subjected to current flow. As an all-electrical means of aligning spins it has the potential to be useful for spintronics applications. However, the mechanism that produces this spin polarization remains an open question. Measurements are taken on strained $In_{0.04}Ga_{0.96}As$ exhibiting a spin-orbit interaction that is anisotropic in $momentum^2$. We pattern contacts such that electrical conduction can be oriented along any in-plane direction. By varying the electron current direction we can continuously tune between the spin-orbit field extrema. We show that, contrary to expectation, the magnitude of the current-induced spin polarization decreases with increasing spin-orbit field. Furthermore, we find that the steady-state in-plane spin polarization is not along the direction of the spin-orbit field, except in the cases that the spin-orbit field is along an eigenvector of the spin relaxation tensor.

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²B. M. Norman, C. J. Trowbridge, D. D. Awschalom, and V. Sih, "Current-induced spin polarization in anisotropic spin-orbit fields," submitted.

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