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Electrical detection of spin polarized current in semiconductors using Andreev reflection¹ PARTHA MITRA, MENG ZHU, NITIN SAMARTH, Department of Physics The Pennsylvania State University — Electron transport across the interface between a superconductor and a normal conductor is sensitive to the spin populations of electrons in the conduction band of the latter, leading to the phenomenon of Andreev reflection. A characteristic non-linear behavior in differential conductance is observed in superconductor/ferromagnet bilayers, with a suppression of the conductivity below the superconducting gap. This allows the carrier spin polarization in the normal conductor to be extracted. We attempt to exploit Andreev reflection for measuring hole spin diffusion lengths in p-GaAs by studying a series of hybrid heterostructures of superconducting metal (In or Nb) and a ferromagnetic semiconductor (GaMnAs), separated by p-GaAs spacer layers of different thickness. Qualitatively, our data show evidence for a finite spin polarization in the current that decreases with spacer thickness.

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