

Abstract Submitted
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A general dynamical model for spin transport in a non-degenerate semiconductor with non-collinear ferromagnet terminals YANG SONG, HANAN DERY, University of Rochester — We present a comprehensive model of spin transport in a non-degenerate semiconductor in contact with multiple ferromagnetic terminals. The model is generalized to include non-collinear magnetization configurations as well as the dynamic response following a perturbation of one of the magnetization directions. We reexamine the quasi-neutrality approximation and in addition to the WKB calculation of the coherent FM/SC interface transmission, we include a non-coherent transport mechanism due to the inhomogeneous doping profile at the interface region. The non-coherent effect is relevant in forward bias conditions where we find a nearly opposite average spin polarization rule in the semiconductor channel. The validity of the employed boundary conditions at the reverse biased interface are checked by calculating the Dyakonov-Perel spin relaxation of the injected hot electrons. We study transient currents and other dynamical signals of a three terminal device with 16 distinguishable states.

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