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Spin transport and the giant Zeeman effect in systems with spin-orbit interaction[1] ANH NGO, SERGIO ULLOA, Ohio University — Spin-orbit coupling in semiconductors provides a pathway for electrically initializing and manipulating electron spins for applications in spintronics and spin-based quantum information processing. This coupling can be regulated with quantum confinement, band structure engineering and applied fields. Here we investigate the spin-dependent transport properties of electrons in diluted magnetic two dimensional electron gas (2DEG) systems using a scattering matrix approach. We include the Rashba spin-orbit interaction and the role of realistic magnetic barriers produced by the deposition of ferromagnetic stripes on heterostructures [1]. We show that the quantum conductance in these systems depends on spin orientation of the incident carriers, the magnitude of spin-orbit coupling, and the giant Zeeman effect present in diluted magnetic semiconductors. We will describe how all effects can be employed in the efficient control of spin polarization via the application of moderate fields.
1. A. Matulis, F. M. Peeters, P. Vasilopoulos, Phy. Rev. Lett. **72**, 1518 (1994).

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