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Self-Consistent Non-equilibrium Greens Function Description of Spin Transport in Diluted Magnetic Semiconductors ALVARO S. NUÑEZ, ALLAN H. MACDONALD, The University of Texas at Austin — We present and discuss some applications of a method for treating transport in semiconductor heterostructures which is based on the Kohn-Luttinger k.p model Hamiltonian and the non-equilibrium (Keldysh) Green's function formalism. The method is compatatible with self-consistent and time-dependent mean-field descriptions of magnetically ordered states and is capable of handling problems of current interest in semiconductor spintronics, including magnetoresistive and Spin Momentum Transfer related phenomena in ferromagnetic semiconductors. In the case of diluted magnetic semiconductors exchange interactions with local moments are included by means of the mean-field virtual crystal approximation and electron-electron interactions can be included at the self-consistent level, using either Hartree or local density approximations. We perform a calculation of the magnetoresistance in a GaMnAs/GaAlAs/GaMnAs diluted magnetic semiconductor heterostructure using the 4-band model. Spin Transfer effects are also studied by a direct calculation of the non-equilibrium spin density and its corresponding contribution to the exchange.

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