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Charge and spin transport of diluted magnetic semiconductors
M. A. MAJIDI, Univ. Cincinnati, J. MORENO, Univ. North Dakota, M. JARRELL, Univ. Cincinnati, R. S. FISHMAN, Oak Ridge Nat. Lab. — We use the Dynamical Mean Field Approximation (DMFA) to study the transport properties of diluted ferromagnetic semiconductors such as GaAs doped with Mn. Our model incorporates the strong spin-orbit effects on the j=3/2 GaAs valence band and the exchange interaction between the randomly distributed local ions and the itinerant holes. We calculate the density of states and the spectra of the system for different carrier concentrations, coupling strengths and temperatures. In the ferromagnetic phase the Zeeman split GaAs bands are strongly anisotropic. This anisotropy reflects on the charge- and spin transport conductivities which are different for carriers moving parallel- or perpendicularly to the direction of the average Mn magnetic moment. We discuss how to take advantage of this intrinsic anisotropy in the design of semiconducting heterostructures.

Muhammad Aziz Majidi
Department of Physics, University of Cincinnati

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