Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Electronic transport in diluted magnetic semiconductors: application of the memory function formalism for spin and charge disordered media.[1] F.V. KYRYCHENKO, C.A. ULLRICH, Department of Physics and Astronomy, University of Missouri - Columbia — To get an expression for electrical conductivity in diluted magnetic semiconductors (DMSs) we employ the memory function formalism and derive a general expression for the current relaxation kernel in spin and charge disordered systems. To illustrate the model we performed simplified calculations of spin and charge scattering rates in the weak-disorder limit for some special cases of interest: (i) In a system with positional correlation of the scattering centers we found a significant enhancement of the charge scattering. The enhancement is sensitive to cluster parameters and may be influenced through post-growth annealing. (ii) In the magnetically ordered system we show that the suppression of localized spins fluctuations results in the reduction of the spin scattering that substantially contributes to the experimentally observed resistivity drop below T_c. (iii) Memory function formalism gives the possibility to include electronic many-body effects in a consistent and systematic manner through time-dependent density functional theory. We use this approach to study the combined effect of disorder and electron-electron interaction on the transport properties of DMSs.

[1]This work was supported by DOE grant No. DE-FG02-05ER46213.

Fedir Kyrychenko
Dept of Physics and Astronomy, Univ of Missouri - Columbia

Date submitted: 18 Nov 2006 Electronic form version 1.4