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Memory function formalism for the optical response of diluted magnetic semiconductors FEDIR V. KYRYCHENKO, CARSTEN A. ULLRICH, Department of Physics, University of Missouri — Because of the possibility to act as effective spin injectors, diluted magnetic semiconductors (DMSs) play a significant role for spintronics applications. Detailed investigation of the transport and optical properties of these materials is thus important for theory and experiment. Present theoretical calculations of the electrical conductivity and dielectric function in DMSs are based on the relaxation time approximation. Usually, the relaxation time is treated as an adjustable parameter or is calculated within the weak scattering approach. However, real III-V DMS samples are highly disordered, which casts doubt on the validity of the relaxation time approximation in general, and the weak scattering approach in particular. We go beyond the relaxation time approximation and treat disorder in DMSs in terms of the memory function formalism. As an example, we present calculations of the dielectric function in the infrared range and compare with the relaxation time approximation and with experimental data.
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