Seminarankündigung
(gem. mit FKT-Seminar)

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Thema: Itinerant Spin Dynamics in Structures of Reduced Dimensionality

Abstract:

In this talk our results of the study of spin dynamics and quantum transport in disordered semiconductor quantum wires with spin-orbit coupling are presented. We show the dependence of the weak localization correction to the conductance on the strength and the kind of spin-orbit interaction (linear and cubic Dresselhaus, as well as Rashba coupling) and width of the quantum wires. Furthermore, we exploit the connection found between the microscopic picture given by the Cooperon and the spin diffusion equation to extract the spin relaxation rate, which shows the same wire dependencies as the weak localization correction. We also explain how the result depends on the direction of the transverse confinement of the quantum wires. In this context we have addressed the question concerning long persisting or even persistent spin states in spintronic devices, presenting the corresponding optimal adjustment of spin-orbit couplings of different kind and optimal alignment of the wire direction in semiconductor crystals. In addition, we focus on the intrinsic spin Hall effect on a square and (anisotropic) triangular lattice. At this we apply the Kernel Polynomial Method, which allows for a finite size analysis of the metal-insulator transition and the calculation of spin Hall conductivity in large systems compared with those addressable with exact diagonalization.

Ansprechpartner: J. Schliemann