POZVÁNKA

na seminář oddělení 15 Fyzikálního ústavu AV ČR, v.v.i.

Seminář se koná

ve středu 3. března 2010 v 9:00

v zasedací místnosti budovy A (1. patro vedle knihovny)
Fyzikálního ústavu, Cukrovarnická 10, Praha 6.

Na programu je přednáška

Semiclassical Monte Carlo Simulation of Transport in Spintronic Devices

kterou prosloví

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Abstrakt

Semiclassical Monte Carlo methods have been widely used for carrier transport simulations in microelectronic devices. In the Monte Carlo device simulations the charge carriers are replaced by particles whose semiclassical dynamics is determined by the band structure of the semiconductor. Such an approach is justified for describing the transport at the length scales of realistic devices, where the quantum interference effects are less important. These length scales are inaccessible to fully quantum mechanical methods such as the nonequilibrium Green function technique due to the high computational cost. Moreover, in the case of semiclassical Monte Carlo, it is straightforward to include various scattering processes affecting the carrier transport. We use the ensemble Monte Carlo method for computing the particle averaged values of the physical quantities of interest and we extend it to investigate the spin-dependent transport in spin-orbit coupled two-dimensional electron gas. This enables us explain some features of spin transport in the recently discovered spin injection Hall effect. We discuss the current status of our Monte Carlo spintronic device simulator. We also point out to some possible extensions to include quantum effects (Wigner function Monte Carlo) and the challenges related to including spin-dependent scattering mechanisms while retaining the quantum nature of the spin evolution.