Spin-Hall edge spin polarization in a ballistic 2D electron system
EUGENE MISHCHENKO, VLADIMIR ZYUZIN, University of Utah, PETER SILVESTROV, Bochum University, Germany — Universal properties of spin-Hall effect in ballistic 2D electron systems are addressed. The net spin polarization across the edge of the conductor is second order, \( \sim \lambda^2 \), in spin-orbit coupling constant independent of the form of the boundary potential, with the contributions of normal and evanescent modes each being \( \sim \sqrt{\lambda} \) but of opposite signs. This general result is confirmed by the analytical solution for a hard-wall boundary, which also yields the detailed distribution of the local spin polarization. The latter shows fast (Friedel) oscillations with the spin-orbit coupling entering via the period of slow beatings only. Long-wavelength contributions of evanescent and normal modes exactly cancel each other in the spectral distribution of the local spin density.

Mikhail Raikh
University of Utah

Date submitted: 04 Dec 2007

Electronic form version 1.4