to Spin-Polarize the Current

PETER SILVESTROV, Instituut-Lorentz, Universiteit Leiden, P.O. Box 9506, 2300 RALeiden, The Netherlands, E.G. MISHCHENKO, Department of Physics, University of Utah, Salt Lake City,UT 84112, C.W.J. BEENAKKER, Instituut-Lorentz, Universiteit Leiden, P.O. Box 9506, 2300 RALeiden, The Netherlands
— Semiclassical solutions of a 2-dimensional Schrödinger equation with the Rashba spin-orbit interaction and a smooth potential are considered. We argue that the electron motion in the semiclassical approximation follows the evolution of one of the spin-orbit-split energy subbands. Within a given subband the in-plane electron spin orientation is automatically adjusted to the momentum orientation. This allows to generate spin-polarized currents with the help of a Quantum Point Contact open for transmission only in a single subband. Out of plane spin polarization, proportional to the electric field, appears as a quantum correction.

Peter Silvestrov
Instituut Lorentz, Universiteit Leiden, P.O. Box 9506, 2300 RALeiden, The Netherlands