Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

All-Electric Quantum Point Contact Spin Polarizer[1] PHILIPPE DEBRAY, SAYDUR RAHMAN, University of Cincinnati, Cincinnati, OH 45221, STEVEN HERBERT, Xavier University, Cincinnati, OH 45207, MARC CAHAY, RICHARD NEWROCK, University of Cincinnati, Cincinnati, OH 45221 — The conductance of InAs quantum point contacts (QPCs), created by two side gates on InAs/InGaAs quantum-well structures, was measured at low temperatures ($\leq$ 4.2K) as a function of Fermi energy. By tuning the bias voltages of the gates, we were able to make appear or disappear on demand a conductance plateau at G $\cong$ 0.5 ($2e^2/h$). The presence of this plateau indicates complete spin polarization in the fundamental mode of transport. The 0.5 plateau appears when the transverse confining potentials of the QPC are tuned to be highly asymmetric. We believe the spin polarization responsible for the 0.5 plateau is induced by the lateral spin-orbit coupling, which originates from the transverse electric field of the confining potentials at the edges of the QPC. In a strong perpendicular magnetic field the magnetic confinement screens out the electrostatic confinement and the 0.5 plateau disappears. Our results show that it is possible to use an InAs QPC as a spin polarizer of both spin species through appropriate tuning of the bias voltages of its side gates.

[1]This work is supported by the National Science Foundation under grant ECCS-0725404

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Date submitted: 27 Nov 2007 Electronic form version 1.4