Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quantum Point Contacts as Spin Injectors and Detectors for Studying Rasha Spin Precession in Semiconductor Quantum Wires PHILIPPE DEBRAY, University of Cincinnati, Cincinnati, Ohio 45221, IVAN SHORUBALKO, HONGQI XU, Lund University, Sweden — We have studied polarized spin transport in a device consisting of three quantum point contacts (QPCs) in series made on InGaAs/InP quantum-well (QW) structures. The QPCs were created by independent pairs of side gates, each pair for one QPC. By adjusting the bias voltages of the side gates, the widths of the QPCs are independently tuned to have transport in the fundamental mode. An external magnetic field of a few T causes spin splitting of the lowest one-dimensional (1D) subbands. The widths of the end QPCs are adjusted to position the Fermi level in the spin-split energy gap, while that of the central QPC is kept wide enough to populate both spin-split bands. Measurement of the conductance of the end QPCs at low temperatures ($\leq$ 4.2K) showed a splitting of the first conductance quantization plateau. The end QPCs are used as spin injectors and detectors with 100% efficiency to study spin-polarized transport in the central QPC. The 3-QPC device we have studied can conceivably be used to study Rashba spin precession in a 1D channel to check the concept of the Datta-Das spinFET.

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Date submitted: 22 Nov 2006 Electronic form version 1.4