Abstract Submitted
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Anomalous Conductance Quantization in Side-Gated InAs Quantum Point Contacts[1] SAYDUR RAHMAN, University of Cincinnati, Cincinnati, Ohio 45221, STEVEN HERBERT, Xavier University, Cincinnati, Ohio 45207, RICHARD NEWROCK, PHILIPPE DEBRAY, University of Cincinnati, Cincinnati, Ohio 45221 — Conductance measurements as function of Fermi energy of InAs quantum point contacts created by side gating on InAs/InAlAs quantum-well structure exhibit a distinct plateau at e^2/h and a less distinct one at $2e^2/h$. Applied magnetic field has little or no influence on the conductance quantization pattern. We believe the conductance plateau at e^2/h indicates a spin contribution of h/e^2 to the resistance of the one-dimensional channel when the electron density is low and the electron-electron interaction is strong. This can be understood in the framework of the recently proposed spin-incoherent Luttinger liquid (SILL) state that is considered to exist when $J<<T<<E_F$, where J is the spin exchange constant and E_F the Fermi energy. In the SILL regime, the spin excitations are reflected back to the leads reducing the conductance of the quantum wire to e^2/h. At higher Fermi energy, when the electron density is higher, the spin contribution to resistance vanishes and the conductance takes the well-known quantized value of $2e^2/h$.

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