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Resonance Phenomenon in Double-bend-point Contact Structures

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Abstract

Quantum wires with double bend discontinuities have been fabricated in modulation-doped field-effect transistors. The low temperature conductance shows resonant peaks in the lowest quantized conductance plateau. The double bend constitutes an electron cavity where the number of peaks is directly related to the cavity length. This view is supported by comparison to the theoretical conductance calculated from a generalized mode-matching theory. The experimental peak conductivity decreases with cavity length, which is consistent with elastic scattering due to random disorder in the quantum wire. Magnetic field studies show quenching of the resonance structure when the cyclotron radius approaches the one-dimensional channel width.