

PAPER

Conductance quantisation in patterned gate $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}$ structures up to $6 \times (2e^2/h)$

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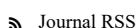
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Abstract

We present electrical measurements from $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}$ 1D channel devices with Rashba-type, spin-orbit coupling present in the 2D contact regions. Suppressed backscattering as a result of the time-reversal asymmetry at the 1D channel entrance results in enhanced ballistic transport characteristics with clear quantised conductance plateaus up to $6 \times (2e^2/h)$. Applying DC voltages between the source and drain ohmic contacts and an in-plane magnetic field confirms a ballistic transport picture. For asymmetric patterned gate biasing, a lateral spin-orbit coupling effect is weak. However, the Rashba-type spin-orbit coupling leads to a g-factor in the 1D channel that is reduced in magnitude from the 2D value of 9 to ~ 6.5 in the lowest subband when the effective Rashba field and the applied magnetic field are perpendicular.

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