



## PAPER

Conductance quantisation in patterned gate  $\text{In}_{0.75}\text{Ga}_{0.25}\text{As}$  structures up to  $6 \times (2e^2/h)$ Y Gul<sup>1</sup> , G L Creeth<sup>1</sup>, D English<sup>1</sup>, S N Holmes<sup>2</sup> , K J Thomas<sup>5,1</sup>, I Farrer<sup>3</sup>, D J Ellis<sup>2</sup>, D A Ritchie<sup>4</sup> and M Pepper<sup>1</sup> 



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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  $\sim 6.5$  in the lowest subband when the effective Rashba field and the applied magnetic field are perpendicular.

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