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High-quality quantum point contact in two-dimensional GaAs (311)A hole system JAVAD SHABANI, JASON PETTA, MANSOUR SHAYEGAN, Princeton University — We studied ballistic transport across a quantum point contact (QPC) defined in a high-quality, GaAs (311)A two-dimensional (2D) hole system using shallow etching and top-gating. The QPC conductance exhibits up to 11 quantized plateaus and the "0.7" structure. The ballistic one-dimensional subbands are tuned by changing the lateral confinement and the Fermi energy of the holes in the QPC. We demonstrate that the positions of the plateaus (in gate-voltage), the source-drain data, and the negative magneto- resistance data can be understood in a simple model that takes into account the variation, with gate bias, of the hole density and the width of the QPC conducting channel. Spacings between the quantized energy levels in this geometry are about 2 to 7 times larger than in previous reports of QPCs in other GaAs hole systems.

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