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Effect of electron-electron interaction on the conductance plateaus of a quantum wire YONATAN ABRANYOS, GODFREY GUMBS, Hunter College of the City University of New York, MICHAEL PEPPER, Department of Electronic and Electrical Engineering, University College London, DAN-HONG HUANG, Air Force Research Laboratory, Space Vehicles Directorate, Kirtland Air Force Base — We present a model which is employed to explain recent experimental results for the conductance in a channel within GaAs/AlGaAs heterostructures. These measurements show that the hierarchy of conductance plateaus interestingly depend on the quantum wire widths. We propose that the data may be interpreted by the role played by entangled and non-entangled electron-pair ballistic transport. For non-entangled electrons, two electrons with different spins move through the 1D conduction channel independently without impurity or phonon scattering. For entangled states, the orbital-singlet state corresponds to the antisymmetric two-electron state in which one spin up (down) electron is in the $n = 0$ level of a parabolic confining potential while another spin down (up) electron simultaneously stays in the $n = 1$ level. We demonstrate the conditions under which agreement with experiments for the conductance may be achieved.

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