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Spin-polarized conductance anomalies in one-dimensional channels ALFREDO SANCHEZ, JEAN-PIERRE LEBURTON, Univ of Illinois - Urbana — We explain the emergence of conductance anomalies ($\sim 0.3G_0$ and $\sim 0.7G_0$, $G_0 = 2e^2/h$) in one-dimensional channels by using an unrestricted Hartree-Fock approach with a three-dimensional Coulomb interaction. The latter predicts the onset of a pair of degenerate spin-polarized configurations (or channels), with specific conductance above a concentration-dependent threshold. The $0.3G_0$ anomaly is a consequence of the 1D nature of the carrier density of states at the conductance onset, which weakens with temperature. Meanwhile, the second anomaly manifests itself as shoulders in the quantum conductance at the onset of concentration-dependent spin polarization, and becomes more pronounced as the temperature increases above 0 K, in agreement with experimental results. Our model also explains the dependence of the anomalies on drain and gate biases, longitudinal magnetic field, and channel length.

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