

Abstract Submitted
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Ferromagnetic spin coupling as the origin of 0.7 anomaly in quantum point contacts¹ KARAN ARYANPOUR, JONG E. HAN, Department of Physics, SUNY at Buffalo — We study one-dimensional itinerant electron models with ferromagnetic coupling to investigate the origin of 0.7 anomaly in quantum point contacts (QPC). Linear conductance calculations using the Kubo formula from the quantum Monte Carlo (QMC) technique for spin interactions of different spatial range suggest that $0.7 \times (2e^2/h)$ anomaly results from a strong interaction of low-density conduction electrons to ferromagnetic fluctuations formed across the potential barrier. The conductance plateau results due to the strong incoherent scattering at high enough temperatures when the electron traversal time through the gate voltage barrier matches the time-scale of dynamic ferromagnetic excitations (magnons). In addition, our model also captures the correct evolution of the anomalous plateau as a function of temperature and Zeeman magnetic field.

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