

Abstract Submitted
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Metal-insulator transition in a quantum wire with alternating Rashba interaction HENRIK JOHANNESSON, University of Gothenburg, Sweden, GEORGE I. JAPARIDZE, Andronikashvili Institute of Physics, Tbilisi, Georgia, ALVARO FERRAZ, ICCMP, Brazil — We propose and analyze a device scheme by which an electrical current can be controlled via a gate-operated spin-orbit interaction. The device consists of a quasi-one-dimensional (1D) ballistic channel in a gated semiconductor heterostructure, contacted to a source and a drain and with the gates producing an alternating Rashba spin-orbit interaction. When the period of the Rashba modulation becomes commensurate with the 1D electron density, the spin-orbit interaction opens a charge gap, leading to a suppression of the current. Using bosonization and a perturbative RG approach we explore how electron-electron interactions influence the effect.

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