# SPIN-DEPENDENT TRANSPORT IN FERROMAGNETIC SINGLE-ELECTRON TRANSISTOR WITH NON-COLLINEAR MAGNETIZATIONS IN THE COTUNNELING REGIME

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Spin-dependent electronic transport in a ferromagnetic single-electron transistor (FM SET) is studied theoretically in the Coulomb blockade regime [1]. Two external electrodes and the central part (island) of the device are assumed to be ferromagnetic, with the corresponding magnetizations being non-collinear in a general case. First order (sequential) transport is suppressed in the Coulomb blockade regime, so only the second order (cotunneling) processes contribute to the current. It is assumed relatively fast spin relaxation processes on the island, so the spin accumulation is neglected. Based on the real time diagrammatic approach [2-4], we developed a computer algorithm that calculates transport characteristics in the second order tunneling regime. The relevant probabilities of different charge states have been determined from the appropriate master equations. Basic transport characteristics, like tunneling current, differential conductance and tunnel magnetoresistance (TMR), are calculated for an arbitrary magnetic configuration of the system and for different values of the bias and gate voltages. It is shown that electric current and TMR strongly depend on the angle between magnetizations. This dependence follows from asymmetry between the spin majority and spin-minority electron bands in ferromagnetic metals.

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