SPIN-DEPENDENT TRANSPORT IN FERROMAGNETIC SINGLE-ELECTRON TRANSISTORS WITH NONCOLLINEAR MAGNETIZATIONS

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9.7 cm

Spin-polarized electron transport through a ferromagnetic single-electron transistor (FM SET) is studied theoretically in the sequential tunneling regime. Two external electrodes and the central part (island) of the device are assumed to be ferromagnetic, with the corresponding magnetizations being generally non-collinear. Transport properties of the device are analyzed using the master equation approach, and the respective transition rates are determined from the Fermi golden rule. Basic transport characteristics, like tunneling current, differential conductance and the tunnel magnetoresistance, are calculated for an arbitrary magnetic configuration of the system. All the characteristics are shown to be strongly dependent on the relative orientation of the magnetizations. We have also calculated torque due to spin transfer, which acts on the central part of the system. Such a torque may lead to magnetization switching on the island.

13.4 cm

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