TORQUE INDUCED BY SPIN-POLARIZED CURRENT IN FERROMAGNETIC SINGLE-ELECTRON TRANSISTORS

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9.7 cm

We present theoretical analysis of current-induced torque which is exerted on the central part (island) of a ferromagnetic single-electron transistor. The considerations are restricted to the regime of sequential tunneling. The island is assumed to be ferromagnetic and attached to two ferromagnetic leads (electrodes), whose magnetic moments are oriented arbitrarily. The torque is calculated from the net spin current absorbed by the island. In turn, spin currents are calculated within the master equation approach. The torque has been calculated as a function of gate voltage, spin polarization of the leads, and charging energy. It is also calculated as a function of the angle between magnetic moments of the leads. Two different situations are compared in detail; single-electron transistor with one electrode being ferromagnetic and one nonmagnetic, and single-electron transistor with both electrodes ferromagnetic. In both situations the central island is ferromagnetic. All calculations are carried out in the limit of fast spin relaxation processes, when no spin accumulation builds up on the island.

13.4 cm

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