Spin-dependent transport through double-island single-electron devices

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Spin-dependent electronic transport through a double-island device with Coulomb blockade is considered theoretically in the sequential tunneling regime. The analysis is based on the master equation method, with the corresponding tunneling rates calculated from the Fermi golden rule. Electric current and the resulting tunnel magnetoresistance are analyzed as a function of bias and gate voltages for different collinear magnetic configurations of the device. Furthermore, the nonequilibrium spin accumulation in the islands is calculated self-consistently from the appropriate spin balance conditions. It is shown that the interplay of spin accumulation and charging effects may lead to negative differential conductance. This is in agreement with recent experimental observations.

9.7 cm

13.4 cm

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