CONDUCTANCE OF MESOSCOPIC MAGNETIC SYSTEMS

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9.7 cm

Theoretical studies of conductance of various nanowires are performed within the framework of a semi-realistic $s-d$ tight-binding model. The presented results concern both homogenous paramagnetic and ferromagnetic systems as well as trilayers composed of 2 magnetic slabs separated by a nonmagnetic spacer. On the one hand, in case of the homogenous systems the attention is focused on conductance quantization, which manifests itself when a contact gets open and conduction decays in a spectacular stepwise way. A new approach is developed by assuming that in the last stage of the breaking of the contact between nanowires there are fewer and fewer, distributed at random, conduction paths passing through the nanowire cross-section. The corresponding conductances are calculated within the quasiballistic regime, using the Kubo formula and a recursion Greens function technique. The results for weak ferromagnets (when both majority and minority bands intersect the Fermi surface) are qualitatively different from those for strong ferromagnets (only the minority bands do), which may explain why cumulative histograms of conductance reveal pronounced peaks in case of Fe but are featureless for Ni. On the other hand, giant magnetoresistances of magnetic trilayers are studied for both current-perpendicular-to-plane (CPP) and current-in- plane (CIP) geometries. The corresponding magnetoresistances are compared with each other and with the interlayer exchange coupling.

13.4 cm

Subject category :

2. Magnetic Films, Surfaces and Multilayers

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