

Huge magnetoresistance in magnetic nanocontacts

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Abstract

The quasiclassical theory of a nanosize point contacts (PC) between two ferromagnets is developed. The maximum available magnetoresistance in PC is calculated for ballistic and diffusive transport at the area of a contact, in the ballistic regime, the magnetoresistance in excess of few hundreds percents is obtained for the iron-group ferromagnets. The regime of quantized conductance through the magnetic nanocontact is considered. It is shown that magnetoresistance is tremendously enhanced at small number of open conductance channels. The quantum spin valve realization is discussed in detail, and recent observations of huge (up to 100 000 %) magnetoresistance in the electrodeposited nickel nanocontacts are discussed in the framework of the developed theory.
