ELECTONIC TRANSPORT THROUGH FERROMAGETIC SINGLE-ATOM CONTACTS

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For possible use of magnetic properties in electronic devices magnetic point contacts have been investigated during the last years. In particular the possibility to dramatically change the resistances by application of a small magnetic field has been studied thoroughly. Nevertheless the experimental situation is still contradictory [1]. This holds for the so-called conductance histograms, which are used for determining the preferred conductance values of quantum point contacts as well as for the magnetoresistance (MR) ratios which in some publications reach values of 100,000 %. The mechanism which is at their origin is controversy as well. Effects due to the micromagnetic order of the domains in the vicinity of the contact, giant MR, tunnel MR, ballistic MR, magneto-striction and further effects depending on the actual realization of the contacts are proposed [2]. In our experiment the possible influence of the spin polarization onto the electronic transport of atomic-size contacts was investigated by analyzing MR curves in different orientations of the applied magnetic field with respect to the film plane and current direction. In order to separate the influence of the large electrodes from the influence of the contacts themselves, we used different sample geometries. We used cobalt samples within a symmetric and an asymmetric layout as well as combinations of nonmagnetic electrodes with magnetic bridges and vice versa. In all geometries the MR values are of comparable size (up 10 a few hundred %) and the MR traces show a rich behavior. Preliminary results of the cobalt samples are published in [3]. In this talk we describe the results of our recent experiments obtained on the two-metal contacts. The main conclusion which we draw from our results is that the micromagnetism of the electrodes as well as the precise atomic arrangement of the contact account for the large MR values.

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