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Ballistic Anisotropic Magnetoresistance of Single-Atom Contacts
F. OTTE, J. SCHÖNEBERG, A. WEISMANN, R. BERNDT, S. HEINZE, University of Kiel, Germany, N. NÉEL, J. KRÖGER, TU Ilmenau, Germany, Y. MOKROUSOV, Forschungszentrum Jülich, Germany — It has been predicted that the anisotropic magnetoresistance (AMR) is greatly enhanced in the ballistic transport regime. [1] Results from break junctions in a magnetic field [2,3] can be explained in terms of this ballistic AMR (BAMR), although the interpretation is controversal due to the unknown atomic geometry of the junction. Here, we demonstrate the emergence of BAMR in single-atom contacts. Single Co and Ir atoms are deposited on domains and domain walls of ferromagnetic Fe layers on W(110), which is used to control their magnetization directions. They are contacted with nonmagnetic tips in a low-temperature scanning tunneling microscope to measure the junction conductances. AMR is observed and changes drastically between tunneling and the ballistic regime. First-principles calculations and tight-binding modeling demonstrate that this change is due to a competition of delocalized and localized d states of different orbital symmetry.

[1] J. Velev *et al.*, Phys. Rev. Lett. **94**, 127203 (2005)
[2] A. Sokolov *et al.*, Nature Nano. **2**, 171 (2006)
[3] M. Viret *et al.*, Eur. Phys. J. B **51**, 1 (2006)

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