

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Anderson model of local magnetism at a break junction nanocontact PAOLA GENTILE, SISSA, Democritos, Trieste, Italy, MICHELE FABRIZIO, GIUSEPPE E. SANTORO, ERIO TOSATTI, SISSA, Democritos, ICTP, Trieste, Italy — Atoms at break junction nanocontacts in nearly magnetic heavy transition metals such as Pt and Pd may develop a nonzero magnetization. Since here the nanocontact is strongly electronically tied to the two bulk leads, it is not automatically clear what the correct physical picture of the system should be, and in particular whether the nanocontact should or should not become analogous to a Kondo impurity as in quantum dot devices. To clarify that, we consider one (or more) impurity sites inserted into a linear chain (representing the nonmagnetic leads), every site endowed with orbitally degenerate orbitals, large spin orbit coupling, and Hund's rule exchange; neighboring sites connected by electron hopping and by intersite ferromagnetic exchange. The mean-field solution when the impurity site (where Hund's rule exchange is made stronger) is locally magnetic shows a ferromagnetic polarization around it, in agreement with realistic density functional calculations for nanocontacts consisting of monatomic chain segments. Our results suggest that this type of nanocontact, regarded as an Anderson impurity, is ferromagnetically coupled to the leads, and hence that Kondo screening does not occur in this case. The physical consequences for the conductance through the chain are discussed.

Paola Gentile

Date submitted: 16 Nov 2007

Electronic form version 1.4