Inelastic tunneling spectroscopy for magnetic atoms and the Kondo resonance.

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Abstract

An ionic Hamiltonian is introduced to describe the inelastic electron tunneling spectroscopy of single magnetic atoms. Then, a Green-function Equation of Motion method is used to analyze the interaction between a single magnetic atom and the metal environment (including a magnetic field) leading in the tunneling spectroscopy to conduction steps associated with atomic spin fluctuations and Kondo resonances. We analyze in the case of Fe on CuN the possible spin fluctuations between states with S=2 and S=3/2 or 5/2 and conclude, from the found asymmetries and marked structures in the conductance, that the $2 \leftrightarrow 3/2$ fluctuations are dominant and provide a good description of the experimental data. The case of Co is also considered and shown to present, in contrast with Fe, a resonance at the Fermi energy corresponding to a Kondo temperature of 6K.