MAR10-2009-004197

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Kondo effect of bulk impurities studied with electron focusing[1]

MARTIN WENDEROTH, IV. Physikalisches Institut, University of Göttingen, Friedrich-Hund-Platz 1, 37077 Göttingen, Germany

By scrutinizing the real-space properties of the single-electron propagator and settling the explicit relation between the Fermi surface shape in k-space and the anisotropic charge oscillations in r-space, we demonstrate a new application of STM: visualization of (i) bulk electron properties of metals and of (ii) embedded single impurities in a metal. Even the very simple Fermi surface of copper causes strongly anisotropic propagation characteristics of bulk electrons that are confined in beamlike paths on the nanoscale, a form of electron focusing. The induced charge density oscillations on the nearby surface can be visualized with a low-temperature scanning tunneling microscope. We have used this focusing effect to study single magnetic impurities. Up to now scanning tunneling spectroscopy has shown that Kondo signatures rapidly vanish with increasing distance from the impurity. Here we report on a hitherto unobserved long range Kondo fingerprint for single magnetic atoms Fe and Co below the surface of copper.

[1]This work was supported by the Deutsche Forschungsgemeinschaft Collaborative Research Centre SFB602.