TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

INSTITUT FÜR ANGEWANDTE PHYSIK
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# IAP-SEMINAR

## ANNOUNCEMENT

Date: **Tuesday, 27.1.2015**
Time: **16:00 p.m.**
Location: **Technische Universität Wien, Institut für Angewandte Physik, E134**
yellow tower „B“, 5th floor, Seminarraum 134A (room number DB05L03)
1040 Wien, Wiedner Hauptstraße 8-10

Lecturer: **Katharina J. Franke**
Fachbereich Physik, Freie Universität Berlin/Germany

Subject: **Scanning Tunneling Spectroscopy of Single Crystal Superconductors and Molecular Adsorbates**

Abstract: The magnetic properties of single atoms are significantly affected by details in the atomic-scale surrounding. One strategy to control the spin state and magnetic anisotropy is to embed the atoms into specifically designed organic ligands. Moreover, the surface plays a pivotal role in the magnetic properties when it interacts with the magnetic core. Here, we point out possibilities to tune the magnetic properties of single paramagnetic molecules on a surface.

We first characterize the electronic properties of a superconducting Pb substrate. Two quasi-particle resonances reveal two different superconducting gap parameters. The tunneling probability into these two gaps varies on different surface orientations and spatially around subsurface defects. These observations provide the experimental evidence of the two-band nature of superconductivity in Pb.

A superconductor is an interesting substrate for paramagnetic molecules. In Fe-Octaethylporphyrin-Chloride (FeOEP-Cl) on Pb(111), we resolve spin excitations in inelastic tunneling spectra. At increasing tunneling current densities a pumping into higher spin states becomes possible due to relatively long lifetimes of the first excited state. We ascribe the long spin relaxation time to the superconducting energy gap at the Fermi level, which prohibits efficient pathways of energy quenching into the substrate. By approaching the tip towards the molecule, we detect a monotonous increase in axial anisotropy. On the de-chlorinated species, in contrast, the magnetocrystalline anisotropy is decreased at smaller tip-molecule distances. This change in the order of 10% can be explained by a deformation of the molecules in the presence of the attractive force of the tip, which leads to a change in d-level alignment and consequently the magnetic anisotropy.

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*All interested colleagues are welcome to this seminar lecture*
*(45 minutes presentation followed by discussion).*

*U. Diebold e.h.*
*(Seminar-Chairperson)*

*H. Störi e.h.*
*(LVA-Leiter)*