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EINLADUNG zum IFP-SEMINAR

Thema: **Investigating the magnetic properties of superconducting samples**

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Host: Silke Bühler-Paschen

Termin: **Mittwoch, 26. Jänner 2011, 12:30 Uhr**

Ort: TU Wien, Institut für Festkörperphysik
Freihaus Seminarraum 138C, Turm B, 9. OG (gelbe Leitfarbe)
Wiedner Hauptstraße 8-10, 1040 Wien

Abstract:

I will present an overview on my previous work on superconductivity. Large bulk superconductors and coated conductors made of $YBa_2Cu_3O_y$ are considered most interesting for current carrying applications. Since the manufacturing process is quite difficult and often leads to sample inhomogeneities, it is desirable to characterize the samples locally and in a non-destructive way. This was achieved by inducing small local currents in the sample and recording the generated field by a Hall probe, called the magnetoscan technique, for which I present results. Furthermore, the measurements were numerically simulated to obtain a more quantitative understanding of the results.
The second part of this talk is devoted to the vortex matter physics in superconductors. MgB_2 single crystals were measured in SQUIDs and a VSM to determine the characteristic magnetic fields and lengths of superconductivity. Fitting the Ginzburg Landau model to the magnetization vs. magnetic field curves demonstrated that MgB_2 is a two band superconductor, i.e., the basic parameters depend not only on the temperature but also on the magnetic field. It was also shown that introducing flux line pinning centers (i.e. nanometer-sized defects) by neutron irradiation, increases the critical current of the material and additionally reveals a second peak at higher magnetic fields. This second current peak was analyzed as a function of defect density and compared with theory based on the assumption of an order disorder phase transition of the vortex matter. $NbSe_2$ shows a similar behavior, but is also a very convenient material for imaging the flux line lattice by scanning tunneling microscopy, which allows to compare microscopic (i.e. the flux line distribution) and macroscopic (e.g. the critical current) properties in the same sample.

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