Institut für Physik

Montanuniversität Leoben

A-8700 LEOBEN, Franz Josef Straße 18, Austria
Tel: +43 3842 402-4601, Fax:+43 3842 402-4602
e-mail: physics@unileoben.ac.at

S E M I N A R

aus

Halbleiterphysik und Nanotechnologie

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"Swift and lazy vortices in cuprate high-T_c superconductors"

Univ.-Prof. Dr. Wolfgang Lang

Fakultät für Physik der Universität Wien, Elektronische Materialeigenschaften

Apart from their high critical temperature the cuprate superconductors are known for their abundance of unconventional properties. Many of them are related to pronounced anisotropy, short coherence lengths, and a rich landscape of intrinsic defects in these materials. The study of magnetic flux quanta in these superconductors, thus, reveals novel effects. I shall discuss different ways of modulating the superconducting order parameter and its impact on vortex motion and vortex pinning.

In the first scenario thin films of $YBa_2Cu_3O_7$, grown on vicinal substrates, allow for exploring the intrinsic modulation of the superconducting order parameter along the *c* axis and to create and accelerate in-plane flux quanta, the so-called Josephson vortices, to high-speed sliding motion along the copper-oxide planes.

To demonstrate a particular form of pinning, a square array of nano-patterned columnar defects has been created in a $YBa_2Cu_3O_7$ thin films by shadow projection of He^+ ions through a silicon stencil mask. Distinct peaks of the critical current and minima of the magnetoresistance can be observed when the fluxoids arrange themselves commensurate with the defect lattice.