
Seminar

Real space imaging of stable and metastable vortex lattices in a weakly pinned Type II superconductor

Pratap Raychaudhuri

Tata Institute of Fundamental Research, Mumbai

The vortex lattice in a Type II superconductor provides a rich playground to investigate the order-disorder transition in a periodic medium in the presence of random pinning. In this talk, I will describe our recent investigations on direct imaging of various vortex lattice states in NbSe₂ single crystal, using low temperature scanning tunneling spectroscopy down to 350 mK. In particular, through step by step imaging of the vortex lattice as a function of magnetic field, I will show that the disordering of the vortex lattice in a 3 dimensional superconductor happens in two steps. First, the quasi long-range ordered Bragg glass state at low fields transforms to a hexatic glass through the proliferation of dislocations. At a higher field, the dislocations dissociate into isolated disinclination giving rise to an amorphous vortex glass. Our results show that while the vortex lattice in a 3D superconductor follows the same two-step route to disordering as that predicted by Kosterlitz, Thouless, Halperin, Nelson and Young for a 2 dimensional hexagonal lattice, the presence of a random pinning potential gives rise to a variety of additional non-equilibrium states, which can be accessed through different thermomagnetic cycling.

Tuesday, July 15th 2014

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS