

The Vortex Lattice of a Type II Superconductors Studied by Small Angle Neutron Scattering

In this laboratory work we will study the vortex lattice VL of a type II superconductor using Small Angle Neutron Scattering SANS. The sample is a single crystal of Nb, a superconductor with a $T_c = 9.3$ K and lower and upper critical fields of $H_{c1} = 0.18$ T and $H_{c2} = 0.4$ T, respectively. For external magnetic fields between H_{c1} and H_{c2} the superconductor is in the so-called intermediate state. There the magnetic field partially penetrates the material in the form of individual flux lines, forming a regular lattice, the "vortex lattice" VL. This lattice can be directly probed using small angle neutron scattering SANS techniques. In this experiment we will study the behaviour of the VL as a function of the magnetic field.