

SANS Studies of the Flux Lattice in $\text{YBa}_2\text{Cu}_3\text{O}_7$ at Very High Fields

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We present recent results from small angle neutron scattering (SANS) studies of detwinned single crystal $\text{YBa}_2\text{Cu}_3\text{O}_7$ (YBCO), obtained using the new Birmingham 17 T magnet. This recently commissioned facility allows investigation of the flux lattice at unprecedentedly high fields, with very low backgrounds due to the very small amount of material in the beam path. Measurements of flux lattice structure versus field give an indication of the evolution of the Fermi surface, and the pairing symmetry. The lattice has a number of structural transitions and continues to evolve in shape up to the highest fields observed. We have also investigated the form factor of the Bragg peaks (obtained from the integrated intensity) as a function of both field and temperature. The form factor is related to the spatial variation of the magnetic field, and hence the penetration depth. The FWHM of the peaks also gives information about the perfection of the flux lattice, and both taken together show evidence of pinning at low temperature, and tantalising signs of fluctuations at high fields near the melting line.