

D33, a new Small Angle Neutron Scattering Instrument for ILL

C. D. Dewhurst, Institut Laue Langevin, Grenoble, France

D33 will be a third Small-Angle Neutron Scattering (SANS) instrument at ILL, adding to and building upon the highly productive and world leading D11 and D22 instruments. Modern trends in materials science, physics and in particular nano-structured materials require that D33 should provide both high resolution and wide dynamic q-range. In 'monochromatic' mode a high-resolution velocity selector and flexible system of inter-collimation apertures will define the neutron beam. A double chopper system will enable a novel 'time-of-flight (TOF)' mode of operation (2Å to 20Å) allowing an enhanced dynamic q-range and flexible wavelength resolution. TOF on a reactor source has the distinct advantage that pulse frequency, bandwidth and resolution can be optimally matched to the neutron flight path without compromise.

Two large multitube detectors will allow a wide dynamic q-range ~ 15 and (a massive) ~ 150 in monochromatic and TOF modes respectively. Beam polarisation and ^3He spin analysis will facilitate and expand studies of magnetism and allow a more quantitative analysis of spin incoherent samples. Enhancements such as focussing lenses will be available to allow the study of large samples without loss of resolution while refractive prisms will improve resolution at long wavelengths by cancelling gravitational effects. The TOF chopper system will also allow time-resolved and kinetic studies (< 10 's ms) using the 'TISANE' technique. The siting of D33 will be such as to allow high magnetic fields at the sample position. Low background sample environments are foreseen where possible incorporating windowless mating of common vacuum spaces. As a SANS instrument with full polarisation and analysis we ultimately have the ambitious intention to implement new and novel spin manipulation, 'bunching' and interference techniques which allow much higher resolution in either time or space.