



**Low energy excitations in magnetic systems probed by neutron scattering:  
making maps of magnetism**

Toby Perring, ISIS Facility, STFC Rutherford Appleton laboratory, Harwell Oxford, Didcot, UK

**Abstract**

Inelastic neutron scattering directly measures the wave-vector and frequency dependency of the magnetic excitations in condensed matter. This lecture will explain why we should be interested to measure this quantity and what we can learn from the magnetic excitations in a system, and will give an introduction to the type of excitations that might be observed. The two most common experimental methods for probing magnetic dynamics with neutrons will be described and compared – triple axis spectroscopy at reactor sources, and time-of-flight techniques at both spallation sources and reactors. The lecture will contain some illustrative examples drawn from quantum magnetism, high-T<sub>c</sub> superconductivity and molecular magnetism, covering energies of excitations from a few 100meV to fractions of a meV. The complementary roles of resonant inelastic x-ray scattering and muon spectroscopy will be briefly discussed, and the lecture will finish with a future perspective of inelastic neutron scattering.