X-ray Photon Correlation Spectroscopy as a Probe for Magnetisation Dynamics in the Spin Ice, Holmium Titanate

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Probing spin dynamics using x-ray photon correlation spectroscopy (XPCS) is a field still in its infancy. To date, only a handful of studies of this kind have been carried out. However, there are many processes that occur in the dynamical range of XPCS that cannot be accessed by other techniques.
One particularly interesting problem is the spin ice, holmium titanate. This compound exhibits residual magnetic entropy and has been found not to order at finite temperatures. Bulk susceptibility measurements give evidence for long lived magnetic fluctuations which are also hinted at in neutron spin echo measurements, although they fall outside the measurement window[1].
These correlations are believed to occur on timescales accesible to XPCS. Developing XPCS to probe these correlations gives an unprecedented microscopic view of these systems and sets out to elucidate the nature of the magnetic fluctuations. This presentation outlines the work carried out so far, focusing on the static magnetic scattering, and the roadmap for further XPCS investigation.

[1]G. Ehlers *et al.* J. Phys. Cond. Matt. **16,** 11 (2004)