

# Department of Physics

Condensed Matter Physics  
Clarendon Laboratory, Parks Road, Oxford OX1 3PU



## CONDENSED MATTER SEMINAR

Thursday 24 January at 2.15pm

*“Emergent order and relief of frustration through ordering of quasi-spins in Ising magnets”*

**Dr Siân E. Dutton**

Department of Physics, University of Cambridge

In this talk I will present two examples of novel magnetic regimes in Ising magnets where the observed magnetic properties are best considered in terms of the quasi-spin generated from summing moments over the triangles which comprise the magnetic lattice. In the first example, emergent charge order in an Ising Kagome magnet will be presented, and in the second an order-by-disorder transition due to a staggered magnetic field in manganese substituted Ising lanthanide gallium garnets will be discussed. In the first example, I will present bulk thermomagnetic and neutron scattering measurements on  $\text{Dy}_3\text{Mg}_2\text{Sb}_3\text{O}_{14}$  and compare with the predictions from Monte Carlo simulations. Experimental and theoretical evidence for the formation of a charge ordered regime will be presented. In the second case study an experimental realisation of a degeneracy lifting order-by-disorder transition in  $\text{Ho}_3\text{MnGa}_4\text{O}_{12}$  garnet will be presented. Through analysis of the magnetic structure obtained from neutron diffraction experiments a mechanism for an order-by-disorder transition in which the frustration of the magnetic lattice is almost entirely relieved will be presented. Tuning of the order-by-disorder transition by alternative substituents or dilution of the staggered magnetic field will also be discussed. I will then discuss the effect of substitution of magnetic ions within the garnet structure and the impact this has for their use as low temperature magnetocalorics.

**Host: Dr Andrew Princep**

**Audrey Wood Seminar Room, Clarendon Laboratory**