ECNS 2023 Garching
EUROPEAN CONFERENCE ON NEUTRON SCATTERING

Contribution ID: **400** Type: **Poster**

Tunable critical correlations in kagome ice

Tuesday 21 March 2023 16:00 (2 hours)

The kagome ice state is a two dimensional critical state of algebraic spin correlations formed by the application of a moderate magnetic field along the cubic [111] direction of a pyrochlore spin ice. Tilts of the field away from perfect alignment allow for tuning of these algebraic correlations by variations of tilt angles, field or temperature, leading to symmetry-sustaining Kasteleyn transitions. We present a detailed experimental/theoretical study of the kagome ice Coulomb phase, which explores the fine tuning of critical correlations by applied field, temperature and crystal orientation. We observe the continuous modification of algebraic correlations with polarized neutron scattering experiments, and they are found to be well described by numerical simulations of an idealized model. We further clarify the thermodynamics of field tuned Kasteleyn transitions and demonstrate some dramatic finite size scaling properties that depend on how topological string defects wind around the system boundaries. We conclude that kagome ice is a remarkable example of a critical and topological state in a real system that may be subject to fine experimental control realizable at easily accessible temperatures and fields.

Authors: Dr HARMAN-CLARKE, A (London Centre for Nanotechnology and Department of Physics and Astronomy, UCL, London UK); TURRINI, Alexandra (EPF Lausanne); Mr HAESELER, G (Université de Lyon, ENS de Lyon, Université Claude Bernard, CNRS, Laboratoire de Physique, France); Dr WOOD, I. G. (Department of Earth Sciences, UCL, London, UK); Prof. HENELIUS, P (Faculty of Science and Engineering, Åbo Akademi University, Åbo, Finland); Prof. HOLDSWORTH, P. C. W. (Université de Lyon, ENS de Lyon, Université Claude Bernard, CNRS, Laboratoire de Physique, France); Prof. BRAMWELL, S. T. (London Centre for Nanotechnology and Department of Physics and Astronomy, UCL, London UK); Dr FENNELL, T (Laboratory for Neutron Scattering and Imaging, PSI, Villigen, Switzerland)

Presenter: TURRINI, Alexandra (EPF Lausanne)

Session Classification: Poster session TUESDAY

Track Classification: Magnetism, Superconductivity, Topological Systems, Magnetic Thin Films an other electronic phenomena