NEUTRONS FOR SOCIETY

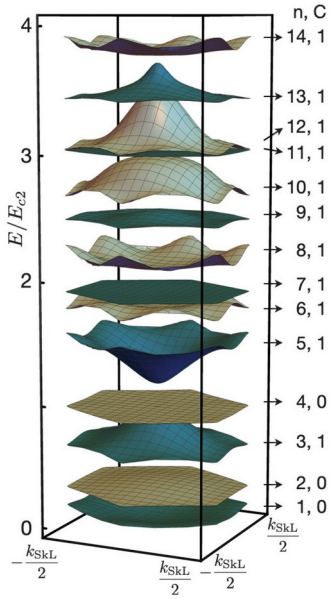
Technische Universität München

A joint Ph.D. position co-financed by the Institut Laue-Langevin and Technische Universität München is available on the subject:

Evolution of Landau Quantisation of Topological Magnons in Chiral Magnets

The main focus of the proposed thesis is an investigation of magnetic excitations whose properties are influenced by the topology of the underlying spin configuration. Of special interest for this work will be the skyrmion lattice, which is a topologically protected spin vortex that possesses magnetic excitations forming energetically closely-spaced Landau levels (Figure), as well as degeneracies in the magnon bands.

The project will run over the course of three years during which the candidate will perform experiments at large-scale research facilities. The main instrumental techniques employed for this task will be neutron time-of-flight, triple-axis, and spin-echo spectroscopy. The experiments will focus on measuring the low-energy Landau quantisation and the topological magnetic dynamics in the skyrmion lattice as well as the extended high-energy band degeneracies of the chiral magnet Cu_2OSeO_3 and their interplay with the low-energy regime. Further investigations of the skyrmion excitations will be performed on doped samples of $Mn_{1-x}Fe_xSi$ and $Mn_{1-x}Co_xSi$.



Magnon Landau levels in Cu_2OSeO_3's sister compound MnSi (Science 375, p. 1025, 2022).

Apart from the experiments, the thesis will involve theoretical modelling of linear spin-wave dispersions and correlation functions as well as helping in their implementation using modern software development techniques.

Work places

The successful candidate will be enrolled as Ph.D. student at the doctoral school of Technische Universität München in Garching, Germany. He/She will spend the first two years of the work at the Institut Laue-Langevin in Grenoble, France, and the final year at Technische Universität München.

Required skills

- M.Sc., diploma or equivalent in physics, chemistry, materials science or a related field.
- Previous experience with neutron scattering would be an advantage.
- Knowledge in *Python* and *C++* programming would be a plus. If available, please also indicate your *GitHub* (or similar) profile in your CV.

Contact and application

Questions can be addressed to Dr. Tobias Weber (tweber@ill.fr) or Prof. Dr. Christian Pfleiderer (christian.pfleiderer@tum.de). Please send applications including a CV, a grade transcript, and a motivation letter to *both* of us.