

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

***Vortex Fluid Dynamics: Advanced Vortex Matter Transport***

The study of superconductivity is one of the most important topics in modern solid-state physics. Neutron scattering experiments from quantized vortices are ideally suited to investigating and understanding the fundamental magnetic properties of superconductors on a microscopic scale. The subject of this doctoral thesis is the combination of in-situ electrical transport measurements with small-angle neutron scattering. The aim is to examine complex transport phenomena in detail, which have so far been largely inaccessible experimentally. The fascinating aspect of the subject is not just how and where the current flows but the additional orthogonal flow of magnetic matter in the form of vortices, the behaviour of which is crucial to the utility of superconductors.

The tasks include the implementation, testing, and characterisation of a new setup for in-situ transport measurements with small-angle neutron scattering. Laboratory measurements of susceptibility and magnetisation, the characterisation of samples with different surface treatments, and numerical simulations complement the research strategy.

**Work places**

The doctoral project is carried out as a collaborative project between TUM (Munich, Germany) and the Institut Laue-Langevin (Grenoble, France), with formal academic supervision provided by the Technical University of Munich. Following an 18-month appointment at FRM II, the second part of the doctoral project (also 18 months) will take place in Grenoble at the Institut Laue-Langevin.

**Required skills**

You hold a degree (Diplom, Master) in the field of physics or related with a focus on condensed matter research. Ideally, you already have first experience with superconductivity or scattering techniques. Experience operating complex experimental setups and data analysis tools (e.g. python programming) are an asset. You enjoy working in an international team and have good communication skills. A good command of written and spoken English is a prerequisite.

**Contact**

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