

The Technical University of Munich (TUM) operates the research neutron source Heinz Maier-Leibnitz (FRM II) in Garching near Munich, which is one of the most powerful and modern neutron sources. The leading position in science in the field of research with neutrons is achieved by a cooperation between the TUM and the Forschungszentrum Jülich and Helmholtz-Zentrum Hereon under the name Heinz Maier-Leibnitz Zentrum (MLZ). We are looking for:

## Master's Thesis

### Physical Engineering - Electronic Engineering

Neutron scattering can provide structural and dynamic information on systems from the atomic scale up to macro-molecules layered systems. Of particular interest to the group are polarized neutron methods which give further access to effects of magnetic moments in crystal structures and magnetism of complex materials. Maintaining and using neutron polarization requires special attention to magnetic fields and their homogeneity and stability even in the vicinity of strong sources of stray magnetic flux. We would like to explore cryogenic super conducting (SC) shields as a method to provide controlled and magnetically isolated spaces for our neutron instrumentation, in this case to house a polarized  $^3\text{He}$  cell and maintain its polarization. Large size SC screens made of Niobium have been used for such purposes, however we would like to explore the concepts further, starting with learning the cryogenic techniques needed to make a test apparatus where we would be able to study-optimize the cooling efficiency of the large area shields, and then explore their properties for shielding and trapping of magnetic flux.

This project will consist of:

1. Assembling a test cylindrical SC screen, first of niobium, in a cryostat in order to understand and optimize the cryogenics needed to create large area SC screens.
2. Using this SC screen to study its ability to trap magnetic flux lines and also to shield from externally applied magnetic sources.
3. The knowledge gained will be used to design a neutron compatible cryostat/magnetic shield that would be able to house a polarized  $^3\text{He}$  cell to use for polarization analysis of scattered neutrons.

Parallel to the Thesis work itself, a mini-job work student contract can be offered in some cases.



In case of an online application please send the documents compiled in a PDF file.