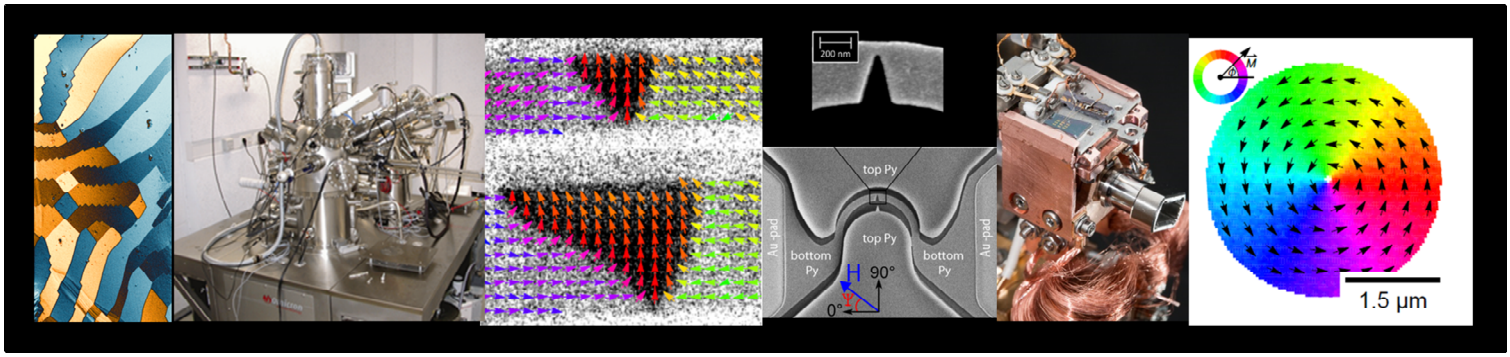


# Experimental Ph.D position in high resolution magnetic imaging

A Ph.D. position is available in the field of spintronics studying high spatial resolution magnetic imaging of magnetic spin structures and their dynamics, in various systems. High resolution magnetic imaging provides a direct window to the physics of a system as well as important practical considerations, such as switching pathways. In particular, recently discovered effects arising from the spin-orbit interaction have been observed to lead to a number of exciting and very timely new phenomena such as Dzyaloshinskii-Moriya interaction, which provides novel chiral spin configurations with enhanced stability, as well as leading to new efficient avenues for current-induced magnetic state switching, such as the spin Hall effect. In addition to the study of the fundamental processes, this project has a strong outlook towards technological applications such as data storage and logic.

The project will in particular make use of a unique scanning electron microscope with polarization analysis (SEMPA) system that allows for particularly high spatial resolution magnetic imaging (< 20nm) in a laboratory setting, and which was recently upgraded to provide nanosecond temporal resolution and enhanced sensitivity via a novel detection scheme. Furthermore the lab boasts advanced fabrication techniques (full clean room with lithography and pattern transfer techniques), a range of materials deposition tools (molecular beam epitaxy, sputtering, pulsed laser deposition, etc.) and a number of sophisticated characterization techniques. To complement the magnetic imaging, low temperature magneto-transport measurements (10mK to room temperature with fields up to 15T) will be carried out to detect spin injection, spin dynamics and quantum transport effects. Additionally the group employs a variety of software for the simulation of domain structures, magnetization dynamics and spin current transport (OOMMF, MicroMagnum, SpinFlow3D, etc.) for complementary analysis of the experimentally measured systems and has access to high performance computing facilities. Depending on the interest of the candidate, such simulations can form a greater or lesser part of the project. There is also the potential for extending the instrumental functionality via LabView/C++ programming.

Potential applicants need to hold a Masters or equivalent degree in Physics or Materials Science. Experience in magnetic materials or spintronics is an advantage. In the recent Shanghai and CHE rankings Physics at Mainz was selected for the excellence group in Europe and top 5 in Germany and is the only physics department in Germany that houses both a Research Cluster and a Graduate School funded by the German Excellence Initiative. It is particularly strong in the area of condensed matter physics / material sciences with the Graduate School of Excellence Materials Science in Mainz. Very good candidates will be considered for this Graduate School that provides a structured graduate education with additional tailored training.

For further information and applications (including a full CV) contact:
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