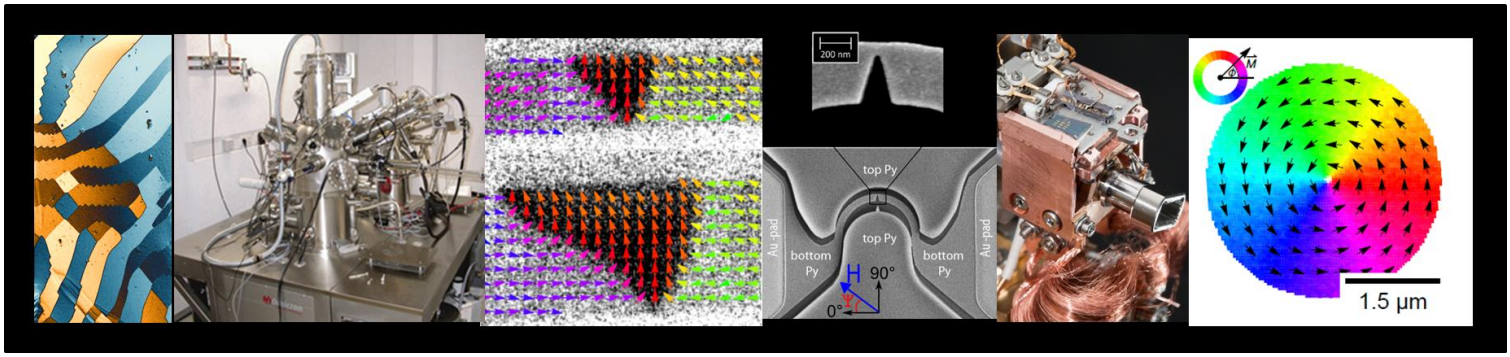

Topological Spin Dynamics

Experimental Ph.D position at Johannes Gutenberg University

A Ph.D. position is available in the field of spintronics studying high spatial resolution magnetic imaging of magnetic spin structures and their nanosecond dynamics, in selected 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 stabilizes novel chiral spin configurations such as skyrmions with topologically enhanced stability, as well as leading to new efficient avenues for current-induced magnetic state switching, such as by spin – orbit torques. 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 (10 mK 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, etc.) for complementary analysis of the experimentally measured systems and has access to high performance computing facilities.

The physics department at Johannes Gutenberg University Mainz has been consistently ranked as one of the leading physics departments in Germany. In the recent 2017 Shanghai and CHE rankings it was selected for the excellence group in Europe and in the 2018 was ranked #1 in Condensed Matter Physics and Physics overall in Germany by the German Research Foundation. It is particularly strong in the area of spintronics and material sciences and houses the Collaborative Research Center Spin+X and the Max Planck Graduate Center to support excellent students.

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