

Ph.D. Position in Spin-orbit effects (experiment / numerical simulations)

A Ph.D. position is available in the field of spin-orbit effects in nanostructures. In particular we are working on novel effects that occur due to the interaction of spin currents and magnetization, spin dynamics and quantum effects in novel materials such as tailored heterostructures made of selected materials combinations with high spin-orbit interaction. These materials are very topical and highly interesting from scientific point of view as they exhibit ultra-efficient spin manipulation by spin-polarized currents and tailored switching. Furthermore spin-orbit effects can lead to chiral spin structures such as domain walls that are topologically stabilized. In addition to novel fundamental physical mechanisms, these effects are also promising for applications in data storage, sensors, logic and high frequency microwaves sources.

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. Low temperature magneto-transport measurements (10mK to room temperatures with fields up to 15T) will be carried out to detect spin injection, spin dynamics and quantum transport effects. A novel scanning electron microscope with polarization analysis was recently installed that allows for high resolution magnetic imaging. As part of the project a Kerr microscope is being acquired that will be intensively used for rapid screening of domain structures and spin manipulation.

Depending on the interest of the candidate, the work can be primarily experimental or have a significant numerical simulations component.

Possible 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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