# Bachelor thesis available

## Cryogenic Time-Resolved Magneto-Optical Kerr Effect Microscopy

The magneto-optical Faraday and Kerr effects were discovered in 1845 and 1877, respectively. The first describes the rotation of the plane of polarization of light traveling through a magnetized medium, while the latter occurs when linearly polarized light is reflected from the surface of a magnetized material. Nowadays, these effects are used for magneto-optical imaging of magnetically active specimens. Ever since the first implementation of the time-resolved magneto-optical Kerr effect (TR-MOKE) to probe the dynamics of magnetic thin films in 1991, this technique has evolved into a powerful means for studying the magnetization dynamics, with a temporal resolution limited by the pulse-width of the laser. The spatial resolution enables probing of single nanomagnets well beyond the diffraction limit. Yet, so far TR-MOKE has been primarily used at room temperature. At the same time, its extension towards cryogenic conditions is becoming of increasing interest today for investigations of hybrid systems made of materials exhibiting the strongest magnetic contrast in nature – ferromagnet/superconductor heterostructures. In addition, the cryogenic conditions are fortunate for extending the range of accessible magnetic fields.

In **your Bachelor thesis**, which is a "**Literaturarbeit**", you will

- introduce the physical principles of MOKE and present its building blocks in an illustrative form,
- introduce the idea and principles of the time- and spatially-resolved MOKE variants,
- and describe a cryogenic TR-MOKE system.

In addition, it will be possible to get involved in the designing and building of the respective setup in our group, with the possibility to further deepen the knowledge experimentally when doing a Master project.

From a broader perspective, the formulated Bachelor project is at the interface between magneto-optics and magnetism. Its successful accomplishment will be fortunate for eventual follow-up study and research work in the fields of spintronics, magnonics, low temperature physics, and superconductivity.

For more information, please inquire Oleksandr Dobrovolskiy (oleksandr.dobrovolskiy @univie.ac.at) at your earliest convenience.

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