

Project 4.8 Magnetic multilayers with chiral spin structures

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Background:

In ferromagnetic/heavy metal layered systems, enhanced perpendicular magnetic anisotropy (PMA), Dzyaloshinskii-Moriya interactions (DMI) and interlayer couplings (IEC) are observed. As a result of the coexistence of these effects, chiral spin structures, such as domain walls with a complex configuration or skyrmions – topologically protected magnetization vortices, may occur in this type layers. Layered systems with such properties are very intensively studied, due to the wide possibility of tuning their desired magnetic properties. It is expected that the generated spin structures will be used in modern branches of electronics (spintronics and magnonics) that use both the charge and the magnetic moment of the electron.

Aim:

- design and fabrication of magnetic layered systems with a chiral spin structure
- structural characterization of these systems (RHEED, LEED, XRD, AES)
- description of static and dynamic magnetic properties and interpretation of the obtained results (VSM, SQUID, MFM, PMOKE, VNA-FMR)
- cooperation with other research teams at the Institute of Physics of the Polish Academy of Sciences and with domestic (other measurement techniques) and foreign (lithography, transport measurements, micromagnetic simulations) groups implementing the project.

Requirements:

- creativity
- good ability and basic experience in conducting scientific experiments
- basic knowledge of solid state magnetism
- the ability to analyse experimental data, draw conclusions and prepare reports and publications
- good knowledge of spoken and written English
- ability to work in a team
- experience in high-vacuum technologies and the above-mentioned measurement techniques will be an advantage
- Master's degree in physics (or an equivalent that allows you to start doctoral studies in physics in the country of issue).

Funding:

Scholarship: grant funding of 5000 PLN per month, before subtracting obligatory employer and employee social security contributions (~15%), for 36 months. Afterwards, standard Polish PhD scholarship 3640 PLN/month net in 4th year.

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