The goal of this Master project is to improve our-state-of-the-art generalized magneto-optical ellipsometer (GME) to allow for spectroscopic measurements and associated characterization capabilities. With such methodological advances, the instrument will have the potential to allow for very precise magneto-optical magnetometry measurements, such as:

- (i) depth-resolved magnetometry and
- (ii) spectroscopic materials characterization

The project will consist of two parts. In the first part, an existing GME set-up will be reconfigured with a tunable laser to facilitate spectroscopic measurements. Once the system is operational, measurements on magnetic thin film, multilayer, and nano-structure samples (also produced in our labs) will be made to explore the performance levels that can be achieved with the new characterization capabilities that this unique experimental tool offers. This work will include modifications of the experimental set-up and control software to run these novel experiments (LabView programming platform).

In the second part, the experimental results will be analyzed so that quantitative data of the dielectric tensor for different films and materials can be extracted, as well as 3-dimensional vector magnetometry and depth-resolved magnetometry demonstrated, which would represent a very significant methodological advance. This part will include data analysis programming, the use of commercial analysis software and will furthermore benefit from a good understanding of electromagnetism, optics, solid-state physics, and ferromagnetism.

Description of the research group:

The **nano-magnetism Group** at CIC nanoGUNE is conducting world-class basic and applied research in the field of magnetism in nano-scale structures. The Group staff has a longstanding expertise and proven track record in fundamental and applied aspects of nano-magnetism, and specifically in the use of magneto-optical methods.

Application:

If you are a (prospective) master student and you are interested in this project, please get in touch with the scientist in charge: **Andreas Berger (a.berger@nanogune.eu)**

To apply for a master scholarship fill in the form below and follow the instructions and recomendations of the general call (**open until 30 June 2022**).

NOTES:

(i) All applicants will receive an answer after the end of the selection process; but please note that due to the large number of submissions that are expected, we cannot provide individual feedback.

(ii) Additional information about nanoGUNE's commitment towards HR excellence in Research and Gender Equality are available on our website.

(iii) We encourage you to subscribe to our HR mailing list to receive information related to nanoGUNE's open positions and open calls for different training and talent attraction programs.