Conventional monolithic materials have dominated electronic and optical devices for decades, mostly thanks to our ever-increasing ability to control the properties of bulk materials. However, as we approach the range of the single nanometre scale in our fabrication capabilities, it is necessary for the industry to be able to create, control and profit from novel materials and architectures.

In this context, the rich library of 2D layered materials present multiple opportunities to design novel spintronics and valleytronics devices.

Making use of the possibility to create 2D artificial van der Waals heterostructures, in this project we will overcome single materials by focusing on the interface as an active playground.

For instance, we will perform interface engineering by combining different magnetic and non-magnetic 2D layers in an unprecedent fashion, exploring new magnetic ground states which are not accessible neither in single materials nor in conventional multilayers.

We will also explore spin and valley physics in van der Waals heterostructures by combining 2D layered materials with complementary properties.

More information about our research in this topic can be found in this selection of our recent articles: Nano Letters 19, 1074 (2019), Nano Letters 19, 8758 (2019), APL Materials 8, 071103 (2020) and Phys. Rev. Lett. 127, 047202 (2021).

In this **project**, the Master student will be responsible for the design and preparation of structures by exfoliation and stamping of 2D materials in controlled atmosphere and device fabrication by standard electron-beam lithography. (S)he will be also involved in the magneto-transport measurements (high magnetic fields and low temperatures), data analysis, and drafting of results.

We offer an international and competitive environment, state-of-the-art equipment (including a class 100 cleanroom for nanofabrication capabilities), and the possibility of performing research at the highest level.

Description of the research group:

The Nanodevices Group in CIC nanoGUNE is mostly interested in the electronic properties of systems in reduced dimensions. Our research program is currently articulated around different themes of research related to spintronics, multifunctional devices and advanced nanofabrication. For more information, see our website at https://www.nanogune.eu/nanodevices

Application:

If you are a master student and you are interested in this project, please get in touch with the scientist in charge: **Luis Hueso** (l.hueso@nanogune.eu).

To apply for a master scholarship fill in the form below and follow the instructions and recommendations 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.