Proposal for PhD Project

Title: **Synthesis and electronic structure of one-atom-thick hexagonal boron nitride on curved crystals: toward boron nitride nanostripes.**

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Two-dimensional and one-dimensional materials are attracting strong interest due to their promising electronic, magnetic, or mechanical properties. Among them the heavily investigated graphene, a material that was once supposed to replace silicon in device fabrication. Graphene devices have been realized in certain applications (Sensoring, Biomedicine), but it cannot be used in electronics because it lacks a semiconducting band gap. Hexagonal boron nitride (hBN) is the isostructural semiconducting counterpart of graphene, and hence of fundamental importance in the development of nanolectronics applications. Yet the synthesis and electronic characterization of 2D hBN monolayers and 1D nanostructures, such as nanostripes, is poorly developed, requiring intensive search of appropriate growth substrates and fine characterization using surface science techniques.

Our group has recently demonstrated that hBN can be grown on curved Ni and Rh crystals, leading to homogenous coating and one-dimensional nanostripe arrangement [1]. The candidate will focus on the exploration of the structure and the electronic properties of such hBN nanostructures, using Scanning Tunneling Microscopy, Low-Energy Electron-Diffraction and Angle-Resolved Photoemission in our laboratory, as well as X-ray absorption and core-level photoemission in European Synchrotron radiation facilities.

[1] L. Fernandez et al, 2D Mater. 6 (2019) 2025013; arXiv: http://arxiv.org/abs/1811.09291.