CALL FOR APPLICATIONS - July 2022

Research Assistant Position

Donostia International Physics Center (DIPC) is currently accepting applications for Research Assistant positions. This is a unique opportunity for highly motivated students, recently graduated from the University in Physics or related fields, to gain research experience in one of DIPC's high-profile research teams. A description of each of the available openings, contact information and deadlines can be found on the following pages.

Although candidates are welcome to contact the project supervisors to know further details about the proposed research activity, please be aware that the application will be evaluated only if it is submitted directly to the email address listed as "application email".

Applications received by the deadline will be evaluated by a Committee designed by the DIPC board on the basis of the following criteria:

- CV of the candidate (40%)
- Adequacy of the candidate's scientific background to the project (40%)
- Reference letters (10%)
- Other: Diversity in gender, race, nationality, etc. (10%)

Evaluation results will be communicated to the candidates soon after. Positions will only be filled if qualified candidates are found.

The DIPC may revoke its decision if the candidate fails to join by the appointed time, in which case the position will be awarded to the candidate with the next highest score, provided it is above 50 (out of 100).

However, the selected candidate may keep the position if, in the opinion of the Selection Committee, the candidate duly justifies the reasons why he or she cannot join before the specified deadline, and as long as the project allows it.

Ref. 2022/48
Towards spin-qubits in 2D graphene nanostructures

Supervisor(s):
Aran Garcia-Lekue (wmbgalea@ehu.eus)
Emilio Artacho (e.artacho@nanogune.eu)

Duration*: *1 year*

Application Deadline: *21/07/2022* ***Application Email:*** *jobs.research@dipc.org*

The recent discovery of stable spin-polarised states in graphene nanostructures has paved the way for their potential use as spin qubit elements for quantum computation. Importantly, graphene nanostructures can now be fabricated with atomic precision using bottom-up on-surface synthesis (OSS), which opens the door to fabricating 1D and 2D carbon based materials with precise shape, composition and spin arrangement.

In this project, in order to explore the feasibility of graphene nanostructures for spin qubit applications, we propose to explore the underlying fundamental mechanisms using complementary theoretical and simulation tools. In particular, we envision to use Density Functional Theory (DFT) and model calculations (e.g. Tight-Binding) to unravel the basic mechanisms giving rise to spin polarised and topological states in this class of materials. A special focus will be placed on 2D graphene-based materials, mainly on so-called nanoporous graphene. For the most promising candidate materials, we will analyse decoherence processes, such as spin-orbit coupling, to evaluate their potential as qubits.

The work will be theoretical, but the candidate is expected to contribute to collaborations with experimentalists whenever possible. The student is also expected to work closely with other theoreticians on topics closely related to the present work. The candidate should be willing to perform stays of up to several months with our collaborators worldwide if required by the progress of the thesis.

Interested candidates should submit an updated CV and a brief statement of interest to the application email listed above. Reference letters are welcome but not indispensable. The reference of the specific opening to which the candidate is applying should also be stated in the subject line.