CALL FOR APPLICATIONS - May 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. 2022/32
Implementation of Machine Learning techniques to study Wigner crystals

Supervisor(s):
Jon Mattin Matxain Beraza (jonmattin.matxain@ehu.eus)

Duration*: *6 months*

Application Deadline: *06/05/2022* ***Application Email:*** *jobs.research@dipc.org*

By means of rather basic concepts concerning quantum mechanics governing interactions of systems composed by electrons, in 1934 Wigner predicted that a low-density electron gas crystalizes such that electrons get localised. At sufficiently low densities, there is a tendency for electrons to minimise the total energy of the system by getting localised; this is called a Wigner crystal.

Transitions happening between these quantum states of matter called Fermi-liquids and Wigner crystals have experimentally been observed in plenty of recent works. As it can be seen, in order to describe Wigner crystal or, in general, low density electron systems, electron correlation effects on both, energy and wave-function, must be treated by means of high enough computational methods.

The main scientific goal of this proposal is to develop a theoretical protocol based on semi-supervised machine learning to study Wigner crystallisation. The expertise of the candidates should be, hence, focused on electronic structure calculations and machine learning techniques. Experience on the use of quantum chemical programs such as Gaussian and GAMESS US, and programing will be appreciated.

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.