# CALL FOR APPLICATIONS - October 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 (60%)
- Adequacy of the candidate's background to the project (20%)
- 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. 2022/72**
**Topology in correlated materials**

***Supervisor(s):***
*Maia G. Vergniory (maiagvergniory@dipc.org)*

***Duration:*** *1 year*

***Application Deadline:*** *21/10/2022* ***Application Email:*** *jobs.research@dipc.org*

In the last decade we have witnessed the triumph of topological insulators, making this field one of the most intense in condensed matter. These materials are insulators inside, and yet conductors on their surface when translational symmetry is broken, with optimal electronic properties for future applications in electronics: such as lack of dispersion or very high magnetoresistance.

The experimental confirmation of the theoretical predictions of so many topological materials have sealed the success of the theoretical calculations and their necessity to be able to progress in the field. These predictions are fundamentally based on first principles calculations combined with symmetry analysis using solid state physics group theory. Topological materials thus exhibit a remarkable symbiosis between elegant mathematical theories, rigorous material prediction, and technological applications. In this thesis project we will study a new line of research that is beginning to take off within the field, which consists of the study of electronic properties and thermal stability when the electrons of materials are highly correlated. These interactions can induce or produce topological phase transitions by creating charge or spin waves.

In this aspect we will need, on the one hand, to use codes of first principles that go beyond the mean field approximation, as well as to develop a group theory adapted to said correlations, in order to be able to study which symmetries are conserved and which are not, and to study their consequences.

**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.**