Donostia International Physics Center

DIPC PhD STUDENT GRANTS

The Donostia International Physics Center DIPC is currently accepting applications for PhD students. This is a unique opportunity for highly motivated students, recently graduated from the University in physics or related fields, to develop a research career joining some of the DIPC high-profile research teams.

DIPC PhD grants last for just 12 months. An extension of the grant may be accepted just in some exceptional cases. DIPC PhD grants are intended to support the student during the first steps of his/her research career. Further financial aid to continue the PhD research project after this period should be obtained from other institutions.

Interested candidates please send an updated CV including an academic transcript with the obtained marks, a brief statement of interest, and contact information to phd@dipc.org. Reference letters are welcome but not indispensable. The particular PhD position(s) to which the candidate is applying should be stated as well.

Applicants are advised to hold, or be in the final year of a master's degree in physics, chemistry or material science.

Next review of applications is scheduled for September 16th 2016. Applications will be evaluated by a Committee designed by the DIPC board on the basis of the following criteria (with point weights indicated in parentheses):

- CV of the candidate (60%)
- Adequacy of the candidate's scientific background to the project (20%)
- Statement of interest and reference letters (10%)
- Others: 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.

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PhD OPENINGS

- Many-body perturbation theory for organic photovoltaics

Contact person: P. Koval (peter_koval@ehu.eus). Reference: 2016/10.

Photovoltaic machines build from organic materials is one of the possible routes towards a competitive sustainable electricity source for our society. Electronic excitations determine basic ability of a material to convert light into electricity. The electronic excitations of organic compounds will be characterized theoretically, by means of first principles calculations. To achieve a credible description of organic compounds, we will apply a combined GW/BSE framework. The framework includes so-called Hedin's GW approximation for a description of charged excitations, followed by a solution of the Bethe-Salpeter equation (BSE) to calculate optical excitations. Theoretical estimations of the density of states, ionization potential, electronic affinity and optical absorption spectra are going to provide a valuable information which is useful to screen principally inappropriate chemical designs prior to real synthesis.

Primary occupation of successful candidate will be in studying deposited porphyrin molecules within GW/BSE framework, while further collaboration with theoretical/experimental groups at DIPC and closely related Material Physics Center are possible and encouraged (Daniel Sanchez-Portal, Javier Aizpurua, Andres Arnau). The work will be also in a close collaboration with theoretical and experimental groups in France (Roland Hayn, Marseille). Successful candidate should be willing to accept some longer stays in Marseille (resulting potentially in an international PhD degree).

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- Light emission and propagation in all-dielectric photonic structures

Contact person: J.J. Saenz (juanjo.saenz@dipc.org). Reference: 2016/11.

Spin–orbit optical phenomena involve the interaction of the photon spin with the light wave propagation and spatial distribution, mediated by suitable optical media. The main goal of the PhD Project will be to understand and optimize the coupling mechanisms between a quantum emitter and different all-dielectric photonic structures and to explore near-field effects and geometrical resonances in both photon coupling, propagation and driven dynamics of quantum emitters coupled to nanoparticle arrays, spin-orbit-interaction waveguides and fibers.

The theoretical work will be done in close collaboration with different experimental groups. The PhD is expected to spend research stays in different leading international experimental groups. In particular, we expect strong interactions with the experimental groups of Frank Scheffold in Fribourg University (Switzerland) and Gabriel Molina-Terriza in Macquarie University (Sydney, Australia). Experience on Condensed Matter Physics, NanoPhysics and Light Scattering would be valued.

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- Theory and modelling of topological photonic materials

Contact person: J.J. Saenz (juanjo.saenz@dipc.org). Reference: 2016/12.

The application of topological arguments has opened a whole new field in photonics research. This field was inspired by the exciting developments in solid-state materials along with the discovery with new phases of matter called topological insulators.

The main goal of the PhD Project will be to develop a technique to optimize the refractive index and shapes of the building blocks to reproduce the electronic band structure of the crystals in photonics systems. Following an approach similar to their electronic counterparts, we will first analyse the symmetry properties, band crossings and topology of periodic dielectric structures with Photon spin-orbit coupling (SOC). The acquired knowledge will allow us to develop a classification such as in Condensed Matter Physics, and eventually, to find new topological photonic materials with no electronic counterpart.

The theoretical work will be done in close collaboration with different experimental groups. The PhD is expected to spend research stays in different leading international experimental groups. In particular, we expect strong interactions with the experimental groups of Frank Scheffold in Fribourg University (Switzerland) and Gabriel Molina-Terriza in Macquarie University (Sydney, Australia). Experience on Condensed Matter Physics, NanoPhysics and Light Scattering would be valued.