Donostia International Physics Center

# DIPC POST-DOCTORAL POSITIONS

The Donostia International Physics Center DIPC is currently accepting applications for post-doctoral appointments. This is a unique opportunity for highly motivated junior researchers with a recent PhD degree in physics or related fields to join some of the DIPC high-profile research teams.

Interested candidates please send an updated CV, a brief statement of interest, and contact information to postdoc@dipc.org. Reference letters are welcome but not indispensable. The particular position(s) to which the candidate is applying should be stated as well. Although candidates are encouraged 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 mentioned above (postdoc@dipc.org).

Next review of applications is scheduled for August 17th 2012. Applications must be received before this date and 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 (40%)
- Adequacy of the candidate's scientific background to the project (40%)
- 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.

The duration of the appointment will be 1 year. The appointment could be renewed for a second year, subject to performance and to the availability of funding.

The salary will be 32000 euros per year before taxes.

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# JOB OPENINGS

- ***Magnetic proximity effect in the layered structures***

*Post-doctoral position; Reference: 2012/7.*
*Contact person: E. Chulkov (waptctce@sq.ehu.es).*

The aim of the postdoctoral research is to perform a systematic study of the magnetic proximity effect in the layered structures. Two types of systems will be studied:

(i) layered structures based on 3D topological insulators (TIs). Simplified models, such as models based on kp Hamiltonian, will be used to reveal the common fundamental properties of the structures under study. Microscopic ab-initio calculations will be done for different particular materials.

(ii) Interface between a dilute magnetic semiconductor (DMS) and a nonmagnetic metal. Regarding topological insulator based layered structures s Interface between a dilute magnetic semiconductor (DMS) and a nonmagnetic metal. During the postdoctoral research we are going to carry out a comprehensive study of this question. In order to investigate the physics of such effect, a model will be elaborated. Within this model using the Green function formalism the carrier-mediated coupling of local spins (of the TM) will be investigated. Accurate ab-initio calculations using the Korringa-Kohn-Rostoker (KKR) Green function method will be performed for particular systems: Au, Ag, Pt or Pd layers in contact with different DMSs.

- ***Ab-initio quantum chemistry studies of seleno-L-cysteine on coinage metal surfaces***

*Post-doctoral position; Reference: 2012/8.*
*Contact person: J. M. Ugalde (jesus.ugalde@ehu.es).*

Seleno-L-cysteine is a non-common amino acid belonging to the group of the chalcogen amino acids that has recently drawn attention for its capability of anchoring proteins to inorganic supports. The goal of this project is to gain novel information on the structural and binding properties of seleno-L-cysteine on metal surfaces, in particular silver and gold. The simulation of the adsorption of the amino acid will be treated with periodic density functional methods based on approximated GGA exchange correlation functionals. These calculations will be carried out to analyze all the physical and chemical aspects of these systems and the

results will be compared to the data available for the most common L-cysteine on equivalent surfaces. If time allows, several seleno-L-cysteine on a given surface can be studied at once, in order to provide evidence on the possibility to form self-assembled monolayers.

Candidates with a PhD degree in chemistry, physics or material science with experience in both periodic DFT techniques for coinage metal surfaces and ab-initio quantum mechanical treatment of cysteine or related substituted amino acids are encouraged to apply. (Knowledge of computing programming and experience in studies on Self-Assembled Monolayers are desirable but not mandatory.)

- ***Coupling of ferroic nanoscale films with interfacial two dimensional electron gases in oxides***

*Post-doctoral position; Reference: 2012/9.*
*Contact person: E. Artacho (e.artacho@nanogune.eu).*

The discovery of high-quality two-dimensional electron gases at the interface between a bulk perovskite oxide and a nanoscale film of another perovskite oxide generated much interested and research in what has become a new promising avenue for nanoelectronics. The host group has contributed to the elucidation of the origin of the electron gas and its properties. The main aim of this project is exploring the coupling of such electron gas with the ferroic properties (ferroelectric, ferroelastic, ferromagnetic) and possible combinations thereof (multiferroic) of thin films of appropriate materials. The possibility of switching on/off the gas and its conduction along the interface by the application of magnetic, electric or strain fields allows to foresee very large mageto-, electro-, and elasto-resistance couplings that could prove useful in nanotechnology. The thin-film materials will include organic materials, and a close collaboration with the experimental Nanodevices group at Nanogune is expected.

The candidate should have a PhD in physics, chemistry, or materials science and experience in the first principles simulation of solids based on density-functional theory. Previous experience in the simulation of oxide and/or ferroic materials will be highly valued.