

## Dynamical Aspects of Quantum Transport in Nanoelectronics

We announce the opening of a PhD position in theoretical physics, shared between the Theory group of Laboratoire Ondes et Matière d'Aquitaine (LOMA) from Bordeaux University and French CNRS, and the Theory and Simulation group of Nanoelectronics at the Donostia International Physics Center (DIPC) in San Sebastian, Spain.

The PhD student will have the opportunity to work in a collaborative and international environment, on an emergent research topic at the crossroads of molecular electronics, quantum transport, and nanomechanics. The project will be co-supervised by Fabio Pistolesi and Rémi Avriller from the Bordeaux University (<https://www.loma.cnrs.fr/equipe-quatems/>) and Thomas Frederiksen (<http://dipc.ehu.es/frederiksen/>) from DIPC.

In this PhD project, we plan to develop new theoretical and numerical tools to characterize and better understand electronic transport in nanoelectronic devices. The candidate will explore the rich physics underlying the coupling between the electronic current (electrons transmitted across a nano-device) and collective modes of atomic vibrations of the junction (phonons): this interaction leads to energy dissipation, heating of the junction, mechanical instabilities, and finally to the breakdown of the device. A global understanding of the dynamical aspects of this coupling is still lacking.

The PhD candidate will have the opportunity to learn and develop a combination of model calculations based on the use of nonequilibrium Green's functions (NEGF) and atomistic simulations based on density functional theory (DFT). He/she will develop new spectroscopic tools to gain information about the electronic structure, electron-phonon couplings, and heating effects of actual devices. We also aim at studying current-induced mechanical instabilities and self-oscillations with the goal to open new perspectives for the design and control of atomic dynamics in nanoelectronics.

We are seeking motivated candidates with a MSc degree in physics or related disciplines for the position, ideally with a strong background in condensed-matter and statistical physics as well as quantum mechanics. Candidates should preferentially have a taste for both analytical and numerical calculations, as well as good communication skills and English knowledge. The total duration of the thesis is 36 months. Mobility is required as the candidate will spend 18 months in each institution. The starting date is between 1 October and 15 December, 2016.

Interested candidates are invited to inquire more detailed information and to submit a CV, a motivation letter, and eventual reference letter(s) to one of the following researchers: Prof. Fabio Pistolesi ([Fabio.Pistolesi@u-bordeaux.fr](mailto:Fabio.Pistolesi@u-bordeaux.fr)), Dr. Rémi Avriller ([remi.avriller@u-bordeaux.fr](mailto:remi.avriller@u-bordeaux.fr)) and Prof. Thomas Frederiksen ([thomas\\_frederiksen@ehu.eus](mailto:thomas_frederiksen@ehu.eus)).

The deadline for applications is 10 June 2016.