2 years Post-Doctoral position on:
Optical spectroscopy of graphene quantum dots

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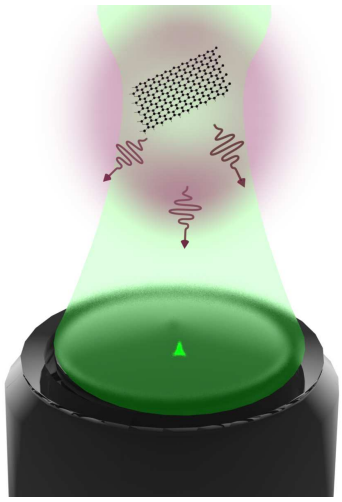
Topic:

Graphene quantum dots are new nano-objects made of hundreds of carbon atoms. These atoms can be arranged in various geometries leading to widespread properties. Their intermediate size between small molecules and solids makes them a perfect platform to test theoretical predictions both of quantum chemistry and condensed matter physics. However, accessing these potentialities requires performing experiments at the single object level.



Recently, our group reported such experiments for the first time [1]. In particular, we showed that graphene quantum dots emit single photons at room temperature with high brightness and good photostability. The goal of the present project is to address in-depth the intrinsic properties of these objects. For example, insights on electron-phonon coupling, emission statistics, many-body effects or intersystem crossing will allow adapting the properties of the graphene quantum dot to the aimed application in photonics, quantum optics, sensing, and biology. Also, the study of their photophysical properties, such as blinking and spectral diffusion, will provide a perfect tool for sensing of electrostatics environment at the nanoscale.

This postdoctoral project is developed in the framework of three grants at the local, national, and European level. It will benefit from the collaborations of our group with:

- Several groups specialized in the synthesis of graphene quantum dots by 'bottom-up' - chemistry. These collaborations are a strong asset as the control of the structure gives an ultimate control of the intrinsic properties of the object. To date, our group is working on samples at the international state of the art.
- Theory group.

To carry out this project, the candidate will use a microphotoluminescence setup working at cryogenic temperatures. The candidate must be motivated by experimental physics. He/She should have a strong background in one or more of the following topics: photonics, quantum optics, solid state-physics, physico-chemistry.

[1] S. Zhao *et al*, Nature Communications 9, 3470 (2018)