Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition :

Responsable du stage / *internship supervisor*:

Nom / *name*: Pr Lauret — Prénom/ *first name* : Jean-Sébastien

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Courriel / *mail*: lauret@ens-paris-saclay.fr

Nom du Laboratoire / *laboratory name*: Laboratoire Aimé Cotton

Code d'identification :UMR9188 — Organisme : CNRS/Paris Sud/ENS Paris-Saclay

Site Internet / *web site*: http://www.lac.u-psud.fr/spip.php?rubrique86

Adresse / *address:* bâtiment 505 campus d'Orsay 91405 ORsay cedex

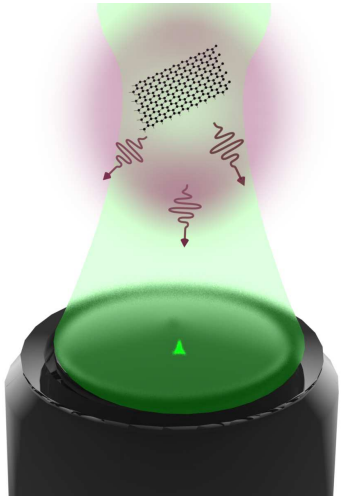
Lieu du stage / *internship place*: Laboratoire Aimé Cotton

Titre du stage / *internship title*: Optical spectroscopy of graphene quantum dots

Résumé / *summary*

Graphene quantum dots are new nano-objects made of hundreds of carbon atoms. These atoms can be arranged in various geometries leading to a wide spread of 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 this potentialities requires to perform 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 a high brightness and good photostability. The goal of the present internship/PhD 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, or biology. Similarly, the study of the blinking and spectral diffusion of the emitter will offer a unique way to probe its local environment. Thus, electrostatics environment can be characterized at the nanoscale .



This internship will benefit from the collaborations of the 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 on the intrinsic properties of the object. To date, our group is working on samples at the international state of the art.

To carry out the internship, the candidate will use a microphotoluminescence setup working at cryogenic temperatures. The candidate must be motivated by experimental physics. Good knowledge of some of the following topics: optics, quantum mechanics, statistical physics and solid state physics will be a plus.

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

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : YES**

Si oui, financement de thèse envisagé/ *financial support for the PhD***: CDSN, EDOM**

Lumière, Matière, Interactions	**X**	Lasers, Optique, Matière	**X**

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