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 : 30/10/2017

Responsable du stage / *internship supervisor*:

Nom / *name*:	Chassagneux	Prénom/ *first name* :	Yannick
Tél :	0144323845	Fax :	
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Nom du Laboratoire / *laboratory name*: Laboratoire Pierre Aigrain

Code d'identification : UMR8551 Organisme :Ecole Normale Supérieure

Site Internet / *web site*: www.lpa.ens.fr

Adresse / *address:* Ecole Normale Supérieure, 24 rue Lhomond, 75005 Paris

Lieu du stage / *internship place*: même adesse

Titre du stage / *internship title*: ***Sensing the structure of carbon nanotubes with light : a valorization project.***

Résumé / *summary*

In recent years, several research projects on carbon nanotubes in Laboratoire Pierre Aigrain have converged to the conclusion that ultraclean carbon nanotubes are the key to using them for quantum physics (Single photon sources, indistinguishable photons, quantum simulation). To this purpose a specific reactor has been developed to grow carbon nanotube of ultra high quality on micro-forks in order to avoid any contamination and for further dry transfer on devices. Nevertheless, a pending issue is to characterize the crystallographic structure of these nanotubes since the growth is non selective and since the electronic properties of the tube depend critically on this structure. In particular, in view of the future commercialization of ultra clean nanotubes for advanced applications, there is a critical need for a high throughput, non invasive characterization means. A method of choice relies on a combination of optical spectroscopies including broad-band Rayleigh spectroscopy and Raman spectroscopy. The former gives access to the band edge optical transitions and the latter to the diameter of the tube together with its nature (semi-conducting or metallic). The combination of these two techniques allows, in principle, a reliable identification of the (n,m) chiral indices that determine entirely the crystal structure of the nanotube.

The goal of the internship is to develop the Rayleigh spectroscopy setup based on a supercontinuum laser (already available) and a polarization sensitive microscopy approach (Raman spectroscopy is already operational). It will be conducted in collaboration with the clean room staff (Michael Rosticher, Jose Palomo, Aurélie Pierret) as regards the growth of nanotubes and Raman, and with the HQC group (T. Kontos).

This internship can possibly be extended in a PhD project either on the same topic or on a related topic on the diffusion of excitons along the nanotube axis and their trapping in unintentional defects.

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***: Ecole Doctorale**

Lumière, Matière, Interactions	**yes**	Lasers, Optique, Matière	**yes**	

*Fiche à transmettre (fichier pdf **obligatoirement**) sur le site http://stages.master-omp.fr*