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 : 23/10/2017

Responsable du stage */ internship supervisor*: Yannick Chassagneux

Nom / *name*:	Chassagneux	Prénom/ *first name* :	Yannick
Tél :	0144323845	Fax :	
Courriel / *mail*:	Yannick.chassagneux@lpa.Ens.fr		

Nom du Laboratoire / *laboratory name*: Laboratoire Pierre Aigrain

Code d'identification : ULR 8551 Organisme :ENS

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

Adresse / *address:* 24 rue Lhomond, 75005 Paris

Lieu du stage / *internship place*: 24 rue Lhomond, 75005 Paris

Titre du stage / *internship title*: **Cavity Quantum Optics with emerging nano-emitters**

Résumé / *summary*

One decisive feature for quantum cryptography application in the real world, would be the ability to have a room temperature, on demand single photon source, and emitting in the telecom bands. The most advanced systems in this field (epitaxial quantum dots and color defect in diamond) do not match all those requirements and some of these limitation will be almost impossible to tackle. Emerging new actors in the quantum optics field like Carbon nanotubes, Perovskite quantum dots and graphene quantum dots can make up valuable alternative route. We propose to embed these emerging single emitters in a small mode volume cavity, that will strongly increase their performances, and force the emitter to emit in the cavity mode through the so called Purcell effect, the first of the quantum electrodynamical effect. The cavity will be made of two dielectric mirrors. A flat and cm-wide mirror will be used in the same time as a substrate for the emitter and as back mirror of the cavity. A coated concave depression will be fabricated on the tip of a fiber and serve as the second cavity mirror. These fibered cavity have the main advantage to be completely tunable since lateral displacement of the fibered mirror is used for spatial matching with the emitter, whereas perpendicular translation can change the cavity resonant frequency and make it spectrally tunable. Cavities are not only desirable to improve emitters performance through the Purcell effect, but they can also be used as a highly performant spectroscopic tool. As an example, through multiple light pass, absorption of single emitter is strongly enhanced and allows to gain comprehension of these structure.

A new setup will be developed during the internship, building on the know-how of the team for such techniques.

The student must have a strong backgroung in quantum optics, solid state physics and experimental optics and a strong motivation for experimental work.

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

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

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

Lumière, Matière, Interactions	**oui**	Lasers, Optique, Matière	**oui**

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