Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : 22/10/2012

Responsable du stage / *internship supervisor*:

Nom / *name*:	Bramati	Prénom/ *first name* :	Alberto
Tél :	01 44 27 43 93	Fax : 01 44 27 38 45	
Courriel / *mail*:	bramati@spectro.jussieu.fr		

Nom du Laboratoire / *laboratory name*: Kastler Brossel

Code d'identification : UMR 8552 Organisme : ENS, UPMC, CNRS

Site Internet / *web site*: http://www.spectro.jussieu.fr/

Adresse / *address:* 4, place Jussieu

Lieu du stage / *internship place*: Campus Jussieu

Titre du stage / *internship title*: **Single photon sources for quantum information**

The first single photon sources appeared in the mid 80s and since then they have continued to develop and diversify. There are many types of single photon sources: isolated atoms, atoms coupled with optical cavities, single molecules, quantum dots and defects in crystalline media such like NV centers in diamond.

Despite a significant improvement in their effectiveness, their use in the context of quantum information requires an extra effort to obtain photons in perfectly controlled quantum states.

Our research focuses on the development of a new type of nano-sources very promising for quantum information, based on semiconductor nanocrystals synthesized by wet-chemistry techniques. These nano-particles, due to the extreme confinement of the charges have discrete energy levels and can emit single photons at room temperature.

The specificity of the nanocrystals studied in our laboratory is constituted by their shape: they are CdSe nano-rods with a spherical core in CdS. We have recently shown that they emit single photons strongly polarized with a very high linear polarization degree (> 85%)[1].

During the internship, the candidate will study the coherence time of the emitted photons, measured using an interferometric set-up, first both at room and cryogenic temperature to assess the feasibility of an experiment of photon coalescence.

The performance of these non-classical sources will be characterized during the internship in terms of quantum efficiency, emission and collection rates, coherence time, spectral purity, value of the autocorrelation function in order to determine the best samples to perform Quantum Information experiments.

In conclusion, the internship will be carried out in the framework of nanophotonics and is aimed to the experimental study of a new class of single photon sources based on semiconductors for quantum information applications.

[1] F. Pisanello et al., Appl. Phys. Lett. 96, 033101 (2010)

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*:**NO**

Lasers et matière	**X**	Lumière, Matière : Mesures Extrêmes	**X**
Optique de la science à la technologie	**X**	Plasmas : de l'espace au laboratoire	

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