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 : 8 novembre 2018

Responsable du stage / *internship supervisor*:			
Nom / *name*:	Lounis/Trebbia	Prénom/ *first name* :	Brahim/J.-Baptiste
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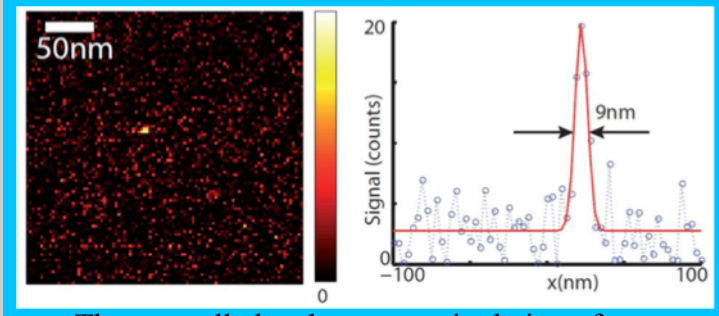
Courriel/*mail*	jean-baptiste.trebbia@institutoptique.fr		
Nom du Laboratoire / *laboratory name*: Laboratoire Photonique Numérique et Nanosciences			
Code d'identification : UMR 5298		Organisme : Institut d'Optique Graduate School	
Site Internet / *web site*: https://sites.google.com/site/bordeauxnanophotonicsgroup/home			
Adresse / *address:* 1 rue François Mitterrand, 33400 Talence			
Lieu du stage / *internship place*: LP2N			

Titre du stage / *internship title*: **Coherent dipole-dipole coupling of single molecules at low temperatures**



The controlled, coherent manipulation of quantum systems is an important challenge in modern science, with significant applications in quantum technologies. Solid-state quantum emitters such as single molecules, quantum dots and defect centers in diamond are promising candidates for the realization of quantum bits and quantum networks. Because coupling mechanisms such as dipole–dipole or tunneling occur on a nanometer scale, it is crucial to develop experimental schemes that optically resolve quantum emitters at this scale and allow the manipulation of their degree of entanglement. Recently, we introduced a simple super-resolution optical nanoscopy method operating at cryogenic temperatures and achieved a sub 10-nm far-field optical resolution. We propose to use this technique to reveal the rich space-frequency signatures of coherent coupled quantum emitters and manipulate on demand their degree of entanglement.

The formation of collective quantum states from coupled optical emitters being a general phenomenon, these experimental schemes can also be useful for the study of many other systems including light harvesting complexes polymer conjugates, quantum dots molecules and hybrid systems.

Quelques références du groupe :

[1] A solid state source of photon triplets based on quantum dot molecules, Nature Comm. 8 (2017) 15716.
[2] Optical Manipulation of Single Flux Quanta, Nature Comm. 7 (2016) 12801.
[3] Optical Nanoscopy with Excited State Saturation at Liquid Helium Temperatures, Nature Photonics, 9 (2015) 658-662.
[4] Indistinguishable near-infrared single photons from an individual organic molecule, PRA 82 (2010) 063803.

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***: EUR**

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

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