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 : 4 décembre 2016

Responsable du stage / *internship supervisor*:			
Nom / *name*:	PONS / FRAGOLA	Prénom/ *first name* :	Thomas / Alexandra
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Nom du Laboratoire / *laboratory name*: Laboratoire Physique et Etude de Matériaux LPEM			
Code d'identification : UMR 8213		Organisme : ESPCI, CNRS, UPMC	
Site Internet / *web site*: https://www.lpem.espci.fr			
Adresse / *address:* ESPCI, 10 rue Vuaquelin 75005 Paris			
Lieu du stage / *internship place*: ESPCI			

Titre du stage / *internship title*: Multicolor superresolution imaging of synaptic plasticity using fluorescent quantum dots.

Résumé / *summary*

Neuronal plasticity, by modifying synaptic function is one of the fundamental aspects of development, cognitive function, learning and memory and is affected in several neuronal disorders. The underlying mechanisms of synaptic strength changes include changes in receptor numbers and/or changes in vesicle machinery and Ca2+ flux. Recently, changes in the morphology of the synapse due to cytoskeletal modifications have been recognized as a possible additional mechanism, but remain poorly understood due to the lack of appropriate imaging techniques. Recently we demonstrated the use of fluorescent nanocrystals (quantum dots) with high brigthness and photostability to reconstruct the synaptic 3D shape in live neurons with a resolution of a few tens of nm using a novel superresolution reconstruction microscopy modality. This paves the way to elucidating the role of membrane deformation on synaptic plasticity. Here, we propose to develop the multicolor capability of this technique to enable simultaneous tracking of membrane neuronal receptors and synaptic vesicles.

During this internship the student will design and realize a spectro-imager allowing to simultaneously localize and spectrally discriminate single fluorescent emitters, with a high spatial and temporal resolution. Using a grating to disperse fluorescence wavelengths before detection, this setup will enable to distinguish between 4 different fluorescence probes. The student will then develop the image analysis needed to identify emission colors and localize individual QD markers with a 20 nm resolution. Finally, in collaboration with Diana Zala (Neurobiology laboratory at ESPCI), the student will apply this imaging modality to track synaptic quantum dots in real time during activation of cannabinoid receptors in living neurons.

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

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

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

Lumière, Matière, Interactions	**x**	Lasers, Optique, Matière	**x**

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