

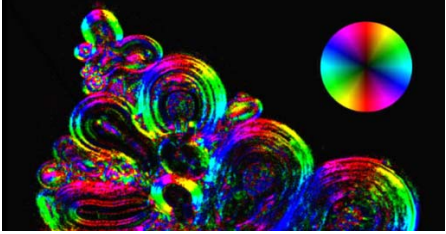
Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : October 2015

Responsables du stage / internship supervisors:			
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Nom du Laboratoire / laboratory name:			
Code d'identification :	LOB	Organisme :	Polytechnique - CNRS - Inserm
Site Internet / web site:	www.lob.polytechnique.edu		
Adresse / address:	Ecole Polytechnique, 91128 Palaiseau		
Lieu du stage / internship place:	Ecole Polytechnique		

Titre du stage / internship title: Nonlinear microscopy of nervous tissue: multiparametric and polarization-based imaging	
Keywords : nonlinear optics, microscopy, polarization, imaging, tissues, metabolism	
	<p>Nonlinear optical (or multiphoton) microscopy makes it possible to study intact biological tissues in 3D over depths of a few hundreds of micrometers. With this unique capability, it is possible to study complex biological processes such as the development and physiology of biological tissues (embryo, skin, brain) with sub-cellular resolution. Our laboratory develops original microscopy methods dedicated to the study of intact tissues.</p> <p>The goal of this project is to develop new imaging methods to monitor simultaneously cell metabolism and lipid physiology in nervous and brain tissue.</p> <p>During the M2 internship, the work will focus on optimizing advanced contrast modes of nonlinear optical microscopy. These developments will be implemented on an existing microscope equipped with a dual femtosecond laser source, providing multi-contrast imaging capability for tissue imaging (two-photon fluorescence, harmonic generation, fluorescence lifetime, etc.).</p> <p>The PhD work will consist of a methodological and an applicative part. The objectives can be adapted to the motivations and interests of the candidate.</p> <p>From a methodological perspective, two important aims are:</p> <ul style="list-style-type: none">(*) to develop advanced beam and polarization shaping approaches for enhancing the sensitivity of third-harmonic generation (THG) imaging, a technique developed at LOB for imaging organized biological media.(*) to implement efficient approaches for combining lipid and fluorescence-based metabolic imaging in tissue. <p>On the application side, these developments will be used to gain a better understanding of (de)regulation mechanisms in pathologies involving metabolic disorders.</p> <p>Context: The work will take place in the «Nonlinear microscopy of tissues» pole of the Lab for Optics and Biosciences at Ecole Polytechnique (LOB). Our team has an internationally acknowledged expertise in the field of multiphoton microscopies and their application to dynamic imaging of biological tissues. Work will be performed within an active local research group, and through an established network of biomedical collaborations (Brain Institute Paris, IB-ENS, etc). The project will involve nonlinear optics, numerical simulations, image processing, and manipulation of biological samples.</p>
Some related references:	
www.lob.polytechnique.fr/home/research/advanced-microscopies-and-tissue-physiology/nonlinear-microscopy-and-tissue-morphogenesis/	
Zimmerley, Phys Rev X (2013); Stringari, Cell Reports 10 (2015); Chang, Biomaterials 34, 8607 (2013); Mahou, Nature Methods 9, 815 (2012).	

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: ANR			
Lasers, Optique, Matière	<input checked="" type="checkbox"/>	Lumière, Matière, Interactions	<input checked="" type="checkbox"/>
Plasmas : de l'espace au laboratoire	<input type="checkbox"/>		<input type="checkbox"/>

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