

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 :

Responsable du stage / internship supervisor:			
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Code d'identification : UMR 8501		Organisme : IOGS/CNRS/UPSud	
Site Internet / web site: http://www.lcf.institutoptique.fr/Groupes-de-recherche/Biophotonique			
Adresse / address: 2 avenue Fresnel, 91127 Palaiseau Cedex			
Lieu du stage / internship place: Institut d'Optique, Palaiseau			

Titre du stage / internship title: Protein synthesis study using fluorescence microscopy
Résumé / summary Protein synthesis is a fundamental cellular process. This function is performed by a molecular motor, the ribosome, which structure has been elucidated in the early 2000s (see 2009 Nobel prize in Chemistry). However the dynamics of this motor still remains a mystery in many respects, involved in processes as diverse as antibiotics efficiency, virus replication or genetic diseases associated with the defective synthesis of certain proteins. Single molecule studies using fluorescence microscopy have already brought new insight on the dynamics of prokaryotic ribosomes, but to this day very few results have been published on eukaryotic ribosomes, which are more complex. We have developed a fluorescence microscopy setup based on total internal reflection, designed for the study of individual ribosome dynamics. We carry out studies both on the prokaryotic ribosome, in collaboration with the CGM laboratory in Gif/Yvette, and on eukaryotic ribosomes, in collaboration with the Institute for Genetics and Microbiology (IGM) at the Université Paris-Sud. With the IGM team, we are particularly interested in the « termination » process, when the ribosome reaches the stop codon on messenger RNA (mRNA), and consequently terminates the synthesis of the protein. In this master project, the goal is to improve the quality of the fluorescence signals associated with the motion of the ribosome along the mRNA. In our method, the ribosome unzips a short fluorescent RNA strand, thus leading to the disappearance of a fluorescent spot. This process competes with photobleaching of the fluorophore under illumination. Several strategies are under study : accelerating the ribosome motion or slowing down photobleaching by photochemical action on the fluorophore. Changing the translation system is also envisaged, using human HeLa cells, in order to benefit from an environment more favorable to the lifetime of our fluorophores. In the scope of the PhD project, we are looking for a student with a background in physics, who will work jointly with a PhD student in biology from the IGM team who started in october 2012. Understanding the biological objectives will be necessary to contribute efficiently to this type of interdisciplinary project.

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: Bourses de l'Ecole Doctorale Ondes et Matière (EDOM, n°288) + appels d'offres spécifiques de l'Université Paris Sud et de l'IDEX Paris Saclay pour les sujets interdisciplinaires.			
Lasers et matière	x	Lumière, Matière : Mesures Extrêmes	x
Optique de la science à la technologie	x	Plasmas : de l'espace au laboratoire	