

# Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 mois minimum, à partir de début mars 2012)

## Proposition de stage pour l'année 2011-2012 (ne pas dépasser 1 page)

Date de la proposition : 03 octobre 2011

<b>Responsable du stage / internship supervisor:</b>			
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Code d'identification :	UMR 6133	Organisme :	CNRS / Aix Marseille Université
Site Internet / web site:	http://www.fresnel.fr/spip/		
Adresse / address:	domaine universitaire de Saint-Jérôme, 13397 Marseille cedex 20		
Lieu du stage / internship place:	Institut Fresnel		

<b>Titre du stage / internship title:</b> <b>Detection of single DNA strands by the combination of phase imaging and optical resonators</b>
Résumé / summary
<p>Recently, our group has developed a quantitative phase microscopy technique aiming at measuring phase distributions of living organisms like individual cells from single shot acquisitions [1]. The basic idea of the system was to plug a wavefront sensor (SID4Bio, Phasics SA, Palaiseau, France) on a microscope to record the distorted wavefront (due to the sample) on its image plane. The current sensitivity of the technique, developed in our group in close collaboration with Phasics Company, is 1 nanometer for the optical path difference between the measured objet and its environment.</p> <p>We would like to see now much thinner structures presenting sub-nanometer optical path, as single DNA strands deposited on a substrate. For that purpose, we propose to insert the sample inside a resonator presenting a high quality factor, in order to give us the benefit of the high number of times the light crosses the sample in such a structure. In a first step, the selected applicant will determine the sensitivity of the original technique with respect to the quality factor of the resonator. Then optimization of the system will be performed in order to reach the target application, i.e. detect single DNA strands. This last part of the work should be done with Dr. Erwin Peterman (Vrije Universiteit Amsterdam) who could initiate a formal scientific collaboration with our group in case of successful single DNA detection.</p>
<b>Links :</b> <a href="http://www.fresnel.fr/mosaic">www.fresnel.fr/mosaic</a> <a href="http://www.phasicscorp.com">www.phasicscorp.com</a>
<b>Publications :</b> [1] P. Bon, G. Maucort, B. Wattelier, S. Monneret, "Quadriwave lateral shearing interferometry for quantitative phase microscopy of living cells", Optics Express <b>17</b> (15), 13080-13094 (2009).
<b>Toutes les rubriques ci-dessous doivent obligatoirement être remplies</b>

<b>Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : oui</b>			
<b>Si oui, financement de thèse envisagé/ financial support for the PhD: non déterminé</b>			
Lasers et matière		Lumière, Matière : Mesures Extrêmes	
Optique de la science à la technologie		Plasmas : de l'espace au laboratoire	

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