

# 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 :

|  |                                   |                      |                 |
|--|-----------------------------------|----------------------|-----------------|
| <b>Responsable du stage / internship supervisor:</b>   |                                   |                      |                 |
| Nom / name:  | PERRONET                          | Prénom/ first name : | Karen           |
| Tél :  | 0164533348                        | Fax :                |                 |
| Courriel / mail:   | karen.perronet@institutoptique.fr |                      |                 |
| <b>Nom du Laboratoire / laboratory name:</b> Laboratoire Charles Fabry, Institut d'Optique   |                                   |                      |                 |
| Code d'identification :  | UMR 8501                          | Organisme :          | IOGS/CNRS/UPSud |
| Site Internet / web site: <a href="http://www.lcf.institutoptique.fr/Groupes-de-recherche/Biophotonique">www.lcf.institutoptique.fr/Groupes-de-recherche/Biophotonique</a> |                                   |                      |                 |
| Adresse / address: 2 avenue Fresnel, 91127 Palaiseau Cedex   |                                   |                      |                 |
| Lieu du stage / internship place: Institut d'Optique, Palaiseau  |                                   |                      |                 |

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| <b>Titre du stage / internship title:</b> <b>Study of the mechanical properties of endothelial cells using optical tweezers</b>  |
| Résumé / summary   |
| <p>The mechanical properties of cells have a significant impact on their functions. For example, endothelial cells covering our arteries can be damaged because of the forces due to blood flow and lead to diseases such as atherosclerosis.</p> <p>In our laboratory, we seek to understand how the force exerted on the outer membrane of these cells is transmitted to the nucleus. Indeed, an abnormal deformation of the nucleus is a path to the disease. In order to apply controlled forces, we use the technique of optical tweezers. With a highly focused laser beam, we can manipulate micron-sized beads attached to specific proteins of the extracellular membrane. Then, by phase contrast microscopy, we can observe the deformations of the cell under the effect of this well controlled force.</p> <p>In this master project, the student will develop an oscillating trap to measure the local rheological properties of the cellular matrix. He/she will evaluate the deterioration of these properties if the cell does not express specific proteins, which are involved in the transmission of the external force to the cell nucleus.</p> <p>This project will be done in the framework of a collaboration between our "Single Molecule Biophysics" team at Institut d'Optique and the team of Abdul Barakat, holder of the AXA chair of cardiovascular cell engineering in the LadHyX laboratory at Ecole Polytechnique.</p> <p>It may be followed by a thesis with either AXA funding or funding from the Ecole doctorale Ondes et Matière (EDOM / ED n°288).</p> |

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| <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:</b> bourse de la fondation AXA ou bourse de l'Ecole doctorale Ondes et Matière (EDOM / ED n°288). |

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|--|---|--------------------------------------|---|
| Lasers et matière                      | x | Lumière, Matière : Mesures Extrêmes  | x |
| Optique de la science à la technologie | x | Plasmas : de l'espace au laboratoire |   |