

Spécialité de Master « Optique, Matière, Paris »

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

Proposition de stage

Date de la proposition : 09.12.2018

Responsable du stage / internship supervisor:		
Nom / name:	Fillion	Prénom/ first name : Jean-Hugues
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Nom du Laboratoire / laboratory name: LERMA		
Code d'identification :	UMR 8112	Organisme : CNRS-Sorbonne Université- Observatoire de Paris

Site Internet / web site: <http://lerma.obspm.fr/spip.php?article47>

Adresse / address: 4 place Jussieu, 3, Paris 5eme

Lieu du stage / internship place: Campus Pierre et marie Curie (Jussieu), Tour 32-32, 3^{ème} étage

Titre du stage / internship title: Photon Stimulated Desorption from Cold Surfaces

UV Photon Stimulated Desorption of neutral and ionic species from cold surfaces is playing an important role in astrophysics media and in cryogenic parts of accelerators, such as the superconducting magnets of the Large Hadron Collider (LHC) at CERN or in use at synchrotron radiation facilities. Modeling this process needs to be supported by fundamental studies in the laboratory. Experimental investigations at LERMA are performed within a new ultrahigh-vacuum analysis chamber ("SPICES 2"), where thin molecular films can be grown on various surfaces (graphite, Au, technical surface NEG) and irradiated in the Vacuum-Ultra-Violet (VUV) energy range ($\lambda < 200$ nm) thanks to two kinds of monochromatic sources : tunable state-of-the-art synchrotron beam line or pulsed tunable lasers.

The student will perform two-color pulsed laser beams experiment. A first VUV laser beam produced by frequency tripling or difference frequency mixing from dye lasers will be focused on the cold surface at selected energies to induced the molecular desorption. A second laser beam generated from an OPO tunable laser (201– 1750 nm) will be focused in front of the surface with the aim to characterize the quantum states of molecules that are ejected from a cold surface (T=10 K). Analysis through Resonance Enhanced Multiphoton Ionisation (REMPI) spectroscopy will be made, coupled to kinetic energy resolved mass spectrometry and velocity map imaging (VMI) techniques. Depending on the timetable, an important part of the work might be devoted a measurement campaign on the SEXTANTS beamline at the French synchrotron facility SOLEIL (St Aubin). In this case, the whole experiment will be transported to SOLEIL for recording photon stimulated desorption spectra in the soft X-ray range.

During the internship, the student will be part of a team leading state-of-the-art laboratory astrophysics experiments optimized for light-matter interaction studies. The aim is to provide fundamental knowledge needed for the development of astrophysical models of star and planet-forming regions, and intimately linked with the central question of the origin of the molecular richness and chemistry in space. The student will be involved in an important international collaborative framework, including researchers from UK, Swiss and Italy with whom the scientific host team actively collaborates.

The training will be supervised by Jean-Hugues Fillion and Mathieu Bertin.

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:

Lumière, Matière, Interactions	X	Lasers, Optique, Matière	X
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