

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 : 3 octobre 2013

Responsable du stage / internship supervisor:			
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Nom du Laboratoire / laboratory name: LULI			
Code d'identification :	UMR7605	Organisme :	CNRS
Site Internet / web site:	http://www.luli.polytechnique.fr		
Adresse / address:	Ecole Polytechnique, 91128 Palaiseau Cedex		
Lieu du stage / internship place:	luli		

Titre du stage / internship title: Astrophysique de laboratoire: Processus radiatifs dans les systèmes binaires
Résumé / summary
<p>High energy density physics (HEDP) in the laboratory is a new field that emerged in the last two decades thanks to the development of pulsed, high-energy/high power laser facilities. On high power laser facilities, macroscopic volumes of matter can be created under astrophysically relevant conditions and their properties measured. Examples of processes and issues that can be experimentally addressed include strong shocks, radiative flows, hydrodynamic instabilities, magnetohydrodynamic turbulence, radiative shocks, high Mach number jets and outflows, equations of state of highly compressed matter, complex opacities, photoionized plasmas etc. In this project, we aim to study some particular astrophysical situations where strong radiation occurs which concerns in fact all processes of born and death of stars. Understanding the physical properties of radiative shock waves is fundamental since they are at the basis of the interpretation of several astronomical observations.</p> <p>In this context, the PHYHDEL group from LULI is a world pioneer as proved by recent awards of PhD students (EPS plasma, SFP Plasma, ...). We opened several new topics such as radiative shocks in supernovae, young star jets collimation, accretion phenomena in binary systems, magnetic field generation in protogalactic systems, ...</p> <p>The present project will consists in several different tasks that will show the student the variety of works to be performed in this new domain of physics. First the student will participate to a large international experiment to be held in march on the new laser in UK: ORION (http://www.awe.co.uk/set/Orion.html). This experiment will concern accretion phenomena in highly magnetised binary systems. The idea is to generate a highly collimated flow that will impact an obstacle that mimic a white dwarf atmosphere. Then, the time will be to analyse the data, with existing tools at LULI or developing new ones if necessary. Finally laboratory astrophysics is a perfect way to benchmark radiative 2D-3D hydrodynamic codes that not only reproduce laser experiments but also are dedicated to astrophysics situations. This is why, we do use a widely developed code, in the astrophysics community, (FLASH) from U. of Chicago that can combine perfectly both aspects. This project is also part of a large consortium that will soon come out with expected experiments on the OMEGA laser (Rochester) to prepare full energy NIF experiments.</p>
Toutes les rubriques ci-dessous doivent obligatoirement être remplies

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: etude doctorale - cea			
Lasers, Optique, Matière	x	Lumière, Matière : Mesures Extrêmes	x
Plasmas : de l'espace au laboratoire	x		

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