Spécialité de Master « Optique, Matière, Paris »

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*:

Nom / *name*: Fuchs — Prénom/ *first name* : Julien

Tél : : 01 69 33 54 07 — Fax :

Courriel / *mail*:
julien.fuchs@polytechnique.fr

Nom du Laboratoire / *laboratory name*: ratoire pour l'Utilisation des Lasers Intenses (LULI)

Code d'identification :UMR7605 — Organisme :CNRS

Site Internet / *web site*: https://portail.polytechnique.edu/luli/fr/personnel/equipes-de-recherche/equipe-sources-de-particules-rayonnement-intenses

Adresse / *address:* Ecole Polytechnique, Palaiseau

Lieu du stage / *internship place*: sur place+déplacement pour expériences

Titre du stage / *internship title*: Investigation of high-power laser propagation in a magnetized plasmas.

Résumé / *summary*

In magnetised plasmas having typical millimetric dimensions and temperature about 100 eV, electrons and ions will be strongly magnetized; thus, one can expect that high-power laser coupling to the plasma, and the associated instabilities and heat deposition, will be modified. Our group has extensive experience in investigating, in unmagnetized, hot, low-density plasma [M. Nakatsutsumi et al., Nat. Phys. 6, 1010 (2010)], laser propagation using one or two, well-controlled laser beams (there are many such small-scale beams within the large-energy laser beams used at fusion facilities such as LMJ).

The proposed project will aim at investigating this topic in long-scale length low-density plasmas to mimic the gas-filled interior of the fusion target and with external magnetic field applied. Setting aside ionization changes in the plasma that involves precise atomic physics, laser propagation in plasmas depends mainly on the local electron temperatures and densities that can trigger instabilities such as self-focusing and stimulated scattering off plasma waves.

The motivation here is that magnetizing the low-density plasmas where the laser propagate could reduce the growth of those nefarious instabilities that are triggered at the laser intensities used in ICF experiments, hence helping to maintain stable laser propagation up to the target.

To investigate this, the work proposed during the internship will be to analyse data acquired during an experiment already performed at LULI, and to perform simulations using the HERA code, of CEA, of laser-plasma propagation, which also integrates external magnetic fields.

The project is intended for a PhD as well, with experiments to be performed at LULI, or other facilities we have access to, using diagnostics such as Thomson scattering and optical interferometry, as well as scattered light resulting from non-linear coupling. The project will aim at analysing laser propagation and coupling between the two neighbor laser beams. The project will take in partnership with CEA-DAM, France.

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*:
bourse ouverte au concours

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

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