

# 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 : 26/11/2017

<b>Responsable du stage / internship supervisor :</b>	
Nom / name : CORDE	Prénom/ first name : Sébastien
Tél : +33 1 69 31 97 10	Courriel / mail : sebastien.corde@polytechnique.edu
<b>Nom du Laboratoire / laboratory name :</b> Laboratoire d'Optique Appliquée (LOA)	
Code d'identification : 7639	Organisme : Ecole Polytechnique
Site Internet / web site : <a href="http://loa.ensta-paristech.fr/">http://loa.ensta-paristech.fr/</a>	
Adresse / address : 181 Chemin de la Hunière, 91120 Palaiseau, France	
Lieu du stage / internship place : Ecole Polytechnique Campus	

<b>Titre du stage / internship title:</b> <b>Developing miniature beam-driven plasma accelerators powered by laser-accelerated electrons</b>
<b>Résumé / summary</b> <p>As we push the frontier of particle physics to higher particle energies, conventional accelerator techniques are attaining their limits and new concepts are emerging. The use of an ionized gas—or plasma—circumvents the most significant barrier of conventional techniques by increasing the energy gained per unit length by several orders of magnitude. One class of plasma accelerators, relevant for high energy physics applications, consists in using a particle beam, « the driver », to excite a plasma wave, that is then used to accelerate the main particle beam [1-4]. Research in this field requires large facilities, due to stringent conditions on the driver. The goal of the internship will be to demonstrate that one can power a beam-driven plasma accelerator with laser-accelerated electron beams based on 100-TW-class laser systems, so as to miniaturize the so-called “beam-driven plasma accelerators”. The project will be at the interface between the fields of research of laser acceleration and of beam-driven plasma acceleration. During the internship, the student will work at Laboratoire d'Optique Appliquée on the preparation and realization of an experiment aiming at a proof-of-principle demonstration of a beam-driven plasma accelerator powered by laser-accelerated electrons. In particular, the goal will be to be able to take optical snapshots of the plasma wave driven by the laser-accelerated electron beams, as well as to perform Faraday measurement of the magnetic field of the plasma wave and of the electron beam.</p> <p>It is strongly preferred that the internship be pursued by a PhD. Both the internship and the PhD will be part of a recently obtained ERC project (Starting Grant from the European Research Council). In addition to the usual financial support for the PhD from the graduate school or the laboratory, the student will have a complementary salary funded by the ERC grant.</p> <p>[1] I. Blumenfeld et al., Nature 445, 741 (2007) [2] M. Litos et al., Nature 515, 92 (2014) [3] S. Corde et al., Nature 524, 442 (2015) [4] A. Doche et al., Scientific Reports 7, 14180 (2017)</p>
 
<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 ? : Yes</b>			
<b>Si oui, financement de thèse envisagé/ financial support for the PhD: The PhD can be funded by the laboratory or the graduate school and the PhD student will have a complementary salary funded by the ERC grant.</b>			
Lumière, Matière, Interactions	<b>YES</b>	Lasers, Optique, Matière	<b>YES</b>

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