

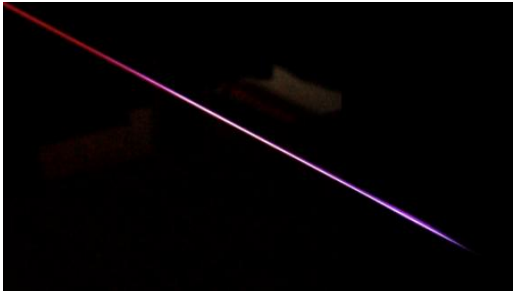
Spécialité de Master « Optique, Matière, Paris »

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

Proposition de stage

Date de la proposition : 15 octobre 2015

Responsable du stage / internship supervisor:		
Nom / name:	Liu	Prénom/ first name : Yi
Tél :	01 69 31 97 13	Fax :
Courriel / mail:	yi.liu@ensta-paristech.fr	
Nom du Laboratoire / laboratory name:		
Code d'identification :	UMR7639	Organisme : ENSTA, Ecole Polytechnique, CNRS
Site Internet / web site:	http://loa.ensta-paristech.fr/ilm/	
Adresse / address:	LOA, ENSTA, Chemin de la Hunière, 91762 Palaiseau	
Lieu du stage / internship place:	LOA	

Titre du stage / internship title: Lasing action from air plasma
Résumé / summary Air turns into an optically amplifying medium under excitation by intense ultrashort laser pulses. This free-space “air laser” is potentially capable to generate backward and forward laser radiation remotely in the sky, and revolutionize the current technique of remote sensing in atmosphere. Our group has recently demonstrated a new scheme to achieve backward lasing from air plasma filament using circularly polarized 800 nm femtosecond pulses.

<i>Image of a 1 meter long plasma filament generated in air by 10 mJ, 50 fs laser pulse</i>
The PhD student is expected to participate in a series of research activities in order to clarify the fundamental mechanisms involved in the lasing actions of neutral nitrogen molecule and the nitrogen molecular ions. The second step is to search for the optimal operational conditions for the backward nitrogen laser and improve its properties such as pulse energy and divergence. Finally, applications of this air laser will be demonstrated in standoff sensing of air pollutants and electric field.
Required background of the student: Optics, notion on plasma physics or spectroscopy.
Representative publications of the group: <ol style="list-style-type: none">1. S. Mitryukovskiy, Y. Liu, P. J. Ding, A. Houard, A. Mysyrowicz, Backward stimulated radiation from filaments in nitrogen gas and air pumped by circularly polarized 800 nm femtosecond laser pulses, <i>Opt. Express</i> 22, 12750 (2014).2. P. Ding, S. Mitryukovskiy, A. Houard, E. Oliva, A. Couairon, A. Mysyrowicz and Y. Liu, Backward Lasing of Air plasma pumped by Circularly polarized femtosecond pulses for the sake of remote sensing, <i>Optics Express</i> 22, 29964 (2014).3. S. Mitryukovskiy, Y. Liu, P. Ding, A. Houard, A. Couairon, and A. Mysyrowicz, Plasma luminescence from femtosecond filaments in air: evidence for impact excitation with circularly polarized light pulses, <i>Phys. Rev. Lett.</i> 114, 063003 (2015).4. Y. Liu, P. Ding, G. Lambert, A. Houard, V. Tikhonchuk, and A. Mysyrowicz, Recollision induced superradiance of ionized nitrogen molecules, <i>Phys. Rev. Lett.</i> 115, 133203 (2015)

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 ministérielle à l'EDOM			
Lumière, Matière, Interactions	X	Lasers, Optique, Matière	X