M2 INTERNSHIP PROPOSAL

Laboratory name: Laboratoire de Physique des Plamas
CNRS identification code: UMR7648
Internship director'surname: STARIKOVSKAIA and BENABID
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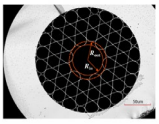
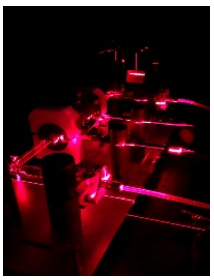
Internship location: PALAISEAU

Thesis possibility after internship: **YES**/NO
Funding: to get If YES, which type of funding: by Doctoral School competition

Hollow-coRE fiber absorption SpectroscOpy (HCF-AS) for miniatUre pRobing of small densities of IR-absorbing speCiEs (RESOURCE)

In different fields of science optical diagnostics is challenging because of small opical distance or low absorption coefficient. The aim of the suggested RESOURCE project is to develop a device for a miniature probing spectroscopy technique using hollow-core fibers (HCFs). Work supported by Energy for Climate (E4C) Center of Institut Polytechnique de Paris in 2025, provided a proof of concept, illustrating the possibility to develop a hollow-core fiber spectroscopy technique for miniature probing of plasma-produced species. The experiment on fiber-enhanced Raman spectroscopy has been performed in collaboration with group of David PAI (LPP). The aim of the Master thesis will be (i) to develop the scheme of the prototype of the micro-spectrometer; (ii) to learn how to sample for the conditions of air pollution sampling and for the conditions of plasma experiment; (iii) to make a list of the component to buy with the aim to build a prototype of the HCF spectrometer and to demonstrate a principal possibility of further development of the technique (PhD Thesis).
This work is in collaboration with two laboratories:
(i) GPPMM Group, XLIM Research Institute, Limoges develops and produces hollow cofe fibers of a new generation;
(ii) Aeronautics and Astronautics, Massachusetts Institute of Technology, USA, is interested in using this technique in their plasma-assisted combustion platforms. Scientific visits to MIT will be included.





The supervisors:
Fetah BENABID (XLIM) :
https://scholar.google.com/citations?user=H6oN69UAAAAJ&hl=fr
Carmen GUERRA-GARCIA (MIT):
https://scholar.google.com/citations?user=OagwcE4AAAAJ&hl=es
Svetlana STARIKOVSKAIA (LPP):
https://scholar.google.com/citations?view_op=list_works&hl=fr&user=T-x1JN4AAAAJ

The selection criteria for students are as follows: excellent knowledge of physics, intellectual capacity, ability to generate ideas to solve problems, ability to make decisions, interest in experimental work, basic programming skills, English at B2 level, integrity and sense of responsibility.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES/NO Soft Matter and Biological Physics: **YES**/NO
Quantum Physics: **YES**/NO Theoretical Physics: YES/NO