

INTERNSHIP PROPOSAL

Laboratory name: Laboratory of Physics of Plasmas
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Internship location: Ecole Polytechnique, Palaiseau
Thesis possibility after internship: YES
Funding: YES at conditions of passing the IPP Doctoral School competition

Electric field measurements by second harmonic generation of laser light for aerospace applications (E-FISH)

Scientific context

Accurate knowledge of the electric field in the vicinity of electrically polarized systems is essential for understanding and modeling the plasma phenomena that may develop in their surroundings. Conventional measurement techniques, however, often rely on probes or electrodes that can significantly disturb the local electric-field distribution. A reliable characterization therefore requires a non-intrusive measurement technique capable of probing the field without altering it. Such a technique would be of particular interest for several aerospace applications. One example is the characterization of electric fields in plasmas used for combustion stabilization in aeronautical combustors or for the development of plasma actuators. Another is the measurement of the electric field around an aircraft or other aerospace structure exposed to the atmospheric electric field, with the aim of assessing its susceptibility to lightning attachment. The project will begin with the implementation of an EFISH measurement system in the laboratory. This setup will be used to evaluate the capabilities and limitations of the current state of the art. Building on this assessment, the candidate will design and implement improvements to the system, with two main objectives: improving the spatial resolution of the electric-field measurements and extending the measurement range.

Profile and skills required:

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

Positioning and funding

This M2 project is 100% funded. The PhD is funded under conditions of passing the IPP Doctoral School competition. E-FISH project involves 4 partners: the Laboratory of Plasma Physics (LPP) at École Polytechnique, the Laboratory of Applied Optics, LOA at ENSTA, French Aerospace Agency ONERA and external collaboration with the National University of Singapore. Thesis co-supervisors will be Dr. Svetlana STARIKOVSKAIA (LPP) and Dr. Paul-Quentin ELIAS (ONERA).

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

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