Call for applications for a PhD position
Laboratory of Excellence PLAS@PAR

**SYCAMORE: Surface reactivity of molecular plasmas for CO₂ REcycling**

**Project description** (Context and objectives of the project, possibly with 2-3 references)

**SYCAMORE** is the experimental part of two twin PhD projects aiming at developing a deep and accurate understanding of CO₂ plasma dynamics and their interactions with surfaces.

Achieving CO₂ dissociation at low energetic cost is the key for various energy storage strategies (“solar fuels” production) and for the viability of new organic synthesis (“green chemistry”). Non Thermal Plasmas (NTP) are very promising for activating CO₂ molecule because of their ability to spend most of the energy on vibrational excitation of molecules.

The PhD working on Sycamore will first perform experimental study of pure CO₂ plasmas at reduced pressure (few millibars) with a large set of diagnostics allowing providing electric field, gas temperature, vibrational temperature as well as radical densities and dissociation rate necessary for accurate kinetic modeling of these plasmas. Another PhD working under the supervision of Pr V. Guerra from and who will team up with the PhD from Sycamore, will be in charge of the development of the kinetic model that will be used for comparison with the experimental data in order to develop the most accurate kinetic model available for CO₂ plasmas.

In a second part of the project, model surfaces, catalytic or not, will be added in the same plasma to investigate the surface reactivity. The recombination of O atoms and the de-excitation of vibrationally excited molecules on various materials will be especially studied. Other plasma sources at higher pressure will also be investigated.

The PhD will be done under the co-supervision of Olivier Guaitella from LPP at Ecole polytechnique, Palaiseau, France and Vasco Guerra IPFN at IST Lisbon. It will take place at Ecole Polytechnique but several stays at IST will be organized for keeping a strong link between the experimental and the modeling strategies.

**Requirements for the candidate**

Master on physics, applied physics or engineering; acceptable level of English. Experience with plasma spectroscopy will be positively valued.

**Location and starting date**

Laboratory of Plasma Physics, Ecole Polytechnique, Palaiseau, France

The application should be sent by e-mail to the following contacts:

Olivier Guaitella (olivier.guaitella@lpp.polytechnique.fr)
Vasco Guerra (vguerra@tecnico.ulisboa.pt)

Applications with CV, statement of motivation, copies of degree diplomas and grades, two reference letters, and copies of any previous research-related work. Deadline is May 31st 2016. If the Master degree has not been obtained by the deadline for application, the degree must be successfully obtained prior to the start of the PhD programme.