PhD position

Vacuum Ultraviolet Diagnostics of Discharges in O$_2$

Starting September/October 2016. Deadline for submission of application: June 30th 2016

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Applications are invited for a position to work on a joint project between Laboratoire de Physique des Plasmas and Synchrotron SOLEIL. This position is jointly funded by SOLEIL and Labex Plas@par. The selected candidate will register for a PhD at Université Pierre et Marie Curie and will be jointly supervised by Jean-Paul Booth and Laurent Nahon.

1. Description of the project

Electrical discharges in oxygen-containing gases are ubiquitous in nature and in many man-made plasma applications, including low-pressure plasma materials processing and atmospheric pressure applications such as plasma medicine and pollution abatement. Nevertheless, many uncertainties persist concerning the reaction mechanisms and fundamental data necessary to make fully predictive models, in particular the role and kinetics of metastable states (O$_2$ a $^1\Delta_g$ and b $^1\Sigma$) in reaction processes including negative ion destruction. The DESIRS VUV beamline offers a unique opportunity to answer these questions, using the high spectral resolution of the Fourier-Transform Spectrometer (FTS) branch to understand the structure of the excited states of O$_2$, and the monochromatic branch to measure (for the first time in low-pressure discharges) the absolute density and (using time-resolved measurements in pulse-modulated discharges) the kinetics of O$_2$ a $^1\Delta_g$. These results will be complemented by measurements at LPP, including TALIF measurements of oxygen atoms, vibrational energy distributions and their relaxation (by broadband UV absorption spectroscopy), and investigations of surface processes. The work will be carried out in collaboration with an international team coordinated by LPP, including: Bristol University (ab-initio calculations and VUV spectra analysis), IST Lisbon (O$_2$ discharge modelling) and Moscow State University (kinetics and reactivity).

2. Qualifications & Experience

The successful candidates for this post will possess an excellent Master’s degree in a relevant subject (Physics or Chemical Physics), very good English verbal and written communication skills, and the potential to conduct independent scientific research and perform well as part of a research team. Previous experience in fields such as molecular spectroscopy, chemical kinetics and low-temperature plasma physics would be a plus.

3. General conditions & hiring procedures

This full-time post will be available from September/October 2016 and is offered on a fixed-term 36 month contract. The monthly net salary is 1540€, and includes social security and benefits. In addition there is a 6000 € stipend for research expenses (travel, computer, books, etc).

The place of work will be at LPP (Palaiseau) and at Synchrotron SOLEIL (Saint-Aubin), both located in the Paris suburbs about 10 km from each other.
Informal enquiries may be addressed to the supervisors jean-paul.booth@lpp.polytechnique.fr and laurent.nahon@synchrotron-soleil.fr. Applications should be sent to jean-paul.booth@lpp.polytechnique.fr, and include a cover/motivation letter, resume (CV), Bachelor and/or master’s degree transcript as well as the name and contact details of 2 to 3 referees. The application should be completed by June 30th 2016 to receive full attention. If no suitable candidates are identified by June 30th, the position will remain open until filled.

SOLEIL is the French national synchrotron facility, located on the Saclay Plateau nearby Paris. It is a multi-disciplinary instrument and a research laboratory, whose mission is to run research programs using synchrotron radiation, to develop state-of-the-art instrumentation on the beamlines, and to make those available to the scientific community. LPP is a joint research institute studying all aspects of plasma physics and technology from space to the laboratory, from theory to experiments. The low-temperature plasmas team is particularly interested in experimental studies of physical and chemical processes occurring in reactive gas plasmas, and the development of novel diagnostic techniques.