

Molecular Universe ER Position

Team 3 [17]

Location of Appointment: Bordeaux-France [Perugia-Italy]

Team Leader (contact person): Dr. Michel Costes [Prof. Piergiorgio Casavecchia]

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Various URL:

Category of position: Experienced Researcher

Duration of Appointment (in months): 24

Starting Date: October 2005

Requirements with respect to candidate: PhD in experimental chemical physics, physical chemistry or physics; previous experience with molecular beam spectroscopy or scattering would be an advantage.

Title of Research project: Experimental reaction dynamics studies of molecular processes of astrophysical importance.

Abstract of Research Project: A dual postdoctoral position is available to work one year at Bordeaux and one year at Perugia under the direction of Dr. Michel Costes and Prof. Piergiorgio Casavecchia. The work involves experimental reactive scattering studies of atom-molecule, radical-molecule and atom-radical reactions of astrophysical interest by crossed molecular beam techniques. Some of the systems, such as reactions of carbon atoms with unsaturated hydrocarbons are to be investigated at both locations.

General Introduction: Whereas experimental kinetic studies are based on reactant disappearance in multiple collision regime, providing absolute reaction rates at temperature of the thermalised buffer gas, experimental dynamics studies focus on product detection in the so called "single collision regime" where each product is observed in the quantum-state and the initial recoil velocity vector given by the reactive event. Dynamics studies performed under supersonic crossed-beam configuration yield integral and differential cross sections measurements as a function of collision energy, revealing unambiguously the presence or not of any reaction barrier, and identifying different reaction products or different product isomers. They provide stringent tests for comparison with the results of the most sophisticated quantum mechanical studies.

Methods: Experiments have to be performed with state-of-the-art complementary crossed-beam machines of very different concepts. The Bordeaux machine uses crossed molecular beams with variable beam intersection angle, laser ablation for generation of atom species, vacuum UV-laser-induced fluorescence or resonance-enhanced multiphoton ionisation for detection of reaction products; it has the capability to reach very low collision energy values, down to 0.4 kJ/mol,

which are relevant of interstellar conditions. The Perugia machine uses continuous beams with soft ionization Mass-Spectrometric-time-of-flight detection; its versatility makes possible the study of many complex multichannel reactive systems including reactions between two unstable radical species.

Applications: The position is available from October 2005. Informal enquiries should be directed by e-mail to Dr. M. Costes and Prof. P. Casavecchia, enclosing a detailed CV (including grades obtained, publications, work experience etc) and names and contact details of possible referees. Qualified female candidates are specifically encouraged to apply.