

Molecular Universe ER Position

Team 18

Location of Appointment : Rennes

Team Leader (contact person): Ian R. Sims

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Category of position : Experienced Researcher

Duration of Appointment (in months) : 24

Starting Date : 2005

Requirements with respect to candidate : PhD in experimental chemical physics or physical chemistry; experience with lasers, gas handling and vacuum techniques would be useful. Interest in astrochemistry/astronomy would be an advantage.

Title of Research project : Measurement of collisional rate coefficients for processes of astrophysical importance

Abstract of Research Project : A two year postdoctoral position is available to work within the Experimental Astrochemistry Team at the Université de Rennes 1, under the direction of Professor Ian R Sims on experimental measurements of a range of reactive and inelastic processes in the gas phase, particularly at the low temperatures relevant to the conditions existing within interstellar clouds (down to around 10 K).

General Introduction : Experimental measurements of rate coefficients for reactive and inelastic collisions of molecules in the gas-phase at low temperatures are essential for the construction of models to help us understand extreme astrophysical environments such as dense interstellar clouds. They are also of great fundamental interest, providing data for stringent comparisons with the latest theoretical calculations. The Experimental Astrochemistry Team at the Université de Rennes 1 is the world leader in making such measurements, and was awarded along with the University of Birmingham team then lead by Ian Sims and Ian Smith one of the EU's first Descartes Prizes for this work in 2000. Ian Sims has recently moved to the Université de Rennes 1 along with the entire experimental set up, and the combined team now has at its disposal an unparalleled array of experimental tools for the study of low temperature kinetics and energy transfer. The postdoctoral fellow would be expected to take a leading role in novel experiments designed to measure low temperature rate coefficients for radical/atom - molecule reactions and collisional energy transfer processes of astrophysical interest, with the possibility of participating in other projects within the team, including new techniques to study electron attachment and dissociative recombination of polycyclic aromatic hydrocarbons (PAHs).

Methods : We use the CRESU (Cinétique de Réaction en Ecoulement Supersonique Uniforme or Reaction Kinetics in Uniform Supersonic Flow) technique to create a gas phase environment at temperatures down to 10 K and below, and then either laser photochemical techniques to initiate and monitor neutral-neutral reactions or energy transfer processes, or mass spectrometric/Langmuir probe techniques to follow reactions of charged species, all within the super-cold uniform

supersonic flow provided by the CRESU. Among other technical developments planned, a new kind of pulsed CRESU is under development, with the aim of enabling the use of expensive isotopomers and difficult to synthesise reagents in the CRESU. The postdoctoral fellow would be expected to take a leading role in these projects.

Applications : The position is available immediately but a start date up to October 1st 2005 is possible. Informal enquiries should be directed to Professor Ian R. Sims in the first instance, enclosing a detailed CV (including grades obtained, publications, work experience etc) and if possible the names and contact details (including email) of two or more referees. Qualified female candidates are specifically encouraged to apply.

References : Please visit our website for a complete list of the Team's publications.