



ERC Advanced Grant Project CRESUCHIRP

Description of research internship

One or two Master 2 internships in ERC Advanced Grant Project CRESUCHIRP with PhD positions available for successful candidates

The CRESU (Reaction Kinetics in Uniform Supersonic Flow) technique, combined with laser photochemical methods, has been applied with great success to perform research in gas-phase chemical kinetics at low temperatures, of particular interest for astrochemistry and cold planetary atmospheres, as well as for combustion and atmospheric chemistry [1-6]. Recently, we have been involved in a collaboration with Arthur Suits (U. Missouri) and Bob Field (MIT) to develop a new combination of the revolutionary chirped pulse broadband rotational spectroscopy technique invented by Brooks Pate and co-workers [7] with a novel pulsed CRESU, which we have called Chirped Pulse in Uniform Flow (CPUF) [8-10].

Recently, the European Research Council (ERC) has awarded an Advanced Grant to Ian Sims along with his senior collaborators and a team of external experts (project CRESUCHIRP [11]). In this project we aim to exploit the exceptional quality of the Rennes CRESU flows to build an improved CPUF instrument, and use it for the quantitative determination of product branching ratios in elementary chemical reactions over a wide temperature range (data which are urgently required as input to models of gas-phase chemical environments such as interstellar clouds and planetary atmospheres), as well as the detection of reactive intermediates and the testing of modern reaction kinetics theory. Applications to the areas of combustion and terrestrial atmospheric chemistry are also envisaged.

We are looking for one or two M2 students to join a multinational team (currently comprising French, British, American and Australian researchers) working on this project. A new, completely refurbished laboratory facility has been created, along with dedicated collaborative office space, and the necessary instrumentation is currently being acquired. We envisage the recruitment of two PhD students starting in September 2018, and the successful completion of an M2 internship would be expected to lead to an offer of a PhD contract.

Scientific fields: Physics, (physical) chemistry

Key-words: chemical physics, molecular physics, physical chemistry, molecular astrophysics, experimental astrochemistry, Chirped Pulse Fourier Transform Microwave Spectroscopy, CRESU, low temperature reaction kinetics, product branching ratios, elementary reactions

Research training environment and conditions

The Rennes Laboratory Astrophysics group (<https://ipr.univ-rennes1.fr/labastro>) is internationally known for its experimental studies of elementary processes of interest for astrophysics, atmospheric science and combustion [1-6], and provides an excellent environment for research training. It is situated within the Molecular Physics Department of the Institute of Physics Rennes (IPR, a CNRS - University of Rennes 1 Joint Research Unit, UMR 6251). It benefits from excellent technical and administrative support, and is situated in Rennes, the attractive and vibrant capital of the French region of Brittany.

A gratification of at least 504 € / month will be provided, and the length of the internship can be from 4—6 months.

Candidate profile

Candidates should be registered for a Masters degree (M2) or the final year of a "Diplôme d'Ingénieur" in physics or (physical) chemistry. Experience in experimental research would be advantageous, but full on-the-job training will be provided. A working knowledge of English is essential to be able to interact effectively with the multinational CRESUCHIRP team.

Deadline and procedure for candidatures

The final deadline for candidatures is 31/01/2018 but applications will be considered as they are received and the positions will likely be filled before this date.

Inquires and applications, including a detailed CV citing grades, an accompanying letter, and the names and contact details of two potential referees (with recommendation letters in pdf format if available), should be addressed to Prof. Ian Sims (ian.sims@univ-rennes1.fr).

References

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11. <https://perso.univ-rennes1.fr/ian.sims/>
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