Molecular Universe ESR Position
Team 2

Location of Appointement : Basel
Team Leader (contact person): Prof.J.P.Maier
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Various URL : http://www.chemie.unibas.ch/~maier/Maier.html
Duration of Appointment (in months) : 36
Starting Date : 01-01-2005
Requirements with respect to candidate : physical chemistry or physics degree

Title of Research project : Spectroscopic Studies of Astrophyscally Relevant Molecules

Abstract of Research Project

The research will involve in part the use of existing instrumentation developed in Basel to study the electronic spectra of astrophysically relevant molecules and partly approaches to be developed. The studies involve the investigations of systems containing mainly carbon in the size of 10-30 atoms, such as chains, rings and fullerene structures with the aim of being able to compare laboratory and astronomically data directly.

General Introduction :

The lack of laboratory gas phase data on unusual carbon containing molecules has hindered the comparison with astronomically data. Thus for example if one wishes to identify carbon chains, their ion and derivatives involving hydrogen, nitrogen or oxygen atoms, their gas phase spectra are requisite. To obtain such spectra has been the aim of our research group in the Department of Chemistry, University of Basel for over a decade. In particular we have focussed on the electronic spectra of such radicals and as a result we have been developed a number of approaches to achieve this goal. In the recent years this has led to the first gas phase spectra of the smaller carbon chains, their anions, as well as to selected examples among chains containing hydrogen and some cations. This in turn has allowed for the first time a direct comparison between laboratory and astronomical measurements.

Methods :

The methods used involve the production of the species in plasma sources combined with supersonic jets. These are then used in conjunction with sensitive laser methods to detect the electronic transitions. The laser methods include direct absorption by means of cavity ringdown techniques with pulsed and cw lasers, detection with REMPI and photodetachment approaches and the preparation and storage of collisionally coolled ions in a 22-pole trap. Concurrent to this mass-selected experiments on species deposited in neon matrices are used to guide the gas phase studies. The web site gives the references to the publications of the last years indicating the research activity going on.

References : Current references are to be found on the web site:
http://www.chemie.unibas.ch/~maier/Maier.html