ID de Contribution: **58** Type: **Non spécifié**

Models of interstellar chemistry - The influence of cosmic rays.

vendredi 1 juillet 2011 11:20 (20 minutes)

Cosmic rays have a strong impact on interstellar chemistry. By ionizing some species, they initiate fast ion-neutral reactions that lead to the formation of complex molecules. So, the measurement of the cosmic ionization rate in different media is crucial to understand the chemical mechanism leading to the composition of interstellar clouds.
In diffuse interstellar gas, the abundances of molecules as OH and HD are directly proportional to the cosmic rays flux. These species can be considered as probes of this flux. On another hand, the measurement of the elemental abundances of O and D from OH and HD observations can only be done if the flux of cosmic rays is precisely known. In parallel, from several years, H3+, as been detected on several diffuse lines of sights. It has been shown that its abundance can only be explained by a cosmic rays flux higher by a factor 5 to 10 than what was thought previously. Herschel observations seem to confirm this highest cosmic ionization rate.
In dense gas, cosmic rays initiate the formation of H3+ (and its isotopologue H2D+) that leads to the formation of more complex molecules. Dense clouds are open and non-thermal equilibrium systems. Our team showed that such properties can lead to chemical bistability in which the flux of cosmic rays, that controls the ionization degree, is a critical parameter. Between the two possible chemical phases, abundances of some species can be different by one order of magnitude. In particular the abundance of deuterated species can be strongly affected.

Our team is developing the Meudon PDR code that computes the chemical and thermal structure of interstellar clouds. It solves in a consistent way the radiative transfer, the chemistry of several hundreds species as well as the thermal processes. In this talk, I will show, thanks to this code, the influence of cosmic rays on the interstellar chemistry and why it is important to constrain as much as possible the flux of cosmic rays to interpret observations in the interstellar medium.

Orateur: Dr LEPETIT, Franck (LUTH Meudon)

Classification de Session: Impact of cosmic rays over chemistry and climate