Colloquium

SFB 956

Conditions and Impact of Star Formation

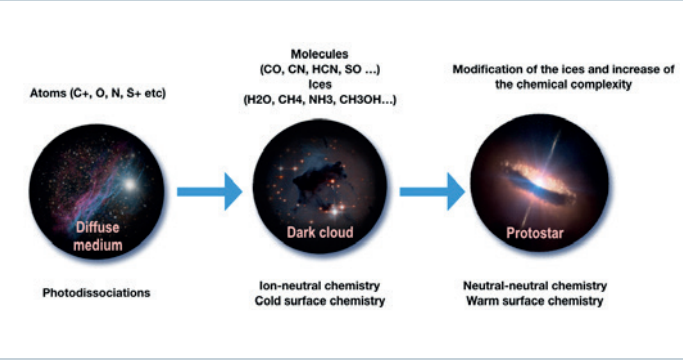
17 December 2018

Monday 3:00 pm

Physikalische Institute Köln

Lecture Hall III

Zülpicher Straße 77 | 50937 Köln



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Following the Interstellar Gas and Ice through the Formation of Stellar Nurseries

Carbon and heavier atoms are born in the centre of stars. At the end of their life, stars spread their inner material into the diffuse InterStellar Medium (ISM), yielding at the same time the formation of interstellar dust refractory cores. This diffuse medium (where photo-dissociation dominates the chemistry) gets locally denser in the form of dark clouds whose innermost part is shielded from the external UV field by the dust, allowing for molecules to grow and get more complex. As dust grains start to be covered by molecules, they also undergo coagulation. Gravitational collapse occurs inside these dense clouds forming protostars and their surrounding disks, and eventually planetary systems like (or unlike) our own solar system. Throughout all these stages, chemistry keeps evolving far from the equilibrium/steady-state set by physical conditions.

In recent years, our knowledge on the composition of the ISM and the process of star formation has entered a new area with the powerful capabilities (in term of sensitivity, spatial resolutions and/or new wavelength windows) of recent ground based and space observatories (Spitzer, Herschel, ALMA, NOEMA, and the new EMIR receiver on the IRAM 30m). These new instruments have allowed for the detection of new molecules (in the gas-phase or in the ices), either simple ones such as HCl+ or complex ones such as CH3NCO. In addition to revealing the richness of the ISM chemistry, they have revealed the non-uniform distribution of their abundances from object to object or even within a certain type of object (with similar physical conditions). One of the key questions astrochemists want to answer is: how do these molecules in the gas-phase or in the ices form and can we reproduce their variability in abundance?

In this presentation, I will describe the tools and methodology used to study the chemical composition of the interstellar medium and what we think we currently know about it.