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ION PROCESSING OF MOLECULAR SYSTEMS: A WAY TO FORM COMPLEX SYSTEMS IN SCPACE

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Abstract. In space, the molecular matter is exposed to ionizing radiation and two scenarios are proposed to explain the emergence of new molecular species. On the one hand, the *bottom-up* approach proposes the growth of larger molecules from smaller subunits. On the other hand, the *top-down* scenario considers the emission of molecular species from a large piece of matter. In order to study the processes leading to the formation of complex organic molecules, we have considered ion interaction with molecular clusters or icy mantels.

Molecular systems in space are expose to energetic ions e.g. solar wind or ions trapped in the Jupiter magnetosphere and cosmic rays. The GANIL facility (Grand Accélerateur National d'Ions Lourds, Caen, France), a unique tool to study ion interactions with matter, allow to study ion induced fragmentation and reactivity of such systems in a very large range of kinetic energies of projectiles (from keV to GeV, ions from He to U). During my talk, I will present examples of: i) intra-cluster molecular growth processes within of polycyclic aromatic hydrocarbons and amino acids molecular clusters induced by ion collisions (e.g. Delaunay R. et al. 2015, Domaracka A. et al. 2018, Rousseau P. et al. 2020) and ii) ion processing of astrophysical ice analogues and condensed complex organic molecules (e.g.: Rothard H. et al. 2017, Vignoli Muniz G. S. et al. 2017 and 2022).

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