**Non-thermal desorption of ice mantles:**
**cosmic rays desorption of complex organic molecules**

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Determining experimentally the magnitude of interstellar grain mantles accretion and desorption mechanisms is mandatory for astrophysical models to constrain and predict gas and solid phase chemical evolutions. Irradiation by cosmic rays have been simulated experimentally using high energy ions. The ice mantles phase transformation and sputtering yields for released species were monitored simultaneously by infrared spectroscopy and mass spectrometry. The dominant ice mantle species, can be effciently sputtered by cosmic rays. In this talk, the sputtering yield and its evolution as a function of ice mantle thickness for high-energy ions will be discussed in the context of astrophysical environments. Cosmic rays penetrating deep into dense clouds provide a major sputtering mechanism to desorb the observed complex organic molecules (COMs) built over the lifetime of dense clouds, when many other mechanisms fail at releasing them effciently from cold grains. We focused our study on the sputtering effciency of two complex organic molecules that are observed either in interstellar dense clouds ice mantles directly by infrared spectroscopy (CH3OH), or observed in the gas phase by millimetre telescopes (CH3COOCH3). The sputtering was measured for different ice matrices dominated by water ice or carbon dioxide ices.

A large fraction of COMs desorbs as intact molecules with a proportion corresponding to the time dependent bulk composition of the ice mantles, the latter evolving with time due to the secondary photons VUV photolysis and CR ice mantle radiolysis. The astrophysical cases in relation with these experiments will be discussed.

## References

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