Chemistry of cold dense cores: On the observed abundance gradients in dense clouds

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Abstract

Observations of cold and dense interstellar clouds have revealed an extraordinary molecular richness but also a large dispersion in the inferred abundances between and within them. Understanding these differences is a difficult task because (1) the chemistry is out of equilibrium in most of these objects and, (2) molecular observations provide us only a snapshot of what their state are. Although a considerable theoretical work has been done to understand the chemistry at work in such regions, most of the time dependent chemical modeling of dense clouds rely on simple approximation that reflect these difficulties. Based on the lack of information on their dynamical state, dense clouds are often considered as very simple objects in which the physical conditions are homogeneous and fixed.

In this talk, I will discuss this assumption and show how the past physical conditions of dense clouds can impact their molecular composition. I will show that the physical history from the diffuse interstellar medium to the birth of dense clouds could be important in establishing their chemical composition and account for the observed abundance gradients.

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