CHEMICAL EVOLUTION OF INTERMEDIATE- AND HIGH-MASS STAR FORMING REGIONS

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Our Sun and planetary system were born about 4.5 billion years ago and understanding how all of this have come to be is one of the most important topics in astrophysical research. In particular, a crucial aspect to understand is whether and how much we inherited chemically from the time of the Sun's birth. In fact there is some crucial information from meteorites, comets and other small bodies of the Solar System that are thought to be linked to the first phases of the Solar System's formation (Caselli & Ceccarelli, 2002).

For this reason, observations of star forming regions believed to be precursors of our Solar System where the gas is mostly in the form of simple molecules, are mandatory. In particular, because our Sun was born in a rich cluster, possibly including massive stars (Adams, 2010), observations of massive, dense star forming cores are needed.

In this framework, the PhD project, in the first and second year, aims to analyse several observational data to find evolutionary chemical tracers in intermediate- and high-mass star forming regions in different evolutionary stages (Fontani et al. 2011, 2015), and to investigate the presence for a possible link with pristine minor bodies of the Solar System; in particular, thanks to these data, we will investigate how the ^{14}N, and his stable isotope ^{15}N, are distributed in the molecular species present in the gas phase, through observations of their rotational and/or rovibrational transitions. Observations with single dishes (e.g. IRAM-30m) and interferometers (e.g. NOEMA, ALMA) will be performed and analysed. The observational works will be done in collaboration with different people and research groups: F.Fontani (Osservatorio Astrofisico di Arcetri), V. Rivilla and M. Beltran (Osservatorio Astrofisico di Arcetri), G. Busquet (ICE) and M. Padovani (Osservatorio Astrofisico di Arcetri), P. Hily-Blant and C. Ceccarelli (IPAG). At the end of second year and during the third year it will be made an attempt to explain the observational results obtained previously, through chemical models (Roueff et al. 2015), in collaboration with Prof. P.Caselli and her team at the MPE.

References

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