

# Pristine protostellar jet-disk systems: from darkness to the cradle of life

C. Codella<sup>1</sup>

What are the conditions for the emergence of life? What are the basic chemical mechanisms that led atoms to molecules and then to life? What is the role of the pre-solar chemistry in the present chemical composition of the Solar System bodies, planets, comets, and asteroids? The molecular complexity builds up at each step of the process leading to star formation, starting from simple molecules and ending up in Complex Organic Molecules (COMs). The detection of COMs is thus key to understanding the formation of pre-biotic molecules in the interstellar medium and their subsequent delivery onto planetary systems.

However, observations of COMs have been and still are instrumental in making progress; it is of paramount importance to have reliable information on the spatial distribution of COMs in order to investigate their association with different ingredients of the star formation recipe (warm envelopes and cavities opened from hot jets, accretion disks and shocks), which requires spatial resolutions less than 100 AU. Thanks to the combination of the high-sensitivities and high-angular resolutions provided by the advent of new telescopes such as ALMA and NOEMA, it is now possible to image in details the earliest stages of a Sun-like star formation. In particular, we will discuss the results obtained in the framework of Large Programs at mm and sub-mm wavelengths (such as ASAI, CALYPSO, and SOLIS), showing how to verify whether the regions precursor of planetary systems are already rich in COMs and pre-biotic molecules.

---

<sup>1</sup> INAF, Osservatorio Astrofisico di Arcetri, Largo E. Fermi 5, 50125 Firenze, Italy