

Molecules in space and the origin of life

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To disclose the “secrets” of the chemistry in space and the origin of life on Earth (and elsewhere?), the first step is to understand how and where small prebiotic species could form and then, most importantly, how the chemical complexity could evolve. Within this goal, this seminar addresses the investigation of the chemical evolution in the interstellar medium (ISM) as well as in planetary atmospheres. In particular, it focuses on the role played by molecular spectroscopy and quantum-chemical computations in disclosing how small prebiotic molecules are formed in different astronomical environments, like interstellar clouds and Titan’s atmosphere, and in understanding how these species can further evolve in complexity toward building blocks of biomolecules. Indeed, spectroscopic signatures provide the unequivocal proof of the presence of chemical species in a given astronomical environment, which is the starting point for the development of any astrochemical model and for laying the foundation of astrobiology. On the other hand, because of difficulties in mimicking the extreme conditions that characterize the ISM (but also Titan’s upper atmosphere) in experimental investigations, accurate state-of-the-art computational approaches play a fundamental role in analyzing feasible reaction mechanisms.

