From Interstellar Ices to PAHs
A symposium to honor Lou Allamandola's Contributions to the Molecular Universe
Annapolis, MD, USA - September 13^{th} to September 17^{th}, 2015

INVITED TALK

Complex organic ice chemistry: from interstellar ices to nascent planets

Karin I Öberg[1]

[1] Harvard-Smithsonian Center for Astrophysics

E-mail: koberg@cfa.harvard.edu

In the presence of UV and other high energy radiation, the icy mantles of interstellar grains are efficient factories of complex organic molecules (COMs) (e.g. Bernstein et al. 2002). In protoplanetary disks around young stars, icy grains coagulate to form boulders and eventually planetesimals (comets) and planets. The organic composition of the icy grain mantles may thus seed the chemistry of nascent planets, connecting interstellar chemistry with the origins of life. I will review experimental constraints on this interstellar organic ice chemistry (e.g. Öberg et al. 2009), and how these constraints have been used to observationally test different formation scenarios of complex organics in space. A major development in observational astrochemistry in the past decade is the opening up of complex organic molecular studies to the different stages of low-mass star formation (e.g. Cazaux et al. 2003, Öberg et al. 2010). Observations of abundant cold and lukewarm COMs in such regions have presented both support and challenges to traditional icy COM formation scenarios. Most recently ALMA has enabled the extension of COM studies to protoplanetary disks and the result is a surprisingly different COM composition compared to pre-stellar cores and protostars (Öberg et al. 2015). I will discuss some of these questions on COM formation and abundances during star and planet formation, and the next generation of laboratory ice experiments that will help to address them.

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