

From Interstellar Ices to PAHs

A symposium to honor Lou Allamandola's Contributions to the Molecular Universe
Annapolis, MD, USA - September 13th to September 17th, 2015

INVITED TALK

The Frosty History of Interstellar Ices

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The possible existence of interstellar ices was proposed some 80 years ago (Lindblad 1935) and the first astronomical observations of their absorption bands were confirmed 4 decades later. Since those early observational studies, it is now known that frozen molecules are an important and ubiquitous constituent in the dense molecular cloud environment. The first observations of interstellar ices were accomplished from ground-based observatories, one molecular absorption band at a time, starting first with observations of H₂O-ice (e.g., Gillett & Forrest 1973), followed by CO-ice (Lacy et al. 1984). Many early observations focused on the nascent cloud material around massive protostars (e.g., Willner et al. 1982) or a few bright stars located by chance alignment behind star formation regions (e.g., Whittet et al. 1983). Airborne and space-based observations broke down barriers of limited sensitivity and wavelength coverage allowing for the full infrared spectral range of a full gamut of dense cloud environments to be observed (see Boogert et al. 2015 for a recent review).

Observations of interstellar ices would have made little progress without both theoretical and experimental studies to both predict the molecules that should be present and manufacture realistic analogs to compare to the observations. Lou Allamandola founded and, for many years, directed the Astrophysics & Astrochemistry Laboratory at NASA Ames Research Center. The pioneering experiments carried out under Lou's leadership have led to the identification of many of the currently known molecular species frozen in interstellar ices. These experiments not only confirm the presence of specific icy species in space, but also their environment, chemical pathways, and eventual more complex (organic) products, all of which feed in to answering the bigger question of which chemical processes gave rise to life on our own planet.

REFERENCES

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