



PHYSICS AND ASTRONOMY COLLOQUIUM

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“Synthesis of Complex Organics in the Late Stages of Stellar Evolution”

Abstract

Infrared spectroscopic observations of the stretching and bending modes of aliphatic and aromatic compounds are now seen throughout the Universe, from the diffuse interstellar medium of the Milky Way Galaxy to distant galaxies. Observations of evolved stars have revealed a rapid ($\sim 10^3$ year time scale) and continuous synthesis of organic materials from the end of the asymptotic giant branch (AGB), to proto-planetary nebulae, to planetary nebulae. These synthesized products are ejected into the interstellar medium through stellar winds and as a result enriching the Galaxy with complex organics.

Over 70 gas-phase molecules, including rings, radicals, and molecular ions, as well as fullerene (C_{60}) have been identified by millimeter-wave and infrared spectroscopic observations through their rotational and vibrational transitions. Possible chemical pathways leading to the formation of complex organics will be discussed.

Analysis of the infrared spectra suggests that the chemical structure of the carrier is consistent with that of mixed aromatic and aliphatic nanoparticles (MAON). These structures are very similar to those of the insoluble organic matter found in meteorites, suggesting that the early solar system may have been enriched by stellar ejecta.

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3:30 p.m.

Elliott Building

Room 167