

## **Astronomical Polycyclic Aromatic Hydrocarbons: Yesterday, Today, and Tomorrow**

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The infrared signature of Polycyclic Aromatic Hydrocarbons (PAHs) is common throughout the cosmos. Astronomical PAHs, excited by the ambient radiation field in different objects, relax by emitting infrared radiation at their characteristic vibrational frequencies. PAH emission spectra show variations that depend on position in extended objects and type of source, revealing PAH size, structure, and ionization state. Since these spectral variations reflect local conditions such as electron density, radiation field, chemical history, and so on, they are becoming new probes of astronomical environments.

After briefly summarizing the development of the PAH model, this talk will focus on recent applications of the NASA Ames PAH IR spectral Database to interpret astronomical observations. This database now includes PAHs with more than 100 carbon atoms, species comparable in size to those expected of the interstellar species. Examples will be given showing how the spectra from different objects reveal details about the charge, size, and structure of the PAH population in that object, details which, in turn, reflect local conditions. Lastly, since PAHs are so widespread throughout the cosmos, this talk will conclude with a short summary of PAH transitions that fall in other wavelength regions, transitions that should impact astronomical observations from the UV through the radio.