
Contribution ID: **111** Type: **Contributed talk**

# The photochemical evolution of the interstellar PAH family in photodissociation regions

*Tuesday, 12 June 2018 16:55 (25 minutes)*

As is unequivocally evident from observations, Polycyclic Aromatic Hydrocarbons (PAHs) pervade the Universe. PAHs are easily detected through their vibrational IR emission bands at 3.3, 6.2, 7.7, 8.6 and 11.2 micron. They are found in a wide variety of environments, including post-AGB stars, planetary nebulae, young stellar objects, HII regions, reflection nebulae, the interstellar medium, and galaxies out to redshifts of z ~3. To date, PAHs are among the largest and most complex molecules known in space. They emit up to 10% of the total power output of star-forming galaxies and harbor a significant fraction of the cosmic carbon. Being so abundant and widespread, PAHs play a crucial role in several astrophysical and astrochemical processes such as the heating of the diffuse ISM and surfaces of molecular clouds and proto-planetary disks, gas-phase abundances and surface chemistry.

The Infrared Space Observatory (ISO) and the Spitzer Space Telescope showcased the richness and complexity of the astronomical PAH spectra. The PAH features exhibit significant variability and depend on several parameters such as radiation field, object type and metallicity. These variations thus reflect both the physical conditions in the emission zones and the composition of the PAH population. Thus, one of the best ways to investigate the detailed characteristics of the PAH population is by analyzing IR spectral maps. Here we present the results of such hyperspectral imaging studies done with Spitzer/IRS in the 5-20 micron range for a sample of Reflection Nebulae and HII regions. These studies reveal subtle, but significant spatial variations in individual PAH emission bands revealing a spatial sequence with distance from the illuminating star. The overall dominant charge state of the PAH population is certainly a key factor in driving these variations. However, hyperspectral imaging studies allow to probe PAH parameters beyond charge, such as molecular structure and size. Combined with the NASA Ames PAH database to fine-tune band assignments, the observed spatial sequence reveals the photochemical evolution of the interstellar PAH family as they are more and more exposed to the radiation field of the central star in the evaporative flows associated with the Photodissociation Regions.

## Consider for a poster?

Yes

**Primary author:** PEETERS, Els (University of Western Ontario & SETI Institute)

**Co-authors:** Dr STOCK, Dave (University of Western Ontario); SHANNON, Matthew (NASA/Universities Space Research Association); Dr BAUSCHLICHER, Charles (NASA Ames Research Center); Dr ALLAMANDOLA, Louis (NASA Ames Research Center); Prof. TIELENS, Alexander (Leiden Observatory); Dr RICCA, Alessandra (NASA Ames Research Center & SETI Institute); Dr WOLFIRE, Mark (University of Maryland)

**Presenter:** PEETERS, Els (University of Western Ontario & SETI Institute)

**Session Classification:** Molecules and dust

**Track Classification:** What is dust?