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research highlights

ASTROCHEMISTRY

A complex reflection

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Els Peeters and colleagues present an extensive spectral map of the reflection nebula NGC2023. Using the Spitzer Space Telescope's Infrared Spectrograph, which is sensitive to wavelengths of light from 5–35 μm, they studied the infrared features in the 5–20 μm region belonging to large carbonaceous molecules such as buckminsterfullerene (C_{60}) and polycyclic aromatic hydrocarbons (PAHs). PAH emission bands have known correlations with each other, depending on the charge states and structures of the molecules. By considering the spatial dimensions of an extended nebula, Peeters *et al.* have investigated these correlations further and discovered unknown relationships. For instance, the 7–9 μm complex is made up of at least two spatially different components. Furthermore, PAH emission features behave independently from the underlying emission plateaux. These plateaux are likely due to oversized PAHs, PAH clusters or very small dust grains.

As an extra aspect of the analysis, Peeters *et al.* used hundreds of synthetic spectra from the NASA Ames PAH database to model the spectra in their map. They find that the two spatially-different components in the 7–9 μm range come from different sizes of PAH molecule. Putting together their entire in-depth study, they find that the main driving force behind the distribution of PAH molecules and ions in this region is photochemistry, shown by a clearly-defined spatial sequence of PAH band intensities that depends on distance to the illuminating source. ❐

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