

Spatial analysis of PAH molecules in the Pillars of Creation using JWST

Polycyclic aromatic hydrocarbons (PAHs) are key tracers of the physical conditions in photodissociation regions (PDRs). Photoprocessing of PAH is driven by local radiation conditions. Hence, studying their spatial distribution offers a diagnostic probe of PDR structure.

I present a spatially resolved analysis of the PAH population in the Pillars of Creation within the Eagle Nebula (M16) using James Webb Space Telescope (JWST) MIRI and NIRCam imaging. By using mid infrared PAH sensitive bands, I derive resolved maps of PAH size and ionization state across the pillars and connect these directly to variations in the radiation field and gas structure. I present the first spatial maps of PAH ionization and size in the Pillars of Creation. The maps reveal clear internal gradients that show the PAH population is strongly reshaped by local conditions within the cloud, such as the local radiation intensity and the 3D orientation of the nebular structure.

The large and neutral PAH molecules are found in the highly irradiated regions, due to the destruction of small PAH molecules. As we move towards more shaded regions, the average PAH size becomes smaller.

These results show the photoprocessing of PAH in one of the most active star-forming regions of our galaxy and demonstrate the power of JWST imaging to probe dust processing in star-forming regions.

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