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From grains to fragments: the study of polycyclic aromatic hydrocarbons in multiple radiation environments

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Polycyclic aromatic hydrocarbons (PAHs) are thought to play important roles in interstellar chemistry, from ice grain formation to catalyzing reactions; however, much about their photophysics and photochemistry is not yet known. Therefore, a multi-spectroscopic approach has been employed to study PAH fragmentation upon interaction with high radiation fields, PAH homo-clustering and clustering with water, and the products from discharges of PAHs with organic molecules. The former has been done at the free electron laser facility FLASH in which the fragmentation products of PAHs are studied after interaction with XUV-IR radiation. The latter experiments have been undertaken at the free electron laser, FELIX. Here, IR-UV ion dip experiments revealed the mass-selective mid- and far-IR spectra of the PAH, acenaphthene, clustered with itself and up to three water molecules. We have also investigated the discharge products of several small PAHs with acetonitrile (CH_3CN), in which we observed the formation of larger cyano group containing PAHs.

Summary

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