

Laboratory Calibration Studies in Support of an ISS Exposure Experiment and Comparison to the Diffuse Interstellar Bands

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Polycyclic Aromatic Hydrocarbons (PAHs) are thought to be the carriers of the ubiquitous infrared emission bands (UIBs) that have recently been revisited by the Infrared Space Observatory (ISO). ISO data have provided new insights into the size distribution and the structure of interstellar PAH molecules pointing to a trend towards larger-size PAHs. The mid-infrared spectra of galactic and extra galactic sources have also indicated the presence of 5-ring structures and PAH structures with attached side groups.

This paper reports for the first time the laboratory measurement of the UV– visible– NIR absorption spectra of a representative set of large PAHs that have been selected for a long duration exposure experiment on the International Space Station ISS. This experiment will test the photostability of large carbon- bearing molecules during a long duration exposure in Earth orbit. Comparison of these laboratory spectra with the spectra of the post-flight samples will provide important information on the effects of space radiation on cosmic organic materials. PAHs with sizes up to 600 amu, including 5-ring species and PAHs containing heteroatoms, have been synthesized and their spectra measured using matrix isolation spectroscopy (MIS). The spectra of the neutral and ionized species measured in this work are also compared to astronomical spectra of Diffuse Interstellar Bands

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