EXPLORING THE SPECTRUM OF INTERSTELLAR PAH ANALOGS WITH CRDS AND MULTIPLEX ICOS: ASTROPHYSICAL APPLICATIONS

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The gas-phase electronic absorption spectra of selected neutral and ionized polycyclic aromatic hydrocarbons (PAHs) measured in an astrophysically relevant environment are reported and discussed. This type of measurements provides data on PAHs that can now be *directly* compared to astronomical spectra of the UV interstellar extinction curve and of the diffuse interstellar bands (DIBs). The harsh interstellar environment - characterized by a low temperature, an absence of collisions and strong VUV radiation fields - is simulated in the laboratory by associating a pulsed molecular beam with an ionizing Penning-type discharge that generates a cold plasma expansion[a]. The spectra of PAH ions and molecules are measured in the UV-VIS-NIR range using the complementary high sensitivity methods of Cavity Ring Down Spectroscopy (CRDS) and multiplex Integrated Cavity Output Spectroscopy (ICOS). Internal conversion, followed by intramolecular vibrational redistribution, on a femtosecond timescale is responsible for the significant broadening of the vibronic bands of the set of PAH ions measured so far ($\geq$20 cm^{-1} for two to four rings PAH ions). The laboratory data are compared with recent high quality (S/N $>$ 1000), moderate resolution spectra of selected lines-of-sight toward stars obscured by diffuse interstellar material.

[a]Biennier, L., Salama, F., Allamandola, L. J. & Scherer, J. J., 'Pulsed discharge nozzle cavity ringdown spectroscopy of cold PAH ions', *J. Chem Phys.* **in press**