

## PHOTO-IONIZATION AND PHOTO-DISSOCIATION OF TRAPPED PAH CATIONS

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In astrophysical environments, polycyclic aromatic hydrocarbons (PAHs) are submitted to VUV photons of energy up to  $\sim 20$  eV. In the laboratory, photoelectron-photoion spectroscopy is usually performed using VUV synchrotron radiation, in which the same photon (15-25 eV), is used to ionize and dissociate PAHs<sup>a</sup>. These experiments explore specific conditions and complementary studies in ion traps are required for a wider investigation of interstellar conditions.

We have used the LTQ linear ion trap available on the DESIRS VUV beamline at SOLEIL to study the interaction of PAH cations with photons in the 7-20 eV range. We recorded by action spectroscopy the relative intensities of photo-fragmentation and photo-ionization of eight PAH cations ranging in size from 14 to 24 carbon atoms and with different structures. We found that, at photon energies below  $\sim 13.6$  eV, fragmentation dominates for the smaller species, while for larger species ionization is competitive immediately above the second ionization potential. At higher photon energies, all species behave similarly, the ionization yield gradually increases, levelling off between 0.8 and 0.9 at  $\sim 18$  eV<sup>b</sup>.

We have also recorded the competition between the different dissociation channels as a function of the VUV photon energy, such as the C<sub>2</sub>H<sub>2</sub> versus H/H<sub>2</sub> loss. We will discuss how these data can be compared to results of photoelectron spectroscopy performed on neutral PAHs at the VUV beamline at the Swiss Light Source.<sup>c</sup> Acknowledgments<sup>d</sup>

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<sup>a</sup>H.W. Jochims et al., *Astron. & Astrophys.* **420** (1994), 307-317; P. M. Mayer et al., *J. Chem. Phys.* **134** (2011), 244312-244312-8

<sup>b</sup>J. Zhen et al., *Astron. & Astrophys.* (2016), in press

<sup>c</sup>B. West et al., *J. Phys. Chem. A* **118** (2014), 7824-7831; B. West et al., *J. Phys. Chem. A* **118** (2014), 9870-9878

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