CARBON CLUSTER CATIONS AND THE "BUMP" OF THE INTERSTELLAR UV EXTINCTION CURVE

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Light travelling from far-off stars interacts with interstellar molecules, ice grains, and dust particles, which can show up in astronomical observations. These observations reveal the results of scattering, absorption, and emission across the spectrum. In the ultraviolet region, the wavelength of light is of comparable size to the dimensions of dust particles. This enhances scattering, giving rise to the ultraviolet extinction curve. In photoionizing regions of space, there exists an additional feature of an intense absorption "bump" on this curve at 217.5 nm. The massive intensity of this feature requires that the carrier be made from very abundant interstellar element(s), so many studies have focused on the spectra of polyaromatic hydrocarbons or graphite-containing particles to identify the carrier, but no match has been found. Here, we measure the ultraviolet spectra of ionized carbon monocyclic rings (C_n^+, n = 13 – 19) which are produced by laser vaporization using mass selection and tunable laser photodissociation spectroscopy. The resulting spectra show that ionized carbon rings have the ultraviolet spectra and relevant astrochemistry to explain the bump.