ELECTRONIC SPECTROSCOPY OF COLD POLYCYCLIC AROMATIC HYDROCARBON CATIONS BY PHOTODISSOCIATION OF THEIR VAN DER WAALS COMPLEXES

T. PINO, N. BOUDIN, P. BRECHIGNAC, *Laboratoire de Photophysique Moléculaire, CNRS, Université Paris-Sud, 91405 Orsay Cedex, France*.

The Diffuse Interstellar Bands (DIBs) are absorption features systematically observed throughout the visible and near infra-red region of the Interstellar Extinction curve. These bands represent the longest-standing mystery of astrophysical spectroscopy since no carriers have been identified after more than fifty years. The purpose of the present work is to obtain near-infrared and visible spectra of PAH cations that can be directly compared to the observational data, so that the knowledge of the electronic spectra of PAHs+ can provide a direct test for the proposal of these molecules as DIBs carriers. We have developed a new spectroscopic method especially adapted to obtain absorption spectra of such large aromatic cations by measuring the photodissociation spectra of aromatic-rare gas van der Waals clusters in a molecular beam. The cluster cations produced are rotationally (<10K) and vibrationally cold. Because the binding energy of Ar in these van Der Waals clusters is small (of the order of 500 cm-1), they can easily be fragmented by exciting the species above the dissociation threshold (this process occurs on a subnanosecond time-scale). We have applied this method to a number of cations including PAH+ species and others, which have been measured in the near-IR and the visible region. This set of results represents the first "high resolution" spectroscopic database available today on such large polyatomic cations.