UNRAVELLING THE MECHANISM OF RESONANT TWO-PHOTON PHOTODETACHMENT OF THE VINYLIDENE ANION, $H_2C{=}C^-$, USING VELOCITY-MAP PHOTOELECTRON IMAGING

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Vinylidene, an isomer of acetylene and the simplest unsaturated carbene, has been studied extensively due to its role as a possible intermediate in a wide range of important chemical reactions. The neutral form of vinylidene is an extremely short-lived species and therefore information about its structure and potential energy surface may be gained through the study of its stable anionic form. Using velocity-map photoelectron imaging to investigate the behavior of the anion, we observe electron loss with excitation energies lower than the established electron adiabatic detachment energy (ADE). An in-depth analysis of the velocity-map images and corresponding photoelectron spectra taken at various energies within the C-H stretching region as well as at energies around the ADE provide plausible explanations for the observed behavior. The study also reveals interesting angular distributions specific to certain vibrational modes that are not trivial to understand at this point.