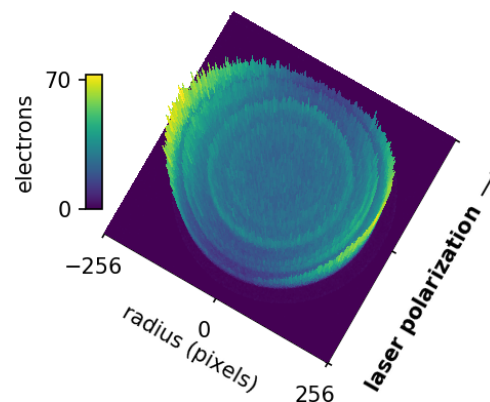


VIBRONIC COUPLING IN THE GROUND STATE OF VINYLIDENE  $\tilde{X}^1A_1$  H<sub>2</sub>CC

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The nature of the isomeration process that turns vinylidene H<sub>2</sub>CC to acetylene HCCH, requiring a 1,2-hydrogen atom shift across the molecule, is a long standing puzzle that has its origin in a 1989 photoelectron measurement of vinylidide (H<sub>2</sub>CC<sup>-</sup>)<sup>a</sup>. In recent years the photoelectron spectrum of vinylidide has been revisited, using improved experimental techniques, including velocity-map imaging for the detection of photoelectrons, low-temperature near-threshold methods (cryo-SEVI)<sup>b</sup>, and sophisticated *ab initio* calculations<sup>c</sup>. The simple normal-mode structure, 1064 nm velocity-map image illustrated, is proving a challenge to decipher. However, the dramatic change in the photoelectron angular distribution of the inner-ring structure is characteristic of vibronic coupling<sup>d</sup>. The lowest electronic state with the correct symmetry,  $\tilde{B}^1B_2$ , is 4eV higher in energy.



<sup>a</sup>K. M. Ervin *et al.* *J. Chem. Phys.* **91** 5974 (1991).

<sup>b</sup>J. A. De Vine *et al.* *J. Am. Chem. Soc.* **138** 16417 (2016).

<sup>c</sup>L. Guo *et al.* *J. Phys. Chem.* **119** 8488 (2015).

<sup>d</sup>A. Weaver *et al.* *J. Chem. Phys.* **94** 1740 (1991).

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