1+1′ TWO-COLOR PHOTOIONIZATION SPECTROSCOPY OF ACETYLENE

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1+1′ two-color photoionization spectrum of C_2H_2 via a single rovibrational level of $\widetilde{A}^1A_u$ as the intermediate was recorded under nearly field-free condition in the range of 91900-92700 cm^{-1}. If the first color was frequency-tuned to excite a single rotational level ($J' = 1-4, e$ parity) of V_4K_1 of the $\widetilde{A}^1A_u$ state, sharp autoionizing spectral lines with the line width of $\Delta\nu$ =0.13-0.20 cm^{-1} were obtained except that where near the ionization threshold, extensive diffuseness ($\Delta\nu$ = 2.1- 4.1 cm^{-1}) was observed. The prominent autoionizing features have been assigned as two Rydberg series converging to the vibronic state (K^+ =0^-, V_4^+ =1) of $C_2H_2^+(\widetilde{X}^2\Pi_u)$. However, if a single rotational level ($J' = 2-4, e$ parity) of V_4K_2 of the $\widetilde{A}$ state was chosen as the doorway state, no autoionizing Rydberg series was possibly assigned. The interchannel coupling between the vibrationally autoionizing state and the ZEKE state explains the vibronic effect of the ion core on the intensity and spectral line shape of the PFI-ZEKE spectrum of acetylene near the ionization threshold.