1+1′ PFI-ZEKE PHOTOELECTRON SPECTROSCOPY OF C_2H_2-THE RENNER-TELLER EFFECT OF $C_2H_2^+$

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This paper presents the 1+1′ pulsed-field induced zero-kinetic energy (PFI-ZEKE) photoelectron spectrum of C_2H_2 recorded in the range of 91900-95600 cm^{-1}via a single rovibrational level of $\tilde{A}^1A_u$ as the intermediate. The prominent spectral features were due to trans-bending vibration progression (V_4^+=0-6, K^+=0-3) of the $\tilde{X}^2\Pi_u$ state of $C_2H_2^+$. Although transitions to levels of the cis-bending vibration and levels with combination of ν_2^+, ν_4^+ and ν_5^+ vibrational excitation were generally much weaker, the combination levels of (0,0,0,1,1) were fairly easily detected. From the parities and symmetries of the nuclear spin of the observed rovibrational levels of the cations and the intermediate, we deduced that both odd and even partial waves were given off in the pulsed-field photoionization of the $\tilde{A}$ state of acetylene. The spectroscopic parameters such as the trans-bending/cis-bending vibrational frequencies, anharmonicity constants, the g_K corrections, and Renner-Teller parameters obtained from the best fit to the observed vibronic levels using a model for the Renner-Teller effect of molecule with two bending vibrational modes will be presented.