CHARACTERIZATION OF THE $\tilde{X}\,^2A_1$ (0,0,0) GROUND VIBRONIC STATE OF CH_2^+ BY PFI-ZEKE PHOTOELECTRON SPECTROSCOPY

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The $\tilde{X}\,^2A_1$ (0,0,0) ground vibronic state of CH_2^+ has been studied by pulsed-field-ionization zero-kinetic-energy (PFI-ZEKE) photoelectron spectroscopy by recording transitions from the $\tilde{X}\,^3B_1$ (0,0,0) ground vibronic state of CH_2 which has been produced by photolysis of CH_2CO at 351 nm. The rotational energy level structure and the spin-rotation splittings of levels with $K_a \geq 1$ could be resolved. The rotational structure in the $\tilde{X}\,^2A_1$ $(0,0,0)$ state deviates strongly from that of a rigid rotor. The adiabatic ionization potential of $^3CH_2$ has been determined to be (83772±3) cm^{-1}. Analysis of the photoionization selection rules indicates that the photoelectron is ejected as a superposition of ℓ even and ℓ odd partial waves.