LASER SPECTROSCOPY OF C_2H: A BAND NEAR 6340 CM^{-1}

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C_2H is a linear radical found in a variety of terrestrial environments (flames, hydrocarbon photofragments), and is abundant in the interstellar medium. Analysis of its infrared spectrum is complicated by a low-lying electronic state $\widetilde{A}\,^2\Pi$, about 3700 cm^{-1} above the $\widetilde{X}\,^2\Sigma^+$ ground state. Strong interactions between $\widetilde{A}\,^2\Pi$ and $\widetilde{X}\,^2\Sigma^+$ make it difficult to assess the vibrational character of the upper states in observed spectra.

In the course of near-infrared laser spectroscopic studies of a methane-helium discharge, we observed a $^2\Sigma - {}^2\Sigma$ band with an origin near 6340 cm^{-1}. Combination difference comparisons confirmed that lower state was the 000 vibrational level of the ground state of C_2H. The upper state may be a vibrational state of $\widetilde{X}\,^2\Sigma^+$, or of $\widetilde{A}\,^2\Pi$ if a bending vibration is involved. We will present the rotational analysis of this band, and will discuss possible vibrational assignments.