A TORSION-ROTATION-VIBRATION INTERACTION ANALYSIS OF THE LOWEST IN-PLANE BEND AND FIRST EXCITED TORSIONAL STATE ROTATIONAL SPECTRUM OF THE C_{3V} INTERNAL ROTOR C_2H_5CN

J. C. PEARSON, HERBERT M. PICKETT, *Jet Propulsion Laboratory, California Institute of Technology, Mail Stop 183-301, 4800 Oak Grove Dr., Pasadena, CA 91109-8099*; K. V. L. N. SASTRY, *Department of Physics, University of New Brunswick, Fredericton, New Brunswick, E3B 5A3 Canada*.

The close proximity of the bend and torsion states of C_2H_5CN (Propionitrile or ethyl cyanide) and their low lying (206 cm^{-1}) nature make them an ideal choice for a millimeter- and submillimeter-wave high resolution study of the complex and largely unexamined interactions among torsion, vibration and rotation in a simple C_{3V} internal rotation case. In order to understand the fine details of these interactions, several thousand rotational transitions in the lowest excited in-plane bend and first excited torsional state have been recorded, assigned and analyzed in the 80-422 GHz spectral region. The analysis of the data reveals very strong a- and b-type Coriolis interactions and a number of other smaller interactions. The relative importance and the physical origins of the coupling among the rotational, vibrational and torsional motions will be presented along with a full spectroscopic analysis. A number of important implications for other C_{3V} torsion-rotation-vibration systems will be elaborated.