THE ROTATIONAL SPECTRUM OF C_2H_5CN

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Ethyl cyanide (C_2H_5CN) is a prominent molecule in many hot cores associated with star formation. It is believed to be formed on grains and ejected into the gas phase upon heating at the onset of star formation. Due to a large dipole moment and a number of low lying vibrational states, ethyl cyanide has a dense rotational spectrum that often dominates astronomical observations of hot cores where the temperature exceeds 200 K. In these regions, the strongest ground state lines can have antenna temperatures in excess of 10 K, making it imperative to understand transitions that are over 1000 times weaker. Thus, a full understanding of the entire spectrum to high J that also includes many vibrational states is critical in eliminating ethyl cyanide confusion in searches for other species. Its spectrum is complex, with a-type and b-type transitions, a low lying in-plane bend, a high barrier internal rotation, as well as a low-lying out-of-plane bend that are all interacting before 400 cm^{-1}. While the ground state has been extensively studied through J=70, the physics of the torsion, rotation-vibration in the excited states remains to be fully described. New measurements have been taken to higher frequencies, and a nearly complete spectrum to 900 GHz is available. The new results will be discussed in relation to the overall spectrum of the molecule.