THE HIGH J ASYMMETRIC INTERNAL ROTATION SPECTRUM OF ETHYL ALCOHOL

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The ground state rotational spectrum of ethyl alcohol (CH_3CH_2OH) is comprised of three interacting conformers of the OH torsion, trans or e_0, gauche+ or e_1 and gauche- or o_1. In the low J limit the trans state may be treated as an independent state and the gauche states as an interacting pair. However, the rotational constants for the trans state are significantly larger than for the gauche states, which quickly leads to a failure of the independent state model. The spectrum becomes substantially more complicated at J's between 20 and 40 with a number of ΔK = 3-6 level crossings. Finally in the high J ($J > 40$) and $K > 16$ limit there are a number of ΔK = 1 and 2 level crossings with an enormous impact on the spectrum and the assignment of quantum numbers. The rotational spectra to 1.65 THz has been assigned and comprises a range of J and K quantum numbers to 72 and 25 respectively. The current state of knowledge is described in this example of an asymmetric-top asymmetric-frame internal rotor.