ETHYL ALCOHOL A CASE STUDY IN ASYMMETRIC-ASYMMETRIC INTERNAL ROTATION

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Ethyl Alcohol offers an outstanding opportunity to study the effects of Asymmetric-Top and Asymmetric-Frame internal rotation. The ground state spectrum of ethyl alcohol is comprised of three torsional substates; the trans or e_0, the symmetric gauche (gauche$^+$ or e_1) and the asymmetric gauche (gauche$^-$ or o_1). The interactions and transitions are governed by the C_S group, with all symmetries being either odd or even. Ethyl alcohol is a prolate asymmetric top and the trans substate has slightly larger rotational constants than the two gauche substates. The trans substate is 1185.4 GHz below the gauche$^+$ state. As a result of the structure and torsional energy, the energy level structure is rich in strongly avoided crossings and substantial mixing, often of all three substates. The spectrum has been assigned to J=70 and K_a=24, including multiple avoided crossings between trans and gauche states with K_a differences of less than 3. The ethyl alcohol energy level structure and spectral features unique to the asymmetric internal rotation problem will be described.