GLOBAL FIT ANALYSIS INCLUDING THE $\nu_9 + \nu_4 - \nu_4$ HOT BAND OF ETHANE: EVIDENCE OF INTERACTION WITH THE ν_{12} FUNDAMENTAL

J.R. COOPER, N. MOAZZEN-AHMADI, *Department of Physics and Astronomy, 2500 University Drive NW, Calgary, Alberta T2N 1N4, Canada*.

The ν_9 (methyl rock) fundamental band of ethane occurs in the 12 μm region. It is the strongest band of ethane in a terrestrial window and is commonly used for the identification of ethane in the Jovian planets. The $\nu_9 + \nu_4 - \nu_4$ band occurs in the same region; neither can be analysed as an isolated band, since both are embedded in the torsional bath of the ground vibrational state. We report here a global fit model including data from the ν_3 (C-C stretch) fundamental, the ν_4, $2\nu_4 - \nu_4$, and $3\nu_4$ torsional transitions, the ν_9 fundamental, and its $\nu_9 + \nu_4 - \nu_4$ hot band. The combined data set of more than 4000 lines has been fitted to within experimental uncertainty using a model Hamiltonian which includes many terms which were important in analyzing the corresponding hot band of CD_3CD_3. We have therefore identified Coriolis interactions with the ground vibrational state (gs) for both the ν_9 and $\nu_9 + \nu_4 - \nu_4$ bands, as well as gs/ν_3 Fermi coupling, and have determined several barrier-dependence terms which were not previously accessible. More remarkably, we have also identified a new, resonant interaction with the ν_{12} fundamental which – unlike terms included in previous models – is off-diagonal in the torsional quantum number σ.