

LOCAL PERTURBATIONS IN THE (10110) AND (10101) LEVELS OF C₂H₂ FROM FREQUENCY COMB-REFERENCED SPECTROSCOPY

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In work reported by Twagirayezu *et al.* at this meeting, the rest frequencies of more than 100 lines in the ν_4 and ν_5 hot bands in the $\nu_1 + \nu_3$ combination band of acetylene have been measured by saturation dip spectroscopy using an extended cavity diode laser locked to a frequency comb. This work was originally directed towards providing a set of accurate frequencies for the hot band line positions to aid in modeling the lineshapes of the main lines in the band. In analyzing the results, we find that many of the upper levels in the hot band transitions suffer small, and in some cases not so small, local perturbations. These arise because of J -dependent near degeneracies between the title levels and background levels of the same symmetry, mostly derived from zero order states involving multiple quanta of bending excitation. The vibration-rotation levels at the energies in question have previously been modeled using a polyad-based Hamiltonian^b and the present data can be interpreted on the basis of this model, but they also provide information which can be used to refine the model, and point to terms that may have previously been neglected. The most important result is that the high precision of the measurements gives the opportunity to calibrate the effects of background levels associated with high bending quantum numbers and angular momentum states that are otherwise very difficult to access.

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