

MICROWAVE SPECTRUM OF ACETIC ACID: THE THIRD AND FOURTH EXCITED TORSIONAL STATES

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We present the first study of the millimeter and submillimeter wave spectra of the third and fourth excited torsional states of acetic acid (CH_3COOH). New measurements have been carried out in the 149-183 GHz and 255-420 GHz ranges using the millimeter wave spectrometer in the Institute of Radio Astronomy of NASU (Ukraine). Already published data [1] were combined with the new measurements and fitted using the rho-axis-method torsion-rotation Hamiltonian and RAM36 code [2]. The current fit uses 109 parameters to give an overall weighted root-mean-square deviation of 2.1 for the dataset consisting of 34799 transitions (which due to blending correspond to 21773 measured line frequencies), among which 2663 and 1243 transitions correspond to the third and fourth excited torsional states of CH_3COOH , respectively. The new dataset also contains numerous intertorsional transitions (2407) including those involving energy levels from the third and fourth torsional excited states that are observed due to intensity borrowing via avoided crossing interactions that provide a direct measure of torsional energy spacings associated with torsional potential barrier. In the talk the details of the experimental dataset and analysis will be given^a.

[1] V. V. Ilyushin, C. P. Endres, F. Lewen, S. Schlemmer, B. J. Drouin *J. Mol. Spectrosc.* 290, pp. 31 - 41, 2013.

[2] V. Ilyushin, Z. Kisiel, L. Pyszczólkowski, H. Mäder, J. T. Hougen, *J. Mol. Spectrosc.* 259, pp. 26-38, 2010.

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