

**MILLIMETER-WAVE SPECTROSCOPY OF AMMONIA-WATER  
WEAKLY BOUNDED COMPLEX**

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The broadband rotational spectra of ammonia-water (NH<sub>3</sub>-H<sub>2</sub>O) complex were measured in the frequency range from 50 to 250 GHz using a supersonic-jet emission spectrometer. The NH<sub>3</sub>-H<sub>2</sub>O complex exhibits two large amplitude motions (LAMs): almost free internal rotation of ammonia owing to very low torsional barrier ( $\approx 10 \text{ cm}^{-1}$ ), and the inversion of water characterized by relatively high barrier ( $\approx 700 \text{ cm}^{-1}$ ). In total, about 150 rotational transitions of NH<sub>3</sub>-H<sub>2</sub>O were assigned in this study. They were fitted together with the data from previous studies<sup>1</sup> using the “hybrid” Hamiltonian approach<sup>2</sup>. The analysis is in progress as we are currently trying to modify the characteristics of supersonic expansion in order to achieve higher rotational temperatures and consequently to measure higher  $K_a$  transitions. We also present recent modification of the spectrometer that allowed us to improve spectral resolution and observe water inversion tunneling splittings in pure rotational transitions of NH<sub>3</sub>-H<sub>2</sub>O. The latest results will be discussed.

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<sup>1</sup>P. A. Stockman, R. E. Bumgarner, S. Suzuki, & G. A. Blake, J. Chem. Phys. 96, 2496 (1992);  
G. T. Fraser & R. D. Suenram, J. Chem. Phys. 96, 7287 (1992)

<sup>2</sup>I. Kleiner & J. T. Hougen, J. Mol. Spectrosc. 368, 111255 (2020)