MILLIMETER-WAVE SPECTROSCOPY OF AMMONIA-WATER WEAKLY BOUNDED COMPLEX

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The broadband rotational spectra of ammonia-water (NH$_3$-H$_2$O) complex were measured in the frequency range from 50 to 250 GHz using a supersonic-jet emission spectrometer. The NH$_3$-H$_2$O complex exhibits two large amplitude motions (LAMs): almost free internal rotation of ammonia owing to very low torsional barrier ($\approx 10$ cm$^{-1}$), and the inversion of water characterized by relatively high barrier ($\approx 700$ cm$^{-1}$). In total, about 150 rotational transitions of NH$_3$-H$_2$O were assigned in this study. They were fitted together with the data from previous studies$^1$ using the “hybrid” Hamiltonian approach$^2$. 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$_3$-H$_2$O. The latest results will be discussed.

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