THE MILLIMETER AND SUBMILLIMETER-WAVE SPECTRUM OF NITRIC ACID: THE $7^1 9^1$, $6^1 9^1$, AND 7^2 EXCITED VIBRATIONAL STATES

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The measurement and analysis of the rotational spectrum of nitric acid in the first three excited vibrational states above 1000 cm^{-1} will be presented. The assignments in each state involve transitions well into the asymmetric rotor limit with over 450 transitions measured in each state that span the frequency range from 80-525 GHz with quantum numbers ranging up to J $\sim$ 55 and $K_c \sim 40$. The rotational transitions in the $7^1 9^1$ and $6^1 9^1$ states exhibit a $\sim$ 12 MHz and $\sim$ 23 MHz torsional splitting, respectively, requiring an internal axis system Hamiltonian with a set of torsional parameters to reproduce the observed spectra. There is no resolvable torsional splitting in the 7^2 spectrum. Each state was fit separately and free from strong perturbations. The rms deviation of each analysis is close to the experimental uncertainty of $\sim$ 100 kHz and the fitted rotational constants of each state agree well with those predicted from the ground, 6^1, 7^1, and 9^1 states.