HIGH-RESOLUTION SPECTRA OF MOLECULAR ANIONS: ANOMALOUS ASYMMETRY SPLITTING IN HNO^-

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Extensive measurements have been made of the infrared vibrational-rotational spectra of the $H^{14}NO^-$ and $H^{15}NO^-$ anions. The spectra were obtained using autodetachment spectroscopy, in which vibrational-rotational transitions are excited using a coaxial ion beam/infrared laser beam spectrometer. The vibrationally excited ions autodetach, producing a fast neutral which is detected. A total of 413 transitions have been measured in the fundamental N-H stretch. The measurements have sub-Doppler resolution, enabling the measurement of the asymmetry splitting. The asymmetry splitting, and rotational constants returned by a least-squares fit to the spectra, manifest an anomalously large dependence of the rotational constants upon isotopic substitution. The spectrum may be perturbed by a Coriolis interaction. Comparison is made with a theoretical calculation [a] of the geometry of this species.

[a] K. A. Robins, J. W. Farley, and J. L. Toto, J. Chem. Phys. 99, 9770 (1993).