Observation of ν_4 band transitions of NH_4^+ and ND_4^+

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The tetrahedral ammonium ion has two triply-degenerate infrared-active fundamentals. In 1983, Crofton and Oka; and Schafer,Begemann,Gudeman and Saykally observed the ν_3 fundamental of NH_4^+ in glow discharges. Several subsequent studies have been reported, but only one concerns the other IR-active fundamental. In this work, more than thirty new lines in the ν_4 band of NH_4^+ are reported, together with the first detection of the same band of ND_4^+.

These ammonium ions were observed in a water-cooled hollow cathode discharge with a diode laser spectrometer. A program was written to fit the spectra to fourth order based upon the spherical top Hamiltonian of Robiette *et al.* and using an uncoupled basis set.