

Abstract Submitted
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Precision mass measurements with molecular ions: resolving rotational and vibrational energy¹ DAVID FINK, JORDAN SMITH, SAEED HAMZELOUI, EDMUND MYERS, Florida State University — Precision measurements of the cyclotron frequency ratios H_3^+/HD^+ and $\text{H}_3^+/^3\text{He}^+$ have shown differences in the masses of H_3^+ ions due to rotational energy. From this, we have confirmed that some high J,K states of H_3^+ have mean lifetimes exceeding several weeks. Using the lightest H_3^+ ion, we have obtained lower limits on the atomic masses of the deuteron and helium-3 with respect to the proton. To obtain further information on the relative masses of the proton and deuteron, we are now measuring the cyclotron frequency ratio H_2^+/D^+ . From our measurements we can observe the vibrational decay of H_2^+ and identify its vibrational state.

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