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Testing CPT with the Anti-hydrogen Molecular Ion[1] EDMUND MYERS, DAVID FINK, JORDAN SMITH, Florida State University — High precision radio-frequency, microwave and infra-red spectroscopic measurements of the anti-hydrogen molecular ion $\bar{H}_2^-$ ($\bar{p}\bar{p}e^+$), compared with its normal matter counterpart, can provide direct tests of the CPT theorem. The fractional precision that can be achieved with such measurements can exceed that from comparing anti-protons with protons or anti-hydrogen with hydrogen. Schemes are outlined for measurements on a single $\bar{H}_2^-$ ion in a Penning trap, that use non-destructive state identification by measuring the cyclotron frequency and positron spin-flip frequency, and also methods for creating an $\bar{H}_2^-$ ion and initializing its quantum state.

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