Abstract Submitted
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Precision Radio Frequency Spectroscopy in the $^{137}Ba^{+}$ $5D_{5/2}$ Manifold[1] MATTHEW HOFFMAN, SPENCER WILLIAMS, ANUPRIYA JAYAKUMAR, E.N. FORTSON, BORIS B. BLINOV, University of Washington — As atomic theorists' computational techniques become increasingly accurate and sophisticated, precision experiments are necessary to confirm the results of these calculations. The substructure of the long-lived $5D_{5/2}$ level of $^{137}Ba^{+}$ is an ideal testing ground, where calculations are limited by uncertainty in the wavefunctions used. The intervals of this hyperfine manifold are parameterized to first-order by the well-studied nuclear magnetic dipole moment (μ) and the electric quadrupole moment (Q). However, the presence of a nuclear magnetic octupole moment, Ω, as well as second-order corrections in the hyperfine interaction of the same magnitude as Ω, offer additional contributions which are measurable using precision radio-frequency (rf) spectroscopy.[2] By accurately measuring hyperfine intervals with transitions that are insensitve to magnetic field to first order, and using results from the $5D_{3/2}$ level,[3] we can extract Ω as well as the magnitude of the second order corrections to compare with theory.

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[2]Phys. Rev. A 77, 052503 (2008)
[3]Opt. Express 20, 21379-21384 (2012)

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