Abstract Submitted
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Measuring the Nuclear Magnetic Octupole Moment of a Single Trapped Barium-137 Ion[1] ADAM KLECZEWSKI, NORVAL FORTSON, BORIS BLINOV, University of Washington — Recent measurements of hyperfine structure in the cesium-133 atom resolved a nuclear magnetic octupole moment Ω much larger than expected from the nuclear shell model[1]. To explore this issue further, we are undertaking an experiment to measure the hyperfine structure in the 5D manifold of a single trapped barium-137 ion which, together with reliable calculations in alkali-like Ba^+, should resolve Ω with sensitivity better than the shell model value [2]. We use a TmHo:YLF laser tuned to 2051 nm and a fiber laser tuned to 1762 nm to drive the $6S_{1/2}$ to $5D_{3/2}$ and $6S_{1/2}$ to $5D_{5/2}$ electric quadrupole transitions. These lasers allow us to selectively populate any hyperfine sub-level in the 5D manifold. We will then perform RF spectroscopy on the 5D states to make a precision measurement of the hyperfine frequency intervals. We report on the development of the laser and RF spectroscopy systems. [1] V. Gerginov, A. Derevianko, and C. E. Tanner, Phys. Rev. Lett. 91, 072501 [2] K. Beloy, A. Derevianko, V. A. Dzuba, G. T. Howell, B. B. Blinov, E. N. Fortson, arXiv:0804.4317v1 [physics.atom-ph] 28 Apr 2008

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