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Precision Measurements of Ba^+ Properties[1] MATTHEW HOFFMAN, SPENCER WILLIAMS, ANUPRIYA JAYAKUMAR, E.N. FORTSON, BORIS BLINOV, University of Washington — Single trapped barium ions continue to offer a wealth of information about atomic and nuclear structure, oscillator strengths, and polarizabilities. We report progress towards a series of precision measurements that will provide stringent tests of theorists' predictions of these various properties. The first of these is a measurement of the $6S_{1/2} \leftrightarrow 5D_{3/2}$ magnetic dipole transition moment (M1), using a frequency stabilized laser operating at 2051 nm.[2] This measurement is of interest, as knowledge of M1 is necessary in a proposed measurement of atomic partity nonconservation (PNC).[3] The second is a radio-frequency (rf) spectroscopic measurement of the hyperfine structure of the $5D_{3/2}$, resulting in a measurement of the nuclear magnetic octupole moment of $^{137}Ba^+$. Finally, we have begun work on measuring the branching ratio of spontaneous decay from $5D_{5/2}$ to $6S_{1/2}$ and $5D_{3/2}$. The underlying theory and motivation behind these measurements will be presented, as well as experimental upgrades and recent results.

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[2]S.R. Williams *et al.*, PRA **88** 012515 (2013)
[3]E.N. Fortson, PRL **70** 2383 (1993)

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