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Progress toward a polarization rotation measurement of the $6S_{1/2} \leftrightarrow 5D_{3/2}$ magnetic dipole transition amplitude in Ba^+ ANUPRIYA JAYAKUMAR, SPENCER R. WILLAMS, MATTHEW R. HOFFMAN, BORIS B. BLINOV, NORVAL FORTSON, University of washington — We report our progress on the measurement of the magnetic dipole transition moment (*M1*) in Ba^+ for the $6S_{1/2}(m) \leftrightarrow 5D_{3/2}(m')$ transition with a linearly polarized 2051 nm laser. The motivation behind this study is to make a precise measurement of *M1*, which is the leading source of systematic error in our planned parity nonconservation measurement. To date there are only two theory calculations that have been reported for *M1* in Ba^+ which are $80 \times 10^{-5}\mu_B$ [1] and $20 \times 10^{-5}\mu_B$ [2]. In our technique, the Rabi frequency was measured for the $6S_{1/2} \leftrightarrow 5D_{3/2}$ transition with $\Delta m = 0$ and $\Delta m = 2$ as a function of the linear polarization angle of the 2051 nm beam. We used the $\Delta m = 2$ transition (that has no *M1* contribution) as a check for systematics in the polarization of the beam. By measuring the polarization dependence of the $\Delta m = 0$ transition Rabi frequency we can extract the ratio of the *M1* to the much larger and well known electric quadrupole amplitude, from which we can extract *M1*.

[1] PRA **74**, 062504
[2], PRA **88**, 034501.

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