Preliminary results measuring the strongly forbidden magnetic
dipole transition moment for the $6S_{1/2} \leftrightarrow 5D_{3/2}$ transitions in Ba$^+$.  
SPENCER WILLIAMS, ANUPRIYA JAYAKUMAR, MATTHEW HOFFMAN, BORIS BLINOV, NORVAL FORTSON, University of Washington — We report the latest results from our effort to measure the magnetic dipole transition moment ($M_1$) between the $6S_{1/2}$ and $5D_{3/2}$ manifolds in Ba$^+$. Knowledge of $M_1$ is crucial for a parity-nonconservation experiment in the ion where $M_1$ will be a leading source of systematic errors. To date no measurement of $M_1$ has been made in Ba$^+$, however, two calculations were recently reported which found $M_1$ to be $80 \times 10^{-5} \mu_B^2$ and $22 \times 10^{-5} \mu_B^3$. A precise measurement may help to resolve this theoretical discrepancy which originates from their different estimations of many-body effects. To access the transition moment we use a variation of a previously proposed technique$^4$ that allows us to observe the effect of $M_1$ directly in the Rabi frequency of particular Zeeman transitions. In this preliminary experiment we eliminate the electric quadrupole coupling by varying the linear polarization angle of the resonant laser.

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