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4:00 PM, Tuesday, June 4, 2013
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Abstract: D1.00024 : Proposal for parity nonconservation measurements in a single trapped Ba ion*

Preview Abstract ← Abstract →

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The interaction of the weak neutral currents between the atomic nucleus and electrons through the exchange of Z_o Bosons results in parity violations in atomic systems. The precision of a single Ba^+ parity nonconservation (PNC) experiment is predicted to be 0.13{\%} (three fold improvement over the recent atomic PNC measurements in Cs [1]). This combined with the atomic theory of Ba^+ will act as a means to test the electroweak physics. We propose to measure the parity violation in Ba^+ by coherently exciting the transition $6S_{1/2} \leftrightarrow 5D_{3/2}$ with a 2051 nm laser. Interference between $E1_{PNC}$ (non-vanishing electric dipole transition amplitude between transition $6S_{1/2} \leftrightarrow 5D_{3/2}$) and $E2$ (electric quadrupole transition amplitude) or $M1$ (magnetic dipole transition amplitude) gives a measure of the parity violating light shifts. Controlling the polarization of the 2051 nm laser and measuring the associated Rabi frequency in each case enables the extraction of $E1_{PNC}$ and $E2/M1$ amplitude from these measurements.\\[4pt] [1] Phys. Rev. Lett. \textbf{82}, 2484

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