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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

Authors:
Anupriya Jayakumar
(University of Washington)

Matthew R. Hoffman
(University of Washington)

Spencer Williams
(University of Washington)

E.N. Fortson
(University of Washington)

Boris B. Blinov
(University of Washington)

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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