Abstract Submitted
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**$Ba^+$ vs. Cs: prospects for parity-nonconservation studies** M.S. SAFRONOVA, E. ISKRENOVA-TCHOUKOVA, University of Delaware — We conduct a systematic study of $Ba^+$ atomic properties using a relativistic all-order method. Energy levels, transition matrix elements, lifetimes, hyperfine constants, and polarizabilities are calculated. This work is motivated by the possibility to study the parity nonconservation (PNC) with a single trapped ion. Comparison of the experimental weak charge of an atom $Q_W$ (a quantity which depends on input from atomic theory) with predictions provides important constraints on possible extensions of the standard model. The experimental value of $Q_W$ is known to 0.5% for Cs and 3% for Tl, the uncertainty in both cases being dominated by atomic theory. Since the Cs PNC studies provided the most accurate determination of $Q_W$ of such kind, we conduct a detailed comparison of accuracy of our $Ba^+$ calculations with the corresponding calculations in Cs. We also calculate the ratio of the light shift in the $6s$ and $5d_{5/2}$ states in $Ba^+$ at various wavelengths and consider the prospects of the precise determination of the $Ba^+$ electric-dipole matrix elements from the combination of the theoretical and experimental [1] studies of the light shift ratios.
[1] J. A. Sherman, T. W. Koerber, A. Markhotok, W. Nagourney, and E. N. Fortson, Phys. Rev. Lett. 94, 243001 (2005)

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