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All-order calculation of spin-dependent PNC amplitude in Cs and a revised value of Cs anapole moment MARIANNA SAFRONOVA, University of Delaware, W. R. JOHNSON, University of Notre Dame — The precise measurements of the $6s_{1/2}[F = 4] - 7s_{1/2}[F = 3]$ and $6s_{1/2}[F = 3] - 7s_{1/2}[F = 4]$ parity-nonconserving (PNC) amplitudes in ^{133}Cs [1] gave an experimental value of the nuclear spin-dependent PNC interaction accurate to about 15%. The resulting nuclear anapole moment extracted from this experiment was, in turn, used to place constraints on PNC meson coupling constants. The constraints obtained from the Cs experiment were found to be inconsistent with constraints from other nuclear PNC measurements, which favor a smaller value of the Cs anapole moment. Motivated by this disagreement, we re-examined the atomic physics calculation of the PNC amplitude used in this analysis. Our calculations are based on the relativistic all-order single-double method where all single and double excitations of the Dirac-Hartree-Fock wave function are included to all orders of perturbation theory. The resulting PNC amplitudes are used to re-evaluate the value of Cs anapole moment. Detailed investigation of the theoretical uncertainties is carried out.
[1] C. S. Wood, S. C. Bennett, D. Cho, B. P. Masterson, J. L. Roberts, C. E. Tanner, and C. E. Wieman, Science 275, 1759 (1997)

Marianna Safronova
University of Delaware

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