Abstract Submitted
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Higher-order lattice light shifts in the Cd optical clock[1] SERGEY PORSEV, MARIANNA SAFRONOVA, University of Delaware — The $5s^2\,{}^1S_0 - 5s5p\,{}^3P_0^o$ transition in cadmium is an attractive candidate for an optical lattice clock because it allows for an efficient narrow-line cooling and has a small sensitivity to blackbody radiation [1], the effect which dominates the uncertainty budget of Sr and Yb clocks. Two isotopes of Cd have a nuclear spin of 1/2, which precludes tensor light shifts from the lattice light, another advantageous feature. In this work we address the problem of higher-order lattice light shifts in the Cd clock caused by the multipolar $M1$ and $E2$ atom-field interactions and by the term nonlinear in lattice intensity and determined by the hyperpolarizability. Using the method that combines configuration interaction and linearized coupled-cluster single double method we found the magnetic dipole and electric quadrupole polarizabilities and hyperpolarizabilities at the magic wavelength of the ${}^1S_0$ and ${}^3P_0^o$ states and determined these quantities for the clock transition frequency. The results are compared with those for the $5s^2\,{}^1S_0 - 5s5p\,{}^3P_0^o$ Sr clock transition.
[1] A. Yamaguchi, M. S. Safronova, K. Gibble, and H. Katori, Phys. Rev. Lett. **123**, 113201 (2019)

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