Abstract Submitted
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Blackbody radiation shift in the Sr optical atomic clock M.S. SAFRONOVA, S.G. PORSEV, University of Delaware, U.I. SAFRONOVA, University of Nevada, Reno, M.G. KOZLOV, Petersburg Nuclear Physics Institute, CHARLES W. CLARK, Joint Quantum Institute — We evaluated the static and dynamic polarizabilities of the $5s^2\ ^1\mathrm{S}_0$ and $5s5p\ ^3\mathrm{P}^\circ_0$ states of Sr using the high-precision relativistic configuration interaction + all-order method. Our calculation explains the discrepancy between the recent experimental $5s^2\ ^1\mathrm{S}_0$ - $5s5p\ ^3\mathrm{P}^\circ_0$ dc Stark shift measurement = 247.374(7) a.u. [T. Middelmann, S. Falke, C. Lisdat and U. Sterr, arXiv:1208.2848 (2012)] and the earlier theoretical result of 261(4) a.u. [S. G. Porsev and A. Derevianko, *Phys. Rev. A* **74**, 020502(R) (2006)]. Our present value of 247.5 a.u. is in excellent agreement with the experimental result. We also evaluated the dynamic correction to the BBR shift with 1% uncertainty; -0.1492(16) Hz. The dynamic correction to the BBR shift is unusually large in the case of Sr (7%) and it enters significantly into the uncertainty budget of the Sr optical lattice clock. We suggest future experiments that could further reduce the present uncertainties. For further information, see http://arxiv.org/abs/1210.7272

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