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Blackbody-radiation shift in a $^{88}Sr^{+}$ ion optical frequency standard DANSHA JIANG, BINDIYA ARORA, MARIANNA SAFRONOVA, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716-2570, USA, CHARLES W. CLARK, Joint Quantum Institute, National Institute of Standards and Technology and the University of Maryland, Gaithersburg, Maryland 20899-8410, USA — The blackbody radiation (BBR) shift of the $5s - 4d_{5/2}$ clock transition in $^{88}Sr^{+}$ is calculated using the relativistic all-order method where all single and double excitations of the Dirac-Fock wave function are included to all orders of perturbation theory. The BBR shift is a major component in the uncertainty budget of the optical frequency standard based on $^{88}Sr^{+}$ trapped ion at room temperature. Additional calculations are conducted for the dominant contributions in order to evaluate some omitted high-order corrections and estimate the uncertainty of our final value. The scalar polarizabilities of the $5s$ and $4d_{5/2}$ levels, as well as the tensor polarizability of the $4d_{5/2}$ level, are presented together with the evaluation of their uncertainties. The lifetimes of the $4d_{3/2}$, $4d_{5/2}$, $5p_{1/2}$, and $5p_{3/2}$ states are calculated and compared with experimental values.

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