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Precise realization of the thermal radiation environment for an optical lattice clock KYLE BELOY, JEFF A. SHERMAN, NATHANIEL B. PHILLIPS, NIST, Boulder, NATHAN HINKLEY, University of Colorado, Boulder, CHRIS W. OATES, ANDREW D. LUDLOW, NIST, Boulder — The Stark shift due to thermal radiation contributes one of the largest known perturbations to the clock transition frequency of optical lattice clocks. Consequently, the uncertainty stemming from this shift has played a dominant role in the total uncertainty of these standards. Following recent works focused on atomic response factors (e.g., the differential polarizability), uncertainty in this perturbation is now limited by imprecise knowledge of the environment itself. Here we present progress towards precise realization of the thermal radiation environment in a Yb optical lattice clock by trapping the atoms in a highly uniform radiation shield at a well-known temperature. We characterize the non-ideal aspects of this approach, including less than unit emissivity, contamination of the blackbody environment from the ambient environment, and thermal non-uniformities.

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