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Reduction of the blackbody radiation and lattice light shift uncertainty of strontium lattice clocks

We present recent improvements of the systematic lattice light shift in our strontium lattice clock, reaching a fractional uncertainty on the order of 1×10^{-18}. A series of independent determinations of the E2-M1 polarisability $\Delta\alpha_{\mathrm{qm}}$ by different groups, including our own experimental measurement, has narrowed down the limits for the correct value of $\Delta\alpha_{\mathrm{qm}}$. The reduced fractional uncertainty of the lattice light shift benefits the strontium lattice clocks in the community. Further improvements of our system are planned by operating at cryogenic temperature of about 80 K. The fractional uncertainty from blackbody radiation is estimated to be reduced below the level of 2×10^{-19} by this procedure.

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