

Abstract Submitted  
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**$^{87}\text{Sr}$  Optical Lattice Clock** YIGE LIN, MATTHEW SWALLOWS, MICHAEL MARTIN, MICHAEL BISHOF, SEBASTIAN BLATT, TRAVIS NICHOLSON, BENJAMIN BLOOM, JUN YE, JILA, NIST, and the University of Colorado at Boulder — The JILA optical clock based on 1D lattice-confined  $^{87}\text{Sr}$  atoms operating on the ultra narrow  $^1S_0$ - $^3P_0$  transition has reached a fractional uncertainty of  $1.4 \times 10^{-16}$ .<sup>1</sup> We have characterized a density dependent frequency shift, one of the largest sources of uncertainty in the JILA 1D lattice clock, at the  $5 \times 10^{-17}$  level.<sup>2</sup> We have implemented a 2D optical lattice confinement to further reduce this uncertainty. In addition, we report advances in characterizing and eliminating blackbody radiation-induced clock shifts, which currently dominate our systematic uncertainty. Direct optical frequency comparisons with the NIST Yb optical lattice clock demonstrate clock stability below  $10^{-16}$  at 1000 s.

<sup>1</sup>A. D. Ludlow *et al.*, Science, **319**(5871) pp. 1805-1808, 2008.

<sup>2</sup>G. K. Campbell *et al.*, Science, **324**(5925) pp. 360-363, 2009.

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