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A Cavity Enhanced ^{87}Sr Optical Lattice Clock TRAVIS NICHOLSON, JASON WILLIAMS, BENJAMIN BLOOM, SARA CAMPBELL, MICHAEL MARTIN, MATTHEW SWALLOWS, MICHAEL BISHOF, JUN YE, JILA and The University of Colorado — Optical lattice clocks based on alkaline earth atoms have the potential to outperform single atomic ion clocks (the best clocks to date) [1,2]. The promise of lattice clocks is due to their larger atom numbers, for quantum projection noise limited atomic clocks average down like $1/\sqrt{N_{atoms}}$. Our new ^{87}Sr optical lattice clock utilizes a cavity enhanced 1D magic wavelength lattice to further improve our atom number [3]. The circulating power in our cavity allows us to operate at larger trap volumes than our previous retroreflected configuration while maintaining reasonable trap depths. These larger trap volumes enable us to transfer many more atoms into our lattice, improving our signal to noise. We will discuss our new cavity lattice clock system, and progress toward a comparison of two JILA lattice clocks will also be discussed. We will also touch on our goal of a 3D cavity enhanced lattice clock geometry.

[1] A.D. Ludlow et al, Science 319, 1805 (2008)
[2] T. Rosenband et al, Science 319, 1808 (2008)
[3] P.G. Westergaard et al, PRL 106, 210801 (2011)

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