Abstract Submitted
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Suppression of collisional shifts in an optical lattice clock by trapping atoms in a 2D lattice MATTHEW SWALLOWS, MICHAEL BISHOF, YIGE LIN, MICHAEL MARTIN, SEBASTIAN BLATT, ANA-MARIA REY, JUN YE, JILA, NIST, and the University of Colorado — Optical atomic clocks based on ensembles of neutral alkaline earth atoms trapped in a magic wavelength optical lattice are promising candidates for the future generation of frequency standards[1]. One advantage of neutral atom clocks is the simultaneous interrogation of a large number of atoms, which can in principle allow them to surpass the stability achievable with clocks based on single ions. However, several obstacles must be overcome before this advantage can be realized. One of these is atomic density-dependent collisional shifts of the clock transition, which can occur even if the clock is based on an ensemble of ultracold fermions[2]. We will report on recent efforts to eliminate collisional shifts affecting the JILA ^{87}Sr optical lattice clock by trapping atoms in a two-dimensional optical lattice. Collisional shifts will be suppressed by a novel mechanism that should operate even if each one-dimensional tube-like lattice site contains $N \gg 1$ atoms.

[1]A. D. Ludlow *et al.,* Science, **319**(5871) pp. 1805-1808, 2008.
[2]G. K. Campbell *et al.,* Science, **324**(5925) pp. 360-363, 2009.

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