Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Towards experimental demonstration of shaken lattice interferometry CARRIE WEIDNER, HOON YU, DANA ANDERSON, JILA/Univ of Colorado - Boulder — We report on experimental progress towards performing interferometry using atoms trapped in an optical lattice. That is, we load Rb-87 atoms into the ground state of a red-detuned optical lattice potential $V(x) = V_0 \cos[2kx + \phi(t)]$. By changing $\phi(t)$, we wish to implement the standard interferometric sequence of beam splitting, propagation, reflection, reverse propagation, and recombination. In order to find the desired $\phi(t)$, we implement a closed-loop learning algorithm [1] which provides a guess for $\phi(t)$, analyzes experimental data, then modifies the guess in order to converge upon an optimal shaking function that results in transformation of the initial wavefunction to the desired atomic state. For example, splitting of the atom wavefunction, with equal populations of atoms in the $\pm 2\hbar k$ momentum states may be implemented. The experimental implementation of such a system is described and progress towards the full interferometric sequence is detailed. [1] T. Caneva *et.al.* PRA 84, 022326, (2011).

Carrie Weidner
JILA/Univ of Colorado - Boulder

Date submitted: 29 Jan 2016 Electronic form version 1.4