

Abstract Submitted  
for the DAMOP07 Meeting of  
The American Physical Society

**Exploring the phase diagram of a double-well optical lattice** N. LUNDBLAD, P. LEE, B. BROWN, J. SEBBY-STRABLEY, J.V. PORTO, I.B. SPIELMAN, W.D. PHILLIPS, National Institute of Standards and Technology — Recent work in our group has demonstrated the creation and utility of a double-well optical lattice, consisting of a three-dimensional array of dynamically deformable lattice sites spanning the range from simple single wells to independent pairs of wells with variable barrier height and energy ‘tilt.’ The lattice is occupied by atoms loaded from an initially Bose-condensed sample of  $^{87}\text{Rb}$  atoms. The various lattice parameters can be adjusted so as to create a stack of independent 2D lattices, or, in the sense of the so-called ‘two-leg ladder,’ an array of chained double wells. We present preliminary investigations into the phase diagram of this system, which has been predicted to exhibit novel transitions between a half-filling/unit-filling Mott insulator and the superfluid phase as the chain couplings are varied.

N. Lundblad  
National Institute of Standards and Technology

Date submitted: 05 Feb 2007

Electronic form version 1.4