Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Observation of Thermodynamics due to Optical Feshbach Resonances TRAVIS NICHOLSON, SEBASTIAN BLATT, BENJAMIN BLOOM, JASON WILLIAMS, JUN YE, JILA, University of Colorado — Ultracold alkaline earth atoms have enabled great advances in precision measurement science, yielding the world's most precise experimentally-agreed-upon optical frequency [1]. Recent proposals have also argued that these atoms can be used for new quantum computing schemes and for the realization of novel quantum many-body systems [2,3]. For better many-body control of these systems, Feshbach resonances are desired, but there are no magnetic Feshbach resonances in alkaline earths due to their spinless electronic ground state configurations. However, optical Feshbach resonances have been observed to modify the mean-field energy of a BEC of ytterbium, an alkaline earth-like atom [4]. We present the first systematic study of the optical Feshbach resonance effect, including a detailed study of photoassociative inelastic collisions and the direct observation of light-induced thermodynamics.

[1] S. Blatt et al., Phys. Rev. Lett. **100**, 140801 (2008)
[2] A.J. Daley et al., Phys. Rev. Lett. **101**, 170504 (2008)
[3] A.V. Gorshkov et al., Nature Phys **6**, 289 (2010)
[4] K. Enomoto et al., Phys. Rev. Lett. **101**, 203201 (2008)

Travis Nicholson
JILA

Date submitted: 10 Feb 2011 Electronic form version 1.4