

Abstract Submitted  
for the DAMOP12 Meeting of  
The American Physical Society

**Adiabatic loading and cooling of  $SU(N)$  alkaline earth atoms in optical lattices** SALVATORE R. MANMANA, JILA / University of Colorado at Boulder, LARS BONNES, Institute for theoretical physics, University of Innsbruck, Austria, KADEN R.A. HAZZARD, JILA / University of Colorado at Boulder, STEFAN WESSEL, Institute for theoretical solid state physics, RWTH Aachen University, Germany, ANA MARIA REY, JILA / University of Colorado at Boulder — We present thermodynamic properties of  $SU(N)$  alkaline earth atoms adiabatically loaded onto optical lattices. In particular, we compute the final temperatures obtained by such a procedure and identify an enhanced cooling effect when increasing  $N$ . The combination of high temperature series expansion and extensive numerical calculations (Quantum Monte Carlo and DMRG) allows us to characterize this effect over a wide range of initial temperatures and to identify the temperature regime in which the physics is governed by  $SU(N)$  superexchange interactions. We discuss implications for ongoing experiments.

Salvatore R. Manmana  
JILA / University of Colorado at Boulder

Date submitted: 27 Jan 2012

Electronic form version 1.4