

Abstract Submitted  
for the DAMOP08 Meeting of  
The American Physical Society

**Progress Toward a Cavity-QED Realization of the Dicke Model Quantum Phase Transition** ROBERT COOK, BEN BARAGIOLA, JM GEREMIA, University of New Mexico — We present progress towards a Cavity-QED realization of the quantum phase transition seen in the Dicke Model Hamiltonian for  $N > 1$  spins coupled to a single Bosonic field mode, as proposed by Dimer *et. al.* Phys. Rev. A. **75**, 013804 (2007). The implementation is based upon cesium atoms held within a high finesse optical cavity. Cavity-mediated Raman transitions between magnetically detuned Zeeman sublevels provides near critical coupling between a collective pseudo-spin and a quantized cavity mode. Progress has been made in building the necessary infrastructure to collect  $\sim 10^6$  atoms in an intracavity optical lattice, while still maintaining a background pressure of  $\sim 10^{-10}$  torr. A tandem vacuum chamber provides a pressure difference of 2 orders of magnitude. A 2D-MOT will funnel atoms from a high pressure chamber into the lower pressure science chamber. Current efforts are directed towards capturing the funneled atoms.

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Date submitted: 04 Feb 2008

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