Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Lamb-Dicke-enhanced free-space superfluorescence in a cold thermal vapor[1] JOEL GREENBERG, DANIEL GAUTHIER, Duke University — We observe end-fire mode superfluorescence (SF) from an anisotropic, thermal atomic cloud of rubidium atoms. In contrast to traditional SF experiments that employ a single pump beam, we use a pair of counterpropagating, near-resonant beams to drive the SF process. By loading the atoms into the 1D optical lattice created by the pump beams, we greatly enhance the atomic coherence time by exploiting the Lamb-Dicke effect, thus enabling collective emission to occur without the need for an external cavity or ultracold temperatures. Using this technique, we achieve continuous SF with a coherence time of $\sim$300 μs and demonstrate all-optical switching with several thousand photons.

[1]We gratefully acknowledge the financial support of the DARPA DSO Slowlight program and NSF grant # PHY-0855399.

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Date submitted: 25 Jan 2010 Electronic form version 1.4