Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Dynamics of Low-Density Rydberg Gases[1] ERIK BREKKE, JASON DAY, THAD WALKER, University of Wisconsin - Madison — A state dependent stimulated emission probe was used to investigate the coherent and dynamic properties of cold Rydberg atoms. ^{87}Rb atoms were excited to various nl Rydberg states from a MOT via continuous two-photon excitation. A stimulated emission probe laser was then used to bring the Rydberg atoms down to the $6P_{3/2}$ state, allowing detection of decay photons as a Rydberg atom detection method. Phase-matched four-wave mixing was also achieved and the angular dependence investigated. This coherent process is optimized when detuned from the Rydberg state, giving as much as 40% phase-matched light. In addition, the stimulated emission probe technique shows that radiative processes dominate the Rydberg population dynamics on a time scale much faster than the natural radiative lifetime. Modeling suggests superradiant emission may be the dominant factor [T. Wang *et al.,* Phys. Rev. A **75**, 033802 (2007)].

[1]Supported by NSF

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Date submitted: 01 Feb 2008 Electronic form version 1.4