Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Sensitivity of STIRAP to Optical Detuning[1] YUAN SUN, HAROLD METCALF, Physics and Astronomy, Stony Brook University, 11794-3800 — We study the effect of optical detunings on the efficiency of STIRAP excitation of He atoms from the metastable 2^3S_1 state to the Rydberg states in the range of $n = 20$. The intermediate state of the 3 level system is $3^3P_{2,1,0}$, connected to 2^3S_1 by $\lambda = 389$ nm light (blue) and the Rydberg states by $\lambda \sim 800$ nm light (red). The copropagating laser beams cross the atomic beam perpendicularly and are arranged for the encounter to be in the STIRAP order (red before blue) to excite Rydberg atoms efficiently. The transverse velocity spread of the atomic beam induces detunings of both red and blue light. We have implemented a transverse Doppler molasses to reduce this velocity spread. Also, we provide an alternative view of STIRAP to explain the role of detuning based on a Feynman path integral approach. It shows how the tiny population in the intermediate level is vital to the STIRAP process.

[1]Supported by ONR

Harold Metcalf
Physics and Astronomy, Stony Brook University, 11794-3800

Date submitted: 24 Jan 2013 Electronic form version 1.4