Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

**Numerical Studies of Optical Forces from Multiple Adiabatic Rapid Passages**[1] DAN STACK, JOHN ELGIN, PETR M. ANISIMOV[2], HAROLD METCALF, Stony Brook University — In previous experimental work we exploited coherent momentum exchanges between light fields and atoms to produce long-range optical forces much greater than the radiative force through the use of absorption-stimulated emission processes.[3] One such way is through the use of multiple adiabatic rapid passage sequences on the $2^3\mathrm{S} \rightarrow 2^3P$ transition in helium. In this work we study numerical solutions for the optical Bloch equations that show the dependence of such optical forces on the pulse durations, sweep ranges, peak Rabi frequencies, sweep directions, relative phases, and overall phase stability. The velocity dependence of this force as well as the effects of spontaneous decay from the excited state has also been examined under various conditions. We have been surprised by some curious phenomena but have found intuitively satisfying explanations in terms of the motion of the Bloch vector on the Bloch sphere.

[1]Supported by ONR.
[2]Physics and Astronomy, Louisiana State Univ., Baton Rouge, LA 70803
[3]X. Miao et al., Phys. Rev. A **75**, 011402 (2007).

Harold Metcalf
Stony Brook University

Date submitted: 02 Feb 2011 Electronic form version 1.4