

Abstract Submitted  
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**Measurements of the Velocity Dependence of the ARP Force<sup>1</sup>**

JOHN ELGIN, HE ZHANG, H. METCALF, Physics Dept., Stony Brook University, Stony Brook NY 11794-3800 — Adiabatic Rapid Passage (ARP) has previously been shown to produce optical forces that are much larger than the radiative force on atoms at or near rest.<sup>2</sup> However, in order for a force to be useful for laser cooling, it needs to be velocity dependent over a finite region. Our experimental setup uses light from two externally-modulated diode lasers with variable detunings, and is designed to measure this velocity dependence. Our initial results show some unexpected features, mainly that the force *vs.* velocity profile displays narrow resonances at certain velocities, corresponding to both fractions and multiples of the lasers' modulation frequency. Numerically solving the Optical Bloch Equations for the experimental ARP conditions provides insight into these features. We present both experimental and numerical results, and interpret their implications for the usefulness of ARP in laser cooling applications.

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<sup>2</sup>X. Miao, Phys. Rev. A 75, 011402 (2007)

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