

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

A Study of the Velocity Dependence of the ARP Force¹ YIFAN FANG, BRIAN ARNOLD, HAROLD METCALF, Physics, Stony Brook University, Stony Brook NY 11794-3800 — The huge optical force enabled by multiple adiabatic rapid passage (ARP) sequences results from coherent exchange of momentum between atoms and light at a high repetition rate.² We have been studying its dependence on atomic velocity $F_{ARP}(v)$. We use counter-propagating beams from phase-locked lasers, perpendicular to an atomic beam, and measure the deflection of atoms out of the beam. We simulate the Doppler shifts of a transverse atomic velocity by oppositely detuning the frequency of the two light beams. The overall features of $F_{ARP}(v)$ in our experiments match well with our simulations over a wide range of atomic velocities. However, some detailed structures of $F_{ARP}(v)$ remain to be explained. In order to gain more insight into these structures, we have measured $F_{ARP}(v)$ over a range of interaction times and are also working on varying the repetition rate of momentum exchange to ameliorate the effects of sweep imperfections.

¹Supported by ONR

²H.Metcalf, Rev.Mod.Phys. **89** 041001 (2017).

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Date submitted: 01 Feb 2019

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