

Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Atom recoil during coherent light scattering from many atoms¹

FRANCIS ROBICHEAUX, SHIHUA HUANG, Purdue University — The recoil momentum and energy of ultracold atoms is studied for situations where collective scattering or emission of photons is important. Effects due to the dipole-dipole interaction are emphasized. For two and many atoms confined in optical traps, calculations of the energy and momentum with respect to atomic separation are performed. When the atomic separation is comparable to or larger than the transition wavelength, the ultracold atoms recoil energy depends mainly on collective spontaneous decay rather than forces from the cooperative frequency shift. Calculations for a laser pulse reflecting from an atomic array suggest that the recoil energy of atoms can be substantially larger than might be expected from an independent atom picture.

¹National Science Foundation under Award No. 1804026- PHY

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Date submitted: 01 Feb 2019

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