

Abstract Submitted
for the 4CF14 Meeting of
The American Physical Society

Superradiance in Non-Phasematched Laser Third Harmonic Emission from Helium DAVID SQUIRES, JUSTIN PEATROSS, MICHAEL WARE, CHRIS OLSEN, Brigham Young Univ - Provo — We report on single-photon measurements out the side of an intense laser, which is focused into a chamber filled with up to 10 atm of helium. Third-harmonic photons scattered by the 800-nm short laser pulses are readily observed. For a collection of atoms with randomized locations, and if the atoms act independently (classically), the emission into poorly phase-matched directions is the same whether the emission process is coherent or incoherent. The signal strength in that case would be proportional to the number of atoms exposed to the intense laser field. However, the third harmonic intensity is observed to be proportional to the square of the density, indicating cooperative effects between atoms in close proximity, this in spite of the fact that the atoms are only weakly excited with virtually no population remaining in any excited state after the laser pulse passes. In the experiment, over 10^5 atoms are confined within a half wavelength of the harmonic.

David Squires
Brigham Young Univ - Provo

Date submitted: 12 Sep 2014

Electronic form version 1.4