DAMOP16-2016-020099

Abstract for an Invited Paper
for the DAMOP16 Meeting of
the American Physical Society

Photon Processing via Four-Wave Mixing

ALEXANDER GAETA, Columbia University

Quantum frequency conversion is the process by which the wavelength of a light beam is converted to another wavelength while still maintaining its quantum state. Until recently, achieving this process with high conversion efficiency and low noise had been achieved only with second-order nonlinear materials. Here, we describe our recent research that utilizes four-wave mixing in an optical fiber to perform ultralow noise quantum frequency conversion with efficiencies exceeding 90%. We also show how this nonlinear process can be used to realize other quantum phenomena including creating a single-photon Ramsey interferometer and temporally magnifying or compressing single-photon pulses. The latter allows us to perform photon counting with a temporal resolution better than 2 ps.