Abstract Submitted
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Omni-directional collective emission of paired photons from atomic vapors[1] MICHAEL MOORE, Michigan State University, YUPING HUANG, Northwestern University — Spontaneous four-wave mixing can generate highly correlated photon pairs from atomic vapors. We show that multi-photon pumping of dipole-forbidden transitions in a 'recoil-free' geometry can result in ultra-bright pair-emission in the full 4π solid angle with strongly suppressed background Rayleigh scattering. Pair production rates of $\sim 10^{12}$ per second are predicted, given only moderate optical depths of $10 \sim 100$, with subnatural bandwidth biphotons obtainable at lower rates. Collective excitation and coherence dynamics are studied numerically, via a nonlinear extension of the optical Bloch equations, for two realistic schemes, based on ^{133}Cs and ^{171}Yb level structures. Dark-state adiabatic following (EIT) and/or a timescale hierarchy are shown to protect the paired photons from reabsorption.

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