Atom-cavity system as a passive photon adder

JULIO GEA-BANACLOCHE, University of Arkansas — A single three-level atom, in the Λ configuration, in an optical microcavity has been shown to have the potential to provide a totally passive photon-photon quantum logical gate [Koshino et al., Phys. Rev. A 82, 010301(R) (2010)]. Recently, the same system has also been shown to work as a “photon turnstile,” or photon subtracter, which could remove a single photon from an incident N-photon pulse by changing its polarization to an orthogonal state [Rosenblum et al., Phys. Rev. A 84, 033854 (2011)]. Here the possible performance of this system as a photon adder or subtracter will be analyzed, for different types of initial states, paying special attention to spectral entanglement effects and pulse reshaping.

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