Single-photon sources are one of the cornerstones in many quantum information protocols. The extension of photon sources to higher photon numbers, especially N=2, lies also at the heart of many recent proposals, such as the generation of highly entangled NOON states relevant for quantum metrology, beating the diffraction limit, simulation of boson sampling or even within biological applications. Current experimental set-ups are mainly based on non-linear system/parametric oscillators, where the N-photon emission comes from a N-th order process that makes it very inefficient and requires post-selection. An important leap in the fabrication and characterization of these systems was given in Ref. [1], where it was shown that a strongly driven TLS in the Mollow triplet regime can be turned into an efficient continues N-photon source by Purcell enhancing the N-th order processes that appear when the laser field dresses the TLS.

In this work we analyze the problem of the emission of photon pairs (N = 2) from two different perspectives: scattering and master equation formalism. For the connection between them, we show the equivalence between the two (four) photon wavefunction acquired the scattering formalism with the unnormalized correlation functions $G^{(2)}(\tau)$ ($G_2^{(2)}(\tau)$ defined in Ref. [1]) for continuous sources. Then, we apply these concepts to an engineered non-linear cavity QED system that efficiently generates photon pairs within the bad cavity limit. We exploit a quantum interference effect, previously used to enhance single-photon non-linearities, to maximize photon pair generation. Then, we analyze the scalings and figures of merit of the proposal and finally give a possible implementation in two different platforms that show our proposal is within the reach of current technology.

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[1] C. Sánchez Muñoz, *et.al*, Nature Photonics **8**, 550 (2014).