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Abstract

The principal attention is given to the development of coherent aspects of multiple scattering induced emissions in which this coherent state is realized among the photon groups generated in the nonlinear conversion interaction by emitters (atoms, molecules, biomolecules, etc.). The master equations and the moments of this equation are proposed in order to describe the quantum aspects of this type of emission. Using the coherent representation of multiple photon conversion, the quantum aspects of correlations of photons between adjacent and nonadjacent modes are proposed for transferring of information in the process of quantum communication. This type of light generation supports the idea of coherent correlation between the new portion of energies that appear in the description of correlated bi-modal fields [see Refs [1-3])]. In induced multiple Raman processes was introduced the quasi particles with energy of each such a quanta is equal to the difference between energies of two photons from adjacent modes of cavity. The coherent states of cooperative lasing in multiple lasing is introduced, taking into consideration the correlations between the generated photons. The correlation functions and possible teleportation of quantum information from one mode to other is described. The master equations and the moments of this equation is proposed in order to describe the quantum aspects of this type of emission. The bimodal collective photon operators are introduced describing the emission or absorption acts of the fixed portion of energy from the cavity. A key impact of the study focuses on the statistical properties of the bimodal field and their detection possibilities are proposed for the description of the time evolution of quantum correlations between the field components of Raman conversion and two-photon emission.

The last idea can be applied in microbiology, where a selective dis-activation of some molecular structures (for example, of viruses) in the tissue may become possible in induced Raman excitation. In such situations, appears a necessity for a good description of both the amplitude and phase of this new type of radiation formed from bimodal correlated photons. Another application of multiple scattering coherence may be used in photon recycling inside solar cells. Here the photon absorption is accompanied by the excitation of the charge carrier and reemitted another photon with lower energy, which in the next step participates in the same cycle of reabsorption and generation of a new carrier in semiconductors like perovskites

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