Entanglement and Cooperative Effects Between the Mode Components of Raman Process in Cavity and Their Analogy with Atomic Collective Effects

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It is proposed the cooperative excitation and absorption of three cavity modes which corresponds to pump, Stokes and anti-Stokes photons stimulated by the atomic inversion. The three modes collective Roman emission is defined introducing the cooperative description between photon of cavity photons. In the case, when the scattering rates in the Stokes and anti-Stokes modes coincide, the SU(2) symmetry is applied for a simple description of this cooperative process. The statistical proprieties and detection method are proposed using the information entropy and atomic correlation functions.

The application of coherence proprieties of bimodal field in quantum lithography and quantum holography is proposed. The coherence effect between the photons from Stokes and anti-Stokes waves generated in Raman lasing emission is established. The lithography and holography proprieties of Stokes and anti-Stokes bimodal coherent field is presented using with the definition of amplitude and phase of such entangled states of light. The optical scheme of holographic representation of object in bimodal representation is proposed. The main difference between the traditional holograms and such a hologram Registration becomes attractive from physical points of view because it must take into consideration the common phase of two-mode light.

1.. N.A.Enaki “Non-Linear Cooperative Effects in Open Quantum Systems: Entanglement and Second Order Coherence”, Nova Science Publishers, USA, (2015) 280 p.
2. In the Book “New Developments in Quantum Optics Researc” Editors: Nicole Stewart, N.A.Enaki Chapter 2 “Entanglement and Cooperative Effects Between the Mode Components of Raman Process in Cavity and Their Analogy with Atomic Collective Effects”.2015. 40p.

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