Multiorder coherent Raman scattering of a quantum probe field

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Abstract: The quantum properties of multiorder sidebands generated by the beating of a quantum probe field with a prepared Raman coherence in a far-off-resonance medium were studied. Under the conditions of negligible dispersion and limited bandwidth, a Bessel-function solution for the sideband field operators was derived. It was shown that when the effective medium length or the Raman sideband order is changed, the autocorrelation functions, the cross-correlation functions, the photon distributions, and the squeezing factors undergo oscillations governed by the Bessel functions.

Index Keywords: Coherent light; Differential equations; Electron energy levels; Electron resonance; Electron transitions; Laser beams; Light polarization; Molecules; Optical beam splitters; Photons; Raman scattering; Statistical optics; Multiorder coherent Raman scattering; Multipartite entangled coherent state; Photon statistical property; Quantum statistical characteristic; Quantum optics

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