

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

Year: 2003

Source title: Physical Review A - Atomic, Molecular, and Optical Physics

Volume: 68

Issue: 6

Cited by: 3

Link: [Scopus Link](#)

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ISSN: 10502947

CODEN: PLRAA

Language of Original Document: English

Abbreviated Source Title: Physical Review A - Atomic, Molecular, and Optical Physics

Document Type: Article

Source: Scopus

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