2002 Vol.38 No.5 pp.637-640 DOI:

Spectrum of the Micromaser with Kerr Medium

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(Received: 2002-4-3; Revised:)

Abstract: We have established the master equation for the micromaser with Kerr medium field density operator, studied the spectrum of the micromaser with Kerr medium and analyzed the influence of Kerr effect and the detuning on the spectrum. In the thermal-atom regime, we find that Kerr effect broadens linewidth D and increases frequency-shift S, and that the detuning Δ narrows linewidth D and increases frequency-shift S as a whole. Moreover Kerr effect leads to oscillatings more rapidly in the resonance peaks, which means that it causes quantum noise. As a whole, with the increase of cavity-length L, the linewidth D and frequency-shift S gradually increase.

PACS: 84.40.Ik, 42.50.Ar, 42.50.Dv

Key words: micromaser, spectrum, thermal-atom regime, Kerr medium, detuning