

Nonlinear Effects in Quantum Dynamics of Atom Laser: Mean-Field Approach

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Abstract: Quantum dynamics and statistics of an atom laser with nonlinear binary interactions are investigated in the framework of mean-field approximation. The linearized effective Hamiltonian of the system is accurately solvable. It is shown that, although the input radio frequency field is in an ordinary Glauber coherent state, the output matter wave will periodically exhibit quadrature squeezing effects purely originated from the nonlinear atom-atom collisions.

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Key words: quantum dynamics, atom laser, mean-field approximation

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