

Review of: "Dynamics of Three-Level Laser Pumped by Electron Bombardment"

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Potential competing interests: No potential competing interests to declare.

The author investigates the statistical and squeezing properties of the cavity light generated by a three-level laser in the steady state regime.

Indeed, the considered system consists of an ensemble of three-level atoms available in an open cavity, i.e., coupled to a two-mode vacuum reservoir. The atoms are pumped to the top level via electron bombardment at a constant rate.

The author studies the mean and variance of the photon number as well as the quadrature squeezing for the cavity light using the quantum Heisenberg-Langevin approach.

The results show that the squeezed light may be generated by the three-level laser, i.e., the squeezing occurs in the minus field quadrature.

Besides, it is demonstrated that the presence of the spontaneous emission process decreases the mean and variance of the photon number.

In my view, the topic seems to be sound and the contents of this manuscript are satisfactory. The motivation of this work is interesting and beneficial for the quantum optics community.

However, I have some questions and comments.

1- The author did not introduce the state of the quantum reservoir. What type of reservoir does result in the correlation functions presented in Eqs. (6)-(9)?

2- The author investigates the statistical properties of the generated light in the steady state. How can one deal with the time evolution of the non-classical photons?

Is it possible to follow the time evolution of squeezed light?

3- It would be of interest to consider the effects of other parameters involved in the system on the quantum statistical properties of the generated light.

4- The author is suggested to study the other non-classical features of the generated light such as entanglement, and

photon blockade.

5-It is stated that “Fesseha [9,10] has studied the squeezing and the statistical properties of the light produced by a three-level laser with the atoms placed in a closed cavity and pumped by electron bombardment.”

What are the novelties of the current work and the previous ones?

Besides some improvement in the generation of squeezed light, the author should clarify the differences between the contents of this manuscript with Refs. [9-10].