

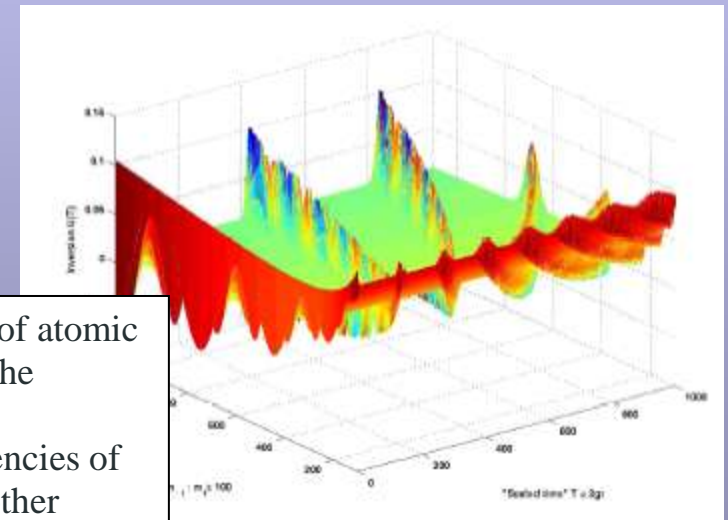
# On the properties of quantum packets for the interaction of a single two-level atom with a mode of the quantized electromagnetic field

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**Abstract:** A new mathematical method using number theory is used to study the function of atomic inversion in the Jaynes-Cummings model (JCM) for the interaction between an atom and the quantized electromagnetic field.

If the optical field is almost monochromatic and its frequency is close to one of the frequencies of the atomic transitions, then it is possible not to take into account the transitions between other energy levels and to consider this atom as a two-level one. Jaynes and Cummings demonstrated that the equations of motion for the problem of the interaction of a single two-level atom with a single mode of the quantized field of radiation are analytically solvable ones. After creation of one-atom maser and microlaser, and also one-mode resonator of high quality the JCM obtained an experimental confirmation of certain phenomena such as the collapse and revival of the oscillations of the atomic inversion.

