STIMULATED RAMAN ADIABATIC PASSAGE AND DARK RESONANCES IN AN OPEN THREE-LEVEL Λ-SYSTEM

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S u m m a r y

The evolution of populations and fluorescence of atoms or molecules interacting with two fields whose frequencies are close to the transition frequencies between the ground and excited states and excited and metastable ones (Lambda-system) is investigated. The system is assumed to be open. The spontaneous decay from the upper state to the other states of the system is taken into account too. The expressions for the dependence of fluorescence and the population of the dark state on two-photon detuning are derived by the pertubation theory. The small parameter of the theory is the nonadiabaticity of the atom-field interaction. The cases of constant and pulse fields are discussed. It is shown that the frequency fluctuation can substantially reduce the population of the dark state and the deepness of the dark resonance but does not affect the width of the two-photon lineshape which is inversely proportional to the square root of the interaction time. The analytical results are confirmed by the numerical simulation.