ONE-PHOTON SCATTERING BY N-ATOM SYSTEM: APPLICATION TO ONE- AND TWO-MODE RESONATOR

A.S. Sizhuk

Faculty of Radiophysics,
Taras Shevchenko National University of Kyiv
(*4-g, Academician Glushkov Prosp.,*
Kyiv 03022, Ukraine;
e-mail: cannabiss@mail.univ.kiev.ua)

S u m m a r y

The system of N identical two-level atoms coupled with a quantized electromagnetic field prepared via a one-photon Fock state is investigated. The corresponding N-particle state amplitudes in one- and two-mode resonators are calculated for several space configurations in the cases of closed conservative and open dissipative systems. The nature and the structure of the Weisskopf–Wigner approximation is revealed in the many-body problem. It is shown that the space distribution of atoms, the total number of atoms, and even the available volume for the field modes define the behavior of system's state amplitudes in time. The elaborated theory allows one to analytically describe the time evolution of the system for a quite wide range of the space configurations, if the specific "cyclic" restrictions are applied.