# DYNAMICAL AND MACROSCOPIC DESCRIPTIONS OF THE STRONGLY DRIVEN GAS MEDIUM OF INTERACTING ATOMS

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S u m m a r y

This paper is devoted to constructing the microscopic and macroscopic theories of a system of $N$ interacting two-level atoms coupled with a strong near resonant pumping field and a weak probe electromagnetic one. Microscopic kinetic equations for the density matrix elements of $N$-atom states including atomic motion are deduced with regard for the atom-field and atom-atom interactions. The corresponding macroscopic kinetics is built for the one- and two-particle density matrix distribution functions. The self-consistent system of macroscopic one-particle equations for the averaged density matrix elements along with the Maxwell equations allow us to describe the emission and absorption properties of the system and to explain the dependence of the optical properties on the particle density in terms of the "long-range" dipole-dipole interaction between the atoms.