Saeideh Esfandiarpour

Kerman, Iran

Van der Waals Forces in the Strong Atom–Field Coupling Regime

Abstract: In the theoretical study that will be presented, we consider the resonant van der Waals interaction between two correlated identical two-level atoms (at least one of which being excited) within the framework of macroscopic cavity quantum electrodynamics in linear,dispersing and absorbing media. The interaction of both atoms with the body-assisted electromagnetic field of the cavity is assumed to be strong. Our time-independent evaluation is based on an extended Jaynes-Cummings model. For a system prepared in a superposition of ist dressed states, we derive the general form of the van der Waals forces, using a Lorentzian single-mode approximation. We demonstrate the applicability of this approach by considering the case of a planar cavity and showing the position-dependence of Rabi oscillations. We also show that in the limiting case of weak coupling, our results reproduce the perturbative ones, for the case where the field is initially in vacuum state while the atomic state is in a superposition two correlated states sharing one excitation. Further, we extend the model to the case of more atoms and more excitations.