Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Entanglement control in two interacting qubits coupled to a radiation field GEHAD SADIEK, Department of Applied Physics and Astronomy, Univerity of Sharjah, Sharjah 27272, UAE, M. SEBAWEH ABDULLAH, Department of Mathematics, King Saud University, Riyadh 11451, Saudi Arabia, WIAM ALDREES, Department of Physics, King Saud University, Riyadh 11451, Saudi Arabia — The interaction between a quantum system and a bosonic field has been one of the central problems in physics. It manifests itself in many different systems of interest such as atoms, ions, molecules and quantum dots coupled to radiation fields in cavity QED, which all are of special interest for quantum information processing. The coupling between a two-level quantum system and a bosonic field is best described by the Rabi model (1936), which is not analytically solvable. Latter, the Jaynes-cummings model (JCM)(1963) presented a solution using the rotated wave approximation. Since then, most of the investigations have focused on the coupling between multiple quantum systems at one hand and radiation fields at the other hand, ignoring the possible coupling between the quantum systems themselves. We consider two interacting two-level quantum systems (qubits) coupled to a single-mode quantized field, where we present an analytic solution for the problem. We show the impact of the coupling between the two quantum systems on the different properties of the composite system, such as the entanglement and the collapse-revival phenomenon. The interplay between the qubit-qubit coupling and the qubit-radiation coupling is investigated thoroughly.

Gehad Sadiek
Department of Applied Physics and Astronomy, Univerity of Sharjah, UAE

Date submitted: 10 Nov 2016 Electronic form version 1.4