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Decoherence of the two-level atom in the Jaynes-Cummings model[1] HOOFAR DANESHVAR, GORDON W.F. DRAKE, University of Windsor — The evolution of coherences as well as $Tr(\rho^2)$ which is a measure of the purity of the system is investigated over long times for the Jaynes-Cummings model of a two-level atom, interacting with a quantized single-mode field and we present the specific initial conditions for the atom as well as the quantized field for which the decoherence of the atom may be delayed. We also present a specific initial condition for which not only we observe a delayed decoherence of the state of the two-level atom, but also the amplitude of the sub-oscillations becomes very small and we observe a smooth decay of both coherences and $Tr(\rho^2)$. As we will present, the calculation of the real entropy of the two-level atom in these regimes, verifies these results. The effect of the phase of the initial atomic and field states is also studied and in particular it is explicitly shown that only the relative phase between the initial states of the atom and the field is important for the subsequent evolution of the atomic coherences.

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Hoofar Daneshvar
University of Windsor

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