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**Entanglement dynamics in two-mode JC-model** MIKHAIL EREMENTCHOUK, MICHAEL LEUENBERGER, University of Central Florida — We consider the problem of entanglement of quantum fields for the example of two mode Jaynes-Cummings model, that is the two-level atom interacting with electromagnetic field. The atomic transitions are characterized by definite helicity, so that electron with spin down at the ground level is moved to the state with spin up at the excited level by absorbing the photon with "+"-polarization and so on. We study the time evolution of entanglement, defined as the von Neumann entropy of the photon single particle density matrix (SPDM), of initially disentangled photon state. Despite the absence of the direct interaction between the different polarizations (the Hamiltonian is completely separable) entanglement develops with time and demonstrates nontrivial oscillatory behavior. In the limit of small number of photons, $N$, the oscillations are the result of superposition of harmonics with incommensurate frequencies and, thus, are quasi-periodic. With increasing the number of photons the quasi-periodic oscillations transform toward a regular pattern. The coherence of SPDM drops and revives with the period $\propto \sqrt{N}/\omega_R$, where $\omega_R$ is the Rabi frequency. The initial drop of coherence, and its time dependence near the revival instants, follows the Gaussian law with the characteristic time $\propto 1/\sqrt{\omega_R}$ independent of $N$.

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