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Analysis of photon-atom entanglement generated by AC Stark shifts in a cavity S.K.Y. LEE, C.K. LAW, Department of Physics, The Chinese University of Hong Kong — AC Stark shifts provide a mechanism to entangle polarization states of photons and atoms. We examine a situation in which an off-resonant light with two polarizations interacts with a collection of 4-levels atoms in a cavity. As the frequency shift in each polarization is conditioned by the number of atoms at the corresponding sub-levels, any imbalance of atom numbers would lead to a rotation of Stokes parameters of light. The quantum entanglement generated in this process is analyzed by the Schmidt decomposition method. We derive the time-dependence of entanglement entropy and the effective Schmidt number for Gaussian amplitudes. In addition, we indicate how the rate of change of entanglement is controlled by the initial fluctuations of atoms and photons.

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