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Correlated photon emission by two excited atoms in a waveguide

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Systems of atoms coupled to a single or few waveguide modes provide the testbed for physically and practically interesting interference effects. We consider the dynamics of a pair of atoms, approximated as two-level quantum emitters, coupled to a linear guided mode. In particular, we analyze the evolution of an initial state in which both atoms are excited, which is expected to decay into an asymptotic two-photon state. We will investigate the lifetime of the initial conguration and the properties of the asymptotic photon correlations, and unveil the dependence on the physical parameters of the relative probability to observe the two photons emitted in the same direction (parallel) or in opposite directions (antiparallel). We discuss the relevance of the bound states in the one-excitation sector, that occur for selected values of the interatomic distance, for the features of photon correlations.

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