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[513] Subradiance via entanglement in atoms with several independent decay channels

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Spontaneous emission of atoms in free space is modified by other atoms in close vicinity inducing collective super- and sub-radiance. For two atoms with a single decay channel the antisymmetric superposition state of the two single excited states will not decay spontaneously. No such excited two-atom dark state exists, if the excited state has two distinguishable independent decay channels. However, we show that for an excited atomic state with $N-1$ independent decay channels one can find a highly entangled N -particle dark state, which completely decouples from the vacuum radiation field. Mathematically, we see that this state is the only such state orthogonal to the subspace of the atomic ground states.

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