

Transformation of subradiant states to superradiant states in a thick resonant medium

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Abstract

The propagation of a step pulse through a thick resonant absorber with a homogeneously broadened absorption line is considered. It is shown that a specific subradiant state is naturally developed in the absorber due to the formation of the spatial domains of the atomic coherence with opposite phases. It is proposed to divide the absorber into slices in accordance with these domains and place the phase shifters in front of the first slice and between the other slices. If the phase shifters are switched on simultaneously at a particular moment of time, elapsed from the beginning of the step pulse, a strong sharp pulse is generated at the output of the last slice of the absorber. The effect is explained by the phasing of the atomic coherence along all slices of the absorber, which transforms the subradiant state of the atom-field system to a superradiant state. © 2014 American Physical Society.

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