

Cooperative transmission in an optically dense medium on the strontium intercombination line

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The coherent transmission of a wave, through scattering medium, results of interference between the incident field and the forward scattering field. This basic and well established process was experimentally observed in the case of an electromagnetic wave transmitted through a resonant strontium cold cloud [1]. Since the forward scattering field is build up on the incident field, one may state that the amplitude of the former cannot be larger than the latter. We demonstrate that this intuitive picture is incorrect [2]. Moreover, cooperative response of the system allows to drive it faster than the excited state lifetime [3]. This regime shares interesting similarity with Dicke superradiance. We take advantage of the slow response time of the strontium intercombination line to clearly observe those effects.

[1] M. Chalony, R. Pierrat, D. Delande and D. Wilkowski, *Phys. Rev. A* **84**, 011401(R) (2011).

[2] C. C. Kwong, T. Yang, M. Pramod, K. Pandey, D. Delande, R. Pierrat and D. Wilkowski, Cooperative emission of a coherent superflash of light, *Phys. Rev. Lett.* **113**, 223601 (2014).

[3] C. C. Kwong, T. Yang, D. Delande, R. Pierrat and D. Wilkowski, Cooperative emission of a pulse train in an optically thick scattering medium, *Phys. Rev. Lett.* **115**, 223601 (2015).

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