Bulletin of the Russian Academy of Sciences: Physics 2008 vol.72 N5, pages 691-694

Quantum memory based on optical subradiance: Optimization of the signal-to-noise ratio

Kalachev A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A scheme for creating subradiant states in an extended system of atoms, based on the use of an external inhomogeneous electric field, is proposed. It is shown that the maximum signal-t--noise ratio at the output of a quantum memory device using such subradiant states for data storage is obtained when the temporal shape of recorded single-photon wave packets (quantum information carriers) is a time-reversed pulse characteristic of a resonant atomic system. In this case, the quantum memory efficiency tends to unity in the limit of large optical thickness of the resonant medium. © Allerton Press, Inc. 2008.

http://dx.doi.org/10.3103/S1062873808050286