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Efficient multimode quantum memory based on photon echo in an optimal QED cavity

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Abstract

Effective multimode photon echo quantum memory on multiatomic ensemble in the QED cavity is proposed. We obtain the analytical solution for the quantum memory efficiency that can be equal to unity when optimal conditions for the cavity and atomic parameters are held. Detailed analysis of the optimal conditions is performed. Numerical estimation for realistic atomic and cavity parameters demonstrates the high efficiency of the quantum memory for an optically thin resonant atomic system that opens a door for real applications. © 2010 The American Physical Society.

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