Quantum Physics

Synchronous Quantum Memories with Time-symmetric Pulses

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(Submitted on 19 Jan 2009)

We propose a dynamical approach to quantum memories using a synchronous oscillator-cavity model, in which the coupling is shaped in time to provide the optimum interface to a symmetric input pulse. This overcomes the known difficulties of achieving high quantum input-output fidelity with storage times long compared to the input signal duration. Our generic model is applicable to any linear storage medium ranging from a superconducting device to an atomic medium. We show that with temporal modulation of coupling and/or detuning, it is possible to mode-match to time-symmetric pulses that have identical pulse shapes on input and output.

Comments: 4 pages, 4 figures
Subjects: **Quantum Physics (quant-ph)**
Cite as: **arXiv:0901.2956v1 [quant-ph]**

Submission history

From: Qiongyi He [view email]
[v1] Mon, 19 Jan 2009 23:45:33 GMT (72kb)

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