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Abstract:	first_pagesettingsOrder Article Reprints Open AccessArticle Generating Sustained Coherence in a Quantum Memory for Retrieval at Times of Quantum Revival by Tavshabad Kaur 1ORCID,Maninder Kaur 1,Arvind 2,3 andBindiya Arora 1,4,*ORCID 1 Department of Physics, Guru Nanak Dev University, Amritsar 143005, Punjab, India 2 Department of Physical Sciences, Indian Institute of Science Education and Research (IISER) Mohali, PO Manauli, Mohali 140306, Punjab, India 3 Punjabi University Patiala, Patiala 147002, Punjab, India 4 Perimeter Institute for Theoretical Physics, Waterloo, ON N2L 2Y5, Canada * Author to whom correspondence should be addressed. Atoms 2022, 10(3), 81; https://doi.org/10.3390/atoms10030081 Received: 28 June 2022 / Revised: 4 August 2022 / Accepted: 5 August 2022 / Published: 10 August 2022 (This article belongs to the Section Atom Based Quantum Technology) Download Browse Figures Versions Notes Abstract We study the time degradation of quantum information stored in a quantum memory device under a dissipative environment in a parameter range which is experimentally relevant. The quantum memory under consideration is comprised of an optomechanical system with additional Kerr nonlinearity in the optical mode and an anharmonic mechanical oscillator with quadratic nonlinearity. Time degradation is monitored, both in terms of loss of coherence, which is analyzed with the help of Wigner functions, as well as in terms of loss of amplitude of the original state, studied as a function of time. While our time trajectories explore the degree to which the stored information degrades depending upon the variation in values of various parameters involved, we suggest a set of parameters for which the original information can be retrieved without degradation. We identify a very interesting situation where the role played by the nonlinearity is insignificant, and the system behaves as if the information is stored in a linear medium. For this case, the information retrieval is independent of the coherence revival time and can be retrieved at any instant during the time evolution.
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