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Stability of Decoherence-Free Subspaces under Stochastic Phase Fluctuations

ZENG Hao-Sheng, NIE Jian-Jun, and KUANG Le-Man

Department of Physics, Hunan Normal University, Changsha 410081, China
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Abstract: We study the stability of decoherence-free subspaces under stochastic phase fluctuations by analytically and numerically evaluating the fidelity of the corresponding decoherence-free subspace bases with stochastic phase fluctuations under the evolution of environment. The environment is modeled by a bath of oscillators with infinite degrees of freedom and the register-bath coupling is chosen to be a general dissipation-decoherence form. It is found that the decoherence-free subspaces take on good stability in the case of small dissipation and small phase fluctuations.

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Key words: decoherence-free subspaces, stochastic phase fluctuations