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Suppression of Decoherence and Disentanglement in Qubits via the Exchange Interaction[1] AMRIT DE, DONG ZHOU, ROBERT JOYNT, Department of Physics, University of Wisconsin- Madison, WI-53706 — We show that the decoherence and disentanglement for a pair of interacting qubits can be suppressed by the exchange interaction in the presence of one or more uncorrelated random telegraphic noise sources. The suppression of the dissipative dynamics is more apparent for the maximally entangled Bell states, particularly if the noise is non-Markovian. Hence, the entangled singlet-triplet superposition state of two qubits can be protected by the interaction, while for the triplet-triplet state, it is less effective. This makes the former more suitable for encoding quantum information. Our calculations are done using a recently developed quasi Hamiltonian formalism that is suitable for describing non-unitary temporal dynamics in an open quantum system subjected to classical stochastic noise processes. Exact and approximate solutions are obtained for a number of cases.

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