

Abstract Submitted
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Decoherence Induced Spontaneous Symmetry Breaking¹ GOKTUG KARPAT, MEHMET ZAFER GEDIK, Sabanci University — We study time dependence of exchange symmetry properties of Bell states when two qubits interact with local baths having identical parameters. In case of classical noise, we consider a decoherence Hamiltonian which is invariant under swapping the first and second qubits. We find that as the system evolves in time, two of the three symmetric Bell states preserve their qubit exchange symmetry with unit probability, whereas the symmetry of the remaining state survives with a maximum probability of 0.5 at the asymptotic limit. Next, we examine the exchange symmetry properties of the same states under local, quantum mechanical noise which is modeled by two identical spin baths. Results turn out to be very similar to the classical case. We identify decoherence as the main mechanism leading to breaking of qubit exchange symmetry. [1] G. Karpat and Z. Gedik, Optics Communications **282**, 4460 (2009).

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