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Decoherence of an entangled states of a strongly-correlated double quantum dot structure through tunneling processes[1] C.A. BÜSSER, F. HEIDRICH-MEISNER, Department of Physics and Arnold Sommerfeld Center for Theoretical Physics, Ludwig-Maximilians-University Munich, Germany — The entanglement of the spin state of two quantum dots is investigated out of equilibrium. First, we prepare a two-dot system in a perfect singlet state at time $t = 0$. For $t > 0$, one of the dots is tunnel-coupled to leads, including a finite voltage. Using the time-dependent density matrix renormalization group method, we study the time evolution of the spin correlations and the concurrence as a function of time since electrons hopping on and off the tunnel-coupled dot lead to decoherence. We observe that the spin correlation between the dots decays exponentially determining a decoherence rate. A similar rate can be defined for the concurrence. We study the dependence of these rates on voltage, tunnel coupling, and Coulomb repulsion and compare our numerical results to a master-equation approach derived for the weak-coupling limit.

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