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Evolution of entanglement and coherence

We consider a system $\mathrm{S} = \mathrm{S}_1 + \mathrm{S}_2$ of two spins $1/2$ (qubits) interacting with several thermal reservoirs. Each spin $j = 1, 2$ is coupled to an individual reservoir R_j and the two spins interact collectively with a third reservoir R. All reservoirs are at the same temperature and do not interact directly. Each interaction between a spin and a reservoir has two channels, an energy-conserving and an energy-exchange one.

We analyze decoherence, thermalization and disentanglement of the system S. We show that due to the energy-exchange interactions, the system has a *finite disentanglement time*, we estimate that time and compare it to decoherence times.

This is joint work with Kassu Gebresellasie.