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The effect of qubit-qubit exchange interaction on qubit relaxation rates DIU NGHIEM, ROBERT JOYNT, University of Wisconsin-Madison — In this report we extend an exactly soluble model of one-qubit decoherence to two qubits with exchange interactions. Closed-form expressions for the transfer matrix can be obtained, but contrary to the single-qubit case, the matrix must be diagonalized numerically. We compute the single- and two-qubit relaxation rates. In the first approximation, the two-qubit rates can be obtained by additivity of single-qubit rates. Interactions and the resulting entanglement modified this, but their effect is surprisingly small. These results suggest that N-qubit decoherence rates scale linearly with N.

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