Title:	Experimental protection against evolution of states in a subspace via a super-Zeno scheme on an NMR quantum information processor
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Abstract:	We experimentally demonstrate the freezing of evolution of quantum states in one- and two-dimensional subspaces of two qubits, on an NMR quantum information processor. State evolution was frozen and leakage of the state from its subspace to an orthogonal subspace was successfully prevented using super-Zeno sequences [Phys. Rev. Lett. 96, 100405 (2006)PRLTAO0031-900710.1103/PhysRevLett.96.100405], comprising a set of radio frequency (rf) pulses punctuated by pre-selected time intervals. We demonstrate the efficacy of the scheme by preserving different types of states, including separable and maximally entangled states in one- and two-dimensional subspaces of two qubits. The change in the experimental density matrices was tracked by carrying out full state tomography at several time points. We use the fidelity measure for the one-dimensional case and the leakage (fraction) into the orthogonal subspace for the two-dimensional case, as qualitative indicators to estimate the resemblance of the density matrix at a later time to the initially prepared density matrix. For the case of entangled states, we additionally compute an entanglement parameter to indicate the presence of entanglement in the state at different times. We experimentally demonstrate that the super-Zeno scheme is able to successfully confine state evolution to the one- or two-dimensional subspace being protected.
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