Title:	Experimental protection of arbitrary states in a two-qubit subspace by nested Uhrig dynamical decoupling
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Abstract:	We experimentally demonstrate the efficacy of a three-layer nested Uhrig dynamical decoupling (NUDD) sequence to preserve arbitrary quantum states in a two-dimensional subspace of the four-dimensional two-qubit Hilbert space on a nuclear magnetic resonance quantum information processor. The effect of the state preservation is studied first on four known states, including two product states and two maximally entangled Bell states. Next, to evaluate the preservation capacity of the NUDD scheme, we apply it to eight randomly generated states in the subspace. Although, the preservation of different states varies, the scheme, on the average, performs very well. The complete tomographs of the states at different time points are used to compute fidelity. State fidelities using NUDD protection are compared with those obtained without using any protection. The nested pulse schemes are complex in nature and require careful experimental implementation.
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