Title:	Evolution of tripartite entangled states in a decohering environment and their experimental protection using dynamical decoupling
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Abstract:	We embarked upon the task of experimental protection of different classes of tripartite entangled states, namely, the maximally entangled Greenberger-Horne-Zeilinger (GHZ) and W states and the tripartite entangled state called the WW state, using dynamical decoupling. The states were created on a three-qubit NMR quantum information processor and allowed to evolve in the naturally noisy NMR environment. Tripartite entanglement was monitored at each time instant during state evolution, using negativity as an entanglement measure. It was found that the W state is most robust while the GHZ-type states are most fragile against the natural decoherence present in the NMR system. The WW state, which is in the GHZ class yet stores entanglement in a manner akin to the W state, surprisingly turned out to be more robust than the GHZ state. The experimental data were best modeled by considering the main noise channel to be an uncorrelated phase damping channel acting independently on each qubit, along with a generalized amplitude damping channel. Using dynamical decoupling, we were able to achieve a significant protection of entanglement for GHZ states. There was a marginal improvement in the state fidelity for the W state (which is already robust against natural system decoherence), while the WW state showed a significant improvement in fidelity and protection against decoherence.
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