Title:	Witnessing nonclassical correlations via a single-shot experiment on an ensemble of spins using nuclear magnetic resonance
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Abstract:	A bipartite quantum system in a mixed state can exhibit nonclassical correlations which can go beyond quantum entanglement. While quantum discord is the standard measure of quantifying such general quantum correlations, the nonclassicality can be determined by simpler means via the measurement of witness operators. We experimentally construct a positive map to witness nonclassicality of two qubits in an NMR system. The map can be decomposed in terms of measurable spin magnetizations so that a single run of an experiment on an ensemble of spins suffices to detect the nonclassicality in the state, if present. We let the state evolve in time and use the map to detect nonclassicality as a function of time. To evaluate the efficacy of the witness operator as a means to detect nonclassicality, we measure quantum discord by performing full quantum-state tomography at each time instant and obtain a fairly good match between the two methods.
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