Title:	Classification and measurement of multipartite entanglement by reconstruction of correlation tensors on an NMR quantum processor
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Abstract:	We introduce a protocol to classify three-qubit pure states into different entanglement classes and implement it on an NMR quantum processor. The protocol is designed in such a way that the experiments performed to classify the states can also measure the amount of entanglement present in the state. The classification requires the experimental reconstruction of the correlation matrices using 13 operators. The rank of the correlation matrices provides the criteria to classify the state in one of the five classes, namely separable, biseparable (of three types), and genuinely entangled (of two types, GHZ and W). To quantify the entanglement, a concurrence function is defined which measures the global entanglement present in the state, using the same 13 operators. Global entanglement is zero for separable states and nonzero otherwise. We demonstrate the efficacy of the protocol by implementing it on states chosen from each of the six inequivalent (under stochastic local operations and classical communication) classes for three qubits. We also implement the protocol on states picked at random from the state space of three-qubit pure states.
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