Detecting Entanglement of Unknown Quantum States with Random Measurements

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In quantum information theory, the reliable and effective detection of entanglement is an important task. However, given an unknown state, assessing its entanglement is challenging. To address this problem, we investigate the use of random local measurements, from which entanglement witnesses are then constructed via semidefinite programming methods. We propose a scheme of successively increasing the number of measurements until the presence of entanglement can be unambiguously concluded, and investigate its performance in various examples. The number of necessary measurements decreases with the amount of entanglement - for high entanglement this number turns out to be much smaller than for full tomography.
- See preprint [1].

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[1] J. Szangolies, H. Kampermann, and D. Bruß, arXiv:1504.08225.