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Informational completeness in bounded-rank quantum-state tomography[1] CHARLES BALDWIN, IVAN DEUTSCH, AMIR KALEV, University of New Mexico — Quantum-state tomography is a demanding task, however, it can be made more efficient by applying prior information about the system. A common prior assumption is that the state being measured is pure, or close to pure, since most quantum information protocols require pure states. Measurements of pure states can be constructed to be more efficiently than measurements of an arbitrary state, and for these types of measurements, there exists two different notions of informational completeness. One notion, called strict-completeness, is more useful for practical applications since it is compatible with convex optimization and is robust to noise. We present a unified framework for both notions of completeness for a certain type of measurements. These are measurements that allow algebraic reconstruction of a few density matrix elements. The framework also aids in the construction of new strictly-complete measurements. Moreover, the results are easily generalized to the case when the prior information is the state has bounded rank.

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