Abstract Submitted
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The power of being positive: Robust state estimation made possible by quantum mechanics[1] AMIR KALEV, CHARLES BALDWIN, Univ of New Mexico — Quantum-state tomography (QST) is generally expensive to implement experimentally. Nevertheless, in state-of-the-art experiments in quantum information science the goal is not to produce arbitrary states but states that have very high purity. Including this prior information in QST results in more manageable tomography protocols. In the context of pure-state tomography, and more generally, of bounded-rank states (states with rank $\leq r$) tomography, a natural notion of informational completeness emerges, *rank-r completeness*. The purpose of this contribution is two fold. First, to prove and emphasize the significance of a less intuitive, yet more powerful, notion of completeness for practical QST, *rank-r strict-completeness*. This notion is made possible due to the positive semidefinite property of density matrices. Strictly-complete quantum measurements ensure a robust estimation of the state of the system, regardless of the convex estimator we use. Thus, pragmatically, quantum state tomography should be done using these kind of measurements. Second, to argue, based on strong numerical indication, that it is fairly straightforward to experimentally implement such measurements by measuring only few random orthonormal bases. For example, in our numerical experi

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