

Abstract Submitted
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Joint quantum tomography of state preparation and measurements using only known quantum operations¹ MARCUS DA SILVA, Raytheon BBN Technologies, JAY GAMBETTA, IBM T.J. Watson Research Center — An important problem in quantum information is the complete characterization of quantum devices, which is usually referred to as “quantum tomography”. Quantum tomography procedures exist for the characterization of quantum states (quantum state tomography), operations (quantum process tomography) and measurements (quantum measurement tomography) — and each of these procedures can be performed using only product states, local unitary operations and local projective measurements. Here we consider the problem of jointly characterizing both the initial state as well as the measurement observable of a system using only well characterized quantum operations. We find that neither local unitaries nor local completely-positive trace-preserving maps are sufficient for obtaining a complete description of the state preparation and measurement of the system, and describe a scheme that uses non-unital trace-reducing physical maps to obtain such a description.

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