

Plenary Talks - abstract



ARAM HARROW

SAMPLE-OPTIMAL TOMOGRAPHY OF QUANTUM STATES

ABSTRACT

It is a fundamental problem to decide how many copies of an unknown mixed quantum state are necessary and sufficient to determine the state. Previously, it was known only that estimating states to error ϵ in trace distance required $O(dr^2/\epsilon^2)$ copies for a d -dimensional density matrix of rank r . Here, we give a theoretical measurement scheme (POVM) that requires $O((dr/\delta)\ln(d/\delta))$ copies of ρ to error δ in infidelity, and a matching lower bound up to logarithmic factors. This implies $O((dr/\epsilon^2)\ln(d/\epsilon))$ copies suffice to achieve error ϵ in trace distance. For fixed d , our measurement can be implemented on a quantum computer in time polynomial in n .

This is based on

<http://arxiv.org/abs/1508.01797>

which is joint work with

Jeongwan Haah, Zhengfeng Ji, Xiaodi Wu, and Nengkun Yu.