

Abstract Submitted  
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**Improved** **precision-guaranteed**  
**quantum tomography**<sup>1</sup> TAKANORI SUGIYAMA, Dep. of Systems Innovation,  
Osaka University — Quantum tomography is one of the standard tool in current  
quantum information experiments for verifying that a state/process/measurement  
prepared in the lab is close to an ideal target. Precision-guaranteed quantum tomog-  
raphy (Sugiyama, Turner, Murao, PRL 111, 160406 2013) gives rigorous error bars  
on a result estimated from arbitrary finite data sets from any given informationally  
complete tomography experiments. The rigorous error bars were derived with a  
real-valued concentration inequality called Hoeffding's inequality. In this talk, with  
a vector-valued concentration inequality, we provide an improved version of the error  
bars of precision-guaranteed quantum tomography. We examine the new error bars  
for specific cases of multi-qubit systems and numerically show that the degree of  
improvement becomes large as the dimension of the system increases.

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