A scalable maximum likelihood method for quantum state tomography

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http://iopscience.iop.org/1367-2630/15/12/125004 [2]

The principle of maximum likelihood reconstruction has proven to yield satisfactory results in the context of quantum state tomography for many-body systems of moderate system sizes. Until recently, however, quantum state tomography has been considered to be infeasible for systems consisting of a large number of subsystems due to the exponential growth of the Hilbert space dimension with the number of constituents. Several reconstruction schemes have been proposed since then to overcome the two main obstacles in quantum many-body tomography: experiment time and post-processing resources. Here we discuss one strategy to address these limitations for the maximum likelihood principle by adopting a particular state representation to merge a well established reconstruction algorithm maximizing the likelihood with techniques known from quantum many-body theory.

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