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Title:	Estimation of quantum states by weak and projective measurements
Authors:	Das, Debmalya (/jspui/browse?type=author&value=Das%2C+Debmalya) Arvind (/jspui/browse?type=author&value=Arvind)
Keywords:	Tomography Weak and projective measurements Quantum
Issue Date:	2014
Publisher:	American Physical Society
Citation:	Physical Review A - Atomic, Molecular, and Optical Physics,89(6)
Abstract:	We explore the possibility of using "weak" measurements to carry out quantum state tomography via numerical simulations. Given a fixed number of copies of identically prepared states of a qubit, we perform state tomography using weak as well as projective measurements. Due to the collapse of the state after measurement, we cannot reuse the state after a projective measurement. If the coupling strength between the quantum system and the measurement device is made weaker, the disturbance caused to the state can be lowered. This then allows us to reuse the same member of the ensemble for further measurements and thus extract more information from the system. However, this happens at the cost of getting imprecise information from the first measurement. We implement this scheme for a single qubit and show that under certain circumstances, it can outperform the projective measurement-based tomography scheme. This opens up the possibility of new ways of extracting information from quantum ensembles. We study the efficacy of this scheme for different coupling strengths and different ensemble sizes.
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