Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Quantum Measurement of Spin Correlations in a Symmetric Many-Body State\f1[1] EZAD SHOJAEE, AMIR KALEV, IVAN DEUTSCH, University of New Mexico, CQuiC, CQUIC TEAM — h −*abstract*−\pard Continuous (nonprojective) measurement on a quantum system has been employed previously for fast, robust, and high-fidelity quantum state tomography (QST) on qudits [1]. We expand this protocol to many-body systems in order to perform QST on the reduced one-body and two-body density matrices of a symmetric many-body state of multiple qubits. Such QST will characterize the spin correlations in the system. In this protocol, a continuous measurement is done collectively on many copies of the reduced state at the same time, and therefore, while it is weakly perturbative on each copy, yields high signal-to-noise. Simultaneously, we subject the system to an external collective control in order to generate an informationally complete measurement record. We characterize the information-gain measurement disturbance tradeoff in terms of parameters in the problem (number of qubits, control parameters, shot-noise bandwidth, and the measurement strength).\pard1] C. Riofrío,, P. S. Jessen, and I. H. Deutsch, "Quantum tomography of the full hyperfine manifold of atomic spins via continuous measurement on an ensemble", J. Phys. B 15, 154007 (2011).\pard\pard\pard-/abstract-\

[1]Support from NSF is acknowledged.

Ezad Shojaee
University of New Mexico, CQuiC

Date submitted: 29 Jan 2016 Electronic form version 1.4