

Abstract Submitted
for the NWS12 Meeting of
The American Physical Society

Measuring geometric quantum discord using DQC1¹ GINA PAS-SANTE, University of Washington, OSAMA MOUSSA, RAYMOND LAFLAMME, Institute for Quantum Computing, University of Waterloo — DQC1 is a model of quantum computation that utilizes a single qubit accompanied by a register of completely mixed states. While this model is able to outperform current classical methods without substantial entanglement, it does contain non-classical correlations as measured by the quantum discord. We describe an efficient algorithm to experimentally measure a near relative of the quantum discord, the geometric quantum discord, of a DQC1-state. We provide an analytical expression that indicates the geometric quantum discord of a $(1 + n)$ -qubit DQC1-state decreases exponentially with n . This is in contrast to the quantum discord, which is independent of n for the same state. In addition, we present experimental results using a four-qubit liquid-state nuclear magnetic resonance quantum information processor.

¹This research was performed at the Institute for Quantum Computing at the University of Waterloo.

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Date submitted: 17 Sep 2012

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