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Preconditioned quantum linear system algorithm

BY Dr. Dave Clader

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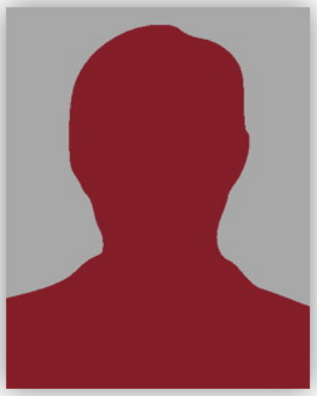

ABSTRACT

We describe a quantum algorithm that generalizes the quantum linear system algorithm [Harrow et al., Phys. Rev. Lett. 103 150502 (2009)] to arbitrary problem specifications. We develop a state preparation routine that can initialize generic states, show how simple ancilla measurements can be used to calculate many quantities of interest, and integrate a quantum-compatible preconditioner that greatly expands the number of problems that can achieve exponential speedup over classical linear systems solvers. To demonstrate the algorithm's applicability, we show how it can be used to compute the electromagnetic scattering cross section of an arbitrary target exponentially faster than the best classical algorithm.

BIOGRAPHY

Dr. Dave Clader is a member of the senior professional research staff at The Johns Hopkins University Applied Physics Laboratory since 2010. His current research interests span many areas of quantum information science, including quantum algorithms development, the theory of fault tolerant quantum computing, as well as theoretical modeling of various hybrid qubit technologies. He received his B.A. in Physics from SUNY Geneseo 2002, and his Ph.D. in physics from the University of Rochester in 2008 where he theoretically studied nonlinear optical pulse propagation in quantum vapors.

EVENT DETAILS

DATE:
November 6, 2013

TIME:
11:00 AM

LOCATION:
Morton 103
Stevens Institute of Technology

ATTENDANCE:
Public

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