

Abstract Submitted
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Implementation of the Variational Quantum Eigensolver algorithm to estimate the ground state energy of the Lipkin model using atomic qubits.¹ CODY POOLE, TRENT GRAHAM, MINHO KWON, MICHAEL CERVIA, University of Wisconsin - Madison, PETER LOVE, Tufts University, SUSAN COPPERSMITH, University of New South Wales, BAHA BALANTEKIN, MARK SAFFMAN, University of Wisconsin - Madison — We present progress in executing the Variational Quantum Eigensolver (VQE) algorithm with neutral atom qubits. The VQE algorithm is used to estimate the ground state energy of the Lipkin-Meshkov-Glick (LMG) Hamiltonian for systems of two and three spins where the state of each spin in the LMG system is encoded in the state of a single hyperfine-ground state encoded cesium atom qubit. The LMG model is exactly solvable and so serves as a useful tool for validating the operations of a quantum computer. Once validated, the quantum computer could potentially implement VQE to model interactions of various dark matter candidates with detectors to aid in dark matter searches.

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