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Numerical Simulation of Coherent Error Correction DANIEL CROW, ROBERT JOYNT, MARK SAFFMAN, Univ of Wisconsin, Madison — A major goal in quantum computation is the implementation of error correction to produce a logical qubit with an error rate lower than that of the underlying physical qubits. Recent experimental progress demonstrates physical qubits can achieve error rates sufficiently low for error correction, particularly for codes with relatively high thresholds such as the surface code and color code. Motivated by experimental capabilities of neutral atom systems, we use numerical simulation to investigate whether coherent error correction can be effectively used with the 7-qubit color code. The results indicate that coherent error correction does not work at the 10-qubit level in neutral atom array quantum computers. By adding more qubits there is a possibility of making the encoding circuits fault-tolerant which could improve performance.

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