New results in fault-tolerant quantum computing[1]
GERALD GILBERT, YAAKOV WEINSTEIN, MITRE Quantum Information Science Group — We compare the accuracy of two methods used to construct a logical zero state appropriate for the [7,1,3] CSS quantum error correction code in a non-equiprobable Pauli operator error environment. The first method is to apply error correction, via syndrome measurement, on seven physical qubits all in the state zero, using four-qubit Shor states to implement the syndrome measurements. The second method is to directly implement the [7,1,3] encoding gate sequence. We find surprising results that show that even at the most basic level there is still much to be learned about achieving fault tolerance.

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