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Overheads for the Toric Code in the Presence of Bit or Phase Flip Errors[1] FERN WATSON, Imperial College, TOM STACE, University of Queensland, SEAN BARRETT, Imperial College — In this talk we will consider one proposal for topological quantum error correction: Kitaev's 2d toric code. The toric code distance scales with lattice size, making a physically larger code more robust. However, a smaller code is desirable because the experimental challenges in creating and manipulating such a state also scale with the number of qubits in the code. The overhead is a balance between these two requirements; in other words the minimum code size that will protect the state with a given accuracy, for a known error rate. We consider different approaches to revealing the overhead, including both analytic approximations and numerically investigations. We find that for a large range of parameter space the overhead for the toric code is polylogarithmic in the desired fidelity.

[1]CDT in Controlled Quantum Dynamics

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