Noise Amplification In a Topological Quantum Memory

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Abstract

We prove a no-go theorem for simulating the Kitaev chain with a chain of superconducting qubits: we show that the noise strength for the topological qubit formed by the chain diverges as the square-root of the number of physical qubits. We find that, to minimize the rate of scaling, the chain must be operated as close as possible to the topological phase boundary. This phenomenon is universal in that it is independent of the bath spectral density.

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