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Construction of Fault Tolerant Interfaces for Topological Quantum Error Correcting Codes

In this work we consider novel constructions for fault tolerant encoding and decoding interfaces in the context of channel codes that serve to protect quantum information being sent between a sender and receiver under the presence of general quantum noise. These encoding and decoding interfaces serve as the transitions between the physical quantum input output information of the system and the logical encoding of it in through a quantum error correcting code. We in particular consider low-overhead primarily measurement based encoding and decoding interfaces in the context of topological codes, specifically surface codes and color codes, due to their low weight generators, planar layout and respectable error correction performance. In the work we evaluate the performance of the interfaces under semi-realistic noise models through home-made stabilizer simulations and consider their theoretical error bounds. Comparisons with prior concatenation and code growing schemes are also to be made.

Field of study

Quantum Physics

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