

Fault-tolerant quantum computation in with 3D cluster states

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Abstract

I discuss fault-tolerant quantum computation in the presence of geometric constraints, specifically fault-tolerant measurement-based quantum computation on 3D cluster states, and its two-dimensional circuit counterpart based on the surface code. After reviewing some background on measurement-based quantum computation and fault-tolerance, I discuss the inherent quantum error-correction capability of 3D cluster states, and its topological origin. I then describe how to implement topologically protected quantum gates in this setting. I conclude with a description of recent advances on the theory frontier, and a summary of the status of experiment.
