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Fault-tolerent Holonomic Quantum Computation Based on Stabilizer Codes YI-CONG ZHENG, TODD BRUN, Department of Electrical Engineering, University of Southern California, QIP TEAM — We present an all-geometric scheme for fault-tolerant holonomic quantum computation with stabilizer codes, based on non-Abelian adiabatic holonomies. This scheme implements a universal set of quantum gates by adiabatic deformation of the stabilizer eigenspaces (both the code space and error spaces) through the same closed path in the parameter space, so that each eigenspace obtains the same holonomy. This approach makes fault-tolerant error correction possible. We give examples to show how this scheme works for different stabilizer codes.

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