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Concatenated logical cluster state for measurement-based quantum computation JAEWOO JOO, University of Calgary — The highly entangled quantum states known as cluster states constitute a universal resource for measurement-based quantum computing (MBQC). How to construct a fault-tolerant protocol for MBQC is still an open question, however. We show how to build concatenated cluster states for MBQC using the five-qubit quantum error-correcting code. These states can be built by a series of single-qubit Hadamard and two-qubit controlled-phase gates. The number of operations is significantly reduced through the use of local complementation graph operations. Error thresholds are investigated and compared with current experimental capabilities.

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