Optimized entanglement purification schemes for modular based quantum computers STEFAN KRASTANOV, LIANG JIANG, Yale University — The choice of entanglement purification scheme strongly depends on the fidelities of quantum gates and measurements, as well as the imperfection of initial entanglement. For instance, the purification scheme optimal at low gate fidelities may not necessarily be the optimal scheme at higher gate fidelities. We employ an evolutionary algorithm that efficiently optimizes the entanglement purification circuit for given system parameters. Such optimized purification schemes will boost the performance of entanglement purification, and consequently enhance the fidelity of teleportation-based non-local coupling gates, which is an indispensible building block for modular-based quantum computers. In addition, we study how these optimized purification schemes affect the resource overhead caused by error correction in modular based quantum computers.

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