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Long distance quantum communication with quantum Reed-Solomon codes SRERAMAN MURALIDHARAN, CHANG-LING ZOU, LINSHU LI, LIANG JIANG, Yale University, JIANGGROUP TEAM — We study the construction of quantum Reed Solomon codes from classical Reed Solomon codes and show that they achieve the capacity of quantum erasure channel for multi-level quantum systems. We extend the application of quantum Reed Solomon codes to long distance quantum communication, investigate the local resource overhead needed for the functioning of one-way quantum repeaters with these codes, and numerically identify the parameter regime where these codes perform better than the known quantum polynomial codes and quantum parity codes . Finally, we discuss the implementation of these codes into time-bin photonic states of qubits and qudits respectively, and optimize the performance for one-way quantum repeaters.

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