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Ultrafast quantum communications over long distances using quantum encoding SRERAMAN MURALIDHARAN, LIANG JIANG, Yale University — Quantum repeaters provide a way of enabling long distance quantum communication by establishing entangled qubits between remote locations. The first generation quantum repeater protocols involve time consuming entanglement purification steps that demand a long lived quantum memory and two-way classical communication that makes them slow. This problem can be circumvented by the new generation quantum repeater protocols that use quantum encoding, one-way classical communication and classical error correction techniques. Furthermore, each quantum repeater station only needs short lived quantum memory bits, the number of which has favorable poly-logarithmic scaling with the distance. We investigate the tolerance of these schemes against photon losses and depolarizing errors, and discuss the possibility of realizing these schemes in physical systems with the current state of art.

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