

Abstract Submitted
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Fast Entanglement Establishment via Local Dynamics for Quantum Repeater Networks¹ LASZLO GYONGYOSI, Budapest University of Technology and Economics, Hungarian Academy of Sciences, SANDOR IMRE, Budapest University of Technology and Economics — Quantum entanglement is a necessity for future quantum communication networks, quantum internet, and long-distance quantum key distribution. The current approaches of entanglement distribution require high-delay entanglement transmission, entanglement swapping to extend the range of entanglement, high-cost entanglement purification, and long-lived quantum memories. We introduce a fundamental protocol for establishing entanglement in quantum communication networks. The proposed scheme does not require entanglement transmission between the nodes, high-cost entanglement swapping, entanglement purification, or long-lived quantum memories. The protocol reliably establishes a maximally entangled system between the remote nodes via dynamics generated by local Hamiltonians. The method eliminates the main drawbacks of current schemes allowing fast entanglement establishment with a minimized delay. Our solution provides a fundamental method for future long-distance quantum key distribution, quantum repeater networks, quantum internet, and quantum-networking protocols.

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