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Multi-hop teleportation of an unknown Two-Particle Entangled State via EPR Pairs XIAOQIN GAO, ZAICHEN ZHANG, XUTAO YU, Southeast University, QUANTUM COMMUNICATION NETWORK CENTER TEAM — A scheme of quantum multi-hop teleportation with an unknown two-particle entangled state based on EPR pairs is proposed. For one-hop teleportation, sender just makes two Bell-state measurements and informs receiver the measured result by classical wireless channel. Then the teleportation will succeed if receiver performs appropriate Pauli operators, and the success probability can reach 1 without any auxiliary particle. For k -hop teleportation, except the destination node, all nodes include source node and $k-1$ intermediate nodes must do two Bell-state measurements and the measurement results are sent to the destination node independently. Then, the destination node performs some Pauli operators based on all received measurement results to recover the initial quantum state. By comparison, our scheme is superior to hop-by-hop teleportation and can reduce hop-by-hop teleportation delay and save resources. The scheme of quantum multi-hop teleportation proposed contributes greatly to long-distance quantum key distribution and can be applied to massive quantum network in the future.

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