

Quantum communication in network channels and multipartite entanglement distribution

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Abstract

Efficient entanglement and secret-key distribution over the network channels is necessary to build a global quantum internet. One of the key technologies for this is quantum repeater. It is important to clarify what is the fundamental performance limit without quantum repeaters and how to overcome it by quantum repeaters, hopefully with relatively simpler technologies. These are intensely investigated for a point-to-point channel with two users but still many things are missing for network channels, in particular, for multipartite entanglement distribution. Here we discuss two examples: 1) fundamental limit of bipartite entanglement and key distribution and a novel multi-party quantum key distribution protocol in a quantum broadcast channel, and 2) quantum repeater-like operations for multipartite entanglement distribution in a star-type network channel.