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Theory of entanglement and entanglement-assisted communication

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Protocols such as quantum teleportation and measurement-based quantum computation highlight the importance of entanglement as a resource to be quantified and husbanded. Unlike classical shared randomness, entanglement has a profound effect on the capacity of quantum channels: a channel's entanglement-assisted capacity can be much greater than its unassisted capacity, and in any case is given by much a simpler formula, paralleling Shannon's original formula for the capacity of a classical channel. We review the differences between entanglement and weaker forms of correlation, and the theory of entanglement distillation and entanglement-assisted communication, including the role of strong forms of entanglement such as entanglement-embezzling states.