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Surprises in the theory of quantum communications

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Notions of communication and computation are most naturally formulated in the quantum arena. Unlike the stuff of conventional communication theory, quantum information cannot be copied, nor eavesdropped on without disturbance, and it can mediate the intense and private form of correlation known as entanglement. As in classical information theory, quantum capacity has to do with sphere packing, but in $C_2^{\otimes n}$ rather than Z_2^n . This difference gives rise to a much richer theory. For example, in contrast to what happens classically, here we often find strong nonadditivity of capacity—the capacity of two channels used together can be much larger than the sum of the individual capacities.