

# Nonlocality and Quantum Communication Complexity

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## **Abstract.**

If two objects are physically separated by a great distance, then a change in the state of one of them cannot instantaneously affect the state of the other. A remarkable property of quantum information is its ability to behave in ways that can appear to violate this simple intuition. I will explain a series of results along these lines, and how they relate to computation. In particular, quantum information can be used to reduce the communication costs of certain distributed computations. A simple example involves the scheduling of an appointment between two parties. Imagine that Alice and Bob each have a schedule and they want to find a day when they are both free. It is clear that this requires some communication. The question is: how much? It turns out that the “quantum communication complexity” of this problem is provably less than its classical communication complexity. I will explain this and other examples where quantum information reduces communication complexity.