Characterizing quantum theory in terms of information-theoretic constraints

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Abstract

We show that three fundamental information-theoretic constraints -- the impossibility of superluminal information transfer between two physical systems by performing measurements on one of them, the impossibility of broadcasting the information contained in an unknown physical state, and the impossibility of unconditionally secure bit commitment -- suffice to entail that the observables and state space of a physical theory are quantum-mechanical. We demonstrate the converse derivation in part, and consider the implications of alternative answers to a remaining open question about nonlocality and bit commitment.

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