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**A derivation of quantum theory from physical requirements**

MARKUS MUELLER, Perimeter Institute for Theoretical Physics, Waterloo (ON), Canada, LLUIS MASANES, ICFO-Institut de Ciències Fotoniques, Barcelona, Spain — Quantum theory is usually formulated by postulating the mathematical structure and representation of states, transformations, and measurements. The general physical consequences that follow (like violation of Bell-type inequalities, the possibility of performing state tomography with local measurements, or factorization of integers in polynomial time) come as theorems which use the postulates as premises. In this work, this procedure is reversed: we impose five simple physical requirements, and this suffices to single out quantum theory and derive its mathematical formalism uniquely. This is more similar to the usual formulation of special relativity, where two simple physical requirements —the principles of relativity and light speed invariance— are used to derive the mathematical structure of Minkowski space-time and its transformations.

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