

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Quantum theory cannot be extended** ROGER COLBECK, Perimeter Institute, Canada, RENATO RENNER, ETH Zurich, Switzerland — Predictions made by quantum theory are generally not deterministic: the theory tells us only how to calculate the probabilities with which measurement outcomes occur. This indeterminism is one of the key differences from classical mechanics and one can ask whether this is the best any theory can offer, or whether observable quantities could be better predicted by some higher theory. In a famous work, Bell considered extensions of quantum theory in the form of local hidden variables and showed that these cannot determine the outcomes of measurements on maximally entangled particles. Here, we go beyond the case of such classical extensions and ask whether any improved predictions can be achieved by any extension of quantum theory. We answer this question in the negative. More precisely, under the assumption that measurement settings can be chosen freely, there cannot exist any extension of quantum theory that provides us with any additional information about the outcomes of future measurements.

Renato Renner  
ETH Zurich, Switzerland

Date submitted: 11 Nov 2010

Electronic form version 1.4