Modal Interpretations of Quantum Mechanics and Relativity: A Reconsideration

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Abstract

Two of the main interpretative problems in quantum mechanics are the so-called measurement problem and the question of the compatibility of quantum mechanics with relativity theory. Modal interpretations of quantum mechanics were designed to solve both of these problems. They are no-collapse (typically) indeterministic interpretations of quantum mechanics that supplement the orthodox state description of physical systems by a set of possessed properties that is supposed to be rich enough to account for the classical-like behavior of macroscopic systems, but sufficiently restricted so as to avoid the no-hidden-variables theorems. But, as recent no-go theorems suggest, current modal interpretations are incompatible with relativity. In this paper, we suggest a strategy for circumventing these theorems. We then show how this strategy could naturally be integrated in a relational version of the modal interpretation, where quantum-mechanical states assign relational rather than intrinsic properties.

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