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On the probabilistic nature of quantum mechanics and the notion of closed systems. (English)

The notion of “closed system” in Quantum Mechanics is discussed. Two models of a quantum mechanical system $P$ spatially far separated from the “rest of the universe” $Q$ are studied. Under reasonable assumptions on the interaction between $P$ and $Q$, it is shown that the system $P$ behaves as a closed system if the initial state of $P \cup Q$ belongs to a large class of states, including ones exhibiting entanglement between $P$ and $Q$. The results are used to illustrate the non-deterministic nature of quantum mechanics. It is also shown that assigning an initial state and a unitary time evolution to a quantum system is generally not sufficient to predict the results of a measurement with certainty.

Reviewer: T. C. Mohan (Chennai)

MSC:
81P05 General and philosophical questions in quantum theory
81S22 Open systems, reduced dynamics, master equations, decoherence
81P40 Quantum coherence, entanglement, quantum correlations

Keywords:
closed systems; quantum mechanics; probabilistic nature

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References:


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