

The physical basis of quantum relativity

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Abstract

Standard Quantum mechanics (SQM) deals with observers, frames of reference (apparatus) and systems under observation (SUOs). Heisenberg based his approach to quantum mechanics on a desire to avoid metaphysical (i.e. unobservable) concepts, dealing only in terms of experimentally observable quantities. Following this idea, we describe an approach to quantum mechanics which deals only with labstates, which represent the observer's quantum information about the apparatus. This approach is compatible and consistent with Hume's philosophy known as empiricism. We show that conventional ideas do not work without modification when we consider certain quantum experiments involving classical special relativistic transformations. We discuss the appearance of quantum horizons, which present a barrier to information transmission between initial and final state apparatus whenever these are in relative motion.

Keywords: quantum relativity apparatus observers information

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Additional Information: A "system-free" approach to physics avoiding the metaphysical concept of SUO (system under observation)