Santos, Emilio
Towards a realistic interpretation of quantum mechanics providing a model of the physical world. (English) Zbl 1368.81030

Summary: It is argued that a realistic interpretation of quantum mechanics is possible and useful. Current interpretations, from “Copenhagen” to “many worlds” are critically revisited. The difficulties for intuitive models of quantum physics are pointed out and possible solutions proposed. In particular the existence of discrete states, the quantum jumps, the alleged lack of objective properties, measurement theory, the probabilistic character of quantum physics, the wave-particle duality and the Bell inequalities are analyzed. The sketch of a realistic picture of the quantum world is presented. It rests upon the assumption that quantum mechanics is a stochastic theory whose randomness derives from the existence of vacuum fields. They correspond to the vacuum fluctuations of quantum field theory, but taken as real rather than virtual.

MSC:
81P05 General and philosophical questions in quantum theory
82B10 Quantum equilibrium statistical mechanics (general)

Keywords:
realistic interpretations of quantum mechanics; models of quantum world; critical analysis of quantum interpretations; ontological vs. epistemological save function; hidden variables

Full Text: DOI

References:
[10] Christensen, BG; McCusker, KT; Altepeter, J; Calkins, B; Gerrits, T; Lita, A; Miller, A; Shalm, LK; Zhang, Y; Nam, SW; Brumner, N; Lim, CCW; Gisin, N; Kwiat, PG, Detection-loophole-free test of quantum nonlocality, and applications, Physical Review Letters, 111, 130406, (2013); - doi:10.1103/PhysRevLett.111.130406

© 2022 FIZ Karlsruhe GmbH


ghirardi, gc; rimini, a; weber, t, unified dynamics for microscopic and macroscopic systems, physical review d, 34, 470, (1986) - \textit{zbib 1222.82047} · doi:10.1103/physrevd.34.470.

ghirardi, gc; rimini, a; weber, t, unified dynamics for microscopic and macroscopic systems, physical review d, 34, 470, (1986) - \textit{zbib 1222.82047} · doi:10.1103/physrevd.34.470.


lakatos, i. (1980). \textit{the methododology of scientific research programmes}. cambridge: cambridge university press.


lamoreaux, s. k. (1997). demonstration of the casimir force in the 0.6 to 6 μm range. \textit{physical review letters}, \textit{78}, 5.


marchildon, l. can everett be interpreted without extravaganza?, foundations of physics, 14, 357, (2011) · \textit{zbib 1211.81011} · doi:10.1007/s11071-010-9415-5.


This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.

Edited by FIZ Karlsruhe, the European Mathematical Society and the Heidelberg Academy of Sciences and Humanities

© 2022 FIZ Karlsruhe GmbH