

Many Worlds?

Everett, Quantum Theory, and Reality

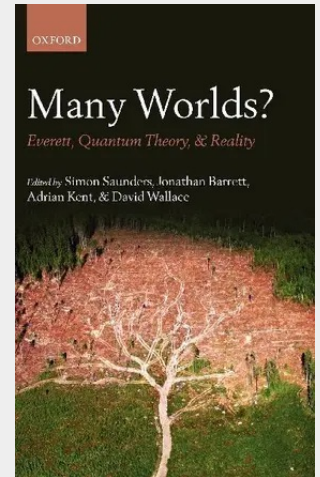
The first full appraisal of this theory Collective study of one of one of the most startling theories in modern science Featuring a stellar line-up of philosophers and physicists What would it mean to apply quantum theory, without restriction and without involving any notion of measurement and state reduction, to the whole universe? What would realism about the quantum state then imply? This book brings together an illustrious team of philosophers and physicists to debate these questions. The contributors broadly agree on the need, or aspiration, for a realist theory that unites micro- and macro-worlds. But they disagree on what this implies. Some argue that if unitary quantum evolution has unrestricted application, and if the quantum state is taken to be something physically real, then this universe emerges from the quantum state as one of countless others, constantly branching in time, all of which are real. The result, they argue, is many worlds quantum theory, also known as the Everett interpretation of quantum mechanics. No other realist interpretation of unitary quantum theory has ever been found. Others argue in reply that this picture of many worlds is in no sense inherent to quantum theory, or fails to make physical sense, or is scientifically inadequate. The stuff of these worlds, what they are made of, is never adequately explained, nor are the worlds precisely defined; ordinary ideas about time and identity over time are compromised; no satisfactory role or substitute for probability can be found in many worlds theories; they can't explain experimental data; anyway, there are attractive realist alternatives to many worlds. Twenty original essays, accompanied by commentaries and discussions, examine these claims and counterclaims in depth. They consider questions of ontology - the existence of worlds; probability - whether and how probability can be related to the branching structure of the quantum state; alternatives to many worlds - whether there are one-world realist interpretations of quantum theory that leave quantum dynamics unchanged; and open questions even given many worlds, including the multiverse concept as it has arisen elsewhere in modern cosmology. A comprehensive introduction lays out the main arguments of the book, which provides a state-of-the-art guide to many worlds quantum theory and its problems.

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192,80 €

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Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780199560561

Medium: Buch

ISBN: 978-0-19-956056-1

Verlag: OUP Oxford

Erscheinungstermin: 01.08.2010

Sprache(n): Englisch

Auflage: 1. Auflage 2010

Produktform: Gebunden

Gewicht: 1109 g

Seiten: 640

Format (B x H): 161 x 240 mm

