Cambridge Elements

Elements in the Philosophy of Physics
edited by
James Owen Weatherall
University of California, Irvine

FOUNDATIONS OF QUANTUM MECHANICS

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CAMBRIDGE UNIVERSITY PRESS

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UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre,
New Delhi – 110025, India

79 Anson Road, #06–04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781108794442
DOI: 10.1017/9781108885515

First published 2021

A catalogue record for this publication is available from the British Library.

ISBN 978-1-108-79444-2 Paperback
ISSN 2632-413X (online)
ISSN 2632-4121 (print)

Foundations of Quantum Mechanics

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DOI: 10.1017/9781108885515
First published online: February 2021

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Abstract: Quantum mechanics is an extraordinarily successful scientific theory. But more than 100 years after it was first introduced, the interpretation of the theory remains controversial. This Element introduces some of the most puzzling questions at the foundations of quantum mechanics and provides an up-to-date and forward-looking survey of the most prominent ways in which physicists and philosophers of physics have attempted to resolve them. The topics covered include non-locality, contextuality, the reality of the wavefunction, and measurement problem. The discussion is supplemented with descriptions of some of the most important mathematical results from recent work in quantum foundations, including Bell's theorem, the Kochen-Specker theorem, and the PBR theorem.

Keywords: quantum foundations, philosophy of physics, non-locality, contextuality, Measurement problem

ISBNs: 9781108794442 (PB), 9781108885515 (OC)
ISSNs: 2632-413X (online), 2632-4121 (print)

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