Electron Scattering for Nuclear and Nucleon Structure

The scattering of high-energy electrons from nuclear and nucleon targets provides a microscope for examining the structure of these tiny objects. The best evidence we have on what nuclei and nucleons actually look like comes from electron scattering. This book examines the motivation for electron scattering and develops the theoretical analysis of the process. It discusses our current theoretical understanding of the underlying structure of nuclei and nucleons at appropriate levels of resolution and sophsitication, and summarizes present experimental electron scattering capabilities. Only a working knowledge of quantum mechanics and special relativity is assumed, making this a suitable textbook for graduate and advanced undergraduate courses. It will also provide a valuable summary and reference for researchers already working in electron scattering and other areas of nuclear and particle physics. This title, first published in 2002, has been reissued as an Open Access publication on Cambridge Core.

JOHN DIRK WALEKA obtained his PhD in nuclear theory from the Massachusetts Institute of Technology in 1958. He was professor of Physics at Stanford University from 1966 to 1987 and then went on to become Scientific Director of the Continuous Electron Beam Accelerator Facility (CEBAF) from 1986 to 1992. He is now Govenor's Distinguished CEBAF Professor of Physics at the College of William and Mary. His research interests cover theoretical nuclear and sub-nuclear physics, in particular nuclear structure, the relativistic nuclear many-body problem, strong coupling QCD, and electroweak interactions with nuclei. He has published numerous papers on nuclear physics, and in 1996 the American Physical Society recognized his work with the award of the Bonner Prize. He has lectured on electron scattering throughout the United States and Europe.

Published online by Cambridge University Press

Published online by Cambridge University Press

CAMBRIDGE MONOGRAPHS ON PARTICLE PHYSICS, NUCLEAR PHYSICS AND COSMOLOGY

16

General Editors: T. Ericson, P. V. Landshoff

1. K. Winter (ed.): *Neutrino Physics*
2. J. F. Donoghue, E. Golowich and B. R. Holstein: *Dynamics of the Standard Model*
3. E. Leader and E. Predazzi: *An Introduction to Gauge Theories and Modern Particle Physics, Volume 1: Electroweak Interactions, the 'New Particles' and the Parton Model*
4. E. Leader and E. Predazzi: *An Introduction to Gauge Theories and Modern Particle Physics, Volume 2: CP-Violation, QCD and Hard Processes*
5. C. Grupen: *Particle Detectors*
6. H. Grosse and A. Martin: *Particle Physics and the Schrödinger Equation*
7. B. Andersson: *The Lund Model*
8. R. K. Ellis, W. J. Stirling and B. R. Webber: *QCD and Collider Physics*
9. I. I. Bigi and A. I. Sanda: *CP Violation*
10. A. V. Manohar and M. B. Wise: *Heavy Quark Physics*
11. R. Frühwirth, M. Regler, R. K. Bock, H. Grote and D. Notz: *Data Analysis Techniques for High-Energy Physics*, second edition
12. D. Green: *The Physics of Particle Detectors*
13. V. N. Gribov and J. Nyiri: *Quantum Electrodynamics*
14. K. Winter (ed.): *Neutrino Physics, second edition*
15. E. Leader: *Spin in Particle Physics*
16. J. D. Walecka: *Electron Scattering for Nuclear and Nucleon Structure*

Published online by Cambridge University Press

Published online by Cambridge University Press

ELECTRON SCATTERING FOR NUCLEAR AND NUCLEON STRUCTURE

JOHN DIRK WALECKA
College of William and Mary

CAMBRIDGE
UNIVERSITY PRESS

Published online by Cambridge University Press



Shaftesbury Road, Cambridge CB2 8EA, 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

103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781009290579

DOI: 10.1017/9781009290616

© John Dirk Walecka 2022

This work is in copyright. It is subject to statutory exceptions and to the provisions of relevant licensing agreements; with the exception of the Creative Commons version the link for which is provided below, no reproduction of any part of this work may take place without the written permission of Cambridge University Press.

An online version of this work is published at doi.org/10.1017/9781009290616 under a Creative Commons Open Access license CC-BY-NC-ND 4.0 which permits re-use, distribution and reproduction in any medium for non-commercial purposes providing appropriate credit to the original work is given. You may not distribute derivative works without permission. To view a copy of this license, visit https://creativecommons.org/licenses/by-nc-nd/4.0

All versions of this work may contain content reproduced under license from third parties. Permission to reproduce this third-party content must be obtained from these third-parties directly.

When citing this work, please include a reference to the DOI 10.1017/9781009290616

First published 2002
Reissued as OA 2022

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

ISBN 978-1-009-29057-9 Hardback
ISBN 978-1-009-29059-3 Paperback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Published online by Cambridge University Press