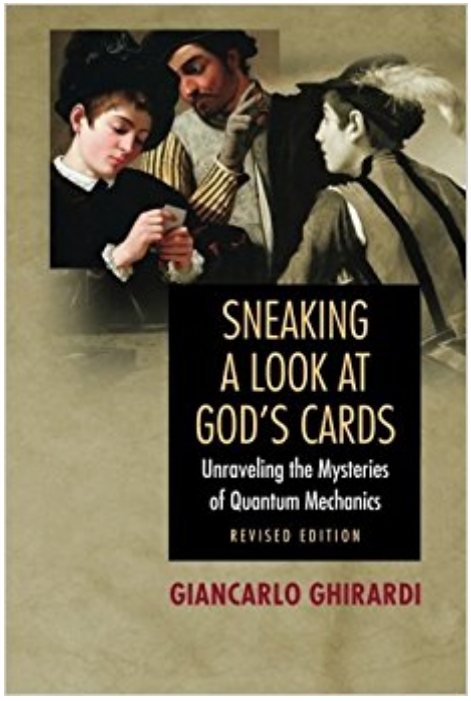
Sneaking A Look At God's Cards: Unraveling The Mysteries Of Quantum Mechanics



Synopsis

Quantum mechanics, which describes the behavior of subatomic particles, seems to challenge common sense. Waves behave like particles; particles behave like waves. You can tell where a particle is, but not how fast it is moving--or vice versa. An electron faced with two tiny holes will travel through both at the same time, rather than one or the other. And then there is the enigma of creation ex nihilo, in which small particles appear with their so-called antiparticles, only to disappear the next instant in a tiny puff of energy. Since its inception, physicists and philosophers have struggled to work out the meaning of quantum mechanics. Some, like Niels Bohr, have responded to quantum mechanics' mysteries by replacing notions of position and velocity with probabilities. Others, like Einstein and Penrose, have disagreed and think that the entire puzzle reflects not a fundamental principle of nature but our own ignorance of basic scientific processes. Sneaking a Look at God's Cards offers the general reader a deep and real understanding of the problems inherent to the interpretation of quantum mechanics, from its inception to the present. The book presents a balanced overview of current debates and explores how the theory of quantum mechanics plays itself out in the real world. Written from the perspective of a leading European physicist, it looks extensively at ideas from both sides of the Atlantic and also considers what philosophers have contributed to the scientific discussion of this field. Sneaking a Look at God's Cards sets out what we know about the endlessly fascinating quantum world, how we came to this understanding, where we disagree, and where we are heading in our quest to comprehend the seemingly incomprehensible.

Book Information

Paperback: 512 pages
Publisher: Princeton University Press; Revised edition (March 25, 2007)
Language: English
ISBN-10: 069113037X
ISBN-13: 978-0691130378
Product Dimensions: 6.1 x 1.2 x 9.2 inches
Shipping Weight: 2 pounds (View shipping rates and policies)
Average Customer Review: 4.4 out of 5 stars 12 customer reviews
Best Sellers Rank: #143,480 in Books (See Top 100 in Books) #71 inÃ Â Books > Science & Math > Physics > Nuclear Physics #144 inÃ Â Books > Science & Math > Physics > Quantum Theory #550 inÃ Â Books > Textbooks > Science & Mathematics > Physics

Customer Reviews

"From the earliest days of the theory, confusion about its interpretation engendered a continuing series of debates. . . . Ghirardi’s book provides a careful, evenhanded and well thought-out introduction to this timely topic."--Peter Woit, American Scientist"This is an excellent translation of a magnificent book. . . . [T]he Italian physicist GianCarlo Ghirardi gives a non-technical and critical exposition of deep facts about the foundations of quantum mechanics."--Adonai S. Sant’ Anna, Mathematical Reviews"[A] sweeping treatment of one of the most unfathomable yet important scientific frameworks of our time."--Cait Goldberg, Science News"A modern overview of the state of quantum theory. . . The breadth and depth are very impressive."--Choice"This remarkable book provides a careful and nontechnical introduction to the fundamental epistemological questions of quantum mechanics. . . . [I]t sets out with an in-depth discussion of the conceptual revolution brought about by the transition from a classical to a quantum description of the physical world. . . . All in all a marvelous and thought provoking book by one of the leading scientists in the field."--M. Kunzinger, Monatschefte fÃƒÂ r Mathematik

"This is a tremendous and wonderful book for novices and experts alike. It provides a lucid and insightful look into the empirical and conceptual problems handled so successfully by quantum theory. Ghirardi also leads us through the debates concerning the interpretation and meaning of this tantalizing and fascinating theory--debates in which he himself has been one of the major participants."--Bas C. van Fraassen, Princeton University "This impressive book leads the lay reader to a real understanding of the problems of interpreting quantum mechanics. It is a well-balanced, indeed wise, book, which will stand the test of time as an intellectually responsible introduction to the field. It is also so far as I know the first book at its level to have chapters on the important topics of quantum cryptography and quantum computation."--Jeremy Butterfield, Oxford University --This text refers to an out of print or unavailable edition of this title.

A very approachable guide to understanding the peculiar implications of quantum mechanics, especially the EPR gedanken experiment. For me, this was the main reason to purchase the book. I have had some courses in QM and QChem, introductory in nature, so while I learned to do the calculations, the philosophy was given short shrift. And this is of course the basic problem... QM works, but the mental model of what is actually happening remains quantum cloudy. If you have some exposure to the concepts of modern physics, diffration, interference, spin, the Bohr model, etc, you will find this book quite comfortable. If not, it may be a tough slog... many of the equations,

though simple, may appear inexplicable.In the discussion of photon polarization, a polarizer is sometimes called a filter and sometimes a lens. In the discussion of the implications of Bell's inequality, some of the sentence structures are confusingly elaborate, and do not help in understanding. I do not know if this is characteristic of Italian as a language, or just a too literal translation. Most of the book reads easily. I believe that the translation was done by more than the single person mentioned on the back cover. Still, this is a somewhat minor issue. Overall the book is excellent.

This is a very comprehensive introduction to the foundations of quantum mechanics for the sophisticated lay person who is willing to think and work through the examples and explanations.If you do the work you will really learn something--as opposed to popularizations that only give you the feeling of understanding--usually an illusion. No math background is assumed but the less math exposure you have the harder you have to work. I have read numerous popularizations--this is one of the very best. In particular it clearly and evenhandedly addresses the alternative interpretations of the quantum formalism pointing out the various myths and popular misconceptions that one can find in both popular and technical literature, the mistakes of Popper and Pais among them. The historical progression from the first versions of the Copenhagen Interpretations up through von Neumann's theorem, and Einstein's challenges(for once Einstein is treated fairly--not as an old geezer who was stuck in the past) through Bohm's 'hidden variables' approach, to Bell's analysis of nonlocality is especially good. It is often hard to keep straight the various logical twists and turns of the competing interpretations but Ghirardi continually recaps the arguments and clarifies the the different points of view. This book is in the league with Albert's and Gibbin's introductions to the philosophy of quantum mechanics.It is often useful to have more than one such book so that when you get stuck in one maybe the other has a clearer explanation. Also you could use this book in conjunction with Prof. Leonard Susskind"s quantum mechanics for the rest of us video lectures (9) on Stanford University itunes (FREE).

Yet another book that explores the mysteries of Quantum Mechanics (Q.M.) with the aim of making them accessible to an audience beyond those with degrees in physics or some related area of study that requires taking courses in Q.M. This has been a regular topic for authors that are practicing physicists (as Ghirardi is...), historians of science, popularizers of science, and others since the acceptance of Q.M. as an integral part of modern physical theory in the 1930s. This reviewer has read a fair number of those books over the years and overall I found Ghirardi's book a worthwhile

addition on the topics it covers.The content of the book's chapters can be divided into four areas. Chapters 1-7 introduce the fundmental concepts of Q.M. and some of the intellectual challenges and debates the physicists involved in their development (mainly Bohr and Einstein) engaged in during the formulation of what came to known as the Copenhagen interpretation of Q.M. Chapters 8-10 discuss later developments centered around the Einstein-Podolski-Rosen (EPR) challenge to the Copenhagen interpretation and re-examination of Q.M.'s foundations by John Bell with the concept of nonlocality emerging as key. Chapters 11-14 explore the implications of Q.M. with a variety of illustrative discussions - quantum computing and encryption, characterization of microsystems with identical particles, and superluminal (i.e. faster than light speed) signals. Finally, Chapters 15-19 discuss some of the perplexing situations that arise when attempting to develop a consistent view of how observations in the macroscopic world based on "classical physics" can be reconciled with microsystem behaviors based on Q.M. and different approaches that have been proposed for "closing the circle" including a discussion of the one that Ghirardi and two colleagues worked on known as GRW Theory.In style Ghirardi's book is an attempt to give a technically correct discussion using only basic high school-level mathematics in the main body of the text with the material requiring more effort on the part of the reader placed in appendices at the end of some of the chapters. He also offers further elaboration on some material in the main text in notes collected at the end of the book that are bookmarked in the text. Overall the reviewer thought the approach worked well for the content discussed in chapters 1-10, but the content in chapters 11-19 was not so well served by the approach. In general the content discussed in chapters 11-19 involved the use of more intricate constructs and covered more subtle concepts. This part of the book might have been better, if the author had reduced the scope of material he attempted to cover and provided a more leisurely expanded discussion of some subset of topics. Overall though the book was readable and the author's ehthusiasm for the material really comes through. If a reader is looking for a reasonably sophisticated discussion of the foundations of Quantum Mechanics and the perplexing issues that arise when attempting to reconcile the behavior of microsystems obeying the dictates of Q.M. with the macroscopic "real world", this is a book definitely worth considering. The book does not go into the history of the development of Q.M., but there are many good books on that topic already. Another book on Q.M. that covers much of the same material, but takes a different approach and includes more of the history is "Beyond Measure" by Jim Baggott. Yet another book that can be an interesting read is Whitaker's book "Einstein, Bohr, & the Quantum Dilemma" which gives a simplified discussion of the material Ghirardi covers in Chapters 1-10 with less technical detail. If one wants to really go into the material of Chapters 1-7 in detail with a blow by blow

account of the arguments among the founders of Q.M. there is the book "Quantum Dialogue" by Mara Heller, but this is not always an easy read due to the fact that Heller is a Professor of History and Philosophy of Science and assumes the reader already has some background in the topics and in open questions related to the development of Q.M. up to 1930 (Baggott's book has most of the background necessary for Heller).

GianCarlo Ghirardi has produced the perfect introduction to the quantum theory: it focusses on the essential issues of physics and gives as well a clear and complete account of the historical development of the theory and debates among the great physicists. Both specialists and non-specialists will learn a lot from this book. It is the best conceptual introduction to the theory on the market. In addition to the more familiar topics, there is discussion of quantum computation and quantum information theory. I recommend this book in the highest terms to anyone interested in really understanding the issues surrounding quantum mechanics.

Cards, Audio CD, Wall Chart & Learning Guide] (Tuttle Flash Cards) Tuttle Japanese for Kids Flash Cards Kit: [Includes 64 Flash Cards, Audio CD, Wall Chart & Learning Guide] (Tuttle Flash Cards) Tuttle Japanese for Kids Flash Cards (CD): [Includes 64 Flash Cards, Downloadable Audio , Wall Chart & Learning Guide] (Tuttle Flash Cards) Tuttle Korean for Kids Flash Cards Kit: (Includes 64 Flash Cards, Downloadable Audio, Wall Chart & Learning Guide) (Tuttle Flash Cards)