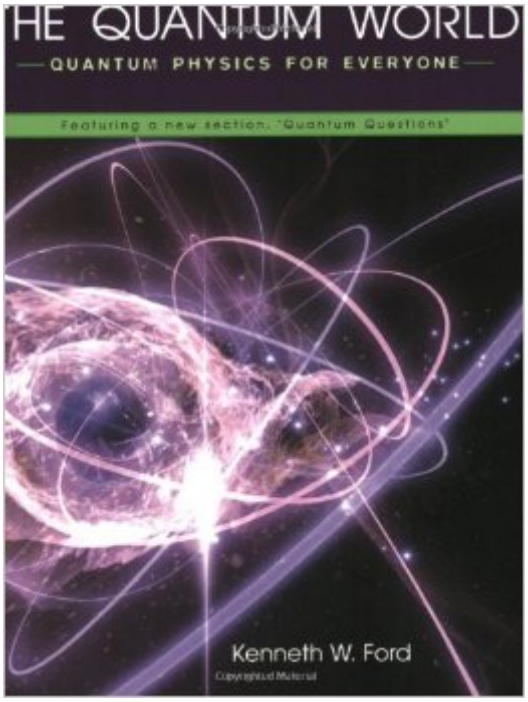
The Quantum World: Quantum Physics For Everyone



Synopsis

As Kenneth W. Ford shows us in The Quantum World, the laws governing the very small and the very swift defy common sense and stretch our minds to the limit. Drawing on a deep familiarity with the discoveries of the twentieth century, Ford gives an appealing account of quantum physics that will help the serious reader make sense of a science that, for all its successes, remains mysterious. In order to make the book even more suitable for classroom use, the author, assisted by Diane Goldstein, has included a new section of Quantum Questions at the back of the book. A separate answer manual to these 300+ questions is available; visit The Quantum World website for ordering information.There is also a cloth edition of this book, which does not include the "Quantum Questions" included in this paperback edition.

Book Information

Paperback: 304 pages

Publisher: Harvard University Press (October 15, 2005)

Language: English

ISBN-10: 067401832X

ISBN-13: 978-0674018327

Product Dimensions: 6.2 x 0.8 x 8.4 inches

Shipping Weight: 12 ounces (View shipping rates and policies)

Average Customer Review: 4.3 out of 5 starsÂ Â See all reviewsÂ (80 customer reviews)

Best Sellers Rank: #274,009 in Books (See Top 100 in Books) #219 inÂ Books > Science & Math > Physics > Quantum Theory #776 inÂ Books > Textbooks > Science & Mathematics > Physics

Customer Reviews

This is the best book on quantum physics that I've ever read. What Kenneth Ford, retired director of the American Institute for Physics, set out to do (and I think largely accomplishes) is to make the world of the quantum (somewhat!) accessible to the general reader. Using a minimum of mathematics and a maximum of analogy and explanation expressed in a direct and readable style, Ford brings the "eerie theory" (p. 247) as close to the everyday mind as might be possible. Part of the reason for the book's success is that Ford had high school seniors at Germantown Academy carve "up the book among themselves and" provide "valuable (and unvarnished) feedback."But let's face it, even great physicists, entirely enmeshed in the difficult mathematics of QM--people who have devoted their lives to understanding the quantum world--can't answer John Wheeler's famous question: "How come the quantum?" The problem is not so much that the quantum world is

complicated or that the math is difficult. The problem is that the "reality" of QM is fundamentally at odds with our everyday experience.Some of the ideas such as superposition, entanglement, fundamental probability, exclusion, and the famous uncertainty principle discovered by Werner Heisenberg, to mention just a few, are completely alien to our experience as human beings. In this regard I am reminded of the saying from Eastern religion that the world is not as we think it is. The world we see is a representation constructed by our minds in collaboration with our senses, honed through the ages by the evolutionary experience so that what we see and hear and feel and taste and smell and especially "understand" is conditioned by our need to survive. We do not see x-rays or radio waves or individual atoms, nor do we know intuitively that atoms are mostly empty space, nor do we appreciate that the colors we see are really just inside our heads, our way of apprehending the differing wave lengths of light coming from the objects in the world, not something intrinsic to those objects.Et cetera, one might say. So vast is the world and so tiny can things be (but not tinier than the Planck limit!--or so it is postulated) and so remote from our day-to-day needs that until recent times the extremes had no relevance for us. But everything has changed. Lasers, computers, nuclear reactors (and bombs) stem from knowledge of things impossible to see and even impossible to visualize or to fully appreciate. The technology works, the math rings true, and our world is changed for the better, for the worse, but regardless, changed forever.But how much can the average educated person with no mathematic training learn about QM? Is it a hopeless case? Certainly the complexities presented in this book just in terms of the number of particles and their properties are formidable. I would have to take notes and construct charts and review and re-review in order to keep the particles straight in my mind. (Ford provides a particle appendix with four tables that helps.) But even so, I would not understand quantum mechanics. However I think there is something wonderful in what I do learn and appreciate. Namely, that the world really is not as we think it is. Such knowledge ushers in feelings of humility and awe and leads to a greater appreciation of how amazing everything is.Implicit in Ford’s presentation is the idea that quantum mechanics is not complete. He writes, "Many physicists believe that some reason for quantum mechanics awaits discovery." (p. 99) The implication is that something more fundamental underpins QM, and when that is discovered our understanding will be perhaps complete, or (more likely, I suspect) a whole new world of mystery will be opened to us. The fact that relativity and QM are yet to be completely reconciled, and that gravity does not fit into the equations of QM, fairly cries out for a larger theory.Most important for me and I think for most people interested in QM are its philosophic and even religious implications. Facile ideas of gods that talk to humans only through the words of ancient books, or of gods that cannot do their will in the world except through the work

(sometimes malicious) of humans, or gods that communicate with no inkling of anything beyond the Age of Bronze, dissipate like fairy tales when one contemplates the world of the very large and the very small. In particular, when I think about the idea that the entire universe was once (before the Big Bang) stuffed into a mathematical point, I am led to wonder what could be contained within the relatively vast expanse of a particle as defined in QM. Who is to say there cannot be worlds within worlds within worlds?Anyway, I believe that even a cursory or hurried reading of this book will prove valuable to the interested reader, and for those with the time and energy to study Ford's presentation, a lot more can be gained even for the non-mathematical.

I've always wanted to learn more about quantum physics, so I figured I would start with a book that was for "Everyone." Me defenitely being that "Everyone" and not having a very strong background in the subject, I thought this book would fit me perfectly. However, about 30 pages in, I realized I was quickly being left behind by Kenneth Ford. He starts out at a good pace in the first few pages, explaining the kinds of measurements in quantum physics and also a little bit of the history behind the field, but then he becomes increasingly technical, referrencing terms unknown to the average layman without prior explanation. Sometimes I realized that these explanations did exist in an abbreviated manner farther along in the book, so many times I found myself searching for terms in the index and jumping around to put everything together.Basically, I think this book might be great for people who already have an intermediate understanding of quantum physics and have heard of the terminology at least once. But the rest of us "everyonish" people who come with less experience on the subject might find that it might be possible to gain a good understanding of quantum physics reading this book but only after some dedicated work on our part. Personally, I think I will buy a more quantum-physics-for-dummies kind of book first and then move on to this one.

This book is pure pleasure. It reads a bit like an adventure story as the author explains how the concepts of the quantum theory were developed to make sense of experimental results in the subatomic realm. The author's engaging style makes quantum theory seem almost easy! This book is by far the best effort to bring the meaning of quantum theory to the nonscientist that I have read

Three themes are intertwined throughout this book:1. Historical and biographical data on the men who, over about 50 years, discovered and described the weird world of quantum phenomenon and particle physics. The use of common sense had to be suspended during these investigations.2. Accurate and intimidating descriptions of the particles and their interactions. I think it was Richard

Feynman who said something like, "If I want to know the particulars about one of these particles, I know where to look it up."3. Running commentary on how the quantum world works.Of the three, the first is well-done and interesting, the second is relentless but necessary (for the career physicist), and the third is simply brilliant. It explains in clear language why the quantum world is so unlike the common sense world we thought we lived in. Difficult concepts come alive - such as wave/particle duality, the exclusion principle, the uncertainly principle, symmetry, and entanglement, or as Einstein called it, "spooky action at a distance." Unless you live like a Mennonite or are on a boy scout campout, quantum physics technologies effect the way you live your daily life - the internet even grew out of early efforts of physicists to keep each other more immediately informed about advances in particle physics. For non-physics majors, consider reading on despite lack of total understanding or you might bog down in details. As the point of view changes, concepts are restated and you'll get another try at it. This stuff is weird!This is a great book that I highly recommend for any physicist who wants to brush up on particle physics and quantum phenomena, any undergrad or grad student in physics, or any other scientist types who are persistent enough to really want a handle on this fascinating but difficult subject.

I'm a mathematical retard, but this book is making sense!! If you are a visual person, who is better able to figure 'things' out if you can 'see' them, get this book. I'm an English major, but this book is helping me to 'see' quantum theory!!

Physics and Reality A Modern Introduction to Quantum Field Theory (Oxford Master Series in Physics) An Introduction to Quantum Spin Systems (Lecture Notes in Physics) Physics of the Soul: The Quantum Book of Living, Dying, Reincarnation, and Immortality The Feynman Lectures on Physics: Volume 1, Quantum Mechanics The Feynman Lectures on Physics: Volume 2, Advanced Quantum Mechanics John for Everyone, Part 1: Chapters 1-10 (The New Testament for Everyone)