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Facts And Mysteries In Elementary Particle Physics



Synopsis

This book provides a comprehensive overview of modern particle physics accessible to anyone with a true passion for wanting to know how the universe works. We are introduced to the known particles of the world we live in. An elegant explanation of quantum mechanics and relativity paves the way for an understanding of the laws that govern particle physics. These laws are put into action in the world of accelerators, colliders and detectors found at institutions such as CERN and Fermilab that are in the forefront of technical innovation. Real world and theory meet using Feynman diagrams to solve the problems of infinities and deduce the need for the Higgs boson. *Facts and Mysteries in Elementary Particle Physics* offers an incredible insight from an eyewitness and participant in some of the greatest discoveries in 20th century science. From Einstein's theory of relativity to the elusive Higgs particle, this book will fascinate and educate anyone interested in the world of quarks, leptons and gauge theories. This book also contains many thumbnail sketches of particle physics personalities, including contemporaries as seen through the eyes of the author. Illustrated with pictures, these candid sketches present rare, perceptive views of the characters that populate the field. The Chapter on Particle Theory, in a pre-publication, was termed "superbly lucid" by David Miller in *Nature* (Vol. 396, 17 Dec. 1998, p. 642).

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Customer Reviews

Veltman delivers the tale of phenomenological particle physics with enthusiasm and depth as one of its leading researchers. He attempts to cover the whole arena, from the complex behavior of quarks

and gluons to the description of particle detectors. Woven throughout the book are small "vignettes" (his terminology for brief biographical sketches) of the many physicists, famous and not-so-famous, who contributed to the current understanding of our universe. He succeeds relatively well in his goal of explaining particle physics to the layman. But don't look here for any coverage of the more esoteric and exotic ideas of theoretical physics like string theory. He unequivocally states, "The fact is that this book is about physics, and this implies that the theoretical ideas discussed must be supported by experimental facts. Neither supersymmetry nor string theory satisfy this criterion. They are figments of the theoretical mind. To quote Pauli: They are not even wrong. They have no place here." He is, of course, correct but I think he downplays the mathematically unifying power of string theory, for which experimental verification lies beyond today's technological reach and thus cannot be vindicated one way or the other. Mathematical beauty, while not a sure sign of physical truth, can at least serve as a powerful beacon for future physical insights. Always the true scientist, Veltman should be praised for unapologetically declaring agnosticism if evidence for a theoretical idea isn't clear cut. For example, he writes several times that the neutrino is massless but will almost always parenthetically acknowledge that it might have a very small mass (which indeed it does, as experimental evidence of neutrino mixing has been since verified). He deems it worthy enough to have an entire section devoted to neutrino mixing and its implications. I found one glaring problem with the book that prevented the 5 star rating it could have received: writing style. It just doesn't read all that smoothly, and I think it could have been cleaned up a bit more by a more astute editor. Balancing the rocky prose, however, are wonderful color templates (excellently used during his description of anti-matter) to aid explanations, pictures of apparatus and scientists to portray the human side of science, and clear diagrams of particle interactions. If you want to learn what physicists empirically know about particle physics today and how they determine it, get this book; just don't expect smooth reading. Veltman is clearly passionate about his profession and it shows.

I don't believe I have ever been so internally conflicted by any book. On the one hand, it is clear that Martinus Veltman is a legitimate genius. The book is a cornucopia of insights I have never seen in any other work. Veltman also enriches the book with original accounts of the human side of numerous physicists; some are so detailed as to seem gossipy. On the other hand, whoever copy-edited this book should be banned from the English-speaking world. Much of the book reads like a transcript of an informal discussion group. It is the task of the editor to provide the translation of the casual musings of a genius into a polished publication; that task is unfulfilled here. Edited properly, *Facts and Mysteries* could be a must-have book for all layman physics enthusiasts. As it

is, it's just an also-ran. I would recommend it only to those who are already pretty conversant in the field.

This is a unique book. First of all, the paper, font, diagrams, and cover are wonderful. It's really a nice looking book cover to cover. Next, the author includes biographies of people involved in the field. The writing is candid and humorous. The biographies don't read like a textbook at all. They include his own opinions, as well as interesting anecdotes about the people. Finally, the author includes some of his own personal story in the book, regarding his work in particle physics. It's nice to see a first-hand account. I enjoy his commentary. All these things make this a special book, and worth reading. The author can be somewhat grumpy, but you have to take that with a sense of humor. Consider that physicists (I am one) tend to be literal and often TOO honest, at the risk of being blunt or awkward. So try not to be put off. Some parts of the book are a bit tedious. If you really want to understand the topic, read some other books along with this one. If there's only one book to get, try Oerter's "Theory of Almost Everything". But if you want a few books, then definitely include this one.

This is a well structured book which describes developments in modern physics in an in-depth and comprehensive way. After a preliminary discussion of basic physical issues, the author launches into a detailed, yet non mathematical, outline of the standard model of particle physics which he rightly says is a beautiful model indeed. His discussion of this is a highlight of the book and the book is worth buying for this chapter alone. He then goes on to discuss quantum mechanics as well as discussing aspects of relativity pertinent to particle physics. Understanding the basic elements of the universe did not happen overnight but rather was the fulfilment of a combined effort of a large number of people. At all stages throughout the book, the author illustrates the contribution of the various personalities involved, and does it so that the reader appreciates the erstwhile contribution each person made. The author himself made a significant contribution. Of course, not just the 'who' is relevant. How they achieved the various breakthroughs is also important and the book's discussion of the history and development of modern accelerators and particle colliders is of particular interest. Finally the discussion of the theory of particles and of interactions within particles concludes what is an enjoyable and interesting book on topics that are justifiably regarded as complicated, yet are dealt with in the book in an easy and very readable way. This book is recommended for all who wish to appreciate current ideas about the basic elementary particles of nature and would like to have an understanding of these incredible 'building blocks' of our wonderful

universe..

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