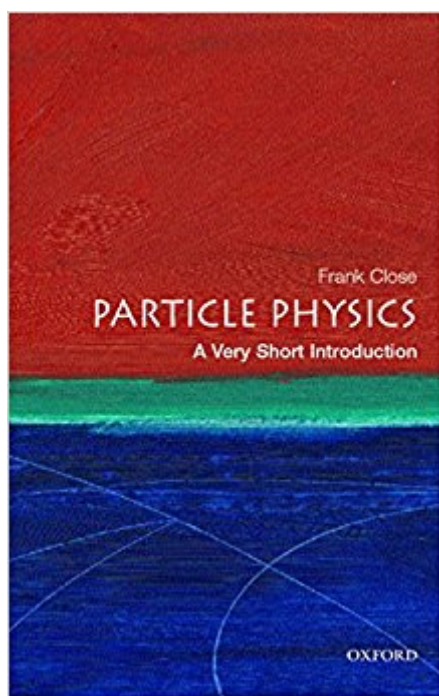


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# Particle Physics: A Very Short Introduction (Very Short Introductions)



## Synopsis

In this compelling introduction to the fundamental particles that make up the universe, Frank Close takes us on a journey into the atom to examine known particles such as quarks, electrons, and the ghostly neutrino. Along the way he provides fascinating insights into how discoveries in particle physics have actually been made, and discusses how our picture of the world has been radically revised in the light of these developments. He concludes by looking ahead to new ideas about the mystery of antimatter, the number of dimensions that there might be in the universe, and to what the next 50 years of research might reveal.

**ABOUT THE SERIES:** The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

## Book Information

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## Customer Reviews

I just love these small books. You get a nice, brief overview of a particular subject, and there are

many subjects covered by these books. In this book, Frank Close, professor of physics at Oxford University, enlightens us on the nature of the particles that make up our universe. He begins by discussing the nature of matter, atoms, and forces. We then get a feel for the relative size of the constituents of our world from the very small (angstroms and Fermi) to the very large (the universe). We are provided with a good explanation of the electron volt (eV) and what it means when trying to ascertain the nature of the atom and the protons, neutrons, quarks, and electrons that compose it. There is some discussion of cyclotrons and synchrotrons, the effects of relativity on the accelerated particles, and the different types of colliders in use today. The author spends a chapter discussing the various particle detection methods from the early techniques to the present, such as the cloud chamber, emulsions, bubble chambers, spark chambers, proportional chamber, drift chamber, and silicon strip detectors. We learn also about the neutrino detection methods via the SuperKamiokande experiment and the Sudbury Neutrino Observatory - all very interesting stuff. Following this, we get an introduction into the weird world of quarks, such as the charm, strange, bottom, and top quarks, concluding with a short discussion on why the world consists of matter rather than antimatter.

I enjoyed this book which develops the view of particle physics however it would be highly desirable to have it updated with the current findings from the CERN LHC.

Frank is a great writer and scientist. He gives good simple explanations of the subject without resorting to a series of formulas. He starts off by explaining atoms. They are not like what we learned in school as miniature solar systems. They are a cloud of electrons around a very very tiny nucleus, with a tremendous amount of nothing between. He describes in detail Baryons - Protons and Neutrons; Mesons - Quarks and Anti quarks. Later things get a bit heady when he describes Sparticles, Strangeness, Baryon Resonance, Leptons, Rho, Omega Phi, Pion, Eta, and Charm Quarks. (But hang in there, it gets better.) He then goes into how atoms were built up from the big bang. Finally the subjects at the end cover, Super-symmetry, Mass and the Higgs, Quark Gluon Plasma, Antimatter and Matter and Future questions. He truly explains things with understandable language.

When the book arrived, I said "It's small and only 160 pages looks like an easy read". I guess there is no such as easy reading in physics for non-scientists. It's not difficult, but there is just so much basic information that I didn't know about. It's small enough to put in my pocket when I go to the

park with my beach towel. I can read a chapter and ponder it. He explains everything clearly, and it is actually very fascinating. For beginners to particle physics, I would recommend going to the Wikipedia article about particle physics, and saving and printing the purple, green, red and yellow chart with all the particles; and cutting, saving and printing the chart with the 61 particles. The Particle Adventure is also a great free beginner website.

the material is very good for someone trying to just learn the basics.

On target and concise. Very nice even for an experienced physicist.

We owe a debt of gratitude to Frank Close for writing such a short and comprehensible introduction to a field that, in everyday scientific practice, is as technical and complex as they come. It is a major accomplishment to set out, in under 150 pages, not just the history of particle physics, the scales of time and space being investigated, the development of experimental techniques from Rutherford to the Large Hadron Collider, and the key concepts of the standard model that has dominated particle physics for more than 30 years. Indeed, the neat overview and classification of elementary particles and their interactions in the standard model is sufficient reason to keep this book close at hand. As befits a very short introduction, the book devotes only limited space to more speculative ideas such as supersymmetry, and indeed strings are mentioned only once. Even so, a few authoritative pages dealing with unsolved theoretical and conceptual problems as they relate to particle physics would have been helpful. Close is associated with CERN and an enthusiastic advocate of multi-billion dollar particle accelerators. While these machines are indeed impressive, an outside observer cannot help but wonder whether such a regimented and bureaucratic approach to science has not already reached severely diminishing marginal returns. It will be interesting to look back in a few years' time at whether this heavy investment of taxpayer money has paid the dividends in new knowledge and insight that Close and others like him hope for.

The book starts well but gets about a third of the way through the topic and seems to stop. I got a taste of the topic but little satisfaction. A very short introduction indeed. Robert Oerter's book is much better and if you have a thirst for an understanding of this topic you would be much better off with it. (ie. The Theory of Almost Everything: The Standard Model.....)

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