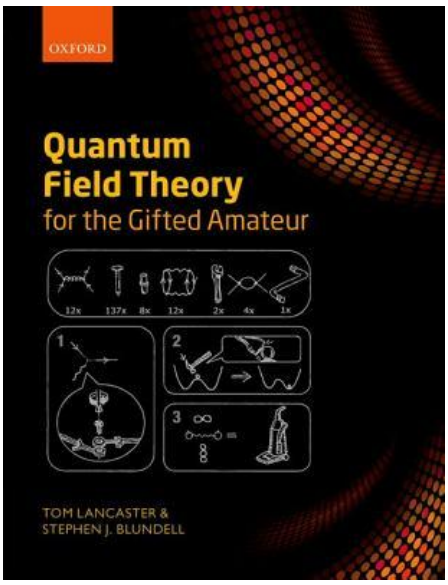

Quantum Field Theory for the Gifted Amateur

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Quantum field theory is arguably the most far-reaching and beautiful physical theory ever constructed, with aspects more stringently tested and verified to greater precision than any other theory in physics. Unfortunately, the subject has gained a notorious reputation for difficulty, with forbidding looking mathematics and a peculiar diagrammatic language described in an array of unforgiving, weighty textbooks aimed firmly at aspiring professionals. However, quantum field theory is too important, too beautiful, and too engaging to be restricted to the professionals. This book on quantum field theory is designed to be different. It is written by experimental physicists and aims to provide the interested amateur with a bridge from undergraduate physics to quantum field theory. The imagined reader is a gifted amateur, possessing a curious and adaptable mind, looking to be told an entertaining and intellectually stimulating story, but who will not feel patronised if a few mathematical niceties are spelled out in detail. Using numerous worked examples, diagrams, and careful physically motivated explanations, this book will smooth the path towards understanding the radically different and revolutionary view of the physical world that quantum field theory provides, and which all physicists should have the opportunity to experience.

To request a copy of the Solutions Manual, visit http: //global.oup.com/uk/academic/physics/ad....

Quantum Field Theory for the Gifted Amateur Details

Date	:	Published June 17th 2014 by Oxford University Press, USA (first published January 1st 2014)
ISBN	:	9780199699322
Author	:	Tom Lancaster , Stephen J. Blundell
Format	:	Hardcover 485 pages
Genre	:	Science, Physics, Nonfiction, Reference

From Reader Review Quantum Field Theory for the Gifted Amateur for online ebook

Erickson says

Excellent book on QFT introduction, giving very broad picture of QFT and how it works. While it says for "gifted amateurs", it actually contains relevant and proper details with many explicit calculations. The only reason why this book is not a graduate level textbook like Peskin or Ryder is just because it sacrifices depth and computational tricks that do not help conceptual understanding for first exposure in quantum field theory --- such as LSZ reduction formula, explicit computation for QED, QCD --- in exchange for clarity of concepts and breadth. It even managed to give some pictures on instanton solutions vortices, as well as covering condensed matter applications of QFT on superconductors and superfluid.

I think this book may be undersold by many practitioners of QFT. As a physics student myself, I would think this is actually a good book to keep as a support text along with proper textbooks like Schwartz or Peskin. I do not have formal courses in QFT, so this book actually was more than sufficient for my current purposes.

Alexander Temerev says

It looks like I am not quite gifted to make a good sense of this book. Many other textbooks on quantum mechanics worked better for me.

Jason Bennett says

Best self study. period.

Jonathan Chuang says

This is a pretty condescending book, it takes too long to develop the canonical quantisation machinery and, imo anyway, canonical quantisation is poor motivation for QFT, since the machinery turns on analogy, not on a physical idea. In contrast, the path integral although badly defined mathematically is a lot more intuitive, consequently the approach taken in Zee's book is much quicker and satisfying - and using fun tricks like complex integral methods for real integrals and getting to Feynman diagrams quickly doesn't hurt. (It still fascinates me that perturbation expansion somehow corresponds to the diagrams!) Another complaint is that this book seems to have been a ripoff Zee's book, tracking derivations (or lack thereof) almost line for line. I wouldn't recommend this. Best to do Zee's book first, but make sure you're ok squirming while he leaves you to finish where he left off.

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Update:
Getting further into Zee's book, I see explanations of crystal clarity on topics this book botched completely,

such as on time reversal and Grassman integration. I stand by my 3 star rating - it's pretty harsh but I am a bit sore from having spent money on this book.

It seems condensed matter experimentalists are really quite worthless as thinkers. They are to theorists as newspaper columnists are to a novelists. (Comparing most unremarkable of the former to a decent pick of the latter).

Recommended for:
Those who want to be led mindlessly by the nose. (i.e. it is a textbook in the worst sense)

Percival Paul says

I found it fun to read. Please read it if you are starting field theory.

Brendan McAuliffe says

I actually understood a lot of this, not the math, but the theory itself

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WarpDrive says

This is a quite interesting and modern exposition that treats all the main concepts Quantum Field Theory in a detailed, but step-by-step fashion. As written in the preface, this book is aimed at scientists that do not intend to become QFT professionals, and it is also designed for students of theoretical physics (at senior undergraduate or postgraduate level).

It is an uncompromisingly mathematical book, generally at post-graduate level. It requires prior good knowledge of quantum mechanics, special relativity, electromagnetism *(if you have never seen the electromagnetic field tensor, then this book is probably not for you)*, vector calculus, partial differential equations, good familiarity with tensor notation and some tensor calculus, Fourier transforms *(quite an important tool, as it is much easier to work in momentum space when dealing with propagators)*, complex analysis *(very handy when dealing with some curly integration - you must know at least the Cauchy's theorem, the residue theorem, and contour integration)*, and group theory *(at beginners-to-intermediate level - some knowledge of Lie algebras, generators, the Lorentz and Poincare groups is recommended)*. Some prior exposure to Lagrangian mechanics is also highly recommended, as at the end of the day the most fundamental step probably boils down to identifying the right Lagrangian (possibly adjusted after re-normalization).

It is clear from the list above that this is NOT a popular science book – it is a full-blown, legit physics textbook. This book is, in my opinion, a great introduction to quantum field theory for those with quite solid mathematical and physical backgrounds. It does require focus and stamina, and it has taken me a significant amount of time to digest the huge amount of information provided by this book – it has been a pretty steep learning curve - and I must confess that, towards the end of this book, I skipped 2 chapters out of the total 50 chapters (magnetic monopoles and Majorana fermions).

I must say however that, while the book is mostly at post-graduate level, the authors do try to progress relatively gently from the "basics" *(such as the quantum harmonic oscillator, or how to write a Lagrangian in QFT)* to more complex and comprehensive items *(such as perturbation theory and renormalization)*; moreover, the derivations are usually quite comprehensive *(but the reader must be prepared to complete some derivations, and also to carry out some important steps in the exercise section)*, the amount of typos is reasonably small *(fortunately, a comprehensive and updated errata is available online here: https://www.dur.ac.uk/physics/qftgabo...)*, and the examples are almost always highly relevant and extremely interesting.

I also greatly appreciated finding a good treatment of subjects that are rarely addressed in a detailed but accessible way: symmetry, Noether's current, symmetry breaking *(including the famous Goldstone theorem, stating that breaking a continuous symmetry gives rise to massless excitations)*, gauge fields and gauge theories, condensed matter applications, and especially re-normalization. In particular, I really enjoyed the authors' treatment of the important issue of re-normalization and re-normalizable theories - finally, a book that does not refrain from a proper mathematical treatment of the issue, while making at the same time good conceptual sense.

On the not-so-positive side, I must say that not all subjects are treated with great conceptual lucidity (for example, I have found a better treatment of Feynman's path integrals in Sakurai's book); moreover, I think that at times too much emphasis has been given by the authors to the mathematics and to the purely calculational side, rather than to the underlying physical processes and conceptual meaning. I am as much interested in why it all works as I am in understanding how to calculate cross sections, and occasionally the authors lose sight of the target audience in concentrating too much on the computational technicalities at the expense of the bigger picture.

Overall it has been a very valuable and interesting book, deserving of a good 4-star rating.
A perfect book for readers who want to get beyond the usual popular science books, and who want to immerse themselves into the kernel of this beautiful theory without getting overwhelmed by the technicalities that would be required in a professional context. Considering that the the subject matter is generally quite abstract, counter-intuitive and highly mathematical, I must say that the authors have not done a bad job at all - maybe not so conceptually brilliant as Penrose, or elegant, precise and concise as Sakurai, but still a very good effort, well worth reading. Anything that can help with the task of achieving a more detailed understanding of a physical theory the the authors have aptly defined as *"too important, too beautiful, and too engaging to be restricted to the professionals"*, is very welcome.

I also think that this is a book that should be read more than once, and kept for future reference - there is just so much good stuff in it - I will definitely give it a second read next year.
Highly recommended.

Mills College Library says

530.143 L245 2014

Ard says

F*ck this, way too much math. I guess I'd beter read 'The dancing Wu Li masters' again.
