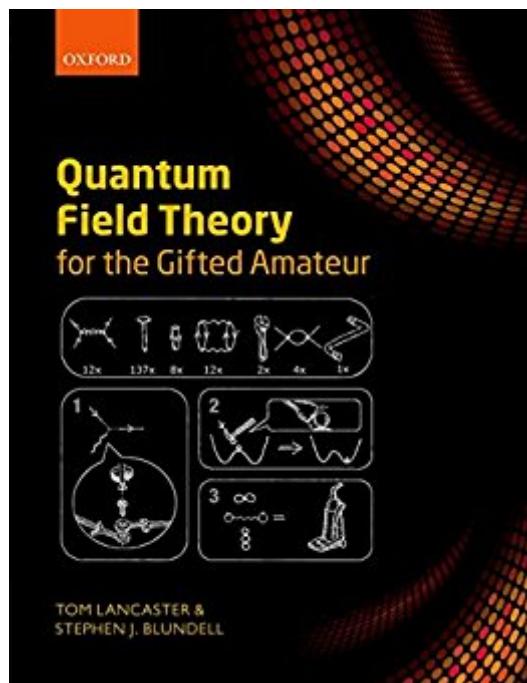


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Quantum Field Theory For The Gifted Amateur



Synopsis

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.

Book Information

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Customer Reviews

The authors of this book should be congratulated for bringing to the masses the difficult field of quantum field theory (QFT). QFT is a notoriously difficult subject to learn from well established books and hence a modern exposition that introduces the concepts in a step-by-step fashion is certainly welcome. As written in the preface, the readers that the authors have in mind are either scientists that do not intend to become QFT professionals or students of theoretical physics which should consult more than one source in their long pilgrimage toward enlightenment (and tenure). In short, QFT has to do with the nature of things that surround us. Things (I should not call them things but fields) like electrons or photons are characterized by the so called particle-wave duality, they behave like particles in some situations and like waves in others. QFT, however, overcomes such duality of conventional (one-particle) quantum mechanics by mathematically describing them as "excitations of the quantum field". By reading the book one is gradually taken to a trip through Lagrangians, harmonic oscillators, the formalism of the second quantization, path integrals, Wick and Noether theorems, Feynman diagrams, broken symmetry, and quasi-particles such as bogolons (Bogoliubov quasi-particles), Majorana and Dirac fermions. All these fancy names given to different theoretical concepts are often represented by nice sketches printed near the text with an entertaining approach as that in Mattuck's book "A Guide to Feynman Diagrams in the Many-Body Problem" (Dover, 1992). One thing that I would suggest the authors to include in a future edition is a final chapter about the position of QFT with respect to other theories (eg. string theory) as well as other scientific fields such as chemistry and biology.

I divide "popular science" books into four categories: 1. The kind you can read on a plane, by itself, and enjoy the ride. 2. The kind you need to read with Wikipedia or a math encyclopedia (or "maths" as these British authors would say) handy. 3. The kind you need to read with at least two other major books, and possibly more. (The authors agree with me here, saying most good books require at least one other to augment them). 4. The kind you can't read at all-- it has to be STUDIED, with painstaking work. I'd classify this gem as between 3 and 4. You really do have to know Fourier transforms, and a high level of undergrad relativity, or you'll miss a lot. That said, how can this be for an "amateur" at all? Well, the authors use an ingenious trick: they put the easier and more popular intuitive concepts in bigger type, and numerous smaller worked, mathematical examples in smaller type. So, you can, in a sense, read/study at your own level. I also find that ethical authors and publishers, especially with a book of this high cost, are generous with the look inside feature, because they care more about you not being disappointed than making an inappropriate sale. Hats

off, the look inside is excellent, please do peruse it carefully before deciding. Since any one aspect (eg. gauge theory) can occupy a dozen texts on its own, how do the authors cover the entire field? Again, VERY WELL DONE-- they give a concept, a little diagram in the margin, an easy example, a hard example, an exercise, and very detailed further reading, with references that are up to date. This makes this wonderful text an awesome "reference guide" to further study, especially for those going on in physics. Now for the bad part.

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