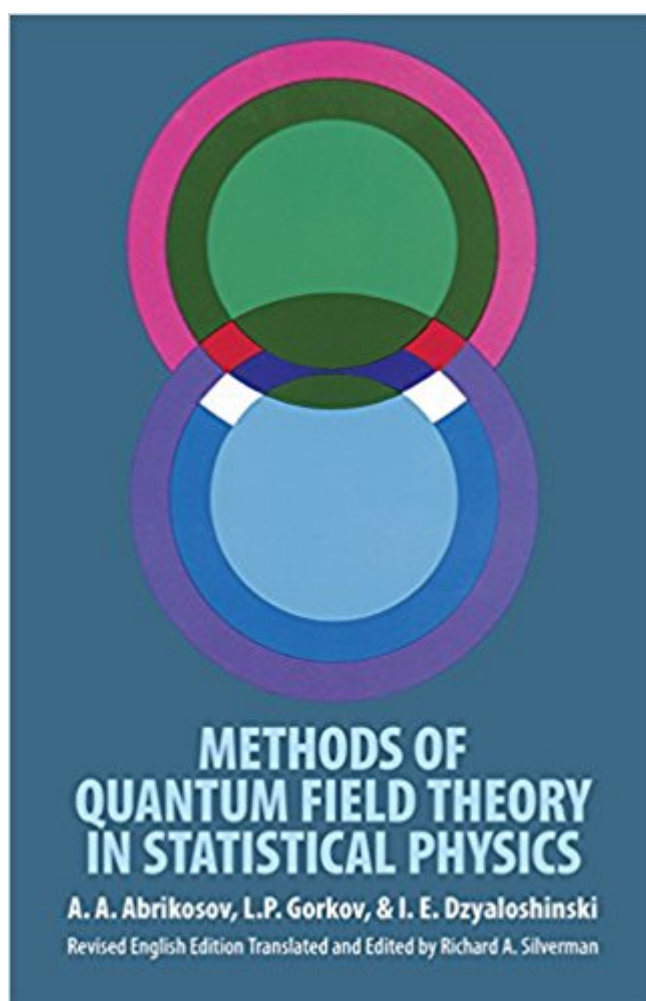


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Methods Of Quantum Field Theory In Statistical Physics (Dover Books On Physics)



Synopsis

This is a comprehensive introduction to the many-body theory was written by three renowned physicists and acclaimed by American Scientist as "a classic text on field theoretic methods in statistical physics."

Book Information

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Customer Reviews

Text: English, Russian (translation)

In typical Russian style this is written in a dense style. There is an introductory chapter which is quite challenging meant, I believe, as an overall discussion laying groundwork for the rest of the book. It can mostly be skipped or skimmed. Then the first few chapters after the first show how to do calculations in absolute gory detail. This is a really good place for students to invest their time. They do real and k-space Feynman diagrams to higher orders so the reader gets used to the technique. Once the techniques are established the book goes on to examine Bose Fermi and superconducting systems. These again, are dense chapters, but everything is in there. I basically consider this book to be part of the Landau-Lifshitz series. Part of it (chapters 2-4?) are appropriate for a graduate class if you know: stat mech, quantum, basic solids, & have patience. Easier books are Bruus and Flensberg (not too much in way of bosons), Rickayzen... Fetter and Walecka are like a longer version of this but they save a lot for the problems and that text is more formal results....The book is called "the green monster" in Russia (it has a green cover in those editions).

The name is appropriate. Rereading AGD (the US name for the same book) is something many professional physicists do.

Abrikosov's exceptionally clear presentation of field theoretic methods is one of the best (and at time, original) sources to learn from. From the perspective of the time when it was written, it is complete and comprehensive, and following in the footsteps of the Russian theoretical school, the reader will need some amount of focus to follow the mathematical line of reasoning. The serious student will nevertheless have to supplement this book with a more modern follow-up - not Fetter/Walecka though, as Abrikosov deals with the formalism much better than F/W.

Good

This is a serious book with a seriously long title and three seriously hard-to-pronounce author-names. Of course, as the other reviewers have already stated, this book is a Classic. It is also, as one other reviewer has proclaimed, not a book from which I would like to learn quantum field theory. "Methods of Quantum Field Theory in Statistical Physics" by A.A. Abrikosov, L. P. Gor'kov, and I.E. Dzyaloshinski (or "AGD" as it is known) is thought of by many as the be all and end all of field theory texts in the condensed matter physics world. But, AGD should not be thought of as a book that introduces the reader to field theory. You definitely must have studied field theory (either relativistic or non-relativistic) from an introductory book that uses the canonical formalism before attempting to get anything out of AGD. For example, if you are not already familiar with Wick's Theorem and how to prove it, then you will get very little out of AGD's single paragraph of text which "proves" the theorem. On the other hand, if you already know of Wick's theorem you may find the proof in AGD rather cute. As for me, when I read the one paragraph of text that AGD put forward as a "proof" of Wick's Theorem, I immediately puked in my own mouth. Yummy. Another downside to AGD is the fact that they do not even mention the path integral formalism. Everything is done in the canonical formalism, as you might expect from a bunch of old school Russians. Finally, I will repeat that this book IS a Classic, and there is a ton of great stuff in this book. If you are a serious student of condensed matter physics then you must have this book. If, on the other hand, you are trying to learn field theory for the first time, then go buy "Quantum Field Theory in a Nutshell" by Zee.

Also a really good book about quantum field theory. This book deals with QFT in a statistical manner and is worth reading.

AGD, as it were, is an essential text for those studying or practicing "methods of QFT in statistical physics". This landmark publication has educated generations of physicists, and can continue to do so due to its bargain price. The book does suffer from "Russian style". It is terse. Read slowly and often. If you're considering buying the book, either do so, or change fields. If you can not or will not invest ten dollars in this book then you are wasting your time anyhow.

This book is a must have if you're interested with applications of QFT in condensed matter physics. It's well organized. Other useful books you may consider: "Methods of Quantum Field Theory in Statistical Physics" by A.A. Abrikosov, L. P. Gorkov, and I.E. Dzyaloshinski (or "AGD" as it is known) is thought of by many as the be all and end all of field theory texts in the condensed matter physics world. Alexander L. Fetter, John Dirk Walecka, Quantum theory of many-particle systems Negele and Orland, Quantum Many-particle Systems Alexander Altland, Ben D. Simons, Condensed Matter Field Theory Jauho and Haug, Quantum Kinetics in Transport and Optics of Semiconductors enjoy!

You will know you've finally arrived in condensed matter theory when you can explain this book to others. For those unfortunate souls who have to learn from this, I can only paraphrase Mark Twain on Huck Finn (the quote becomes all the more appropriate in a Soviet setting): "Persons attempting to find a motive in this textbook will be prosecuted; persons attempting to find a moral in it will be banished; persons attempting to find a plot in it will be shot."

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