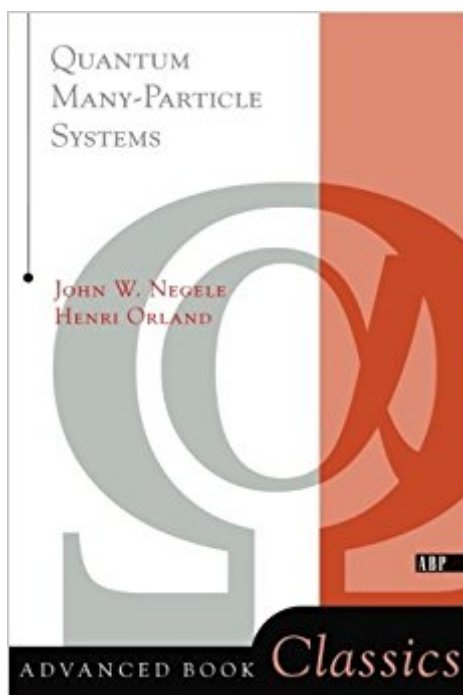


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Quantum Many-particle Systems (Advanced Books Classics)



Synopsis

This book explains the fundamental concepts and theoretical techniques used to understand the properties of quantum systems having large numbers of degrees of freedom. A number of complimentary approaches are developed, including perturbation theory; nonperturbative approximations based on functional integrals; general arguments based on order parameters, symmetry, and Fermi liquid theory; and stochastic methods.

Book Information

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Customer Reviews

Quantum Many-Particle Systems is a book of lecture notes that are rough and informal.

John Negele is Professor of Physics at M.I.T., where he has been a faculty member since 1970. He has been a recipient of numerous fellowships, including Guggenheim, Japan Society for the Promotion of Science, Alfred P. Sloan, NATO, National Science Foundation, Danforth, and Woodrow Wilson. His research interests range from the structure and dynamics of nuclei and the properties of dense matter to spin systems and quantum chromodynamics. Henri Orland, a Physicist at the Service de Physique Théorique, CEA Saclay, has worked extensively in nuclear physics and statistical physics and is currently focusing his research in statistical physics on disordered media: spinglasses, optimization problems, neural networks, wetting phenomena, two-dimensional systems, interfaces in random systems, quasi-periodic systems, and related topics.

This is an excellent book. I read the first three chapters. The harder ones, I think. It is incredibly precise and contains very few errors, even of the typographical kind. The discussion is entirely general (fermions, bosons, finite-temperature, two-body and higher interactions, etc.) and sufficient detail is always given for me to be able to fill in any remaining details. I never felt frustrated or confused! That's amazing for a book on many-body field theory. In fact, I eventually bought it again after spilling a drink on it. Here is the only real downside of the book: It is SO dense as to be a mind-numbing read. There is a lot of precise mathematical detail to keep up with. I have a tough time even remembering the final formulas. After a few pages of reading you begin to feel exhausted and want to put it down. But maybe you're more disciplined than I am! It would help to have more interesting, real-world examples in text to break the monotony.

A great physics book for field theory applied to condensed matter and sometimes nuclear physics problems. The authors are EXTREMELY careful mathematically and really don't skip any steps or shove stuff under the rug; in fact, the first chapter is just all math about how to do integrals and path integrals and field integrals and deal with Grassman numbers. A bit unusual for a physics book, but that's their style. The rest of the book deals with the usual and other material: zero-temperature Green's functions and perturbation theory (for energy, Green's function, etc.) The treatment is detailed and relatively exhaustive. Then there is the same for finite-temperature. The earlier sections on linear response are concise and one of the best treatments of the subject I have seen leading directly to the fluctuation dissipation expression (after this book I realized this vaunted "fluctuation-dissipation" that no one can explain is just a straightforward thing about commutators and pert. theory). The book also has other good stuff: a chapter on mean field theory, Landau-Ginzburg theory, order parameters, and a nice discussion about spontaneous symmetry breaking that helps clarify a bunch of stuff. Then there is a whole chapter on further aspects of one-particle Green's functions (Dyson equation, solving for poles, quasiparticles, satellites, etc.) that is pretty good and gets the physical point across. There is also a chapter on statistical (Monte Carlo, numerical, etc.) methods for doing quantum many body problems. While some of the methods are not the most up to date or modern, the basics are all there (Monte Carlo, Hubbard-Stratonovich (spelling?), inverting matrices via Monte Carlo, some stuff about lattice systems, Langevin equation simulation for Monte Carlo, updating problems, etc.) There is also a chapter on more advanced functional integration stuff. Also there is a nice description of the loop expansion and whatnot. The book is very well written, has no errors as far as I can tell, and is exhaustive on what it

treats. The problems at the end of the first few chapters deal with physics problems and help build intuition whereas the texts in these chapters are more formal. The book could use some more physical insights sprinkled throughout, but that is not too much of a drawback. The book is based on functional integration (Feynman integral) methods for field theory: this is the modern way folks do it and it is a powerful way of doing field theory both to derive results, connect results, do expansions and what not, and also for certain kinds of Monte Carlo computations. So having read this, the reader is up to date on a pretty modern view of field theory in condensed matter (and somewhat on nuclear physics). Highly recommended unless you can't stand precise and long mathematical treatments. My only misgiving is that sometimes I wish the authors provided more physical insights for certain concepts and gave some examples rather than "just the math"; but they do this in other parts of the book, so perhaps my complaint, which is not that serious, is more about the uneven way this is done. Nevertheless, this is 5/5 and a book you will read many times and learn from many times.

This book is recommended by my professor when I asked him about good books on quantum field theory for condensed matter physicists. Although a bit out of date, this book still serves a good introductory to many body physics and every point is pretty clear.

The book is actually very good, however the printing is quite poor. Not sure if it is copyright or not.

the printing is very poor and hard to recognize the letters, e.g., it's so small and thick that 3 and 8 are not distinguishable and etc.

Book from library. Not looks like as shown in the pictures. Same content I would expected.

A very good introduction to the many particle systems, includes all from the basics of coherent states to very complex parts of theory.

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