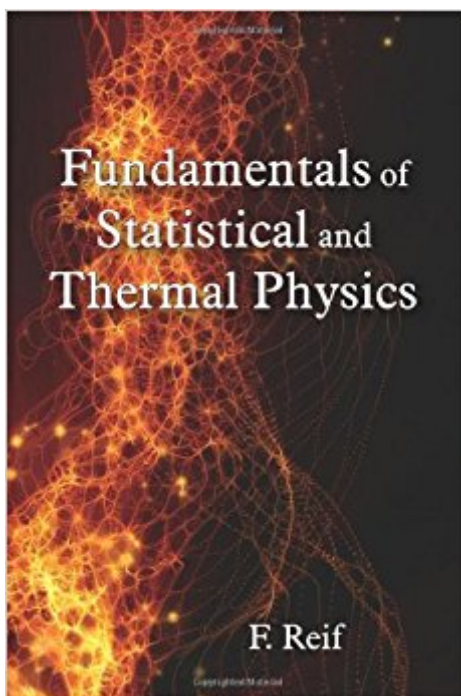


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# Fundamentals Of Statistical And Thermal Physics



## Synopsis

All macroscopic systems consist ultimately of atoms obeying the laws of quantum mechanics. That premise forms the basis for this comprehensive text, intended for a first upper-level course in statistical and thermal physics. Reif emphasizes that the combination of microscopic concepts with some statistical postulates leads readily to conclusions on a purely macroscopic level. The author's writing style and penchant for description energize interest in condensed matter physics as well as provide a conceptual grounding with information that is crystal clear and memorable. Reif first introduces basic probability concepts and statistical methods used throughout all of physics. Statistical ideas are then applied to systems of particles in equilibrium to enhance an understanding of the basic notions of statistical mechanics, from which derive the purely macroscopic general statements of thermodynamics. Next, he turns to the more complicated equilibrium situations, such as phase transformations and quantum gases, before discussing nonequilibrium situations in which he treats transport theory and dilute gases at varying levels of sophistication. In the last chapter, he addresses some general questions involving irreversible processes and fluctuations. A large amount of material is presented to facilitate students' later access to more advanced works, to allow those with higher levels of curiosity to read beyond the minimum given on a topic, and to enhance understanding by presenting several ways of looking at a particular question. Formatting within the text either signals material that instructors can assign at their own discretion or highlights important results for easy reference to them. Additionally, by solving many of the 230 problems contained in the text, students activate and embed their knowledge of the subject matter.

## Book Information

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## Customer Reviews

"Waveland has done a fine job in reissuing this classic text. Especially useful for instructors is the disc with Knacke's solutions to Reif's homework problems." --Bernard Weinstein, SUNY Buffalo

"This is a wonderful textbook that is pedagogically sound and provides a gentle introduction to statistical reasoning in thermodynamics and statistical mechanics. The introduction of the microscopic approach to appreciate thermodynamics is noteworthy. The textbook will adequately serve both undergraduates and beginning graduate students." -- Dilip Asthagiri, Johns Hopkins University

This is a classic text. If you want a comprehensive and well written introduction at the advanced undergraduate or graduate level to the subjects of statistical and thermal physics, you should consider getting this book. For many people, statistical physics is a difficult topic to learn. Buying a single text will not make one an expert. However getting a good introductory text can really facilitate the journey to understanding. This is perhaps my favorite "all in one" textbook covering statistical and thermal physics. It's a hefty tome, so it is best read opened on a desk with a pencil and pad of paper nearby.

I was very lucky that my physics professor brought with him from America the Berkeley Physics course. So I have also been shaped by Frederick Reif's excellent volume 5 *Statistical Physics*. On every page you get the impression that Professor Reif was trying his best to help an uneducated mind understand the physical ideas in use today for the explanation of how nature works. Well, the same is true for *Fundamentals of Statistical and Thermal Physics* where the topics are covered on 651 pages. I will not go through the contents as you can look them up and, as you can imagine, the book covers all essential aspects of the subject. Every chapter is closed by a further reading list and by an exercise section where the student can check his progress. We think the book will also be very useful for the professional physicist who wants to inform himself about a special topic with regard to statistical physics. One of the meanings of Reif in German is mature and we think that *Fundamentals of Statistical and Thermal Physics* is indeed a mature book.

Surprisingly a great book. A very good introduction to a really difficult topic. The only con I have is

that it could definitely use more example problems, but it's very easy to find solutions to many of these problems online since it's been around for so long. The explanations are very thorough. I've also heard from many professors that this has been and still is *\*the\** book for the subject.

The content of the book is a classic and gets 5 stars. The publisher gets 1 star. The printing is cheap and of inferior quality compare to the previous publisher.

The book may be somewhat repetitive in its approach to some of the concepts and prompt readers to skip over some of the examples that he uses to illustrate concepts. However, a closer look gives the reader a better appreciation of this repetition: it builds gradually and is well connected. It helped me gain an understanding of what I learned (which was not the same for other books). I think it is an excellent textbook in presenting the theory and foundations, but I would have liked more applications. I used this book as a secondary resource to my Statistical Mechanics class for Chemistry (which used Dill and Bromberg). I feel that statistical mechanics is somewhat similar to quantum field theory: it has many prerequisites and learning from various texts helps tremendously. However, the approach Reif presents has rather few prerequisites. Calculus is required and Probability is used, but what you need to know about probability is presented nicely in conjunction to the theory. Reif's main audience seems to be physicist rather than chemists or biologist. Most of the examples have to do with gases, particles, and photons. Ideal solutions, Raoult's law, are not mentioned in this book. If you are either a biologist or a chemist, this book will not teach you enough. I suggest Terrell Hill, MacQuarrie, Nitzan, Dill & Bromberg, and Fowler (Fowler may be hard to obtain though). If you are comfortable with Statistics and Probability as well as Lagrangian and Hamiltonian mechanics, I recommend Tuckerman.

Great textbook. Really helped me understand the class. Could have used a few more examples.

Good

I'm a junior in college using this textbook for my introductory thermodynamics class, and I think it's a pretty good book. It's well organized and goes through very clear explanations of the material, usually providing examples applying the ideas in the sections. Best of all, it provides a heckuva lot of references you can pursue if you're interested.

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