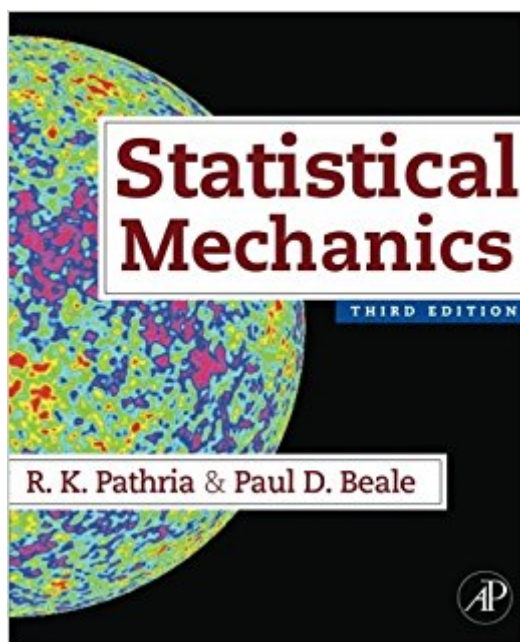


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# Statistical Mechanics, Third Edition



## Synopsis

This classic text, first published in 1972, is designed for graduate physics courses in statistical mechanics. The second edition, published in 1996, incorporated three comprehensive chapters on phase transitions and critical phenomena. This third edition includes new sections on Bose-Einstein condensation and degenerate Fermi behavior of ultracold atomic gases, and two new chapters on computer simulation methods and the thermodynamics of the early universe. We have also added new sections on chemical and phase equilibrium, and expanded our discussions of correlations and scattering, quantized fields, finite-size effects and the fluctuation-dissipation theorem. We hope this new edition will continue to provide new generations of students with a solid training in the methods of statistical physics.

- Bose-Einstein condensation in atomic gases
- Thermodynamics of the early universe
- Computer simulations: Monte Carlo and molecular dynamics
- Correlation functions and scattering
- Fluctuation-dissipation theorem and the dynamical structure factor
- Chemical equilibrium
- Exact solution of the two-dimensional Ising model for finite systems
- Degenerate atomic Fermi gases
- Exact solutions of one-dimensional fluid models
- Interactions in ultracold Bose and Fermi gases
- Brownian motion of anisotropic particles and harmonic oscillators

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## Customer Reviews

This third edition includes new sections on Bose-Einstein condensation and degenerate Fermi behavior of ultracold atomic gases, and two new chapters on computer simulation methods and the thermodynamics of the early universe. We have also added new sections on chemical and phase equilibrium, and expanded our discussions of correlations and scattering, quantized fields, finite-size

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"An excellent graduate-level text. The selection of topics is very complete and gives to the student a wide view of the applications of statistical mechanics. The set problems reinforce the theory exposed in the text, helping the student to master the material" --Francisco Cevantes "Making sense out of the world around us in one of the most appealing facets of physics. One may start by putting together seemingly isolated observations and as the different pieces start to fall into place, more complicated arrangements and more fundamental explanations are sought. This is indeed the case for instance when trying to understand the behaviour of a collection of particles. On the one hand, thermo- dynamics provides us with a satisfactory explanation of the macroscopic phenomena observed, however, in order to get to the core of the physical system it becomes necessary to take into account the microscopic constituents of the system as well as the fact that quantum mechanical

effects are at play. This is the realm of statistical mechanics and the subject of one of the most widely recognised textbooks around the globe: Pathria's Statistical Mechanics. [The original style of the book is kept, and the clarity of explanations and derivations is still there. I am convinced that this third edition of Statistical Mechanics will enable a number of new generations of physicists to gain a solid background of statistical physics and that can only be a good thing." --Contemporary Physics, pages 619-620

This is a book on statistical mechanics written for physicists. While most books dedicate a chapter or so to the treatment of stat mech. of quantum systems, this book uses the statistics of quantum systems as its foundations. While this means that the reader must possess a very firm grounding in quantum, it does eliminate some 'problems' of stat mech. such as the Gibbs paradox. It also makes some of the derivations simpler because once the quantum version of a phenomenon has been derived, the classical limit generally follows immediately. This book is not an easy read. I found that the equations were not always well motivated in the text. Even so, there are usually references to previous equations that will help in the understanding of whatever the current section is covering. One thing that I really like about this book is that the equations are numbered by sections and only the equations that are referenced in the text are given labels so that you don't wind up with numbering that goes into the hundreds (I realize that this is purely a stylistic point but it makes a difference in the readability in my view). I did have a hard time following the chapters on phase transitions and critical phenomena, but after reading parts of Statistical and Thermal Physics: With Computer Applications, which has a very good treatment of this subject, I was able to come back and understand it a bit better. I also found the chapter on the stat mech. of the early universe quite interesting even if it seemed rather tangential to the rest of the book.

I would not recommend this book for physicists. It felt more written for people with a chemistry background. To me, the topics were out of order and often emphasized the wrong things. They occasionally went into too much detail about something for no apparent reason but then left other topics out. The end-of-chapter problems are numerous (which is good), but often poorly worded or vaguely framed (bad). The redeeming qualities of the book are the couple of pages on the grand canonical ensemble and the appendix that summarizes all the ensembles and equations. I much prefer Kittel's treatment and Landau's conceptual explanations (and the Jacobian formalism).

The way the author writes can be very difficult to understand, and his explanations of the material

are opaque. Also, the notation is often counter-intuitive. I am heavily relying on my professor's notes for my graduate stat mech course as well as my undergrad textbook because I do not find this text particularly helpful. I would not recommend buying it unless you absolutely need to.

arrive on time, binding not very good

Not too far through the book yet, but I'm not a fan so far. He rambles on with loose structure and relatively randomly at times, just like the other two authors. He introduces topics that don't follow a logical development. IE Entropy of mixing in chapter 1, after a very minimal discussion of entropy.

I really love this text. It has very deep sense and formalism of the statistical physics. Without doubt this is one of the best, and it would be accessible for undergraduate students

I had Pathria's original book and still bought this updated version. The original was so valuable that I thought the updated version would be worth the money. I wasn't disappointed.

It makes all the ensemble stuffs very clear for me. Also, I don't see any problem about the printing. It is easy to read. The cover is much more beautiful than previous edition, and I like this font very much.

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