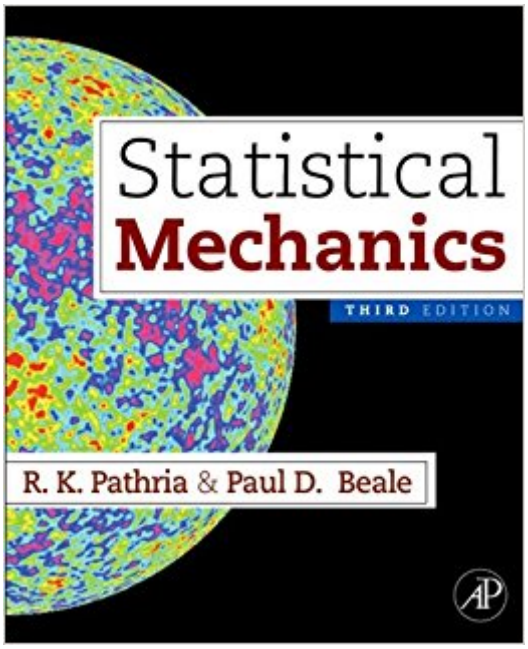
Statistical Mechanics



Synopsis

Statistical Mechanics explores the physical properties of matter based on the dynamic behavior of its microscopic constituents. After a historical introduction, this book presents chapters about thermodynamics, ensemble theory, simple gases theory, Ideal Bose and Fermi systems, statistical mechanics of interacting systems, phase transitions, and computer simulations. This edition includes new topics such as BoseEinstein condensation and degenerate Fermi gas behavior in ultracold atomic gases and chemical equilibrium. It also explains the correlation functions and scattering; fluctuationdissipation theorem and the dynamical structure factor; phase equilibrium and the Clausius-Clapeyron equation; and exact solutions of one-dimensional fluid models and two-dimensional Ising model on a finite lattice. New topics can be found in the appendices, including finite-size scaling behavior of Bose-Einstein condensates, a summary of thermodynamic assemblies and associated statistical ensembles, and pseudorandom number generators. Other chapters are dedicated to two new topics, the thermodynamics of the early universe and the Monte Carlo and molecular dynamics simulations. This book is invaluable to students and practitioners interested in statistical mechanics and physics. Bose-Einstein condensation in atomic gasesThermodynamics of the early universeComputer simulations: Monte Carlo and molecular dynamicsCorrelation functions and scatteringFluctuation-dissipation theorem and the dynamical structure factorChemical equilibriumExact solution of the two-dimensional Ising model forÂ finite systemsDegenerate atomic Fermi gasesExact solutions of one-dimensional fluid modelsInteractions in ultracold Bose and Fermi gasesBrownian motion of anisotropic particles and harmonic oscillators

Book Information

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Customer Reviews

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 ofÂ 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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