Statistical Mechanics, Third Edition

By R K Pathria, Paul D. Beale

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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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Editorial Review

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New this Edition

- Bose–Einstein condensation and degenerate Fermi gas behavior in ultracold atomic gases
- Finite-size scaling behavior of Bose-Einstein condensates
- Thermodynamics of the early universe
- Chemical equilibrium
- Monte Carlo and molecular dynamics simulations
- Correlation functions and scattering
- Fluctuation-dissipation theorem and the dynamical structure factor
- Phase equilibrium and the Clausius-Clapeyron equation
- Exact solutions of one-dimensional fluid models
- Exact solution of the two-dimensional Ising model on a finite lattice
- Summary of thermodynamic assemblies and associated statistical ensembles
- Pseudorandom number generators

- Dozens of new homework problems

Read a sample chapter from *Statistical Mechanics*.

Review

"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, thermodynamics 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**

Users Review

From reader reviews:

Kevin Jakubowski:

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