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Sturge's Statistical and Thermal Physics, Second Edition Springer Science & Business Media

Well respected, widely used volume presents problems and full solutions related to a wide range of topics in thermodynamics, statistical physics, statistical mechanics. Suitable for undergraduates and graduate students, self-study, reference. 1989 edition.

Statistical Physics World Scientific

Statistical Mechanics discusses the fundamental concepts involved in understanding the physical properties of matter in bulk on the basis of the dynamical behavior of its microscopic constituents. The book emphasizes the equilibrium states of physical systems. The text first details the statistical basis of thermodynamics, and then proceeds to discussing the elements of ensemble theory. The next two chapters cover the canonical and grand canonical ensemble. Chapter 5 deals with the formulation of quantum statistics, while Chapter 6 talks about the theory of simple gases. Chapters 7 and 8 examine the ideal Bose and Fermi systems. In the next three chapters, the book covers the statistical mechanics of interacting systems, which includes the method of cluster expansions, pseudopotentials, and quantized fields. Chapter 12 discusses the theory of phase transitions, while Chapter 13 discusses fluctuations. The book will be of great use to researchers and practitioners from wide array of disciplines, such as physics, chemistry, and engineering.

Statistical Physics **World Scientific Publishing Company**

A lucid presentation of statistical physics and thermodynamics which develops from the general principles to give a large number of applications of the theory.

Statistical Physics Springer Science & Business Media

This second edition extends and improves on the first, already an acclaimed and original treatment of statistical concepts insofar as they impact theoretical physics and form the basis of modern thermodynamics. This book illustrates through myriad examples the principles and logic used in extending the simple laws of idealized Newtonian physics and quantum physics into the real world of noise and thermal fluctuations. In response to the many helpful comments by users of the first edition, important features have been added in this second, new and revised edition. These additions allow a more coherent picture of thermal physics to emerge. Benefiting from the expertise of the new co-author, the present edition includes a detailed exposition — occupying two separate chapters — of the renormalization group and Monte-Carlo numerical techniques, and of their applications to the study of phase transitions. Additional figures have been included throughout, as have new problems. A new Appendix presents fully worked-out solutions to representative problems; these illustrate various methodologies that are peculiar to physics at finite temperatures, that is, to statistical physics. This new edition incorporates important aspects of many-body theory and of phase transitions. It should better serve the contemporary student, while offering to the instructor a wider selection of topics from which to craft lectures on topics ranging from thermodynamics and random matrices to thermodynamic Green functions and critical exponents, from the propagation of sound in solids and fluids to the nature of quasiparticles in quantum liquids and in transfer matrices.

Topics In Statistical Mechanics (Second Edition) Princeton University Press

This first volume of Statistical Physics is an introduction to the theories of equilibrium statistical mechanics, whereas the second volume (Springer Ser. Solid-State Sci., Vol. 31) is devoted to non equilibrium theories. Particular emphasis is placed on fundamental principles and basic con cepts and ideas. We start with physical examples of probability and kinetics, and then describe the general principles of statistical mechanics, with appli cations to quantum statistics, imperfect gases, electrolytes, and phase tran sitions, including critical phenomena. Finally, ergodic problems, the me chanical basis of statistical mechanics, are presented. The original text was written in Japanese as a volume of the Iwanami Series in Fundamental Physics, supervised by Professor H. Yukawa. The first edition was published in 1973 and the second in 1978. The English edition has been divided into two volumes at the request of the publisher, and the chapter on ergodic problems, which was at the end of the original book, is included here as Chapter 5. Chapters 1,2,3 and part of Chapter 4 were written by M. Toda, and Chapters 4 and 5 by N. Saito. More extensive references have been added for further reading, and some parts of the final chapters have been revised to bring the text up to date. It is a pleasure to express my gratitude to Professor P. Fulde for his detailed

improvements in the manuscript, and to Dr. H. Lotsch of Springer Verlag for his continued cooperation.

Introductory Statistical Mechanics for Physicists Springer Science & Business Media
Building on the material learned by students in their first few years of study, Topics in Statistical Mechanics (Second Edition) presents an advanced level course on statistical and thermal physics. It begins with a review of the formal structure of statistical mechanics and thermodynamics considered from a unified viewpoint. There is a brief revision of non-interacting systems, including quantum gases and a discussion of negative temperatures. Following this, emphasis is on interacting systems. First, weakly interacting systems are considered, where the interest is in seeing how small interactions cause small deviations from the non-interacting case. Second, systems are examined where interactions lead to drastic changes, namely phase transitions. A number of specific examples is given, and these are unified within the Landau theory of phase transitions. The final chapter of the book looks at non-equilibrium systems, in particular the way they evolve towards equilibrium. This is framed within the context of linear response theory. Here fluctuations play a vital role, as is formalised in the fluctuation-dissipation theorem.The second edition has been revised particularly to help students use this book for self-study. In addition, the section on non-ideal gases has been expanded, with a treatment of the hard-sphere gas, and an accessible discussion of interacting quantum gases. In many cases there are details of Mathematica calculations, including Mathematica Notebooks, and expression of some results in terms of Special Functions.

A Modern Course in Statistical Physics World Scientific
Dealing with all aspects of Monte Carlo simulation of complex physical systems encountered in condensed-matter physics and statistical mechanics, this book provides an introduction to computer simulations in physics. This fourth edition contains extensive new material describing numerous powerful algorithms not covered in previous editions, in some cases representing new developments that have only recently appeared. Older methodologies whose impact was previously unclear or unappreciated are also introduced, in addition to many small revisions that bring the text and cited literature up to date. This edition also introduces the use of petascale computing facilities in the Monte Carlo arena. Throughout the book there are many applications, examples, recipes, case studies, and exercises to help the reader understand the material. It is ideal for graduate students and researchers, both in academia and industry, who want to learn techniques that have become a third tool of physical science, complementing experiment and analytical theory.

Statistical Physics CRC Press
The Manchester Physics Series General Editors: D. J. Sandiford; F. Mandl; A. C. Phillips Department of Physics and Astronomy, University of Manchester Properties of Matter B. H. Flowers and E. Mendoza Optics Second Edition F. G. Smith and J. H. Thomson Statistical Physics Second Edition E. Mandl Electromagnetism Second Edition I. S. Grant and W. R. Phillips Statistics R. J. Barlow Solid State Physics Second Edition J. R. Hook and H. E. Hall Quantum Mechanics F. Mandl Particle Physics Second Edition B. R. Martin and G. Shaw The Physics of Stars Second Edition A. C. Phillips Computing for Scientists R. J. Barlow and A. R. Barnett Statistical Physics, Second Edition develops a unified treatment of statistical mechanics and thermodynamics, which emphasises the statistical nature of the laws of thermodynamics and the atomic nature of matter. Prominence is given to the Gibbs distribution, leading to a simple treatment of quantum statistics and of chemical reactions. Undergraduate students of physics and related sciences will find this a stimulating account of the basic physics and its applications. Only an elementary knowledge of kinetic theory and atomic physics, as well as the rudiments of quantum theory, are presupposed for an understanding of this book. Statistical Physics, Second Edition features: A fully integrated treatment of thermodynamics and statistical mechanics. A flow diagram allowing topics to be studied in different orders or omitted altogether. Optional "starred" and highlighted sections containing more advanced and specialised material for the more ambitious reader. Sets of problems at the end of each chapter to help student understanding. Hints for solving the problems are given in an Appendix.

An Introduction to Statistical Mechanics and Thermodynamics Cambridge University Press
Newer Edition Available: Equilibrium Statistical Physics (3rd Edition)This revised and expanded edition of one of the important textbook in statistical physics, is a graduate level text suitable for students in physics, chemistry, and materials science.After a short review of basic concepts, the authors begin the discussion on strongly interacting condensed matter systems with a thorough treatment of mean field and Landau theories of phase transitions. Many examples are worked out in considerable detail. Classical liquids are treated next. Along with traditional approaches to the subject such as the virial expansion and integral equations, newer theories such as perturbation theory and density functional theories are introduced.The modern theory of

phase transitions occupies a central place in this book. The development is along historical lines, beginning with the Onsager solution of the two-dimensional Ising model, series expansions, scaling theory, finite-size scaling, and the universality hypothesis. A separate chapter is devoted to the renormalization group approach to critical phenomena. The development of the basic tools is completed in a new chapter on computer simulations in which both Monte Carlo and molecular dynamics techniques are introduced.The remainder of the book is concerned with a discussion of some of the more important modern problems in condensed matter theory. A chapter on quantum fluids deals with Bose condensation, superfluidity, and the BCS and Landau-Ginzburg theories of superconductivity. A new chapter on polymers and membranes contains a discussion of the Gaussian and Flory models of dilute polymer mixtures, the connection of polymer theory to critical phenomena, a discussion of dense polymer mixtures and an introduction to the physical properties of solid and fluid membranes. A chapter on linear response includes the Kubo formalism, the fluctuation-dissipation theorem, Onsager relations and the Boltzmann equation. The last chapter is devoted to disordered materials.Each chapter contains a substantial number of exercises. A manual with a complete set of solutions to these problems is available under separate cover.

Statistical Physics Courier Corporation

"Building on the material learned by students in their first few years of study, Topics on Statistical Mechanics (Second Edition) presents an advanced level course on statistical and thermal physics. It begins with a review of the formal structure of statistical mechanics and thermodynamics considered from a unified viewpoint. There is a brief revision of non-interacting systems, including quantum gases and a discussion of negative temperatures. Following this, emphasis is on interacting systems. First, weakly interacting systems are considered, where the interest is in seeing how small interactions cause small deviations from the non-interacting case. Second, systems are examined where interactions lead to drastic changes, namely phase transitions. A number of specific examples is given, and these are unified within the Landau theory of phase transitions. The final chapter of the book looks at non-equilibrium systems, in particular the way they evolve towards equilibrium. This is framed within the context of linear response theory. Here fluctuations play a vital role, as is formalized in the Fluctuation-Dissipation theorem. The second edition has been revised particularly to help students use this book for self-study. In addition, the section on non-ideal gases has been expanded, with a treatment of the hard sphere gas, and an accessible discussion of interacting quantum gases. In many cases there are details of Mathematica calculations, including Mathematica Notebooks, and expression of some results in terms of Special Functions"--

Equilibrium Statistical Physics (2nd Edition) Princeton University Press

Going beyond traditional textbook topics, 'A Modern Course in Statistical Physics' incorporates contemporary research in a basic course on statistical mechanics. From the universal nature of matter to the latest results in the spectral properties of decay processes, this book emphasizes the theoretical foundations derived from thermodynamics and probability theory underlying all concepts in statistical physics. This completely revised and updated third edition continues the comprehensive coverage of numerous core topics and special applications, allowing professors flexibility in designing individualized courses. The inclusion of advanced topics and extensive references makes this an invaluable resource for researchers as well as students -- a textbook that will be kept on the shelf long after the course is completed.

Problems in Thermodynamics and Statistical Physics Cambridge University Press

Statistical Mechanics: Fundamentals and Model Solutions, Second Edition Fully updated throughout and with new chapters on the Mayer expansion for classical gases and on cluster expansion for lattice models, this new edition of Statistical Mechanics: Fundamentals and Model Solutions provides a comprehensive introduction to equilibrium statistical mechanics for advanced undergraduate and graduate students of mathematics and physics. The author presents a fresh approach to the subject, setting out the basic assumptions clearly and emphasizing the importance of the thermodynamic limit and the role of convexity. With problems and solutions, the book clearly explains the role of models for physical systems, and discusses and solves various models. An understanding of these models is of increasing importance as they have proved to have applications in many areas of mathematics and physics. Features Updated throughout with new content from the field An established and well-loved textbook Contains new problems and solutions for further learning opportunity Author Professor Teunis C. Dorlas is at the Dublin Institute for Advanced Studies, Ireland.

Statistical Mechanics Springer Science & Business Media

This volume provides a compact presentation of modern statistical physics at an advanced level, from the foundations of statistical mechanics to the main modern applications of statistical physics. Special attention is given to new approaches, such as quantum field theory methods and non-equilibrium problems. This second, revised edition is expanded with biographical notes

contextualizing the main results in statistical physics.

Statistical Physics Elsevier

Statistical Physics II introduces nonequilibrium theories of statistical mechanics from the viewpoint of the fluctuation-disipation theorem. Emphasis is placed on the relaxation from nonequilibrium to equilibrium states, the response of a system to an external disturbance, and general problems involved in deriving a macroscopic physical process from more basic underlying processes. Fundamental concepts and methods are stressed, rather than the numerous individual applications.

Statistical Physics of Fields Wiley-VCH

Statistics links microscopic and macroscopic phenomena, and requires for this reason a large number of microscopic elements like atoms. The results are values of maximum probability or of averaging. This introduction to statistical physics concentrates on the basic principles and attempts to explain these in simple terms, supplemented by numerous examples. These basic principles include the difference between classical and quantum statistics, a priori probabilities as related to degeneracies, the vital aspect of indistinguishability as compared with distinguishability in classical physics, the differences between conserved and non-conserved elements, the different ways of counting arrangements in the three statistics (Maxwell-Boltzmann, Fermi-Dirac, Bose-Einstein), the difference between maximization of the number of arrangements of elements, and averaging in the Darwin-Fowler method. Significant applications to solids, radiation and electrons in metals are treated in separate chapters, as well as Bose-Einstein condensation. In this latest edition, apart from a general revision, the topic of thermal radiation has been expanded with a new section on black bodies and an additional chapter on black holes. Other additions are more examples with applications of statistical mechanics in solid state physics and superconductivity. Throughout the presentation, the introduction carries almost all details for calculations.

Topics In Statistical Mechanics (Second Edition) CRC Press

Market_Desc: · Senior/Graduate Level Courses in Statistical Mechanics offered for 2 Semester in Department of Physics. About The Book: Unlike most other texts on the subject, this clear, concise introduction to the theory of microscopic bodies treats the modern theory of critical phenomena. Provides up-to-date coverage of recent major advances, including a self-contained description of thermodynamics and the classical kinetic theory of gases, interesting applications such as superfluids and the quantum Hall effect, several current research applications, The last three chapters are devoted to the Landau-Wilson approach to critical phenomena. Many new problems and illustrations have been added to this edition.

Statistical Physics Springer Science & Business Media

This book provides a comprehensive presentation of the basics of statistical physics. The first part explains the essence of statistical physics and how it provides a bridge between microscopic and macroscopic phenomena, allowing one to derive quantities such as entropy. Here the author avoids going into details such as Liouville's theorem or the ergodic theorem, which are difficult for beginners and unnecessary for the actual application of the statistical mechanics. In the second part, statistical mechanics is applied to various systems which, although they look different, share the same mathematical structure. In this way readers can deepen their understanding of statistical physics. The book also features applications to quantum dynamics, thermodynamics, the Ising model and the statistical dynamics of free spins.

Statistical Physics II John Wiley & Sons

This book aims to provide a compact and unified introduction to the most important aspects in the physics of non-equilibrium systems. It first introduces stochastic processes and some modern tools and concepts that have proved their usefulness to deal with non-equilibrium systems from a purely probabilistic angle. The aim is to show the important role played by fluctuations in far-from-equilibrium situations, where noise can promote order and organization, switching among non-equilibrium states, etc. The second part adopts a more historical perspective, retracing the first steps taken from the purely thermodynamic as well as from the kinetic points of view to depart (albeit slightly) from equilibrium. The third part revisits the path outlined in the first one, but now undertakes the mesoscopic description of extended systems, where new phenomena (patterns, long-range correlations, scaling far from equilibrium, etc.) are observed. This book is a revised and extended version of an earlier edition published in 1994. It includes topics of current research interest in far-from-equilibrium situations like noise-induced phenomena and free energy-like functionals, surface growth and roughening, etc. It can be used as an advanced textbook by graduate students in physics. It also covers topics of current interest in other disciplines and interdisciplinary approaches in engineering, biophysics, and economics, among others. The level of detail in the book is enough to capture the interest of the reader and facilitate the path to more learning by exploring the modern research literature provided. At the same time, the book is also complete enough to be self-contained for those readers who just need an overview of the subject.

Statistical Mechanics Courier Corporation

Statistical physics is a core component of most undergraduate (and some post-graduate) physics degree courses. It is primarily concerned with the behavior of matter in bulk-from boiling water to the superconductivity of metals. Ultimately, it seeks to uncover the laws governing random processes, such as the snow on your TV screen. This essential new textbook guides the reader quickly and critically through a statistical view of the physical world, including a wide range of physical applications to illustrate the methodology. It moves from basic examples to more advanced topics, such as broken symmetry and the Bose-Einstein equation. To accompany the text, the author, a renowned expert in the field, has written a Solutions Manual/Instructor's Guide, available free of charge to lecturers who adopt this book for their courses. Introduction to Statistical Physics

will appeal to students and researchers in physics, applied mathematics and statistics.

Statistical Physics II Courier Corporation

The application of statistical methods to physics is essential. This unique book on statistical physics offers an advanced approach with numerous applications to the modern problems students are confronted with. Therefore the text contains more concepts and methods in statistics than the student would need for statistical mechanics alone. Methods from mathematical statistics and stochastics for the analysis of data are discussed as well. The book is divided into two parts, focusing first on the modeling of statistical systems and then on the analysis of these systems. Problems with hints for solution help the students to deepen their knowledge. The third edition has been updated and enlarged with new sections deepening the knowledge about data analysis. Moreover, a customized set of problems with solutions is accessible on the Web at extras.springer.com.