Introduction To Statistical Physics By Anthony John Pointon

YARELI ALESSANDRO

Introduction to Statistical Physics New Age International
Statistical mechanics is concerned with defining the thermodynamic properties of a macroscopic sample in terms of the properties of the microscopic systems of which it is composed. The previous book Introduction to Statistical Mechanics provided a clear, logical, and self-contained treatment of equilibrium statistical mechanics starting from Boltzmann's two statistical assumptions, and presented a wide variety of applications to diverse physical assemblies. An appendix provided an introduction to non-equilibrium statistical mechanics through the Boltzmann equation and its extensions. The coverage in that book was enhanced and extended through the inclusion of many accessible problems. The current book provides solutions to those problems. These texts assume only introductory courses in classical and quantum mechanics, as well as familiarity with multi-variable calculus and the essentials of complex analysis. Some knowledge of thermodynamics is also assumed, although the analysis starts with an appropriate review of that topic. The targeted audience is first-year graduate students and advanced undergraduates, in physics, chemistry, and the related physical sciences. The goal of these texts is to help the reader obtain a clear working knowledge of the very useful and powerful methods of equilibrium statistical mechanics and to enhance the understanding and appreciation of the more advanced texts.
From Microphysics to Macrophysics World Scientific
Discusses the basic law of statistical physics and their applications to a range of interesting problems. In this title, the basic principles of equilibrium statistical mechanics are clearly formulated and applied to specific examples of ideal gases and interacting systems to bring out their strength and scope.
Modern Physics Springer
Fundamental concepts of phase transitions, such as order parameters, spontaneous symmetry breaking, scaling

transformations, conformal symmetry and anomalous dimensions, have deeply changed the modern vision of many areas of physics, leading to remarkable developments in statistical mechanics, elementary particle theory, condensed matter physics and string theory. This self-contained book provides a thorough introduction to the fascinating world of phase transitions and frontier topics of exactly solved models in statistical mechanics and quantum field theory, such as renormalization groups, conformal models, quantum integrable systems, duality, elastic S-matrices, thermodynamic Bethe ansatz and form factor theory. The clear discussion of physical principles is accompanied by a detailed analysis of several branches of mathematics distinguished for their elegance and beauty, including infinite dimensional algebras, conformal mappings, integral equations and modular functions. Besides advanced research themes, the book also covers many basic topics in statistical mechanics, quantum field theory and theoretical physics. Each argument is discussed in great detail while providing overall coherent understanding of physical phenomena. Mathematical background is made available in supplements at the end of each chapter, when appropriate. The chapters include problems of different levels of difficulty. Advanced undergraduate and graduate students will find this book a rich and challenging source for improving their skills and for attaining a comprehensive understanding of the many facets of the subject.

Statistical Mechanics World Scientific

In a comprehensive treatment of Statistical Mechanics from thermodynamics through the renormalization group, this book serves as the core text for a full-year graduate course in statistical mechanics at either the Masters or Ph.D. level. Each chapter contains numerous exercises, and several chapters treat special topics which can be used as the basis for student projects. The concept of scaling is introduced early and used extensively throughout the text. At the heart of the book is an extensive treatment of mean field theory, from the simplest decoupling approach, through the density matrix formalism, to self-consistent classical and quantum field theory as well as exact solutions on the Cayley tree. Proceeding beyond mean field theory, the book discusses exact mappings involving Potts models, percolation, self-avoiding walks and quenched randomness, connecting various athermal and thermal models. Computational methods such as series expansions and Monte Carlo simulations are discussed, along with exact solutions to the 1D quantum and 2D classical Ising models. The renormalization group formalism is developed, starting from real-space RG and proceeding through a detailed treatment of Wilson’s epsilon expansion. Finally the subject of Kosterlitz-Thouless systems is introduced from a historical perspective and then treated by methods due to Anderson, Kosterlitz, Thouless and Young. Altogether, this comprehensive, up-to-date, and engaging text offers an ideal package for advanced undergraduate or graduate courses or for use in self study.

Introductory Statistical Mechanics for Physicists Springer Science & Business Media

This introductory textbook for standard undergraduate courses in thermodynamics has been completely rewritten to explore a greater number of topics, more clearly and concisely. Starting with an overview of important quantum behaviours, the book teaches students how to calculate probabilities in order to provide a firm foundation for later chapters. It introduces the ideas of classical thermodynamics and explores them both in general and as they are applied to specific processes and interactions. The remainder of the book deals with statistical mechanics. Each topic ends with a boxed summary of ideas and results, and every chapter contains numerous homework problems, covering a broad range of difficulties. Answers are given to odd-numbered problems, and solutions to even-numbered problems are available to instructors at www.cambridge.org/9781107694927.

Introduction to Statistical Physics CRC Press

This text presents statistical mechanics and thermodynamics as a theoretically integrated field of study. It stresses deep coverage of fundamentals, providing a natural foundation for advanced topics. The large problem sets (with solutions for teachers) include many computational problems to advance student understanding.

An Introduction to Statistical Thermodynamics Springer Science & Business Media

This textbook offers an advanced undergraduate or initial graduate level introduction to topics such as kinetic theory, equilibrium statistical mechanics and the theory of fluctuations from a modern perspective. The aim is to provide the reader with the necessary tools of probability theory and thermodynamics (especially the thermodynamic potentials) to enable subsequent study at advanced graduate level. At the same time, the book offers a bird's eye view on arguments that are often disregarded in the main curriculum courses. Further features include a focus on the interdisciplinary nature of the subject and in-depth discussion of alternative interpretations of the concept of entropy. While some familiarity with basic concepts of thermodynamics and probability theory is assumed, this does not extend beyond what is commonly obtained in basic undergraduate curriculum courses.

Statistical Mechanics of Lattice Systems American Mathematical Soc.

This invaluable textbook is an introduction to statistical physics that has been written primarily for self-study. It provides a comprehensive approach to the main ideas of statistical physics at the level of an introductory course, starting from the kinetic theory of gases and proceeding all the way to Bose-Einstein and Fermi-Dirac statistics. Each idea is brought out with ample motivation and clear, step-by-step, deductive exposition. The key points and methods are presented and discussed on the basis of concrete representative systems, such as the paramagnet, Einstein's solid, the diatomic gas, black body radiation, electric conductivity in metals and superfluidity. The book is written in a stimulating style and is accompanied by a large number of exercises appropriately placed within the text and by self-assessment problems at the end of each chapter. Detailed solutions of all the exercises are provided.

Introduction to Modern Statistical Physics: a Set of Lectures Courier Corporation

The science of statistical mechanics is concerned with defining the thermodynamic properties of a macroscopic sample in terms of the properties of the microscopic systems of which it is composed. The aim of this book is to provide a clear, logical, and self-contained treatment of equilibrium statistical mechanics starting from Boltzmann's two statistical assumptions, and to present a wide variety of applications to diverse physical assemblies. The coverage is enhanced and extended through an extensive set of accessible problems. An appendix provides an introduction to non-equilibrium statistical mechanics through the Boltzmann equation and its extensions. The book assumes introductory courses in classical and quantum mechanics, as well as familiarity with multi-variable calculus and the essentials of complex analysis. Some knowledge of thermodynamics is assumed, although the book starts with an appropriate review of that topic. The targeted audience is first-year graduate students, and advanced undergraduates, in physics, chemistry, and the related physical sciences. The goal of this text is to help the

reader obtain a clear working knowledge of the very useful and powerful methods of equilibrium statistical mechanics and to enhance the understanding and appreciation of the more advanced texts.

Statistical Physics Princeton University Press

This book presents a mathematically rigorous approach to the main ideas and phenomena of statistical physics. The introduction addresses the physical motivation, focusing on the basic concept of modern statistical physics, that is the notion of Gibbsian random fields. Properties of Gibbsian fields are analysed in two ranges of physical parameters: "regular" (corresponding to high-temperature and low-density regimes) where no phase transition is exhibited, and "singular" (low temperature regimes) where such transitions occur. Next, a detailed approach to the analysis of the phenomena of phase transitions of the first kind, the Pirogov-Sinai theory, is presented. The author discusses this theory in a general way and illustrates it with the example of a lattice gas with three types of particles. The conclusion gives a brief review of recent developments arising from this theory. The volume is written for the beginner, yet advanced students will benefit from it as well. The book will serve nicely as a supplementary textbook for course study. The prerequisites are an elementary knowledge of mechanics, probability theory and functional analysis.

Statistical Physics Cambridge University Press

This popular, often cited text returns in a softcover edition to provide a thorough introduction to statistical physics and thermodynamics, and to exhibit the universality of the chain of ideas leading from the laws of microphysics to the macroscopic behaviour of matter. A wide range of applications illustrates the concepts, and many exercises reinforce understanding. Volume I discusses the probabilistic description of quantum or classical systems, the Boltzmann-Gibbs distributions, the conservation laws, and the interpretation of entropy as missing information. Thermodynamics and electromagnetism in matter are dealt with, as well as applications to dilute and condensed gases, and to phase transitions.

Introduction to Statistical Physics Springer Science & Business Media

In this revised and enlarged second edition, Tony Guénault provides a clear and refreshingly readable introduction to statistical physics. The treatment itself is self-contained and concentrates on an understanding of the physical ideas, without requiring a high level of mathematical sophistication. The book adopts a straightforward quantum approach to statistical averaging from the outset. The initial part of the book is geared towards explaining the equilibrium properties of a simple isolated assembly of particles. The treatment of gases gives full coverage to Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics.

Introductory Statistical Mechanics Cambridge University Press

Four-part treatment covers principles of quantum statistical mechanics, systems composed of independent molecules or other independent subsystems, and systems of interacting molecules, concluding with a consideration of quantum statistics.

An Introduction to Thermodynamics and Statistical Physics Springer Science & Business Media

This Book Gives A Clear And Logical Exposition Of The Basic Method Of Ensembles In Statistical Mechanics As Developed By J.W. Gibbs. Beginning With The Liouville Theorem, A Brief But Useful Introduction To The Classical Statistical Mechanics Is Provided. Then The Quantum Picture Is Outlined And Basic Postulate Of Quantum Statistical Mechanics Are Stated. The Discussion Of The Symmetry Of Wave Function And Its Effect On Counting Is Given In Detail.The Relation Between Statistical Mechanics And Thermodynamics Is Worked Out And The Gibbs Paradox Is Discussed In A Lucid Way. The Concept Of Entropy Is Related To The Information Theory. Various Ensembles Are Constructed And Used To Derive The Bose-Einstein And Fermi-Dirac Ideal Gases, Topics Like Liquid He Electrons In Metals, And White Dwarfs Are Given Adequate Coverage. Quantum Hall Effect, Random Walk And Fourier Analysis Of A Random Fluctuation Are Devoted Sufficient Space To Make It A Useful And Fascinating Book. The Book Concludes With A Discussion Of The Sling Model And A Modern Treatment Of The Critical Phenomena. Problems At The End Of Each Chapter Widen The Area Covered And Also Help To Deepen The Understanding Of The Material Given. This Book Is Written To Introduce The Subject To Advanced Undergraduates In Physics And Chemistry Or To Graduates In Engineering Classes. The Present Edition Contains New Material Including A Chapter On Irreversible Thermodynamics And Sections Dealing With Density Matrix And Superconductivity.

Introduction to Statistical Mechanics Oxford Graduate Texts

A self-contained, mathematical introduction to the driving ideas in equilibrium statistical mechanics, studying important models in detail.

Statistical Mechanics in a Nutshell ISBS

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. The basic principles concentrated on are the difference between classical and quantum statistics, the a priori probabilities as related to degeneracies, the vital aspect of indistinguishability as compared with distinguishability in classical physics, the differences between conserved and nonconserved elements (the latter including photons and phonons), 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 in these and averaging in the Darwin–Fowler method. Significant applications to solids, radiation and to electrons in metals are treated in separate chapters. Finally the Bose–Einstein distribution is rederived under condensation conditions. Each chapter concludes with examples and exercises.

An Introduction to Thermodynamics and Statistical Physics Addison Wesley Publishing Company

Rigorous and comprehensive, this textbook introduces undergraduate students to simulation methods in statistical physics. The book covers a number of topics, including the thermodynamics of magnetic and electric systems; the quantum-mechanical basis of magnetism; ferrimagnetism, antiferromagnetism, spin waves and magnons; liquid crystals as a non-ideal system of technological relevance; and diffusion in an external potential. It also covers hot topics such as cosmic microwave background, magnetic cooling and Bose-Einstein condensation. The book provides an elementary introduction to simulation methods through algorithms in pseudocode for random walks, the 2D Ising model, and a model liquid crystal. Any formalism is kept simple and derivations are worked out in detail to ensure the material is accessible to students from subjects other than physics.

Monte Carlo Simulation in Statistical Physics Cambridge University Press

The purpose of this textbook is to bring together, in a self-contained introductory form, the scattered material in the field of stochastic processes and statistical physics. It offers the opportunity of being acquainted with stochastic, kinetic and nonequilibrium processes. Although the research techniques in

these areas have become standard procedures, they are not usually taught in the normal courses on statistical physics. For students of physics in their last year and graduate students who wish to gain an invaluable introduction on the above subjects, this book is a necessary tool.

An Introduction to Statistical Physics for Students Chapman and Hall/CRC

Thirty years' teaching experience have been condensed into this concise introductory book on Statistical Mechanics. Ideal for second and third year undergraduates in physics, applied mathematics, physical chemistry, chemical engineering, metallurgy, materials science and polymer science. Provides a concise introduction to statistical mechanics Ideal for second and third year undergraduates in physics, applied mathematics, physical chemistry, chemical engineering, metallurgy, materials science and polymer science

Introduction to Statistical Mechanics Oxford University Press

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.