Equilibrium Statistical Physics With Computer Simulations In Python

An Integrated Approach
(New and Revised Printing)
A Guide to Monte Carlo Simulations in Statistical Physics
Principles of Equilibrium Statistical Mechanics
Computational Statistical Mechanics
Quantum Statistical Mechanics Classicahb
A Kinetic View of Statistical Physics
Statistical Mechanics for Chemistry and Materials Science
Brain-Inspired Computing
Phases of Matter and Phase Transitions
Statistical Mechanics
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An Introduction
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A Statistical Mechanics Perspective, Second Edition
With Computer Applications, Second Edition
A Statistical Mechanics Perspective
Statistical Mechanics of Nonequilibrium Liquids
International Series of Monographs in Natural Philosophy

A Concise Introduction to the Statistical Physics of Complex Systems
Equilibrium Statistical Physics
Luminy, France, August 2018
Nonequilibrium Statistical Physics
Computer Simulation Studies in Condensed-Matter Physics XVI
4th International Workshop, BrainComp 2019, Cetraro, Italy, July 15–19, 2019, Revised Selected Papers
Equilibrium Statistical Physics (3rd Edition).
Interdisciplinary Stochastic Models
Stochastic Dynamics Out of Equilibrium
Nonequilibrium Statistical Mechanics
Non-equilibrium thermodynamics and physical kinetics
Monte Carlo Simulation in Statistical Physics
Non-equilibrium Thermodynamics and Statistical Mechanics
With Computer Simulations in Python
Thermal Physics
Equilibrium Statistical Physics

JAYLEEN JADA

An Integrated Approach IOP Publishing Limited
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.
(New and Revised Printing) Morgan & Claypool Publishers

Nuclear Structure Physics connects to some of our fundamental questions about the creation of the universe and its basic constituents. At the same time, precise knowledge on the subject has led to the development of many important tools for humankind such as proton therapy and radioactive dating, among others. This book has chapters on some of the crucial and trending research topics in nuclear structure, including the nuclei lying on the extremes of spin, isospin and mass. A better theoretical understanding of these topics is important beyond the confines of the nuclear structure community. Additionally, the book will showcase the applicability and success of the different nuclear effective interaction parameters near the drip line, where hints for level reordering have already been seen, and where one can test the isospin-dependence of the interaction. The book offers comprehensive coverage of the most essential topics, including: • Nuclear Structure of Nuclei at or Near Drip-Lines • Synthesis challenges and properties of Superheavy nuclei • Nuclear Structure and Nuclear models - Ab-initio calculations, cluster models, Shell-model/DSM, RMF, Skyrme • Shell Closure, Magicity and other novel features of nuclei at extremes • Structure of Toroidal, Bubble Nuclei, halo and other exotic nuclei These topics are not only very interesting from a theoretical nuclear physics perspective but are also quite complimentary for ongoing nuclear physics experimental programs worldwide. The book chapters, written by experienced and well-known researchers/experts, will be helpful for master students, graduate students and researchers and serve as a standard and up-to-date research reference book on the topics covered.

A Guide to Monte Carlo Simulations in Statistical Physics World Scientific

This modern textbook provides a complete survey of the broad field of statistical mechanics. Based on a series of lectures, it adopts a special pedagogical approach. The authors, both excellent lecturers, clearly distinguish between general principles and their applications in solving problems. Analogies between phase transitions in fluids and magnets using continuum and spin models are emphasized, leading to a better understanding. Such special features as historical notes, summaries, problems, mathematical appendix, computer programs and order of magnitude estimations distinguish this volume from competing works. Due to its ambitious level and an extensive list of references for technical details on advanced topics, this is equally a must for researchers in condensed matter physics, materials science, polymer science, solid state physics, and astrophysics. From the contents Thermostatics: phase stability, phase equilibria, phase transitions; Statistical Mechanics: calculation, correlation functions, ideal classical gases, ideal quantum gases; Interacting Systems: models, computer simulation, mean-field approximation; Interacting Systems beyond Mean-field Theory: scaling and renormalization group, foundations of statistical mechanics "The present book, however, is unique that it both is written in a very pedagogic, easily comprehensible style, and, nevertheless, goes from the basic principles all the way to these modern topics, containing several chapters on the various approaches of mean field theory, and a chapter on computer simulation. A characteristic feature of this book is that often first some

qualitative arguments are given, or a "pedestrians's approach", and then a more general and/or more rigorous derivation is presented as well. Particularly useful are also "supplementary notes", pointing out interesting applications and further developments of the subject, a detailed bibliography, problems and historical notes, and many pedagogic figures."

Principles of Equilibrium Statistical Mechanics Equilibrium Statistical PhysicsWith Computer Simulations in Python

Quantum and classical physics are presented as distinct and unrelated. Transformation to classical phase space gives researchers access to algorithms derived from classical statistical mechanics that promise results on much more favourable terms. This book offers a framework for understanding the quantum world and collective molecular behaviour.

Computational Statistical Mechanics Springer Nature

Many physicists are not aware of the fact that they can solve their problems by applying optimization algorithms. Since the number of such algorithms is steadily increasing, many new algorithms have not been presented comprehensively until now. This presentation of recently developed algorithms applied in physics, including demonstrations of how they work and related results, aims to encourage their application, and as such the algorithms selected cover concepts and methods from statistical physics to optimization problems emerging in theoretical computer science.

Quantum Statistical Mechanics Classicahb Courier Dover Publications

This status report features the most recent developments in the field, spanning a wide range of topical areas in the computer simulation of condensed matter/materials physics. Highlights of this volume include various aspects of non-equilibrium statistical mechanics, studies of properties of real materials using both classical model simulations and electronic structure calculations, and the use of computer simulation in teaching.

A Kinetic View of Statistical Physics John Wiley & Sons

A completely revised edition that combines a comprehensive coverage of statistical and thermal physics with enhanced computational tools, accessibility, and active learning activities to meet the needs of today's students and educators This revised and expanded edition of Statistical and Thermal Physics introduces students to the essential ideas and techniques used in many areas of contemporary physics. Ready-to-run programs help make the many abstract concepts concrete. The text requires only a background in introductory mechanics and some basic ideas of quantum theory, discussing material typically found in undergraduate texts as well as topics such as fluids, critical phenomena, and computational techniques, which serve as a natural bridge to graduate study. Completely revised to be more accessible to students Encourages active reading with guided problems tied to the text Updated open source programs available in Java, Python, and JavaScript Integrates Monte Carlo and molecular dynamics simulations and other numerical techniques Self-contained introductions to thermodynamics and probability, including Bayes' theorem A fuller discussion of magnetism and the Ising model than other undergraduate texts Treats ideal classical and quantum gases within a uniform

framework Features a new chapter on transport coefficients and linear response theory Draws on findings from contemporary research Solutions manual (available only to instructors)

Statistical Mechanics for Chemistry and Materials Science Springer Science & Business Media

This is a presentation of the main ideas and methods of modern nonequilibrium statistical mechanics. It is the perfect introduction for anyone in chemistry or physics who needs an update or background in this time-dependent field. Topics covered include fluctuation-dissipation theorem; linear response theory; time correlation functions, and projection operators. Theoretical models are illustrated by real-world examples and numerous applications such as chemical reaction rates and spectral line shapes are covered. The mathematical treatments are detailed and easily understandable and the appendices include useful mathematical methods like the Laplace transforms, Gaussian random variables and phenomenological transport equations.

Brain-Inspired Computing ANU E Press

Computational biology has developed rapidly during the last two decades following the genomic revolution which culminated in the sequencing of the human genome. More than ever it has developed into a field which embraces computational methods from different branches of the exact sciences: pure and applied mathematics, computer science, theoretical physics. This Second Edition provides a solid introduction to the techniques of statistical mechanics for graduate students and researchers in computational biology and biophysics. Material has been reorganized to clarify equilbrium and nonequilibrium aspects of biomolecular systems Content has been expanded, in particular in the treatment of the electrostatic interactions of biomolecules and the application of non-equilibrium statistical mechanics to biomolecules New network-based approaches for the study of proteins are presented. All treated topics are put firmly in the context of the current research literature, allowing the reader to easily follow an individual path into a specific research field. Exercises and Tasks accompany the presentations of the topics with the intention of enabling the readers to test their comprehension of the developed basic concepts.

Phases of Matter and Phase Transitions Elsevier

This is a graduate textbook in Statistical Physics intended for students in Physics, Biophysics, Chemistry, Materials Science, and Engineering. It is based on using computer simulations in Python as a learning tool. Many exercises involve simulations, and a set of listings of computer programs are given in the appendix. Algorithms discussed include molecular dynamics, Metropolis Monte Carlo, Gibbs ensemble, and the Wolff algorithm.

Statistical Mechanics Springer

This book covers the broad subject of equilibrium statistical mechanics along with many advanced and modern topics such as nucleation, spinodal decomposition, inherent structures of liquids and liquid crystals. Unlike other books on the market, this comprehensive text not only deals with the primary fundamental ideas of statistical mechanics but also covers contemporary topics in this broad and rapidly developing area of

chemistry and materials science.

New Optimization Algorithms in Physics Cambridge University Press

This text is intended for a first course in digital logic design, at the sophomore or junior level, for electrical engineering, computer engineering and computer science programs, as well as for a number of other disciplines such as physics and mathematics. The book can also be used for self-study or for review by practicing engineers and computer scientists not intimately familiar with the subject. After completing this text, the student should be prepared for a second (advanced) course in digital design, switching and automata theory, microprocessors or computer organization.

Computational Statistical Physics Cambridge University Press

This graduate textbook covers contemporary directions of non-equilibrium statistical mechanics as well as classical methods of kinetics. Starting from phenomenological non-equilibrium thermodynamics, the kinetic equation method discussed and demonstrated with electrons and phonons in conducting crystals. Linear response theory as well as the non-equilibrium statistical operator and the master equation approach are discussed in the course of the book. With one of the main propositions being to avoid terms such as "obviously" and "it is easy to show", this treatise is an easy-to-read introduction into this traditional, yet vibrant field. Problems and their well-documented solutions included at appropriate points of the narrative allow the reader to actively develop essential parts of the theory himself. From the content: Phenomenological thermodynamics of irreversible processes Brownian motion Kinetic equations in non-equilibrium thermodynamics Kinetic equation for electrons and phonons in conducting crystals Theory of non-linear response to an external mechanical pertubation Non-equilibrium statistical operator method Response of a highly non-equilibrium system to a weakly measuring field Master equation approach

Statistical Mechanics of Classical and Disordered Systems Cambridge University Press

Quantitative methods have a particular knack for improving any field they touch. For biology, computational techniques have led to enormous strides in our understanding of biological systems, but there is still vast territory to cover. Statistical physics especially holds great potential for elucidating the structural-functional relationships in biomolecules, as well as their static and dynamic properties. Breaking New Ground Computational Biology: A Statistical Mechanics Perspective is the first book dedicated to the interface between statistical physics and bioinformatics. Introducing both equilibrium and nonequilibrium statistical mechanics in a manner tailored to computational biologists, the author applies these methods to understand and model the properties of various biomolecules and biological networks at the systems level. Unique Vision, Novel Approach Blossey combines his enthusiasm for uniting the fields of physics and computational biology with his considerable experience, knowledge, and gift for teaching. He uses numerous examples and tasks to illustrate and test understanding of the concepts, and he supplies a detailed keyword list for easy navigation and comprehension. His approach takes full advantage of the latest

tools in statistical physics and computer science to build a strong set of tools for confronting new challenges in computational biology. Making the concepts crystal clear without sacrificing mathematical rigor, Computational Biology: A Statistical Mechanics Perspective is the perfect tool to broaden your skills in computational biology.

An Introduction Cambridge University Press

The availability of large data sets has allowed researchers to uncover complex properties such as large-scale fluctuations and heterogeneities in many networks, leading to the breakdown of standard theoretical frameworks and models. Until recently these systems were considered as haphazard sets of points and connections. Recent advances have generated a vigorous research effort in understanding the effect of complex connectivity patterns on dynamical phenomena. This book presents a comprehensive account of these effects. A vast number of systems, from the brain to ecosystems, power grids and the internet, can be represented as large complex networks. This book will interest graduate students and researchers in many disciplines, from physics and statistical mechanics to mathematical biology and information science. Its modular approach allows readers to readily access the sections of most interest to them, and complicated maths is avoided so the text can be easily followed by non-experts in the subject.

Thermodynamics and Statistical Mechanics Oxford University Press

This title builds from basic principles to advanced techniques, and covers the major phenomena, methods, and results of time-dependent systems. It is a pedagogic introduction, a comprehensive reference manual, and an original research monograph--

Dynamical Processes on Complex Networks Springer Science & Business Media

This is a textbook which gradually introduces the student to the statistical mechanical study of the different phases of matter and to the phase transitions between them. Throughout, only simple models of both ordinary and soft matter are used but these are studied in full detail. The subject is developed in a pedagogical manner, starting from the basics, going from the simple ideal systems to the interacting systems, and ending with the more modern topics. The textbook provides the student with a complete overview, intentionally at an introductory level, of the theory of phase transitions. All equations and deductions are included.

Equilibrium Statistical Physics CreateSpace

Aimed at graduate students, this book explores some of the core phenomena in non-equilibrium statistical physics. It focuses on the development and application of theoretical methods to help students develop their problem-solving skills. The book begins with microscopic transport processes: diffusion, collision-driven phenomena, and exclusion. It then presents the kinetics of aggregation, fragmentation and adsorption, where the basic phenomenology and solution techniques are emphasized. The following chapters cover kinetic spin systems, both from a discrete and a continuum perspective, the role of disorder in non-equilibrium processes, hysteresis from the non-equilibrium perspective, the kinetics of chemical reactions, and the properties

of complex networks. The book contains 200 exercises to test students' understanding of the subject. A link to a website hosted by the authors, containing supplementary material including solutions to some of the exercises, can be found at www.cambridge.org/9780521851039.

A Statistical Mechanics Perspective, Second Edition Wiley-VCH

This textbook is the result of the enhancement of several courses on non-equilibrium statistics, stochastic processes, stochastic differential equations, anomalous diffusion and disorder. The target audience includes students of physics, mathematics, biology, chemistry, and engineering at undergraduate and graduate level with a grasp of the basic elements of mathematics and physics of the fourth year of a typical undergraduate course. The little-known physical and mathematical concepts are described in sections and specific exercises throughout the text, as well as in appendices. Physical-mathematical motivation is the main driving force for the development of this text. It presents the academic topics of probability theory and stochastic processes as well as new educational aspects in the presentation of non-equilibrium statistical theory and stochastic differential equations.. In particular it discusses the problem of irreversibility in that context and the dynamics of Fokker-Planck. An introduction on fluctuations around metastable and unstable points are given. It also describes relaxation theory of non-stationary Markov periodic in time systems. The theory of finite and infinite transport in disordered networks, with a discussion of the issue of anomalous diffusion is introduced. Further, it provides the basis for establishing the relationship between quantum aspects of the theory of linear response and the calculation of diffusion coefficients in amorphous systems.

With Computer Applications, Second Edition World Scientific Publishing Company

This revised fourth edition provides an introduction to computer simulations in physics, cutting-edge algorithms, essential techniques, and petascale computing.