Equilibrium Statistical Physics With Computer Simulations In Python

Monte Carlo Simulation in Statistical Physics
International Series of Monographs in Natural Philosophy
With Computer Applications, Second Edition
A Statistical Mechanics Perspective, Second Edition
Statistical Mechanics for Chemistry and Materials Science
Luminy, France, August 2018
An Integrated Approach
Equilibrium and Non-Equilibrium Statistical Mechanics
Nonequilibrium Statistical Mechanics
From Complex to Simple
Cellular Automata Modeling of Physical Systems
A Concise Introduction to the Statistical Physics of Complex Systems
Proceedings of the Fifteenth Workshop, Athens, GA, USA, February 24–28, 2003
Phases of Matter and Phase Transitions
Computer Simulation Studies in Condensed-Matter Physics XVI
Institut Henri Poincaré, Paris, France, 2017
Brain-Inspired Computing
Foundations and Applications
Non-equilibrium Thermodynamics and Statistical Mechanics
4th International Workshop, BrainComp 2019, Cetraro, Italy, July 15–19, 2019, Revised Selected Papers
Nonequilibrium Statistical Physics
New Optimization Algorithms in Physics
Equilibrium Statistical Physics
Equilibrium and Non-Equilibrium Statistical Thermodynamics
Equilibrium Statistical Physics (3rd Edition).
Computational Statistical Mechanics
From Thermodynamics to Statistical Mechanics to Computer Simulation
Proceedings of the Fifteenth Workshop, Athens, GA, USA, February 24–28, 2003
Thermodynamics and Statistical Mechanics
Principles of Equilibrium Statistical Mechanics
Non-Equilibrium Statistical Mechanics
Computer Simulation Studies in Condensed-Matter Physics XVI
Thermal Physics
Statistical Mechanics of Nonequilibrium Liquids
A Kinetic View of Statistical Physics
Non-equilibrium Statistical Physics with Application to Disordered Systems
Statistical Mechanics of Classical and Disordered Systems
A Statistical Mechanics Perspective
Entropy and Free Energy in Structural Biology

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Monte Carlo Simulation in Statistical Physics CRC Press
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.
International Series of Monographs in Natural Philosophy ANU E Press
This revised fourth edition provides an introduction to computer simulations in physics, cutting-edge algorithms, essential techniques, and petascale computing.
With Computer Applications, Second Edition Cambridge 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--
A Statistical Mechanics Perspective, Second Edition 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 for Chemistry and Materials Science John Wiley & Sons
When learning very formal material one comes to a stage where one thinks one has understood the material. Confronted with a "realiife" problem, the passivity of this understanding sometimes becomes painfully elear. To be able to solve the problem, ideas, methods, etc. need to be ready at hand. They must be mastered (become active knowledge) in order to employ them successfully. Starting from this idea, the leitmotif, or aim, of this book has been to elose this gap as much as possible. How can this be done? The material presented here was born out of a series of lectures at the Summer School held at Figueira da Foz (Portugal) in 1987. The series of lectures was split into two concurrent parts. In one part the "formal material" was presented. Since the background of those attending varied widely, the presentation of the formal material was kept as pedagogic as possible. In the formal part the general ideas behind the Monte Carlo method were developed. The Monte Carlo method has now found widespread appli cation in many branches of science such as physics, chemistry, and biology. Because of this, the scope of the lectures had to be narrowed down. We could not give a complete account and restricted

the treatment to the ap plication of the Monte Carlo method to the physics of phase transitions. Here particular emphasis is placed on finite-size effects. *Luminy, France, August 2018* Springer
This concise primer (based on lectures given at summer schools on complex systems and on a masters degree course in complex systems modeling) will provide graduate students and newcomers to the field with the basic knowledge of the concepts and methods of statistical physics and its potential for application to interdisciplinary topics. Indeed, in recent years, statistical physics has begun to attract the interest of a broad community of researchers in the field of complex system sciences, ranging from biology to the social sciences, economics and computer science. More generally, a growing number of graduate students and researchers feel the need to learn some basic concepts and questions originating in other disciplines without necessarily having to master all of the corresponding technicalities and jargon. Generally speaking, the goals of statistical physics may be summarized as follows: on the one hand to study systems composed of a large number of interacting ‘entities’, and on the other to predict the macroscopic (or collective) behavior of the system considered from the microscopic laws ruling the dynamics of the individual ‘entities’. These two goals are, to some extent, also shared by what is nowadays called ‘complex systems science’ and for these reasons, systems studied in the framework of statistical physics may be considered as among the simplest examples of complex systems—allowing in addition a rather well developed mathematical treatment.
An Integrated Approach Princeton 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
Equilibrium and Non-Equilibrium Statistical Mechanics Oxford 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.

Nonequilibrium Statistical Mechanics World Scientific Publishing Company
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)

From Complex to Simple Springer
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.

Cellular Automata Modeling of Physical Systems John Wiley & Sons
Stemming from the IHP trimester "Stochastic Dynamics Out of Equilibrium", this collection of contributions focuses on aspects of nonequilibrium dynamics and its ongoing developments. It is common practice in statistical mechanics to use models of large interacting assemblies governed by stochastic dynamics. In this context "equilibrium" is understood as stochastically (time) reversible dynamics with respect to a prescribed Gibbs measure. Nonequilibrium dynamics correspond on the other hand to irreversible evolutions, where fluxes appear in physical systems, and steady-state measures are unknown. The

trimester, held at the Institut Henri Poincaré (IHP) in Paris from April to July 2017, comprised various events relating to three domains (i) transport in non-equilibrium statistical mechanics; (ii) the design of more efficient simulation methods; (iii) life sciences. It brought together physicists, mathematicians from many domains, computer scientists, as well as researchers working at the interface between biology, physics and mathematics. The present volume is indispensable reading for researchers and Ph.D. students working in such areas.

A Concise Introduction to the Statistical Physics of Complex Systems Oxford University Press

This textbook brings together the fundamentals of the macroscopic and microscopic aspects of thermal physics by presenting thermodynamics and statistical mechanics as complementary theories based on small numbers of postulates. The book is designed to give the instructor flexibility in structuring courses for advanced undergraduates and/or beginning graduate students and is written on the principle that a good text should also be a good reference. The presentation of thermodynamics follows the logic of Clausius and Kelvin while relating the concepts involved to familiar phenomena and the modern student's knowledge of the atomic nature of matter. Another unique aspect of the book is the treatment of the mathematics involved. The essential mathematical concepts are briefly reviewed before using them, and the similarity of the mathematics to that employed in other fields of physics is emphasized. The text gives in depth treatments of low density gases, harmonic solids, magnetic and dielectric materials, phase transitions, and the concept of entropy. The microcanonical, canonical, and grand canonical ensembles of statistical mechanics are derived and used as the starting point for the analysis of fluctuations, blackbody radiation, the Maxwell distribution, Fermi-Dirac statistics, Bose-Einstein condensation, and the statistical basis of computer simulations. Supplementary material including PowerPoint slides and detailed worked solutions can be downloaded online at http://booksupport.wiley.com

Proceedings of the Fifteenth Workshop, Athens, GA, USA, February 24–28, 2003 Cambridge University Press

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.

Phases of Matter and Phase Transitions CreateSpace

Publisher Description

Computer Simulation Studies in Condensed-Matter Physics XVI Springer Science & Business Media

Providing a detailed and pedagogical account of the rapidly-growing field of computational statistical physics, this book covers both the theoretical foundations of equilibrium and non-equilibrium statistical physics, and also modern, computational applications such as percolation, random walks, magnetic systems, machine learning dynamics, and spreading processes on complex

networks. A detailed discussion of molecular dynamics simulations is also included, a topic of great importance in biophysics and physical chemistry. The accessible and self-contained approach adopted by the authors makes this book suitable for teaching courses at graduate level, and numerous worked examples and end of chapter problems allow students to test their progress and understanding.

Institut Henri Poincaré, Paris, France, 2017 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.

Brain-Inspired Computing Springer

Equilibrium Statistical PhysicsWith Computer Simulations in PythonCreateSpace

Foundations and Applications Morgan & Claypool Publishers

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.

Non-equilibrium Thermodynamics and Statistical Mechanics Wiley-VCH

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.

4th International Workshop, BrainComp 2019, Cetraro, Italy, July 15–19, 2019, Revised Selected Papers 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.

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