Monte Carlo Simulations In Physics Helsingin

Guide to Monte Carlo Simulations in Statistical Physics, Fourth Edition
Quantum Fields on a Lattice
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Monte Carlo Methods in Statistical Physics
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An Introduction to Quantum Monte Carlo Methods
An Introduction
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Monte Carlo Calculations in Nuclear Medicine, Second Edition
A Guide to Monte Carlo Simulations in Statistical Physics
Computational Physics: An Introduction To Monte Carlo Simulations Of Matrix Field Theory
An Introduction to Kinetic Monte Carlo Simulations of Surface Reactions
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Introduction, Source Modelling and Patient Dose Calculations
Fundamentals and Advanced Topics
Monte Carlo Methods for Radiation Transport
State-of-the-art Reviews On Energetic Ion-atom And Ion-molecule Collisions
Monte Carlo Simulations of Disordered Systems
With Web-Based Fortran Code
A Guide to Monte Carlo Simulations in Statistical Physics
Computer Simulations of Surfaces and Interfaces
Advanced Problems of Phase Transition Theory
A Guide to Monte Carlo Simulations in Statistical Physics
Computer Simulation in Physics and Engineering

GOODMAN HARPER

Guide to Monte Carlo Simulations in Statistical Physics, Fourth Edition

Clarendon Press

Monte Carlo methods have been used for decades in physics, engineering, statistics, and other fields. Monte Carlo Simulation and Finance explains the nuts and bolts of this essential technique used to value derivatives and other securities. Author and educator Don McLeish examines this fundamental process, and discusses important issues, including specialized problems in finance that Monte Carlo and Quasi-Monte Carlo methods can help solve and the different ways Monte Carlo methods can be improved upon. This state-of-the-art book on Monte Carlo simulation methods is ideal for finance professionals and students. Order your copy today.

Quantum Fields on a Lattice World Scientific

This book teaches modern Markov chain Monte Carlo (MC) simulation techniques step by step. The material should be accessible to advanced undergraduate students and is suitable for a course. It ranges from elementary statistics concepts (the theory behind MC simulations), through conventional Metropolis and heat bath algorithms, autocorrelations and the analysis of the performance of MC algorithms, to advanced topics including the multicanonical approach, cluster algorithms and parallel computing. Therefore, it is also of interest to researchers in the field. The book relates the theory directly to Web-based computer code. This allows readers to get quickly started with their own simulations and to verify many numerical examples easily. The present code is in Fortran 77, for which compilers are freely available. The principles taught are important for users of other programming languages, like C or C++.

Monte Carlo Particle Transport Methods Springer Science & Business Media

This book is a guide to the use of Monte Carlo techniques in radiation transport. This topic is of great interest for medical physicists. Praised as a "gold standard" for accurate radiotherapy dose calculations, Monte Carlo has stimulated a high level of research activity that has produced thousands of papers within the past few years. The book is designed primarily to address the needs of an academically inclined medical physicist who wishes to learn the technique, as well as experienced users of standard Monte Carlo codes who wish to gain insight into the underlying mathematics of Monte Carlo algorithms. The book focuses on the fundamentals—giving full attention to and explaining the very basic concepts. It also includes advanced topics and covers recent advances such as transport of charged particles in magnetic fields and the grid-based solvers of the Boltzmann equation.

Monte Carlo Methods in Statistical Physics CRC Press

This book reviews some of the classic aspects in the theory of phase transitions and critical phenomena, which has a long history. Recently, these aspects are attracting much attention due to essential new contributions. The topics presented in this book include: mathematical theory of the Ising model; equilibrium and non-equilibrium

criticality of one-dimensional quantum spin chains; influence of structural disorder on the critical behaviour of the Potts model; criticality, fractality and multifractality of linked polymers; field-theoretical approaches in the superconducting phase transitions. The book is based on the review lectures that were given in Lviv (Ukraine) in March 2002 at the “Ising lectures” — a traditional annual workshop on phase transitions and critical phenomena which aims to bring together scientists working in the field of phase transitions with university students and those who are interested in the subject.
Contents:Mathematical Theory of the Ising Model and Its Generalizations: An Introduction (Y Kozitsky)Relaxation in Quantum Spin Chains: Free Fermionic Models (D Karevski)Quantum Phase Transitions in Alternating Transverse Ising Chains (O Derzhko)Phase Transitions in Two-Dimensional Random Potts Models (B Berche & C Chatelain)Scaling of Miktoarm Star Polymers (C von Ferber)Field Theoretic Approaches to the Superconducting Phase Transition (F S Nogueira & H Kleinert) Readership: Researchers, academics and graduate students in condensed matter physics.
Keywords:Phase Transitions;Disorder;Critical Phenomena;Renormalization Group;Ising Model;Potts Model

Applications in Diagnostic Imaging World Scientific
This monograph reviews the subject of structural disorder in alloys and describes how structural information can be exploited to build sound theoretical descriptions in terms of modified Ising models. Scattering with thermal neutrons and x-rays prove to be complementary approaches to measure the weak diffuse scattering which provides detailed information about the disorder. The authors show how Monte Carlo methods are applied to determine the most realistic effective interactions among the alloying atoms. These results can be used as a benchmark for modern electronic structure calculations. Of more general interest, the limitations of scattering experiments in a determination of an interaction model, and thus also of the structure itself are discussed. Finally, simulations exhibit not only near-surface disordering due to frustration effects but also new possible surface - induced ordering phenomena. Accurate Monte Carlo simulations are used to test existing theories of wetting.
An Introduction to Quantum Monte Carlo Methods 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 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.
An Introduction CRC Press
This revised fourth edition provides an introduction to computer simulations in physics, cutting-edge algorithms,

essential techniques, and petascale computing.
World Scientific
Kinetic Monte Carlo (kMC) simulations still represent a quite new area of research, with a rapidly growing number of publications. Broadly speaking, kMC can be applied to any system describable as a set of minima of a potential-energy surface, the evolution of which will then be regarded as hops from one minimum to a neighboring one. The hops in kMC are modeled as stochastic processes and the algorithms use random numbers to determine at which times the hops occur and to which neighboring minimum they go. Sometimes this approach is also called dynamic MC or Stochastic Simulation Algorithm, in particular when it is applied to solving macroscopic rate equations. This book has two objectives. First, it is a primer on the kMC method (predominantly using the lattice-gas model) and thus much of the book will also be useful for applications other than to surface reactions. Second, it is intended to teach the reader what can be learned from kMC simulations of surface reaction kinetics. With these goals in mind, the present text is conceived as a self-contained introduction for students and non-specialist researchers alike who are interested in entering the field and learning about the topic from scratch.
Monte Carlo Methods in Statistical Physics Universities Press
Volume 5.
A Guide to Monte Carlo Simulations in Statistical Physics World Scientific
This volume assembles review articles that present the status of frontline research in this field in a manner that makes the material accessible to the educated, but non-specialist, reader. The articles focus on the many-body aspects of the theory of quantum liquids in confined geometry. Research is in the very satisfactory situation where several accurate approaches are available that allow one to describe these systems in a quantitative manner without modelling uncertainty and uncontrolled assumptions. For example, dynamic situations of direct experimental relevance can be modelled with high accuracy.
Markov Chain Monte Carlo Simulations and Their Statistical Analysis World Scientific
In the seven years since this volume first appeared. there has been an enormous expansion of the range of problems to which Monte Carlo computer simulation methods have been applied. This fact has already led to the addition of a companion volume ("Applications of the Monte Carlo Method in Statistical Physics", Topics in Current Physics. Vol . 36), edited in 1984, to this book. But the field continues to develop further; rapid progress is being made with respect to the implementation of Monte Carlo algorithms, the construction of special-purpose computers dedicated to exe cute Monte Carlo programs, and new methods to analyze the "data" generated by these programs. Brief descriptions of these and other developments, together with numerous addi tional references, are included in a new chapter , "Recent Trends in Monte Carlo Simulations" , which has been written for this second edition. Typographical correc tions have been made and fuller references given where appropriate, but otherwise the layout and contents of the other chapters are left unchanged. Thus this book, together with its companion volume mentioned above, gives a fairly complete and up to-

date review of the field. It is hoped that the reduced price of this paperback edition will make it accessible to a wide range of scientists and students in the fields to which it is relevant: theoretical phYSics and physical chemistry , con densed-matter physics and materials science, computational physics and applied mathematics, etc.

A Guide to Monte Carlo Simulations in Statistical Physics John Wiley & Sons

Proceedings of the NATO Advanced Study Institute, Albena, Bulgaria, from 9 to 20 September 2002

Quarks, Gluons and Lattices Springer Science & Business Media

In Monte Carlo Methods in Chemical Physics: An Introduction to the Monte Carlo Method for Particle Simulations J. Ilja Siepmann Random Number Generators for Parallel Applications Ashok Srinivasan, David M. Ceperley and Michael Mascagni Between Classical and Quantum Monte Carlo Methods: "Variational" QMC Dario Bressanini and Peter J. Reynolds Monte Carlo Eigenvalue Methods in Quantum Mechanics and Statistical Mechanics M. P. Nightingale and C.J. Umrigar Adaptive Path-Integral Monte Carlo Methods for Accurate Computation of Molecular Thermodynamic Properties Robert Q. Topper Monte Carlo Sampling for Classical Trajectory Simulations Gilles H. Peslherbe Haobin Wang and William L. Hase Monte Carlo Approaches to the Protein Folding Problem Jeffrey Skolnick and Andrzej Kolinski Entropy Sampling Monte Carlo for Polypeptides and Proteins Harold A. Scheraga and Minh-Hong Hao Macrostate Dissection of Thermodynamic Monte Carlo Integrals Bruce W. Church, Alex Ulitsky, and David Shalloway Simulated Annealing-Optimal Histogram Methods David M. Ferguson and David G. Garrett Monte Carlo Methods for Polymeric Systems Juan J. de Pablo and Fernando A. Escobedo Thermodynamic-Scaling Methods in Monte Carlo and Their Application to Phase Equilibria John Valleau Semigrand Canonical Monte Carlo Simulation: Integration Along Coexistence Lines David A. Kofke Monte Carlo Methods for Simulating Phase Equilibria of Complex Fluids J. Ilja Siepmann Reactive Canonical Monte Carlo J. Karl Johnson New Monte Carlo Algorithms for Classical Spin Systems G. T. Barkema and M.E.J. Newman

Monte Carlo Techniques in Radiation Therapy Cambridge University Press

Expanding the topic of Monte Carlo simulation for graduate students and researchers in physics.

A Guide to Monte Carlo Simulations in Statistical Physics Springer Science & Business Media

This book provides an introduction to the use of Monte Carlo computer simulation methods suitable for beginning graduate students and beyond. It is suitable for a course text for physics or chemistry departments or for self-teaching.

The Monte Carlo Method in Condensed Matter Physics John Wiley & Sons

With this book we try to reach several more-or-less unattainable goals namely: To compromise in a single book all the most important achievements of Monte Carlo calculations for solving neutron and photon transport problems. To present a book which discusses the same topics in the three levels known from the literature and gives us useful information for both beginners and experienced readers. It lists both well-established old techniques and also newest findings.

Advanced Monte Carlo for Radiation Physics, Particle Transport Simulation

and Applications Cambridge University Press
Monte Carlo Simulation in Statistical Physics deals with the computer simulation of many-body systems in condensed-matter physics and related fields of physics, chemistry and beyond, to traffic flows, stock market fluctuations, etc.). Using random numbers generated by a computer, probability distributions are calculated, allowing the estimation of the thermodynamic properties of various systems. This book describes the theoretical background to several variants of these Monte Carlo methods and gives a systematic presentation from which newcomers can learn to perform such simulations and to analyze their results. This fourth edition has been updated and a new chapter on Monte Carlo simulation of quantum-mechanical problems has been added. To help students in their work a special web server has been installed to host programs and discussion groups (http: //wwwcp.tphys.uni-heidelberg.de). Prof. Binder was the winner of the Berni J. Alder CECAM Award for Computational Physics 2001.

Lectures on Matrix Field Theory

Monte Carlo Simulation in Statistical PhysicsAn Introduction
From first principles to current computer applications, Monte Carlo Calculations in Nuclear Medicine, Second Edition: Applications in Diagnostic Imaging covers the applications of Monte Carlo calculations in nuclear medicine and critically reviews them from a diagnostic perspective. Like the first edition, this book explains the Monte Carlo method and the principles behind SPECT and PET imaging, introduces the reader to some Monte Carlo software currently in use, and gives the reader a detailed idea of some possible applications of Monte Carlo in current research in SPECT and PET. New chapters in this edition cover codes and applications in pre-clinical PET and SPECT. The book explains how Monte Carlo methods and software packages can be applied to evaluate scatter in SPECT and PET imaging, collimation, and image deterioration. A guide for researchers and students developing methods to improve image resolution, it also demonstrates how Monte Carlo techniques can be used to simulate complex imaging systems.

Microscopic Approaches to Quantum Liquids in Confined Geometries

Morgan & Claypool Publishers
This book introduces a large number of topics in lattice gauge theories, including analytical as well as numerical methods. It provides young physicists with the theoretical background and basic computational tools in order to be able to follow the extensive literature on the subject, and to carry out research on their own. Whenever possible, the basic ideas and technical inputs are demonstrated in simple examples, so as to avoid diverting the readers' attention from the main line of thought. Sufficient technical details are however given so that he can fill in the remaining details with the help of the cited literature without too much effort. This volume is designed for graduate students in theoretical elementary particle physics or statistical mechanics with a basic knowledge in Quantum Field Theory. Contents: IntroductionThe Path Integral Approach to QuantizationThe Free Scalar Field on the LatticeFermions on the LatticeAbelian Gauge Fields on the Lattice and Compact QEDNon-Abelian Gauge Fields on the Lattice. Compact QCDThe Wilson Loop and the Static Quark-Antiquark PotentialThe QQ-

Potential in Some Simple ModelsThe Continuum Limit of Lattice QCDThe Strong Coupling ExpansionThe Hopping Parameter ExpansionWeak Coupling Expansion (I). The Φ3-TheoryWeak Coupling Expansion (II). Lattice QEDWeak Coupling Expansion (III). Lattice QCDMonte Carlo MethodsSome Results of Monte Carlo CalculationsIntroduction to Finite Temperature Field TheoryLattice Formulation of QCD at Finite TemperatureMonte Carlo Study of the Deconfinement and Chiral Phase TransitionThe High Temperature Phase of QCD Readership: Graduates and postdoctorals in theoretical elementary particle physics or statistical mechanics.

Keywords:Fermion Doubling;Staggered Fermions;Perturbation Theory;Wilson Loop;Confinement;Deconfinement Phase Transition;Chiral Phase Transition;Lattice Sum Rules;QCD Plasma;Monte Carlo Methods

Disordered Alloys Springer

Monte Carlo simulations comprise a substantial part of the new and third major arm of investigation in the physical sciences that has emerged in recent times, to augment the traditional ones of experiment and theory. With the advent of high-speed digital computing, numerical simulations techniques like Monte Carlo have been very successful in extracting real world observations out of seemingly intractable theoretical models.