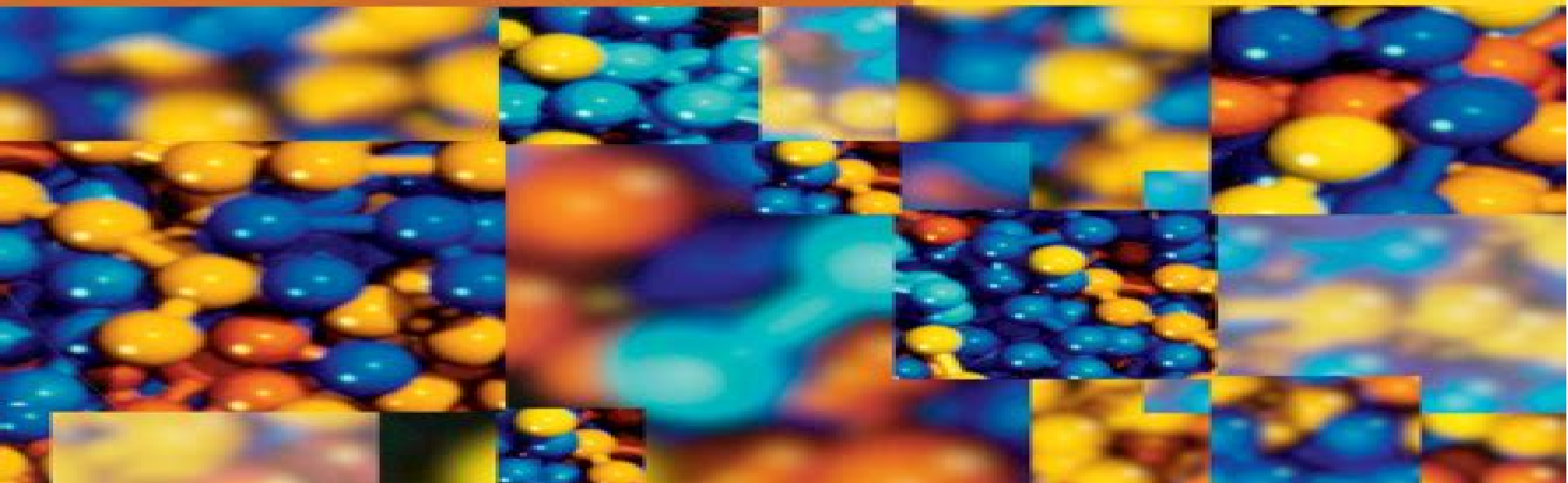


FIFTH EDITION

# A Guide to Monte Carlo Simulations in Statistical Physics

David P. Landau  
Kurt Binder



# A Guide To Monte Carlo Simulations In Statistical Physics

**David P. Landau, Kurt Binder**



## **A Guide To Monte Carlo Simulations In Statistical Physics:**

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part is a practical guide with plenty of examples and exercises for the student Problems treated by simple sampling random and self avoiding walks percolation clusters etc are included along with such topics as finite size effects and guidelines for the analysis of Monte Carlo simulations The two parts together provide an excellent introduction to the theory and practice of Monte Carlo simulations

**Understanding Molecular Simulation** Daan Frenkel, Berend Smit, 2001-10-19 Understanding Molecular Simulation From Algorithms to Applications explains the physics behind the recipes of molecular simulation for materials science Computer simulators are continuously confronted with questions concerning the choice of a particular technique for a given application A wide variety of tools exist so the choice of technique requires a good understanding of the basic principles More importantly such understanding may greatly improve the efficiency of a simulation program The implementation of simulation methods is illustrated in pseudocodes and their practical use in the case studies used in the text Since the first edition only five years ago the simulation world has changed significantly current techniques have matured and new ones have appeared This new edition deals with these new developments in particular there are sections on Transition path sampling and diffusive barrier crossing to simulate rare events Dissipative particle dynamic as a coarse grained simulation technique Novel schemes to compute the long ranged forces Hamiltonian and non Hamiltonian dynamics in the context constant temperature and constant pressure molecular dynamics simulations Multiple time step algorithms as an alternative for constraints Defects in solids The pruned enriched Rosenbluth sampling recoil growth and concerted rotations for complex molecules Parallel tempering for glassy Hamiltonians Examples are included that highlight current applications and the codes of case studies are available on the World Wide Web Several new examples have been added since the first edition to illustrate recent applications Questions are included in this new edition No prior knowledge of computer simulation is assumed

**Monte Carlo Simulation in Statistical Physics** Kurt Binder, Dieter W. Heermann, 2002 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://www.cphphys.uni-heidelberg.de> Prof Binder was the winner of the Berni J Alder CECAM Award for Computational Physics 2001

**Markov Chain Monte Carlo Simulations And Their Statistical Analysis: With Web-based Fortran Code** Bernd Albert Berg, Alexei Bazavor, 2004-10-01 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 Simulations of the Ising Model** Michael Adler, 2016-05 In this book the thermodynamic observables of the classical one and two dimensional ferromagnetic and antiferromagnetic Ising models on a square lattice are simulated especially at the phase transitions if applicable using the classical Monte Carlo algorithm of Metropolis Finite size effects and the influence of an external magnetic field are described The critical temperature of the 2d ferromagnetic Ising model is obtained using finite size scaling Before presenting the Ising model the basic concepts of statistical mechanics are recapped Furthermore the general principles of Monte Carlo methods are explained Reviews in Computational Chemistry, Volume 19 Kenny B.

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