



# Monte Carlo Methods in Statistical Physics

*M. E. J. Newman, G. T. Barkema*

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**Monte Carlo Methods in Statistical Physics** M. E. J. Newman, G. T. Barkema

This book provides an introduction to Monte Carlo simulations in classical statistical physics and is aimed both at students beginning work in the field and at more experienced researchers who wish to learn more about Monte Carlo methods. It includes methods for both equilibrium and out of equilibrium systems, and discusses in detail such common algorithms as the Metropolis and heat-bath algorithms, as well as more sophisticated ones such as continuous time Monte Carlo, cluster algorithms, multigrid methods, entropic sampling and simulated tempering. Data analysis techniques are also explained starting with straightforward measurement and error-estimation techniques and progressing to topics such as the single and multiple histogram methods and finite size scaling. The last few chapters of the book are devoted to implementation issues, including lattice representations, efficient implementation of data structures, multispin coding, parallelization of Monte Carlo algorithms, and random number generation. The book also includes example programs which show how to apply these techniques to a variety of well-known models.

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