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Book Review: *Monte Carlo Simulation in Statistical Physics: An Introduction*

Monte Carlo Simulation in Statistical Physics: An Introduction, K. Binder and D. W. Heermann, Springer-Verlag, 1988.

This thin (127 page) volume is offered as an introduction to the practice of Monte Carlo in the context of lattice statistical mechanics. It consists of two major sections, one dealing with the theoretical background, the other with more practical aspects.

The theoretical section covers a range of topics, including sampling methods, basic techniques, the "dynamic" interpretation of Monte Carlo (where it is correctly pointed out that stochastic MC can be very different from real dynamics), the influence of relaxation rates on error estimation, and finite-size scaling in simulations of percolation and spin models with first- or second-order transitions (Potts and Ising, respectively). The material is a mixture of elementary and advanced, with some topics quite definitely beyond the beginners to whom the book is primarily addressed.

The section on practice begins with a polemic on the virtues of neatly designed software. Though not invited to do so at this point, the reader can then turn to a Fortran program in the Appendix which is in fact an example of how not to write programs (though the authors omit to indicate it as such): it is a program whose principal section contains some 50 statements, of which 11 are the well-avoided "goto." Given that this particular cluster-identification algorithm can be designed without resorting to such obfuscating anachronisms, it appears that the lesson on stepwise refinement with which the section begins was not applied here.

The large collection of exercises (53 in number, accompanied by varying amounts of background material) provides coverage of a wide variety of MC applications, including percolation, walks and spin systems, ranging in difficulty from the elementary (verifying diffusion for a random walk) to current research problems (such as classifying percolation clusters on parallel computers). The collection provides a rich set of ideas for exercises to accompany a course on the subject. However, the student may need guidance beyond what is provided, and may also find it necessary to

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visit the library to determine whether the simulations have produced the correct results. Indeed, for the range of topics addressed by the exercises, one almost wishes that the authors had produced a thicker book.

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