

Book Review: *Statistical Mechanics and Statistical Methods in Theory and Application*

Statistical Mechanics and Statistical Methods in Theory and Application.
Edited by Uzi Landmann. Plenum Press, New York and London, 1977.
\$59.50

In November 1976, the aficionados of statistical methods organized a corrida in Rochester, N.Y., in honor of the sixtieth birthday of their matador Elliott Montroll. A number of espontaneos entered the arena, and their contributions, together with those of absent amigos, are collected in this book. As it contains 32 articles, ranging across the whole field of Montroll's broad interests, the applause can only be desultory.

The spectrum ranges from what appears to be a definitive treatment of the glory by Khare and Nussenzveig to an idea *in statu nascendi* by Dresden on quark confinement by stochastic interaction (which he refers to as a "random concept"). There is a solid article on surfaces by Maradudin, Wallis, and Eguiluz, and a fluent article on interfaces by Widom. There is an elegant treatment of a thermodynamic instability by Bedeaux, Mazur, and Pasmanter and a collection of definitions pertaining to stochastic processes by Srinivas and Wolf. Mathematical methods are represented by Fisher's approximants of singular functions of several variables, Hioe's expansion of determinants, Shlesinger's application of gamma functions to random walks, and the investigation of Weiss and Brooks on image reconstruction from x-ray pictures in tomography. Kac has been converted to the system-size expansion of master equations, but Kenkre gives a discussion of the generalized master equation with which I disagree. Diagrams are summed by Isihara in connection with the electron gas and by Ipatova and Subashiev in connection with optical spectra in mixed crystals, while Lax and Shugard treat radiationless transitions by stochastic methods. M. S. Green marries the renormalization group with van der Waals, and Baker marries field theory with Ising, whose correlations are studied by McCoy, Tracy, and Wu. There is a review of the hard-sphere fluid by Reiss and one on inhomogeneous media by Keller. Emch discusses irreversibility algebraically and Helleman computationally. Silver, Shuler, and Weiss compute the random walk on a two-

dimensional lattice with some of the links missing, and pay homage to the female sex by making the drunkard feminine. Ruderman gives a far-out account of the properties of matter in the extreme conditions that prevail in the universe.

All this, however, is merely physics. Montroll's interest in biological applications is reflected in the articles of T. L. Hill on enzyme reactions, by Frisch, Bishop, and Roth on self-replicating macromolecules, by Wartell on the helix-coil transition of DNA, and by Glass on the equations occurring in population dynamics and other biological problems. Economics is represented by an attempt of T. R. Smith to explain a financial crisis as a structural instability of the equations for money flow, and Newell treats the socially relevant problem of bus delays. Finally, Mandelbrot writes about his fascinating ideas concerning universally valid statistical distributions and in the same vein Herman and Montroll study the Sears Roebuck catalogues.

The book constitutes a fitting homage to Elliott Montroll's broad range and his mathematical virtuosity—never trivial and often thought-provoking. His playful, yet profound, interest in the world around us is reflected by the contents as well as by the two portraits. It makes delightful reading and can be warmly recommended to any physicist who needs a vacation from humdrum bread-and-butter research and can afford \$59.50.

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