Journal of Statistical Physics, Vol. 87, Nos. 3/4, 1997

Book Review: *Fluctuations and Order: The New Synthesis*

Fluctuations and Order: The New Synthesis. Mark Millonas, ed., Springer-Verlag, New York, 1996.

We mainly think of noise as a disrupter of ordered systems. Although this intuitive picture is correct in many instances, it cannot be the entire story because of many examples in which exactly the opposite is true. For example, without enough thermal noise the beautifully ordered structures of biological molecules fall apart. The book under review consists of 26 studies of the many ways in which noise can actually create order. The physical systems in which this effect has been demonstrated includes lasers, diffusion-controlled chemical reactions, motor proteins, ion channels in neurons, and thermal radiation from black holes.

The role of noise in creating order is precisely the sort of topic that attracts a certain breed of intelligent but eccentric scientist who enjoys producing grandiose but unsound theories. Fortunately this book contains very little truly flaky material. There are no promises of a "grand unified field theory" of complex systems here, just lots of examples of interesting physics. I suspect that this absence of nonsense is the result of the efforts of the very unflaky editor, Mark Millonas. My remarks should not be interpreted to mean that there is no speculation here; rather, I wish to emphasize that the speculations are worth considering seriously.

This book is based on a workshop held at the Los Alamos National Laboratory and the Santa Fe Institute. As such, it suffers from some of the usual strengths and weaknesses of conference proceedings, but there are some differences from the usual conference proceedings as well. The range of topics covered in the book is even wider than most conference proceedings and I doubt that very many readers would be interested in all of the articles here. Perhaps in compensation, I found the articles to be written in a more pedagogical style than most conference proceedings. I could follow all of the articles that I chose to read. The production

0022-4715/97/0500-0963$12.50/0

quality is not only higher than most conference proceedings books, it is higher than many monographs that I have read.

Who would want to read this book? The most obvious audience is people who wish to pursue one of the many topics reported in it. The articles can serve as useful starting points to entering the literature on a great variety of problems in nonequilibrium statistical mechanics. I think that the intended audience for this book consists of statistical physicists with an interest in the ways that noise can create nonequilibrium phenomena that have no counterpart in equilibrium systems. This audience is well served here.

Joseph D. Bryngelson
Physical Sciences Laboratory
Division of Computer Research and Technology
National Institutes of Health
Bethesda, Maryland 20892