

**Pavel L. Krapivsky, Sidney Redner and Eli Ben-Naim:
A Kinetic View of Statistical Physics
Cambridge University Press, 488 pages, \$70.00**

Joel L. Lebowitz

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This book is a welcome addition to our stock of graduate texts, but also highly recommended to all researchers in nonequilibrium statistical mechanics. In fact one of its virtues, and occasional problems, is that it is written in a very lively non text-book style. The virtue is that the reading is fun. The authors clearly know and enjoy the subject, one to which they have made important contributions. The problem, a minor one which I hope will be corrected in future editions, is that sometimes a bit more explanation or a reference to the literature would be helpful to the reader (at least to this one).

The book starts out with a chapter called *Aperitifs* which, as an *aperitif* should, whets the reader's appetite. It plunges right into the interesting problems of diffusion. Starting with the diffusion of a single particle where everything is simple it goes on immediately to consider diffusion controlled annihilation and coalescence processes where things are far from simple. This permits the authors to show the power, as well as the limitations, of dimensional analysis and heuristic reasoning by comparing the conclusions drawn from such arguments to exact results. It also permits them to point out there, as well as in the rest of the book, open problems which might well appeal to some students and their teachers as interesting research topics. They also bring in there the notion of critical dimension above which mean-field gives qualitatively correct results.

The rest of the book consists of thirteen chapters, all with catchy titles: Diffusion, Collisions, Exclusion, Aggregation, Fragmentation, Adsorption, Spin Dynamics, Coarsening, Disorder, Hysteresis, Population Dynamics, Diffusive Reactions, and Complex Networks. Each chapter covers a multitude of topics. Taking Chapter 13, Diffusive Reactions, as an example one finds an introductory paragraph followed by sections on: Role of the Spatial dimension, The trapping reaction, Two-species annihilation, Single-species reactions in one dimension, Reactions in spatial gradients, Notes, Problems. Each section is itself made up

J.L. Lebowitz (✉)

Center for Mathematical Sciences Research, Rutgers, The State University of New Jersey,
110 Frelinghuysen Road, Piscataway, NJ 08854-8019, USA
e-mail: lebowitz@math.rutgers.edu

51 of subsections which deal briefly with specific problems, some of them in worked out ex-
52 amples.

53 Overall the book contains a mixture of rigorous computations, heuristic analysis and
54 illustrative computer simulations (with hints on how to best do them). There is also a very
55 extensive and informative set of exercises involving both material covered in the text and
56 extensions.

57 The different results, of which there are many, ranging from the simple to the very sophis-
58 ticated, are given essentially “ex-cathedra.” The sources of the results are described briefly
59 in a narrative fashion in the Notes subsection, where references are given to reviews and
60 original papers, all listed at the end of the book. These notes are informative but quite brief,
61 generally less than one page.

62 I found this mixture of exact mathematical results, which as might be expected are lim-
63 ited, and intuitive arguments very nice. What I found a bit annoying is that there are almost
64 never any references given when the results are first described and it is often not clear what
65 has been rigorously established and what is only generally believed to be true. I imagine
66 that the authors think that this makes the book less text-bookish and therefore more read-
67 able. I am not convinced and hope that they will find a way to be more precise without being
68 boring in future editions, of which I hope there will be many.

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