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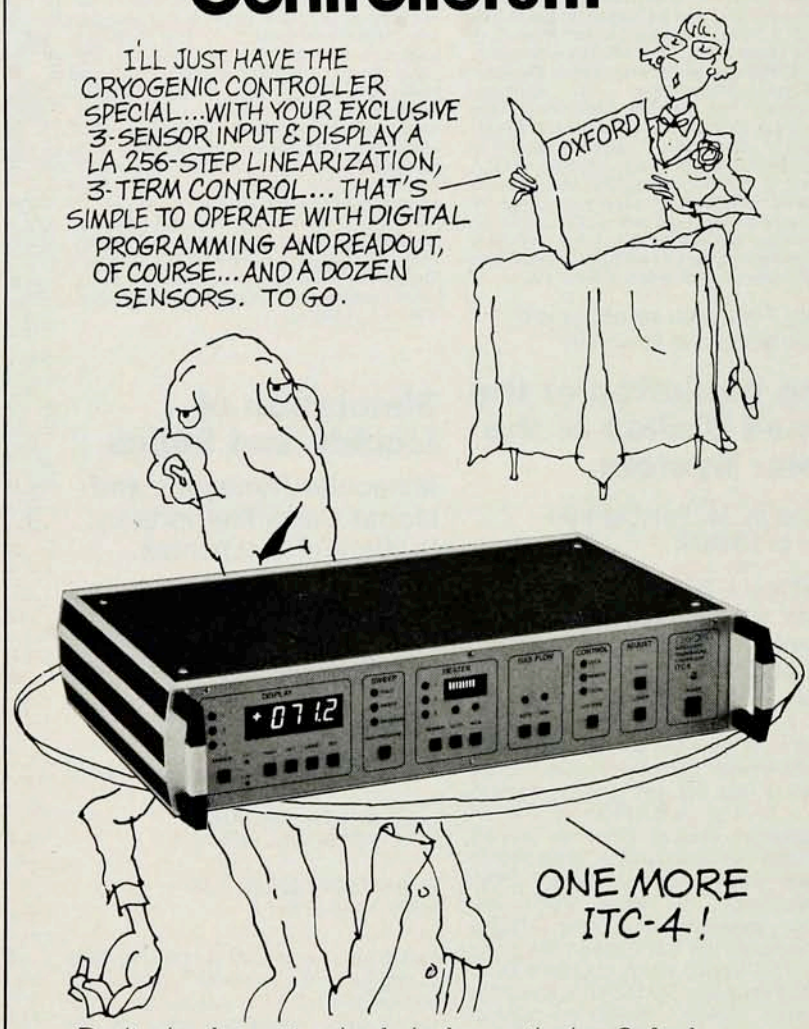

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mensional FFT, convolution and deconvolution, correlation and autocorrelation, optimal filtering, power spectra, maximum entropy, digital filtering and linear prediction. The notation and explanations are excellent (giving me at last an understanding of the optimized FFT algorithm), but a student cannot rely on such terse descriptions for an understanding of this complicated material.

Because of both its style and thoroughness, *Numerical Recipes* is *the* reference text for anyone using computers to do mathematical analysis. Its elegance and the breadth of topics that this remarkable book covers make it truly enjoyable.

PETER B. KRAMER
Special Biological Projects
Johnson & Johnson

Introduction to Percolation Theory

Dietrich Stauffer

124 pp. Taylor and Francis, Philadelphia, 1985.
ISBN 0-85066-315-6 $22.00 paper

If each site of a large lattice is occupied randomly with probability p, groups of neighboring occupied sites are formed. The mean size of these clusters depends on p. Above a critical concentration p_c an "infinite" cluster occurs that spans the system from one end to the other. The physics of the system can be very different below and above p_c. For example, if occupied nearest neighbor sites are connected by metallic bonds the system behaves as an insulator below p_c, but has metallic properties above p_c. Percolation theory investigates the critical behavior of this purely geometric phase transition, the "percolation transition." Historically, percolation theory dates back to the early work of Paul Flory and Walter Stockmayer on the polymerization process. Since then the advances in phase transition theory, as well as the development of large-scale computers, have tremendously stimulated research on percolation systems. Today percolation theory has become a very active field; the applications range from the spread of epidemics and the gelation of branched polymers to transport phenomena in porous materials, doped semiconductors and mixed ionic conductors.

Dietrich Stauffer has made major contributions to this multidisciplinary field and his book represents an easy, accessible and well-organized introduction to the subject. The book starts with two appealing applications of modern percolation theory: forest fires and diffusion in disordered media. In

the major part of the book, the reader comes to know the essentials of the geometric properties of the percolation transition. Guided by exact solutions in one-dimensional systems and in so-called Cayley trees, Stauffer develops more general scaling theories for the cluster numbers and related quantities. He explains extensively the fractal structure of the clusters near p_c, including a simple derivation of the expression for the fractal dimension, and performs a (somewhat too short) excursion into renormalization groups. Wherever possible, Stauffer shows connections to the more conventional thermal phase transitions.

In the second part of the book the reader is introduced to transport phenomena near the percolation transition, which is a subject of great current interest. Here Stauffer treats dc conductivity, kinetics of clusters and anomalous diffusion. In an appendix, he discusses numerical techniques—in particular the Monte Carlo method. In covering that method, he helps the reader to get his own programming experience by presenting FORTRAN programs. I enjoyed this part very much, but I missed here references to alternative approaches, such as the exact enumeration method for diffusion processes, which for many purposes is superior to the Monte Carlo method. I also would have appreciated a more thorough discussion of physical applications. It is remarkable that the book, published in 1985, covers developments as recent as 1984. However, significant progress has been made since that time. Perhaps Stauffer should consider writing a sequel.

In summary, Stauffer's book represents a nice and humorously written introduction to a fascinating new field. Because of the pedagogical efforts of the author and the intelligent selection of topics (advanced mathematical approaches have been omitted) it is easily accessible to a broad readership with an elementary background in statistical physics. I only regret that students have to pay almost 20 cents per page for this excellent monograph.

ARMIN BUNDE
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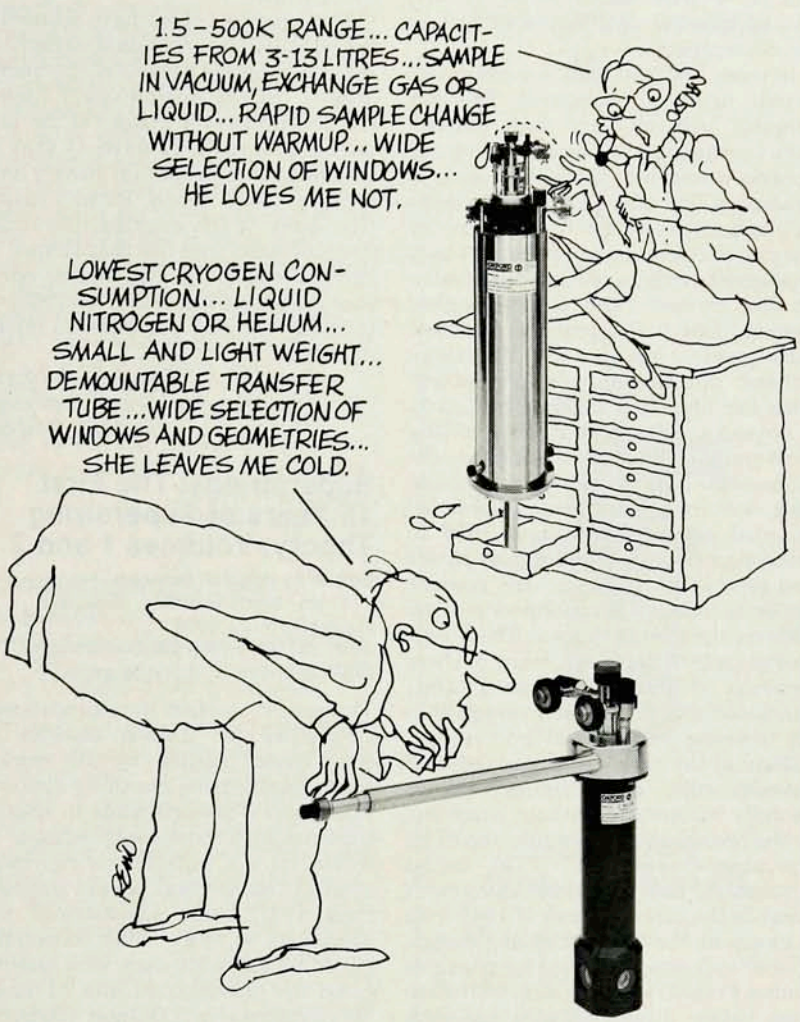
By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age

Paul Boyer
440 pp. Pantheon, New York, 1985.
ISBN 0-394-52878-6 $22.50 hardcover

Above my desk hangs a framed copy of *The New York Times* dated 7 August

In Spring a scientist's fancy turns to Oxford Cryostats...



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