

dicting phase behavior, especially of weaker amphiphiles. But they do not lead easily to the well-defined membranes and large correlation lengths characteristic of strong amphiphiles. Lattice models also violate the scale invariance of the bending energy of physical, "off-lattice" membranes, because the imposed lattice breaks rotation invariance (a point not emphasized by the authors).

▷ Ginzburg-Landau theories are convenient for discussing possible phase diagrams and the structure and fluctuations of phases, but, of course, they require some adjunct microscopic model for computing their several (often many!) phenomenological parameters.

▷ The membrane approach is best for strong amphiphiles, summarizing the complex microscopic association behavior in a few properties of the resulting interface. But it is less successful in predicting phase diagrams, mainly because of the difficulty of a unified description of phases with large-scale structures (microemulsions) and those without (micellar solutions).

The authors give the least time and attention to the membrane approach, with tantalizingly short discussions of and few references to many fascinating topics (lamellar phases and vesicles and their fluctuations, for instance). I found myself wishing that this well-organized, well-presented article had been longer than its 166 pages of text, perhaps with more discussion of questions left unanswered and speculations as to the direction of future work. This volume will certainly be of interest to researchers in this area and may be useful as supplemental material for graduate students.

▷ SCOTT MILNER

*Exxon Research and Engineering  
Annandale, New Jersey*

## Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry and Engineering

▷ Steven H. Strogatz  
*Addison-Wesley, Reading, Mass.,  
1994. 498 pp. \$55.95 hc ISBN  
0-201-54344-3*

As nonlinear dynamics has matured as a subject, the demand has grown for an effective introductory text. The subject is multidisciplinary with applications in diverse fields, and it

## When Choosing Texts for Your Physics Curriculum, Depend on These Exceptional Plenum Press Titles!

*New edition!*

### PRINCIPLES OF QUANTUM MECHANICS

Second Edition

by R. Shankar

"A thoroughly modern book worthy of consideration as a resource for advanced undergraduate or introductory graduate quantum courses..."

Highly recommended."

—Choice

Indispensable to courses in • theoretical and mathematical physics • high-energy physics • solid state physics • atomic, molecular, and chemical physics • nuclear physics • electrical engineering.

0-306-44790-8/694 pp./ill./1994/\$49.50

Selected Topics in Superconductivity  
Series Editor: Stuart Wolf

### INTRODUCTION TO HIGH-TEMPERATURE SUPERCONDUCTIVITY

by Thomas P. Sheahan

Essential for courses in superconductivity, low temperature physics, materials science, cryogenics, ceramics and glass science, and electrical engineering.

0-306-44793-2/598 pp./ill./1994/\$59.50

### CASE STUDIES IN SUPERCONDUCTING MAGNETS

Design and Operational Issues  
by Yukikazu Iwasa

Important addition to mechanical, cryogenic, nuclear, electrical, "energy" and material engineering courses.

0-306-44881-5/435 pp./ill./1994/\$59.50

Plenum Text Policy: Single copies of Plenum books suitable for course work are available on a 60-day approval basis. Write to the Textbook Marketing Manager and include full course information.



PLENUM PUBLISHING CORPORATION  
233 Spring Street, New York, N.Y. 10013-1578  
Telephone orders: 212-620-8000/1-800-221-9369

*Just Published!*

### COMPUTATIONAL PHYSICS

An Introduction

by Franz J. Vesely

A systematic introduction to the field, relevant to courses in • theoretical and mathematical physics • physical chemistry • statistical mechanics

0-306-44903-X/278 pp./ill./1994/\$59.50  
text adoption price on orders of six or more copies: \$29.50 each

### ELEMENTS OF PHYSICS

by Marcel Wellner

"The amount of solid physics contained within the 700 pages is impressive."

—Physics Education

0-306-43354-0/708 pp./ill./1991/\$55.00

*Attention, students: Excel on your qualifying exam!*

### A GUIDE TO PHYSICS PROBLEMS

Part I: Mechanics, Relativity, and Electrodynamics

by Sidney B. Cahn and

Boris E. Nadgorny

"Generations of graduate students will be grateful for its existence as they prepare for this major hurdle in their careers."

—R. Shankar, Yale University

Provides students with 140 advanced physics problems from leading U.S. graduate schools, allowing them to prepare thoroughly for their written qualifying exam.

0-306-44679-0/softcover/324 pp./ill.  
1994/\$24.50

Book prices are 20% higher outside U.S. and Canada.



## SUPERCONDUCTING MAGNET SYSTEMS



### The Industry Standard For Quality And Reliability!

- ☑ Reliable "Workhorse" Magnet Systems For Demanding Applications
- ☑ MIL-STD Approved Quality Control
- ☑ A Magnet Pioneer With 27 Years Fabrication Experience
- ☑ World's Largest Supplier of Helium Level Instrumentation
- ☑ World's Largest Supplier of Vapor Cooled Current Leads
- ☑ On Time Delivery
- ☑ Technical Support
- ☑ Value Pricing

Call, Fax Or Write For  
Free! Product Catalog!

**American Magnetics, Inc.**  
PO Box 2509, Oak Ridge, TN 37831

Phone: 615-482-1056  
Fax: 615-482-5472

can be approached from foundations in physics or in the mathematics of differential equations. Presenting such material in a self-contained and comprehensive fashion poses significant difficulties. Steven Strogatz has produced a text that succeeds admirably with this goal.

The book is suitable for a one-semester, advanced undergraduate course; it requires a standard background in calculus and introductory classical mechanics. The details associated with applications to lasers, pendula, fireflies, rabbits and sheep and foxes, superconductors, chemical reactions, love affairs, insect outbreaks and the coding of secret messages with chaos are self-contained. The richness of the variety of applications emphatically underscores the significance of nonlinear dynamics. It also makes the study of the subject exciting and even amusing.

Strogatz, who is still in the early part of his career, has been recognized for his outstanding teaching at MIT and has been an active contributor to the research literature, especially in the area of coupled oscillators in physics and biology. His approach places geometrical methods at the center of the presentation. The book contains several hundred carefully conceived illustrations, dozens of worked examples and hundreds of instructive problems for the student. The problems are of graded difficulty, with some problems providing the student with a taste of current research. The examples impressed me with their subtlety and incisiveness. Important, delicate distinctions and exceptions are highlighted and accessible.

The first two thirds of the book are devoted to one- and two-dimensional flows, bifurcations and stability diagrams and the lexicon of dynamical systems; the last third of the book is about chaos, covering Lyapunov exponents, renormalization and fractals. Close contact with real applications is maintained throughout this section, and the intuitive treatment of renormalization methods for the logistic map is especially effective.

Two other books of high quality intended for advanced undergraduates are Robert Devaney's *An Introduction to Chaotic Dynamical Systems* (Addison-Wesley, 1989), and Gregory Baker and Jerry Gollub's *Chaotic Dynamics: An Introduction* (Cambridge, 1990), both of which I like. Compared to Strogatz's book, they are narrower in scope and thereby more thorough in the treatment of their chosen topics. Nevertheless, it is the variety of topics in *Nonlinear Dynam-*

*ics and Chaos* that is one of its great strengths.

►RONALD F. FOX

*Georgia Institute of Technology, Atlanta*

## Introduction to Cosmology

►Matts Roos

Wiley, New York, 1994. 206 pp.  
\$39.95 pb ISBN 0-471-94298-7

Cosmology was once a discipline reserved for philosophers and theologians. Echoes of this esoteric past remain, especially in some European countries where the practitioners of the more traditional disciplines of mathematics and physics seem to disdain cosmologists. But this is changing, and a notable indication of the shift is that physicists are transferring in droves to cosmology. After all, new data in physics enter the scene at most a few times per decade. In cosmology, the acquisition of qualitatively new (if sometimes contradictory) data occurs at a breakneck pace; a month does not pass without some new pronouncement. One month it may be a new detection of fluctuations in the cosmic microwave background, a second month may herald a new measure of the Hubble constant, a third will highlight new evidence for dark matter in galactic halos and a fourth may bring yet another independent measure of the Hubble constant (that blatantly disagrees with the earlier announcement). Keeping up with this flood of information requires familiarity with both classical astronomical concepts and the new insights into cosmology that are being produced by particle physics.

Matts Roos has produced a new introductory text on cosmology that strongly reflects his background as a particle physicist. His *Introduction to Cosmology* is aimed at undergraduate physics majors and makes use of only the simplest questions and concepts from modern particle physics. The physics emphasis provides the author with the opportunity to develop the thermal history of the big bang. He describes the imprints of inflation and symmetry breaking on the observable universe, supplemented by more conventional discussion of the cosmic microwave background and cosmological tests. It is rare to find an elementary discussion of such findings, and the book should prove a useful addition to more astronomically oriented introductory discussions of cosmology.

A penultimate chapter is devoted to