

treatment of semiclassical ideas is unusually clear. Nevertheless readers might have benefited by being alerted to the existence of ideas beyond the traditional material, such as multiple-scattering formalisms or exact coupled-equation theories of few-body rearrangement reactions. For example, Faddeev theory is not mentioned; a derivation of the Lippmann-Schwinger equation (not named) refers to it as the integral equation equivalent to the entire original problem. Even a beginner should be told there is an extensive literature about the variety of possible integral equations and their assorted blemishes. I also note that the nice, somewhat phenomenological, approach to compound nucleus ideas entirely avoids the formalism of the boundary-matching theories.

The application of the theory to explicit models has many valuable lessons. In one of my favorites, Satchler points out that often with a model "the more general its nature, the less physical content it tends to have." The subsequent discussion shows how insights can be reaped from a series of worked-out examples of explicit models, even if each individual example has limited applicability. This is a helpful lesson for a new student, or for an experienced practitioner.

NORMAN AUSTERN
University of Pittsburgh

book notes

Recent Developments in Gauge Theories (NATO Advanced Study Series, Ser. B, Vol. 59)

G. 't Hooft, C. Itzykson, A. Jaffe, H. Lehmann, P. K. Mitter, I. M. Singer, R. Stora, eds. 445 pp. Plenum, New York, 1980. \$49.50

The present volume consists of papers based on the lectures of the 1979 Cargèse summer school. The central endeavor of the papers is the application of non-Abelian gauge theory to the problem of quark confinement. The principal subjects discussed are non-perturbative methods in continuum and lattice gauge theory and some related mathematics.

There are three fine papers by G. 't Hooft on renormalizable gauge theories, on topological confinement mechanisms and on naturalness and the gauge-hierarchy problem. There is a useful paper by C. G. Callan on the Princeton semiclassical approach to confinement and its relation to the work of E. Creutz. There is a typically clear paper by E. Witten on the $1/N$ expansion. These five papers by them-

selves make the book worthwhile.

And there is more: by C. Itzykson, G. Mack, G. Parisi and K. G. Wilson on lattice gauge theory; by M. F. Atiyah and R. Bott on Morse theory; by M. Lüscher on instantons; by V. Poenaru and G. Toulouse on condensed-matter physics; by J. -L. Gervais and A. Neveu on strings; by J. Frölich, J. Glimm, A. Jaffe and K. Symansik on mathematical physics; by J. Zinn-Justin on σ models; and by P. K. Mitter on orbits.

As this litany indicates, some subjects are omitted. Little or no attention

is paid to supersymmetry, supergravity, grand unification or perturbative QCD.

The Cargèse summer institute is sponsored in part by NATO. It is regrettable (and, in view of its participation in NATO, somewhat ironic) that the US Department of Defense supports no domestic research that is not directly related to weapons.

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articles that comprise it, the book deserves a place in well-endowed physics libraries.

KEVIN CAHILL
University of New Mexico

Mathematics: Problem Solving Through Recreational Mathematics

Bonnie Averbach, Orin Chein. 400 pp. Freeman, San Francisco, 1980. \$16.50

This book provides an approach to the teaching of mathematics that seems novel and interesting. After recreational puzzles, problems and games are presented as challenges to problem solving, mathematical techniques for dealing with those of a particular type are developed. The authors say in their preface that students have been enthusiastic and have profited by learning to think critically and logically. There is very little of formal mathematical proofs, the emphasis being on the statement and application of mathematical propositions. The topics treated include symbolic logic; algebra; number theory, including prime numbers and factorization; congruence; diophantine equations; number bases and positional notation; networks and graph theory. There are many interesting puzzles and problems, collected from a great variety of sources. Sample problems are solved in each chapter, and hints and answers for many of the problems are given at the end of the book.

HUGH C. WOLFE
Tenafly, N.J.

Pioneers of Science: Nobel Prize Winners in Physics

Robert L. Weber
272 pp. Institute of Physics, London, 1980. \$23.00 (available to members of AIP Societies from Marketing Services, AIP, 335 E. 45 St. New York, N.Y. 10017 for \$18.40 prepaid to Heyden & Sons)

In his preface, Weber quotes I. I. Rabi on the physicist's life: "The stage on which he played his role was the globe. . . He had no counterpart to the art critic, the music critic. . . to plague him. No one stood between him and his public because his public were his colleagues."

Here, with abundant cross references to the physicist's "public" are 114 short biographies that present an informal survey of the development of 20th century physics. The entries, written by a physicist to be understandable by the general public, note the family background, education, apprenticeship, and work habits that distinguished these men and women. Each biography describes in some detail the work for

which the award was given and its place in modern physics. Each one is illustrated with a drawing.

new books

Particles, Nuclei and High-Energy Physics

$\gamma\gamma$ Collisions, Proceedings, Amiens 1980. G. Cochard, P. Kessler, eds. 400 pp. Springer, New York, 1980. \$27.70

Soviet Scientific Reviews, Section A, Physics Reviews. Vol. II. I. M. Khalatnikov. 484 pp. Harwood, New York, 1980. \$98.00

Low and Intermediate Energy Kaon-Nucleon Physics. E. Ferrari, G. Violini, eds. 428 pp. Reidel, Dordrecht, Holland, 1981. \$100.00

Baryon 1980. Proceedings of the IVth International Conference on Baryon Resonances, Toronto, Canada, 14-16 July, 1980. N. Isgur, ed. 479 pp. Baryon Secretariat, U. of Toronto, Toronto, 1981. \$40.00

Optics and Acoustics

Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light (Sixth Edition). M. Born, E. Wolf. 808 pp. Pergamon, New York, 1980. \$27.50

Coherent Nonlinear Optics. M. S. Feld, V. S. Letokhov, eds. 377 pp. Springer, New York, 1980. \$44.50

The Computer in Optical Research: Methods and Applications. B. R. Frieden, ed. 371 pp. Springer, New York, 1980. \$58.00

Acoustics: An Introduction to Its Physical Principles and Applications. A. D. Pierce. 642 pp. McGraw-Hill, New York, 1981. \$28.95

Optical Physics (Second Edition). S. G. Lipson, H. Lipson. 463 pp. Cambridge U.P., New York, 1981. \$55.00 cloth, \$22.50 paper

Atomic, Molecular and Chemical Physics

Vibrational Spectroscopy of Adsorbates. R. F. Willis, ed. 184 pp. Springer, New York, 1980. \$29.50

The Tunnel Effect in Chemistry. R. P. Bell. 222 pp. Chapman and Hall, New York, 1980. \$39.95

Gas-Phase Reactions: Kinetics and Mechanism. V. N. Kondratiev, E. E. Nikitin. 241 pp. Springer, New York, 1981. \$63.80

Mixed-Valence Compounds: Theory and Applications in Chemistry, Physics, Geology, and Biology (Proceedings of a NATO Advanced Institute, Oxford, England, 9-21 September 1979). D. B. Brown, ed. 519 pp. Reidel, Dordrecht, Holland, 1980. \$115.00

Quantum Theory of Chemical Reactions, Vol. II. Solvent Effect, Reaction Mechanisms, Photochemical Processes. R. Daudel, A. Pullman, L. Salem, A. Veillard, eds. 325 pp. Reidel, Dordrecht, Holland, 1981. \$80.00

Laser-Induced Chemical Processes. J. I. Steinfeld, ed. 276 pp. Plenum, New York, 1981. \$32.50

Magnetic Resonance in Colloid and Interface Science (Proceedings of the NATO Advanced Study Institute and the Second Annual Symposium, Menton, France, June 25-July 7, 1979). J. P. Fraissard, H. A. Resing, eds. 716 pp. Reidel, Dordrecht, Holland, 1980. \$145.00

Luminescence and Energy Transfer, Vol. 42. Structure and Bonding. G. Blasse, R. C. Powell, K. C. Bleijenberg. 133 pp. Springer, New York, 1980. \$40.00

Astronomy, Cosmology and Space Physics

Glossary of Astronomy and Astrophysics. J. Hopkins. 196 pp. U. of Chicago P., 1980. \$17.50

Strategies for the Search for Life in the Universe (A Joint Session of Commissions 16, 40 and 44, Montreal, 1979). M. D. Papagiannis. 253 pp. Reidel, Dordrecht, Holland, 1980. \$30.00

Der Neue Kosmos. A. Unsöld, B. Baschek. 471 pp. Springer, Berlin, 1981. \$27.20

Infrared Astronomy (Symposium No. 96, Kona, Hawaii, June 23-27, 1980). C. G. Wynn-Williams, D. P. Cruikshank, eds. 376 pp. Reidel, Dordrecht, Holland, 1981. \$90.00 cloth, \$45.00 paper

Gravity, Black Holes and the Universe. I. Nicolson. 264 pp. Halsted, Wiley, New York, 1981.

Radiation Transfer and Stellar Atmospheres. T. L. Swihart. 130 pp. Pachart, Tucson, Ariz., 1981. \$24.00

Theory and Mathematical Physics

Field Theory, Quantization and Statistical Physics: In Memory of Bernard Jovet. E. Tirapegui, ed. 321 pp. Reidel, Dordrecht, Holland, 1981. \$90.00

Molecular Hydrodynamics. J. P. Boon, S. Yip. 417 pp. McGraw-Hill, New York, 1981. \$49.95

Theories of Spectral Line Shape. R. G. Breene Jr. 344 pp. Wiley, New York, 1981. \$32.95

Geometric Quantization. N. Woodhouse. 316 pp. Oxford U.P., New York, 1981. \$74.00

Structural Phase Transitions. A. D. Bruce, R. A. Cowley. 326 pp. Taylor & Francis, London, 1981. £15.00

Soviet Scientific Reviews, Section C. Mathematical Physics Reviews. Vol. I. S. P. Novikov, ed. 207 pp. Harwood, New York, 1980. \$44.50

The Physics of Deformation and Flow. E. W. Billington, A. Tate. 626 pp. McGraw-Hill, New York, 1981. \$59.00