

main. Single-particle and composite-particle interactions with nuclei are treated within the framework of the complex optical potential, covering scattering, reactions and heavy-ion transfer processes in explicit detail. Some discussion of time-dependent phenomena, fission and nuclear matter is also included. The whole combines to yield a picture of nuclei and their response to disturbances that at the very least offers qualitative insights into hitherto disparate evidence; in many instances, in addition, this picture furnishes excellent quantitative agreement with experimental findings in a richly assorted variety of phenomena.

Past publications by these and other authors, prolifically referenced in this monograph, have served to delineate the finer points of the cluster model throughout its development, but this volume draws the threads together and illustrates more clearly than ever before the generality and interconnection of many of the underlying considerations. It presents a unified, updated account of progress in the utilization of the cluster model that by its authoritative, informative and stimulating nature is likely to whet the appetite for further study. Its contents clearly fall within the province of most nuclear theoreticians and many of the more thoughtful nuclear experimentalists. The level is by no means beyond that of graduate or even senior undergraduate students, for whom the text might, indeed, be well suited as an educative and enriching one-semester course—always providing that students would not be adverse to taking on trust the results of Wildermuth's and Tang's sometimes lengthy and devious algebra or computation.

There is much to be learned from this monograph, including much of a practical nature. The authors always keep the physics in mind, and repeatedly draw attention to the inferences that may be drawn from observations. They have taken evident care to make the subject as comprehensible as possible and have clearly succeeded in their aim of conveying their visualization to others who may be non-specialists in this field. The progress in this even nowadays over-specialized subject becomes evident when the exposition is compared with the early pedagogic review by Wildermuth in 1959 (CERN 59-23), or with the survey by Wildermuth and W. McClure in 1966 (*Springer Tracts in Modern Physics*, Vol. 41), to say nothing of the Proceedings of various meetings and of the two international conferences on clustering phenomena in nuclei (Bochum, 1969, and Maryland, 1975). In the present text a lot of ground is covered—concisely, comprehensively and stimulatingly. The cluster model has really come into its own, and especially for light nuclei it offers the wherewithal for a long-sought unified

treatment that has generality, flexibility and elegance. Truly, the cluster has luster.

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book notes

Introduction to Ergodic Theory. Ya. G. Sinai. 144 pp. Princeton U. P., Princeton, 1977. \$6.00

Originally published in Russian in 1973 by the USSR's Erevan State University, this volume is the eighteenth in a series of informal lecture notes edited by Wuchung Hsiang, John Milnor and Elias M. Stein. In his book Yakov Sinai examines a number of examples "popular" in ergodic theory; the author says that anyone with a knowledge of the general facts of measure theory and probability theory should be able to follow his lectures, a few of which are concerned entirely with mathematics while the rest are physics-related. Some of the topics covered are linear Hamiltonian systems, ergodic theory of ideal gases and Gaussian systems. This volume is not proof-oriented, but Sinai does end his book with a proof that the entropy of billiard balls inside a polygon is equal to zero.

Physics of Semiconductors (Proc. of the 13th Int. Conf., Rome, August–September 1976). F. G. Fumi, ed. 1328 pp. North-Holland, Amsterdam, 1976. \$95.00

This volume contains all of the invited and contributed papers—about 300 in total—presented at the most recent in a series of conferences on semiconductors sponsored by IUPAP and others. The topics covered include excitons and exciton condensation, superlattices, new and disordered materials, optical and surface properties, hot carriers, transport and magneto transport, recombination and luminescence, and low-dimensionality systems. The conference dealt with fundamental physical properties of semiconductors for the most part, but it also conducted a special session on their applications in solar-energy and microwave devices, opto-electronics and other fields. The volume is intended primarily for semiconductor physicists.

Encyclopedia of Physics, Vol. 49, Part 5 (Geophysics III, Part 5). K. Rawer, ed. 407 pp. Springer-Verlag, Berlin, 1976. \$81.20

Five articles dealing with phenomena of the upper atmosphere make up this fifth volume in a series whose previous entries have treated—among many other topics—aurorae, lunar tides in the ionosphere and Earth's radiation belts. The

first contribution, "La luminescence nocturne (The Nightglow)" by Arlette and Etienne Vassy (in French), is concerned with natural optical emissions that occur under magnetically quiet conditions. Willis L. Webb's "Dynamic Structure of the Stratosphere and Mesosphere" is a consideration of the general thermal structure, as well as detailed structure, of the upper atmosphere, with sections on stratospheric circulation, tides and clouds. In "Linear Internal Gravity Waves in the Atmosphere," Walter L. Jones takes up problems associated with linear wave equations in an atmosphere at rest, the isothermal atmosphere and other topics.

The longest contribution is Jakov L. Al'pert's "Wave-Like Phenomena in the Near-Earth Plasma and Interactions with Man-Made Bodies," at 132 pages. Al'pert deals with phenomena associated with vehicles passing through the plasma of near-Earth space. The book ends with "Some Characteristic Features of the Ionospheres of Near-Earth Planets" (meaning Venus and Mars) by Konstantin I. Gringauz and Tamara K. Breus, in which the authors discuss methods for investigating planetary ionospheres via spacecraft, experimental results in the Martian and Cytherean cases and models of the two planets' ionospheres. Researchers and students in atmospheric and space physics constitute the book's likely audience.

—FCB

new books

Particles, Nuclei and High-Energy Physics

In-Beam Gamma-Ray Spectroscopy. H. Morinaga, T. Yamazaki. 527 pp. North-Holland, Amsterdam, 1976. \$61.50

Neutron Physics (Springer Tracts in Modern Physics, Vol. 80). L. Koester, A. Steyerl. 135 pp. Springer-Verlag, New York, 1977. \$26.30

Atomic, Molecular and Chemical Physics

Molecular Symmetry and Group Theory. A. Vincent. 156 pp. Wiley, New York, 1977. \$13.50 clothbound, \$5.95 paperbound

Dynamics of Polymeric Liquids: Vol. 1, Fluid Mechanics; Vol. 2, Kinetic Theory. R. B. Bird, O. Hassager, R. C. Armstrong, C. F. Curtis (Vol. 2 only). 740 pp. Wiley, New York, 1977. \$29.95 and \$26.95, respectively

The Chemical Physics of Surfaces. S. R. Morrison. Plenum, New York, 1977. \$39.50

Introduction to the Electron Theory of Small Molecules. A. C. Hurley. 329 pp. Academic, London, 1977. \$26.25

Electron Correlation in Small Molecules