

tion of Massey's vast influence in making University College London, and the University of Belfast, Northern Ireland, centers of research in atomic and molecular physics.

The distribution of papers also reflects Massey's wide ranging interests. Six are theoretical, three experimental and three deal with applications of atomic physics to astrophysics, the ionosphere and the ionization processes in space. The 13th article is partly experimental and partly theoretical in nature. The articles are intended for the mature practitioner. I found that those articles somewhat away from my field of expertise were very tough sledding indeed. The principal value that any one of the papers would have for a beginner is the excellent bibliographies included with each article.

The volume is in the tradition of the previous books in this series, which it complements. It is an authoritative review of some important areas of current research in atomic physics, notably those areas in which Massey was interested and made an impact. It is a volume of which he could indeed be proud.

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A theoretical atomic physicist who has published in the field of the scattering of electrons by atoms, Sidney Borowitz is currently chairman of the Division of Electron and Atomic Physics of the American Physical Society and acting head of the physics department of New York University.

Layman's technology

GIANT MOLECULES: THE TECHNOLOGY OF PLASTICS, FIBERS AND RUBBER. By Morris Kaufman. 187 pp. Doubleday, New York, 1968. Cloth \$5.95, paper \$2.45

LASERS: TOOLS OF MODERN TECHNOLOGY. By Ronald Brown, 192 pp. Doubleday, New York, 1968. Cloth \$5.95, paper \$2.45

by RICHARD B. ZIPIN

These two new books in the Doubleday Science Series thoroughly treat their respective subjects in easy-to-understand layman's language.

Giant Molecules by Morris Kaufman discusses the chemistry of polymers, their manufacture, their products and the applications of these products. The author gives his non-technically trained readers a good feel for the business of technology, telling them of men responsible for the devel-

opment of plastics, besides discussing the technology itself.

Much the same can be said of *Lasers* by Ronald Brown, which treats the various types of lasers and their applications in communications, holography, medicine, measurements and metalworking.

Both books are interesting reading and have an identical format that contains no references and only very short bibliographies and indexes. But they are attractively illustrated, containing numerous figures, many in full color. They can be recommended as suitable reading for bright high-school students and other laymen interested in an overview of each subject.

For the plasma shelf

ADVANCES IN PLASMA PHYSICS: VOL. 1. Albert Simon, William B. Thompson, eds. 340 pp. Wiley (Interscience), New York, 1968. \$14.95

by B. SAMUEL TANENBAUM

The new editors of the *Reviews of Modern Physics* have correctly stated "In a time when most of our colleagues express the desire to read good reviews, a diminishing fraction seems willing to devote the time and effort to write them." Hence it is a pleasure to welcome the appearance of *Advances in Plasma Physics: Volume 1*, edited by Albert Simon and William B. Thompson.

This volume has a format familiar to readers of other "reviews" and "advances" series. It consists of six individual articles ranging in length from 25 to 104 pages. Two of the articles, on "Plasma in the Magnetosphere" by Frederick L. Scarf and "The Plasma MHD Power Generator" by Thomas R. Brogan, are authoritative summaries of experimental data that make some comparison with theory and provide voluminous references. The Scarf article succeeds in organizing a large amount of recent, often confusing, experimental findings into some semblance of order. Brogan's long paper emphasizes the hard-to-find engineering details of practical MHD generator design.

Another paper on "Minimum-Average-B Stabilization of Toruses" by Harold P. Furth, is an elegant, well referenced, essentially nonmathematical survey of the theory and use of this

The authors are to be commended because these books will certainly be read and understood by young students and may well inspire some of them to pursue technical careers. Although neither author states his purpose in writing the book, no better purpose could have been sought in such a time as now, when so many more scientists and engineers are required in our ever increasingly complex world.

* * *

The reviewer is engaged in the application of laser interferometers as position-measurement devices on large coordinate-measuring machines at the Bendix Corp.

important fusion-confinement scheme. Unfortunately the audience for this article is limited by the author's assumption that the reader is already familiar with the array of plasma instabilities that are so disastrous to present fusion devices. (Papers surveying both the overall status of the fusion program and our present knowledge about instabilities would have been highly desirable additions to this volume.)

The remaining three articles, "Radiation from Plasmas" by John M. Dawson, "Drift Waves" by Nicholas A. Krall and "Thermodynamics of Unstable Plasmas" by T. Kenneth Fowler are tutorial papers treating specific aspects of plasma-physics theory. Of the three, the article by Dawson makes the best reading. Although he limits his discussion by omitting cyclotron and synchrotron radiation, the material covered is treated with clarity and sufficient detail to satisfy the needs of an advanced graduate student or an instructor using the material in a plasma-physics course. The other two articles are shorter and less successful in this respect, and I suspect their use will be more limited.

In all, the editors are to be congratulated for initiating this series and for obtaining articles from well recognized researchers in plasma physics. (An indication of their success in obtaining manuscripts is that the second and third volumes of the series are both scheduled for publication later this year.) One cannot help wishing that the entire volume were more comprehensive in its coverage and more uni-

Wiley-Interscience books for Physicists

DISPERSION RELATION DYNAMICS

A Phenomenological Introduction to S-Matrix Theory

By HUGH BURKHARDT, *The University of Birmingham, England.*

This is a simple, easy-to-follow exposition of S-matrix theory. The deductive approach has been avoided since the author believes that the physical calculations that are actually made can be developed and understood on a simple conceptual basis with a largely phenomenological spirit.

CONTENTS: Complex Variable Analysis. Phenomenological Collision Theory. S-Matrix Dynamics. Appendices. General References. 1969 325 pages \$18.50

TRANSFER AND STORAGE OF ENERGY BY MOLECULES

Edited by G. M. BURNETT, *University of Aberdeen, Scotland,* and ALASTAIR M. NORTH, *University of Strathclyde, Scotland.*

Volume I: Electronic Energy

This first volume of *Transfer and Storage of Energy by Molecules* deals with the storage of electronic energy. It places emphasis on processes occurring during chemical reactions, and includes articles on gas phase reactions, the chemistry of electronically excited molecules, energy transfer in radiation chemistry, and thermal activation of electronic states.

1969 234 pages \$11.95

Volume II: Vibrational Energy

The purpose of this volume is to review the current theories of vibrational energy transfer, to cover the background of the experimental methods currently used to study the phenomenon, and to discuss the experimental results obtained to date.

1969 382 pages \$14.50

GALLIUM ARSENIDE p-n JUNCTION LASERS

By C. H. GOOCH, *Services Electronics Research Laboratory, England.*

This volume considers the gallium arsenide p-n junction laser in all aspects and in considerable length. It cuts across the boundaries between theoretical and practical aspects of the subject. Aspects of the lasers which are discussed include theory, properties, preparation, technology, and application.

1969 384 pages \$12.50

PHOTOGRAPHIC ACTION OF IONIZING RADIATIONS

By R. H. HERZ, *Consultant to Kodak Research Laboratories, England.*

A volume in the *Photographic Science and Technology and Graphic Arts Series*. This is an account of the theoretical and experimental fundamentals of the photographic response of x and gamma rays, charged and uncharged particles such as electrons, alpha particles, protons, and neutrons. Applications of ionizing radiation are considered in dosimetry, in medical, industrial, neutron, auto- and micro-radiography.

1969 In press Approx. 664 pages

MATHEMATICAL AND THEORETICAL PHYSICS

In four volumes

By the late EGIL A. HYLLERAAS, *formerly of the University of Oslo, Norway.*

These volumes present a clear and concise treatment of classical physics including the necessary mathematical background. They expound four basic themes: classical mechanics, the theory of heat, electricity and magnetism, and atomic theory.

Volumes 1 and 2 now in press.

CORRELATION EFFECTS IN ATOMS AND MOLECULES

Edited by R. LEFEBVRE and C. MOSER, *both of the Centre de Mechanique Ondulatoire Appliquee, Paris.*

Volume 14 in the *Wiley-Interscience Advances in Chemical Physics Series*.

This volume presents a wide variety of articles dealing with atomic and molecular physics and involving both traditional and less traditional approaches. It contains most of the papers presented at the Advanced Summer Institute of Correlation Effects in Atoms and Molecules held in Italy in 1967.

1969 556 pages \$29.95

DISPERSION THEORIES OF STRONG INTERACTIONS AT LOW ENERGY

By D. V. SHIRKOV and V. V. SEREBRYAKOV, *both of the Institute for Mathematics, Siberian Branch of the Academy of Sciences, U.S.S.R.,* and V. A. MESHCHERYAKOV, *Joint Institute for Nuclear Research, U.S.S.R.*

A volume in the *Wiley-Interscience Monographs and Texts in Physics and Astronomy*, edited by R. Marshak, *University of Rochester.*

This book is devoted to the application of the dispersion relations method to the theory of strong interactions of elementary particles at low energies. It discusses foundations of the dispersion method, the main features of low energy approximations, pion scattering electromagnetic interaction of pions, and pion-nucleon interactions.

1969 384 pages \$19.50

THEORY OF WEAK INTERACTIONS IN PARTICLE PHYSICS

By ROBERT T. MARSHAK, *University of Rochester;* RIAZUD-DIN, *University of Islamabad;* and CIARAN P. RYAN, *University College, Dublin.*

This volume serves both experimental and theoretical workers in this growing branch of physics. Reference is given to a substantial number of the original papers.

"The breadth and depth of its coverage and the lucidity and elegance of its arguments is bound to make it a standard work in the field for a long time to come."—Henry Primakoff, *University of Pennsylvania*

1969 784 pages \$29.95



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fied in its level of presentation, notation, units and approach. The recent volume *Plasma Physics in Theory and Application* edited by Wulf B. Kunkel comes to mind as a successful example of what can be done. Nonetheless, this book is a valuable reference work that will be a welcome addition to research libraries catering to plasma physicists.

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B. Samuel Tanenbaum, who teaches at Case Western Reserve University, is the author of a recent text, *Plasma Physics*.

Composite monograph

CERAMIC FIBERS AND FIBROUS COMPOSITE MATERIALS. By H. W. Rauch Sr, W. H. Sutton and L. R. McCreight. 436 pp. Academic, New York, 1968. \$12.50

by THOMAS R. CASS

Although the concept of composite strengthening is not new, interest in its application to materials technology is rapidly growing. This is primarily because with composite materials one is able to "design" mechanical properties by choice of the amount and type of reinforcing phase. In doing so one can provide strength-to-density and stiffness-to-density ratios superior to those of homogeneous materials.

This monograph is described by the publisher as a survey of composite technology; however, the monograph is itself a composite. Unfortunately it is not apparent that it is an improvement over a homogeneous presentation. The survey was performed under Air Force contract, and was accomplished by personal and written contacts as well as by a patent and literature search. Accordingly the monograph is composed of four heterogeneous sections. The first section, which comprises one-fourth of the monograph, consists of chapters on fiber-composite technology, reinforcements, testing fine filaments and whiskers and fiber-composite materials. The remaining three sections present contract reports (95), patent abstracts (200) and references (789).

The initial chapters of the monograph give a general discussion of composite technology and are worthwhile introductory reading for materials engineers and interested scientists. However, because of the sensitivity of mechanical properties of composites to

subtle variables, many of the early property data presented should be considered tentative. I also noted a bias towards discontinuous "whisker"-reinforced composites relative to continuous-filament composites. This bias probably is traceable to the authors' greater experience with single crystal Al_2O_3 whisker composites. Little mention is made of two of the more important composite systems in use today, boron-epoxy and graphite-epoxy. Finally the problem of the physicochemical compatibility of filament-matrix combinations is not treated in any detail. Chemical research between reinforcement and matrix presently limits the application of metal-matrix composites at elevated temperatures. Widespread recognition of this problem, however, was not forth-

coming until 1967, after the monograph was written.

This comment brings us to the major criticism of this monograph as a source book of the rapidly expanding field of composites; its latest reference is Fall 1966. Much the same information was available, albeit to a limited audience, earlier than 1969 in the form of the original Air Force contractual reports. Nonetheless for those to whom these reports are inaccessible, the monograph will be of use as an index of composite technology.

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The reviewer is chief of the advanced materials research section at the Orlando Division of the Martin Marietta Corp., where he is involved in research programs dealing with metal-matrix composites.

The omnipresent hydrogen bond

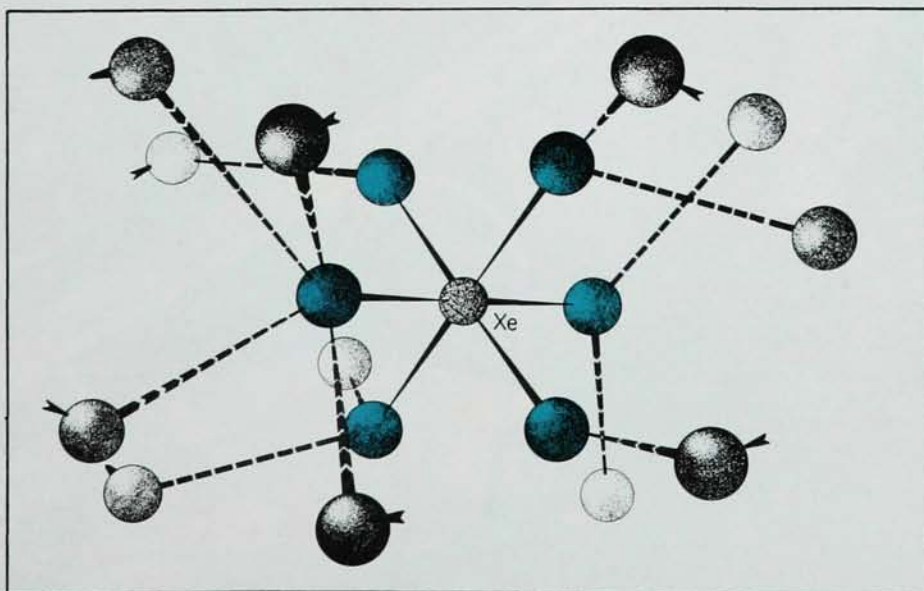
HYDROGEN BONDING IN SOLIDS: METHODS OF MOLECULAR STRUCTURE DETERMINATION. By Walter C. Hamilton, James A. Ibers. 284 pp. W. A. Benjamin, New York, 1968. \$13.95

by JOSEPH G. HOFFMAN

The eight chapters and one appendix of this book pull together much timely information about the strangest, and possibly the most important, type of chemical bond known. Certainly in macromolecules, the hydrogen bond is paramount in determining the chemical properties that have led to the daz-

zling successes of molecular biology.

This book is the best yet available for an introduction to the physical methods and the chemical criteria for studying the bond. The first four chapters review methods of electron, x-ray and neutron diffraction along with those of spectroscopy and nuclear magnetic resonance. Essential theory underlying each method is outlined and compared with experiment. Organic and biological molecules, inorganic crystals and hydrates and ferroelectrics are discussed with a generous complement of structural formulas and



HYDROGEN BONDING in part of sodium perxenate octahydrate, showing the surrounding of a single perxenate ion. Color shows oxygen atoms.