

and replaced by a continuous pagination; the job is so well done that it requires some effort to ascertain that apparently none of the text had to be re-set in type.

There are great men whose writing centers about autobiography and invariably reverts to it; there are others who deliberately set out and succeed in covering up their personal tracks for the sake of the objectivity of their work. Max von Laue belongs wholly to the second category. Such modest personal and biographical elements as there are will be found in Vol. 3, a miscellany of popular articles, public addresses, and obituary speeches on some of the great of science. This volume is preceded by a brief (30-page) autobiography. We begin to understand from it certain of the personality traits which made von Laue in his later life appear to many as something of a saint: by a unique combination of reticence of speech, personal tact, and completely unbending moral fortitude he, fervent patriot that he was, managed not only to survive the Nazis whom he clearly despised, but also to give help to innumerable of their victims. In advanced age, after the war, he made great personal sacrifices to be one of the leaders in restoring what was left of the once flourishing German scientific establishment.

We get occasional glimpses, in this volume, of his lifelong friendship with Einstein, which had nothing in it of the mere mutual accommodation of two celebrities but was clearly an intimate and very personal affair throughout. We learn from this book about the events that led up to von Laue's famous discovery: In February of 1912 he was visited one evening by a student of Sommerfeld's, P. P. Ewald (well known to all x-ray crystallographers, now living in retirement in the US). Ewald wanted help in his thesis work which dealt with propagation of light through crystal lattices, the latter concept still being somewhat hypothetical at the time. Von Laue was, among other things, a specialist in wave optics. The wavelength of x rays being roughly known from knife-edge diffraction experiments, the idea of obtaining x-ray diffraction patterns from crystals occurred to him on

the spot. This was bandied about among some younger experimentalists, and two of them volunteered to set up the experiment. It was in working shape several weeks later, and on the second photographic plate exposed there appeared unmistakable diffraction spots behind a single crystal of copper sulfate. It is strange to contemplate in the age of the large accelerators that only 50 years separate us from this golden age of scientific discovery.

Von Laue's commanding position as a theoretical physicist rests on his total work, not on any single idea, however successful. Vols. 1 and 2 contain 91 scientific papers spanning the period from 1904 to 1959. Whenever von Laue got engrossed in a subject, he ended up by writing a book or monograph. His *Special Relativity* was the first textbook to appear on this subject (1910); it is a classic, now in its 7th edition. Later followed a book on *General Relativity*, one on *X-ray Interference in Crystals*, one on *Matter-waves*, one on *Superconductivity*, and a little gem, the short *History of Physics*. Only the last two have been translated into English. Since all these works have been so successful as to be reissued, some in improved versions, a comprehensive and critical edition of von Laue's Collected Works seems dependent on the expiration of the copyrights on these books, which are omitted here and are of course indispensable for an appreciation of his total work. In the meantime, we believe that Vol. 3 will be indispensable to those who are interested in tracing the development of scientific thought in the early part of this century; they will also obtain some unique glimpses into the mind of a truly great man.

Atomic and Nuclear Physics. Theoretical Principles. By H. D. Bush. 218 pp. (Iliffe, London) Prentice-Hall, Englewood Cliffs, N. J., 1962. \$8.95.
Reviewed by H. H. Bolotin, Physics Department, Argonne National Laboratory, Argonne, Illinois.

The most striking characteristic of this volume is the ease with which the author leads the reader from one concept to another in an extremely natural and provocative way. Each topic is developed in a manner which em-

phasizes the physical concepts and the understanding of the importance of these concepts with respect to each other. Historical developments are used to great advantage and are accompanied by lucid accounts of their meaning and significance so that the better student will find himself brought to the point of anticipating the next significant step prior to its description.

The section on the nucleus, in which its constitution is described and treated, is done in a way that is outstanding for its clarity. The arguments for or against particular elementary constituents of the nucleus are developed and explained within the context of the experimental and theoretical developments of the era in which the topic was of paramount issue. Although this has been described by many previous authors, seldom has the development of this topic been as notable for its lucidity and for the basic understanding it gives to the student reader.

This is by no means a text devoted to the mere description and survey of physical concepts. It is best described as a detailed textbook which develops both the concepts and understanding of topics ranging from atomic structure to induced nuclear reactions, neutron physics (not technology), and electromagnetic radiation. This book is primarily designed to serve the needs of students who are experimentally oriented, since the contents are based upon a course, given by the author, for engineers entering the field of nuclear reactor technology. However, unlike several other texts geared to the same type audience, the success of this book is derived from its ability to give the reader a rather deep understanding of and insight into the fundamentals of the physics involved. This is definitely a textbook of physics and not an engineering treatise. In addition to the type of reader to whom the author addresses himself, this text is extremely well suited for an advanced undergraduate physics or chemistry student, or for an introductory graduate course in atomic and nuclear physics. In this regard, the only shortcoming of the book is the total absence of problems. If and when a second edition of this

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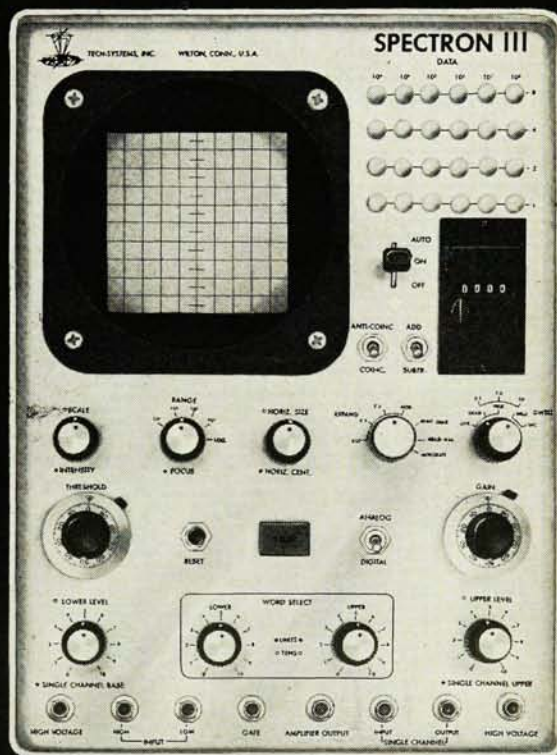
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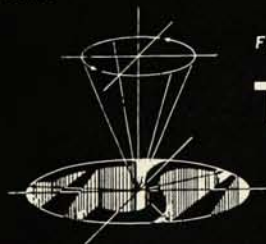
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book is brought out, the author might very well extend its usefulness for such students by including problems which are as provocative as his text. This lack, however, in no way detracts from the extremely successful presentation of the contents.

Rarefied Gas Dynamics. Symp. Proc. (Paris, June 1962). J. A. Laurmann, ed. Supplement 2 of *Advances in Applied Mechanics*, edited by H. L. Dryden, Th. von Kármán, et al. Vol. 1, 541 pp.; vol. 2, 529 pp. Academic Press New York, 1963. \$16.00 per volume. Reviewed by R. Bruce Lindsay, Brown University.

The statistical theory of gases is a very old discipline, much cultivated by both physicists and chemists, who have used it in trying to learn about transport and other properties of such fluids. In fairly recent times it has taken on renewed life in view of the practical problems provided by the

high-speed flow of low-density gases encountered in high-flying aircraft and in the ballistic-missile and artificial-satellite field. The flow of ionized gases has also posed a new challenge to the statistical theory. It is, therefore, not surprising that considerable research activity has developed, leading to international symposia for the discussion of the results. The two volumes under review contain 55 papers from the Third International Symposium on Rarefied Gas Dynamics held in Paris in June 1962.

Rarefied gas dynamics deals with the flow of gases in which the mean free path of the molecules is not negligible compared with some length associated with the structure of the flow, e.g., channel width in tube flow or the boundary-layer thickness in external flow. Its normal field of study is the transition region between the effectively continuous flow handled by the Navier-Stokes equation (very small

mean free path) and the other extreme of collisionless molecular motion. Much of the mathematical complexity of the subject is connected with the difficult physical conditions encountered in this region.

The articles in these volumes are grouped in six sections dealing respectively with: (1) fundamental kinetic theory (Boltzmann equation); (2) molecular beams and surface interactions; (3) ionized gas flows; (4) transition flow-theory; (5) transition flow-experiment; and (6) experimental methods in rarefied gas flows. Each article is accompanied by a brief bibliography and in many cases by a summary of the discussion it elicited at the symposium. Most of the articles are in English, though there are a few in French. The figures and typography are excellent. The whole constitutes a compendium of useful up-to-date information in a most important field of fluid dynamics.

BOOKS RECEIVED

ACOUSTICS

Acoustique sous-marine. By L. Guieysse and P. Sabathé. 251 pp. Dunod, Paris, 1964. 64 F.

ASTRONOMY & ASTROPHYSICS

Astronomy. By R. H. Baker. (8th ed.) 557 pp. Van Nostrand, Princeton, N.J., 1964. \$8.25.

Elements of Astromechanics. By P. van de Kamp. 140 pp. W. H. Freeman, San Francisco, 1964. Cloth \$4.00, Paper \$2.00.

ATOMIC & MOLECULAR PHYSICS

The Atom. By Charles Hatcher. 107 pp. (Macmillan, London) St Martin's Press, New York, 1964. \$3.95.

BIOPHYSICS & MEDICAL PHYSICS

Introduction to Biophysical Chemistry. By R. Bruce Martin. 365 pp. McGraw-Hill, New York, 1964. \$11.50.

CHEMISTRY & CHEMICAL PHYSICS

Crystallization of Polymers. By Leo Mandelkern. 359 pp. McGraw-Hill, New York, 1964. \$13.50.

Classics in the Theory of Chemical Combination. O. Theodor Benfey, ed. 191 pp. Dover, New York, 1963. Paper \$1.85.

Uranium. By J. H. Gittus. 623 pp. Butterworths, Washington, D.C., 1963. \$24.75.

Vapour Pressure of the Elements. By An. N. Nesmeyanov. Transl. from Russian and edited by J. I. Carasso. 469 pp. Academic, New York, 1963. \$14.50.

COMPUTATION & COMMUNICATION

The Art of Simulation. By K. D. Tocher. 184 pp. Van Nostrand, Princeton, N.J., 1964. \$5.95.

Automat und Mensch (2nd ed.) Kybernetische Tatsachen und Hypothesen. By Karl Steinbuch. 392 pp. Springer-Verlag, Berlin, 1963. DM 36.

IBM 1620 Programming. For Science and Mathematics. By Irving Allen Dodes. 276 pp. Hayden Book Co., New York, 1963. \$9.95.

An Introduction to Digital Computing. By Bruce W. Arden. 389 pp. Addison-Wesley, Reading, Mass., 1963. \$9.75.

EDUCATION

The Writing Requirements for Graduate Degrees. By Paul E. Koefod. 268 pp. Prentice-Hall, Englewood Cliffs, N.J., 1964. \$4.50.

ELECTRICITY & MAGNETISM

Charge Storage in Solid Dielectrics. A Bibliographical Review on the Electret and Related Effects. By Bernhard Gross. 153 pp. Elsevier, Amsterdam, 1964. \$8.00.

ELECTROMAGNETIC WAVES & ELECTRONS

Lectures on the Many-Electron Problem. By R. Brout and P. Carruthers. 204 pp. Interscience, New York, 1963. \$9.50.

Radio Ray Propagation in the Ionosphere. By J. M. Kelso. 408 pp. McGraw-Hill, New York, 1964. \$17.50.

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Transistor Circuit Theory and Design. By John Franklin Pierce. 418 pp. Charles E. Merrill, Columbus, Ohio, 1963. \$13.00.

Semiconductor Particle Detectors. By J. M. Taylor. 180 pp. Butterworths, Washington, D.C. 1963. \$8.25.

Electronic Circuits. A Unified Treatment of Vacuum Tubes and Transistors (2nd ed.). By E. J. Angelo, Jr. 652 pp. McGraw-Hill, New York, 1964. \$11.50.

EXPERIMENTAL TECHNIQUES

Elements of Pulse Circuits. By F. J. M. Farley. (2nd ed.) 159 pp. (Methuen, London) Wiley, New York, 1962. \$3.50.

Application of Ultrasonics in Molecular Physics. By V. F. Nozdrev. Transl. from Russian by Scripta Technica, Inc. 527 pp. Gordon and Breach, New York, 1963. \$27.50.

Laboratory and Workshop Notes 1959-1961. Ruth Lang, ed. 249 pp. (Edward Arnold, London, 1963) St Martin's Press, New York, 1964. \$10.00.