

THE PHYSICS OF ELEMENTARY PARTICLES

By J. D. Jackson

This is an introductory account of the physics of elementary particles and their interactions, with a minimum of formal apparatus and unusual clarity of presentation. The book is designed for graduate students and for physicists not specializing in the field. Selected topics include scattering, photoproduction, K-mesons and hyperons, theoretical models, weak decay processes, and analysis of recent experiments on non-conservation of parity. *Investigations in Physics, No. 9.* 176 pages. \$4.50

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MESONS AND FIELDS

by Hans A. Bethe, Frederic de Hoffmann,
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Vol. I, FIELDS. "... an excellent introduction to present-day field theory . . . well suited for use as the basis of a graduate physics course. . . extremely readable." From review in *Science*, by D. C. Peaslee, Purdue.

Vol. II, MESONS. "... of value to anyone who has any connection with π -meson physics. Nowhere else can so much useful and important information on this subject be found . . ." By Geoffrey Chew, University of California, in *Nucleonics*.

Vol. I, xvi + 499 pp., \$8.00; Vol. II, xiii + 446 pp., \$8.00. For the set of two volumes, \$15.00

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parts of the book which I found most interesting was the discussion of the discovery of discrete sources or radio stars. There are discussions of the tracking of meteors by radar, lunar probes, and radio echoes from earth satellites. New techniques and equipment are also described and, of course, the authors' own important facility, the 250-ft Jodrell Bank steerable telescope is discussed.

Except for a few slips by the authors the book is well written. For example "parsec", a unit of distance, is utilized right at the beginning and it is only defined on page 10. Also, a search through the index did not list this word. Another case which may cause some irritation to the reader is the discussion in the body of the text (page 59) of certain reference points in a diagram (44b). These points do not appear in the diagram.

I am sure that these kinds of errors can be repaired in later printings or editions of this book and that the over-all quality will outweigh these blemishes. In this important scientific International Geophysical Year and because of the current news of earth satellites and lunar probes, this book will surely help serve to introduce those unacquainted with radio astronomy to a very fascinating and important field.

Crystal Physics II. Vol. 7, Part 2 of *Handbuch der Physik*. Edited by S. Flügge. 273 pp. Springer-Verlag, Berlin, Germany, 1958. DM 76.00 (subscription price DM 60.80). Reviewed by R. Smoluchowski, *Carnegie Institute of Technology*.

In continuation of the new *Handbuch der Physik* series there appeared the second part of the volume dealing with crystal physics. While the first part concerns several subjects such as lattice defects, crystallography, elastic and thermal properties, and specific heats, the second is devoted only to plasticity and to transformations and precipitation in solids. Seeger's article, of over 200 pages, is a very thorough survey of the phenomenological and of the theoretical side of plasticity in crystalline materials. Inasmuch as dislocations, the basic concept of plasticity, have been treated at length by the same author in the first part of this volume, the present article uses them as a tool without going into a detailed theoretical and experimental discussion of their properties. Similarly the mathematical plasticity of a continuum is omitted since it is treated elsewhere. The first item to be treated in detail is the estimate of the so-called theoretical shear strength and its comparison with experiment. This is the crucial argument which underlies nearly all concepts of the defect structure of solids. This introduction is followed by an excellent and long (nearly half of the whole article) description of the fundamental facts and notion of plasticity: crystallography of deformation, geometry, creep curves, yield point, critical shear strength, influence of temperature, influence of composition, etc. The chapter covers both metals and many nonmetals such as germanium and



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alkali halides. A separate chapter deals with the important phenomenon of strain hardening in various metal alloys and in nonmetals. Another very well-illustrated chapter deals with slip lines and other surface phenomena as related to the internal processes. Theory of plasticity is discussed in the next chapter which covers nearly 60 pages. Here the various models of critical shear strength, of strain hardening, etc., are discussed. In particular, the role of the Lomer-Cottrell dislocations is stressed. The reviewer found this section particularly valuable since it introduces order into the maze of various semiquantitative models and theories recently proposed. A discussion of plastic properties of alloys and of recovery, polygonization, and recrystallization, as well as creep, closes the article. There are numerous and up-to-date references.

A short article by Dehlinger, only slightly over 40 pages, is devoted to phase transformations in solids. It is a pity that a summary of this rich and interesting field had to be compressed that much. For instance, very little space is devoted to the extremely basic preprecipitation phenomena; similarly the order-disorder transformations and other transformations, which may not be simple phase changes, are disposed of on one page only. On the other hand, the classical first-order phase transitions are treated in more detail. The first chapter deals with the mechanism of nucleation, describing the usual models of Volmer, Becker, and others, and discusses the resulting kinetics. In the next chapter are covered the kinetics of various special reactions such as precipitation and age hardening, x-ray and microscopic evidence, associated magnetic phenomena, thermodynamics of precipitation, and the mechanism and rates of age hardening. In the final chapters are discussed the diffusionless transformations such as the polymorphism of cobalt, the martensitic reaction, the resulting orientation relationships, the strain energy, and the rate of the martensitic transformation. An inclusion of an up-to-date table of the observed orientation relationships in the various diffusionless transformations is most valuable. A rather complete reference list helps to guide the reader into those fields which are only briefly treated.

While the present volume is written in German, the excellent English subject index and the richness of illustrations and diagrams should make the book of value even to those who are shaky in reading foreign languages.

Books Received

THE EARTH AND ITS GRAVITY FIELD. By W. A. Heiskanen and F. A. Vening Meinesz. 470 pp. McGraw-Hill Book Co., Inc., New York, 1958. \$12.50.

FLUID DYNAMICS AND HEAT TRANSFER. By James G. Knudsen and Donald L. Katz. 576 pp. McGraw-Hill Book Co., Inc., New York, 1958. \$12.50.

HANDBOOK OF PHYSICS. Edited by E. U. Condon and Hugh Odishaw. 1504 pp. McGraw-Hill Book Co., Inc., New York, 1958. \$25.00.

INDUSTRIAL NUCLEAR DEVELOPMENT: A Challenge to the States. Proceedings of Nat'l Assoc. of Manufacturers & Nat'l Industrial Council Conf. (NYC, May 1958). 64 pp. Nat'l Assoc. of Manufacturers, New York, 1958. Paper-bound \$2.00.

INDUSTRIAL CARBON AND GRAPHITE: Soc. of Chemical Industry Symp. (London, Sept. 1957). 630 pp. The Macmillan Co., New York, 1958. \$25.75.

TECHNOLOGY OF COLUMBIUM (NIOBIUM): Electrochemical Soc. Symp. (Washington, D. C., May 1958). Edited by B. W. Gonser & E. M. Sherwood. 120 pp. John Wiley & Sons, Inc., New York, 1958. \$7.00.

NUCLEAR ROCKET PROPULSION. By R. W. Bussard and R. D. DeLauer. 370 pp. McGraw-Hill Book Co., Inc., New York, 1958. \$10.00.

METALLURGICAL THERMOCHEMISTRY (3rd Revised Edition). Vol. 1 of Internat'l Series of Monographs on Metal Physics & Physical Metallurgy. By O. Kubaschewski and E. L. Evans. 426 pp. Pergamon Press, London & New York, 1958. \$10.00.

THE PHYSICS OF RUBBER ELASTICITY (2nd Revised Edition). By L. R. G. Treloar. 342 pp. Oxford U. Press, New York, 1958. \$6.40.

THE PHYSICIST'S CONCEPTION OF NATURE. By Werner Heisenberg. Translated from German by Arnold J. Pomerans. 192 pp. Harcourt, Brace & Co., New York, 1958. \$3.75.

ELECTRONICS OF MICROWAVE TUBES. By W. J. Kleen. Translated from German by P. A. Lindsay, A. Reddish, C. R. Russell. 349 pp. Academic Press Inc., New York, 1958. \$9.00.

IONOGRAPHIE: les émulsions nucléaires, principes et applications. By Pierre Demers. 834 pp. Les Presses Universitaires de Montréal, Canada, 1958. \$20.00 (Canadian).

GRUNDRISSE DER PHOTOGRAPHIE UND IHRER ANWENDUNGEN, BESONDERS IN DER ATOMPHYSIK. By Georg Joos and Erwin Schopper. 408 pp. Akademische Verlagsgesellschaft m.b.H., Frankfurt, Germany, 1958. DM 48.00.

MIND AND MATTER. By Erwin Schrödinger. 104 pp. Cambridge U. Press, New York, 1958. \$2.75.

HANDBOOK OF AUTOMATION, COMPUTATION, AND CONTROL. Vol. 1, Control Fundamentals. Edited by Eugene M. Grabbe, Simon Ramo, Dean E. Wooldridge. 5 sections, 26 chapters. John Wiley & Sons, Inc., New York, 1958. \$17.00.

ANNUAL REVIEW OF PHYSICAL CHEMISTRY, Vol. 9. Edited by H. Eyring, C. J. Christensen, H. S. Johnston. 511 pp. Annual Reviews, Inc., Palo Alto, Calif., 1958. \$7.00 in US; \$7.50 elsewhere.

BRIGHTER THAN A THOUSAND SUNS: A Personal History of the Atomic Scientists. By Robert Jungk. Translated from German by James Cleugh. 369 pp. Harcourt, Brace & Co., New York, 1958. \$5.00.

PRODUCTIVE USES OF NUCLEAR ENERGY: Report on Nuclear Energy and World Fuel Prices. By Cornelius J. Dwyer. 74 pp. Nat'l Planning Assoc., Washington, D. C., 1958. Paper-bound \$1.25.

NAVAL HYDRODYNAMICS: Symp. Proceedings (Washington, D. C., Sept. 1956). Edited by F. S. Sherman, 444 pp. NAS-NRC Publication 515. Nat'l Academy of Sciences—Nat'l Research Council, Washington, D. C., 1957. \$5.00.

INTRODUCTION TO MODERN PHYSICS. By C. H. Blanchard, C. R. Burnett, R. G. Stoner, R. L. Weber. 414 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1958. \$10.00.