

intended for a one-semester course on an elementary level, is very satisfying. The discussion is essentially nonmathematical, illustrations are plentiful and the volume abounds in excellent photographs of astronomical objects. Worthwhile features are the monthly star maps with their graphical descriptions of constellations, directions for finding planets, and historical notes. All of this should make the subject enjoyable even for the student who may have no special interest in astronomy but believes it is the easiest course for satisfying his physical sciences requirement. The authors recognize quite rightly that the "space cadets" are now of college age and take advantage by referring often to the scientific space flight literature.

The first chapter is designed to interest a beginning student in astronomy; it talks about the purpose of astronomy and tells him what he may expect to see in the skies with the naked eye and with a small telescope. About two-thirds of the book is devoted to the solar system, i.e., the earth, systems of coordinates, time and the calendar, motion of planets, the moon, eclipses, tides, the sun, the terrestrial and larger planets, comets and meteors. The topics are discussed in an elementary manner but much factual information is often presented—e.g., in the chapter on the sun, while meteorites are treated very lightly. The final third of the book describes star distances and motions, star groups, variable stars, stellar energy sources, galactic nebulae and interstellar material, and galaxies. It includes some of the most recent results on the position of population I and II stars in the Russel diagram and an account of the developments which led to a change in the distance scale of the universe. A valuable addition is a glossary of technical terms at the end of the volume.

Index to the Literature on Spectrochemical Analysis. Part III, 1946–1950. By Bourdon F. Scribner and William F. Meggers. 226 pp. American Society for Testing Materials, Philadelphia 3, Pa., 1954. \$4.50. *Reviewed by N. H. Nachtrieb, Institute for the Study of Metals.*

This is Part III in a series of bibliographical abstracts of the literature of spectrochemical analysis published under the sponsorship of Committee E-2 on Emission Spectroscopy of the American Society for Testing Materials. Part I, published in 1941 under the same authorship, covered the years from 1920 through 1939. Part II, published in 1947, covered the period from 1940 through 1945 and presented for the first time a brief abstract of the content of each article. The abstracts proved to be so useful to spectrographers that the authors have continued to present them, even though their inclusion has more than doubled the size of the publication.

1264 references are included in Part III, including 92 literature citations which were omitted from the Part II compilation. The abstracts are numbered serially through the three parts, and amount to 3736 entries for the thirty year period covered. The main part of the

bibliography is devoted to the abstracts, which are listed chronologically by year and alphabetically according to the first author's name in each year. A detailed subject index and an author index complete the cross-referencing of this invaluable guide to the literature of spectrochemical analysis. Together with Parts I and II, which are still available, it belongs on the desk of every spectrochemist.

Selected Papers on Noise and Stochastic Processes. Edited by Nelson Wax. 337 pp. Dover Publications, Inc., New York, 1954. \$2.00 paperbound, \$3.95 clothbound. *Reviewed by M. H. Cohen, University of Chicago.*

This book consists of facsimile reproductions of six papers originally published during the period 1930–1946. An article by Chandrasekhar (1943) gives an extensive review of the problem of random flights, of the theory of Brownian motion, of time dependent problems such as sedimentation and colloid coagulation, and of probability methods in stellar dynamics. The papers by Uhlenbeck and Ornstein (1930), by Wang and Uhlenbeck (1945), by Kac (1946), and by Doob (1942) present the theory of Brownian motion against the background of the general theory of random processes. The paper by Rice gives a long and detailed mathematical analysis of random noise problems: the shot effect, power spectras and correlation functions, statistical properties of noise current, and noise in nonlinear devices. In addition the editor presents supplementary references in the preface.

The volume should serve as an excellent introduction to the literature on noise, Brownian motion, and random processes in general. Physicists will find the methods presented fruitfully applicable to a wide range of quantum mechanical and statistical mechanical problems.

Optical Mechanics

Physical optics, suitably defined, may be described as a semi-intuitive formalism conceptually and mathematically bounded by the rigorous Hamilton and Maxwell theories. Correspondingly, as J. L. Synge emphasizes in his book, *Geometrical Mechanics and De Broglie Waves*, there is a large domain of *physical mechanics*, also suitably defined (the de Broglie theory) with respect to which the Schrödinger theory replaces the Maxwell theory as bound. The many expositions of this diffuse middle ground (physical mechanics) testify to the only quasi-coherent nature of this field of approximations and extensions. It is the aim of Professor Synge's volume to cast this underlying mathematical theory in form as general and complete as possible.

The whole theory presented may be described as a synthesis of the ideas of Hamilton, de Broglie and Minkowski via the main channel of Hamilton's optical method which, in sharp contrast to Hamilton's dynamical method, is rarely a part of standard training and is comparatively little known. The essential differ-

ence is that the four space-time coordinates are *now* given equal rights: points go into events in space-time with world-lines drawn into the future, waves (two-dimensional surfaces) go into wave-histories (three-dimensional surfaces), etc. By chapters the book comprises: I, Introduction; II, General Theory of Rays and Waves in Space-Time; III, Geometrical Mechanics for a Particle, Free or in a Given Field; IV, Primitive Quantization; V, Generalization. In addition to the considerable interest of the main thesis of this work, it is doubtless of value as a unique study of Hamilton's optical method (in full relativistic form) and perhaps peculiarly timely in connection with the methodological approach to quantum mechanics recently expounded by Feynman. (167 pp. Cambridge University Press, New York, 1954; \$4.75.)

Celestial Magnetism

Le Magnétisme des Corps Célestes is the title of a recent series of books by A. Dauvillier dealing with magnetic phenomena of astronomical interest on an intermediate level. Volume I (171 pp.; Hermann and Cie, Paris, 1954; paperbound, 1600 francs) begins with a discussion of electron motion and the Störmer Theory and goes on to cover solar and stellar magnetism, the solar corona, and zodiacal light. Volume II (161 pp.; paperbound, 1500 francs) deals with geomagnetism and its variations, the effect of the earth's magnetism on cosmic rays, lunar and planetary magnetism, and electromagnetic phenomena in comets. The two volumes have no precise counterpart in English and will probably be most useful to those desiring a general survey of the field. The language barrier is fairly easily surmounted in this case since M. Dauvillier writes clearly and succinctly. A third volume, to be devoted to the aurora and the light of the night sky, is being prepared.

Molecular Spectroscopy

Elementary Introduction to Molecular Spectra, by Børge Bak (125 pp.; Interscience, New York, 1954; \$2.90), is a very brief introductory survey of principal techniques, problems, and results of molecular spectroscopy. An introductory chapter treats: spectroscopic equipment; the spectrograph; dependence of spectra on pressure, temperature, and state of aggregation; and interpretation of molecular spectra. A chapter treats a number of topics in theoretical spectroscopy, among them: the two-body problem, the particle in a box, the hydrogen atom, the diatomic molecule, and selection rules. The remaining three chapters are devoted to microwave spectra, infrared spectra, and spectra of the visible ultraviolet region.

Books Received

ASTRONOMY. A TEXTBOOK (Fifth Edition). By John Charles Duncan. 500 pp. Harper & Brothers, New York, 1955. \$5.50.
THE SOURCES OF EDDINGTON'S PHILOSOPHY. By Herbert Dingle. 64 pp. Cambridge University Press, New York, 1954. Paperbound \$7.5.

DIGEST OF LITERATURE ON DIELECTRICS. Volume XVII, 1953. Edited by A. E. Middleton and H. M. Philofsky. 177 pp. National Academy of Sciences—National Research Council, Washington, D. C., 1954. Paperbound.

THE ATMOSPHERIC LUNAR TIDES (Volume 2, Number 3 of Meteorological Papers). By Ryukichi Sawada. 31 pp. New York University Press, New York, 1954. Paperbound \$1.50.

THE TRAINING OF COLLEGE PHYSICS LABORATORY ASSISTANTS (Proceedings of the Northwestern Conference, June 1954). Edited by C. J. Overbeck. 168 pp. Northwestern University, Evanston, Illinois, 1954. Paperbound.

PROCEEDINGS OF THE FIRST CONFERENCE ON TRAINING PERSONNEL FOR THE COMPUTING MACHINE FIELD. Wayne University Press, Detroit, Michigan. \$5.00.

BEHAVIOR OF METALS UNDER IMPULSIVE LOADS. By John S. Rinehart and John Pearson. 256 pp. American Society for Metals, Cleveland, Ohio, 1954.

ABHANDLUNGEN AUS DEM FRITZ-HABER-INSTITUT. Volume 30. 262 pp. Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin-Dahlem, Germany, 1954. Paperbound.

JENAER JAHRBUCH, 1954. Part I. 304 pp. Published by VEB Carl Zeiss. VEB Gustav Fischer Verlag, Jena, Germany, 1954. DM 20.00.

ANNUAL REVIEW OF NUCLEAR SCIENCE. Volume 4. James G. Beckerley, editor, and Martin D. Kamen and Leonard I. Schiff, associate editors. 483 pp. Annual Reviews, Inc., Stanford, California, 1954. \$7.00.

BIBLIOGRAPHY ON PHYSICAL ELECTRONICS. Prepared by Wayne B. Nottingham and staff. 428 pp. Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1954. Addison-Wesley Publishing Company, Inc. (Distributor), Cambridge. \$8.50.

PHYSICS FOR OUR TIMES. By Walter G. Marburger and Charles W. Hoffman. 570 pp. McGraw-Hill Book Company, Inc., New York, 1955. \$4.48.

SONICS. TECHNIQUES FOR THE USE OF SOUND AND ULTRASOUND IN ENGINEERING AND SCIENCE. By Theodor F. Hueter and Richard H. Bolt. 456 pp. John Wiley & Sons, Inc., New York, 1955. \$10.00.

THE GYROSCOPE APPLIED. By K. I. T. Richardson. 384 pp. The Philosophical Library, New York, 1954. \$15.00.

LUMINESCENCE (WITH PARTICULAR REFERENCE TO SOLID INORGANIC PHOSPHORS). Supplement No. 4 of the British Journal of Applied Physics. 120 pp. The Institute of Physics, London, England, 1955. 25s.

A CHECK LIST OF THE E. DEGLYER COLLECTION IN THE HISTORY OF SCIENCE AND TECHNOLOGY. Compiled by Arthur McAnally and Duane H. D. Roller. 127 pp. University of Oklahoma Press, Norman, Oklahoma, 1955. \$3.00.

HANDBOOK OF RADIOLOGY. Edited by Russell H. Morgan and Kenneth E. Corrigan. 518 pp. The Year Book Publishers, Inc., Chicago, Illinois, 1955. \$10.00.

MAGNETIC AMPLIFIERS. By H. F. Storm. 545 pp. John Wiley & Sons, Inc., New York, 1955. \$13.50.

ADVANCES IN ELECTRONICS AND ELECTRON PHYSICS. Volume VI. Edited by L. Marton. 538 pp. Academic Press Inc., New York, 1954. \$11.80.

STORAGE BATTERIES. A General Treatise on the Physics and Chemistry of Secondary Batteries and their Engineering Applications (Fourth Revised Edition). By George Wood Vinal. 446 pp. John Wiley & Sons, Inc., New York, 1955. \$10.00.