the correct value, 6.025×10^{23}, is given in the table of "Constants of Nature" in the Appendix. Errors and inconsistencies such as this are perhaps inevitable in a book of over 900 pages and can be easily corrected in a subsequent printing, but they detract from an otherwise excellent and well-printed text.

The Present State of Physics. Arranged by F. S. Brackett. 265 pp. American Association for the Advancement of Science, Washington, D. C., 1954. $6.75. *Reviewed by T. Teichmann, Hughes Research and Development Laboratories.*

Though this book was published in 1954, it is based on a symposium presented on December 30, 1949 at the New York meeting of the American Association for the Advancement of Science, and consequently the reader who eagerly snatches it up to learn the present state of physics will be disappointed. If he is a physicist, he is likely to be further disturbed by the absence of such important topics as quantum electrodynamics, nuclear physics and cryogenics, though these omissions may be at least partly accounted for by the rapid change in the state of knowledge at that time, and the evident difficulty of saying something definitive at that stage. On the other hand the book gives a much broader view of physics than is usual, and if the reader is prepared to set aside his initial disappointment he may learn much that is useful and interesting.

The book is divided into four parts: elementary particles, physics of the solid state, chemical physics, and biophysics. The first part contains an article by P. Kusch on the magnetic moment of the electron which is clear, simple, and short and probably the best of the "pure" physics papers in the book. It also contains articles by E. P. Ney (cosmic-ray experiments at high altitude) and J. C. Street (developments in cosmic radiation 1945–1950) which describe painstaking and important experiments, largely pushed into the background, however, by the more spectacular discoveries of recent years (V-particles and heavy mesons, etc.).

The second section contains a lengthy review article by K. Lark-Horowitz on the electrical properties of nonmetals, and the bulk behavior of germanium semiconductors. This article contains a bibliography of more than 350 items and will probably become a sine qua non for anyone starting work in this field. In addition there is an elegant and simple discussion of the flow of electrons and holes in a semiconductor by J. Bardeen, and a description of some structural aspects of barium titanate ferroelectrics by A. von Hippel.

The last two sections of the book describe applications of physics rather than physics itself. P. J. W. Debye gives an illuminating account of the use of optical scattering experiments to determine the structure of polymers. R. Lumry and H. S. Eyring describe in an interesting and suggestive way the application of chemical kinetics to some biological systems. F. Brink discusses some aspects of axons as related to the conduction of nerve impulses. In the final paper F. H. Johnson uses reaction rate theory to discuss bioluminescence. These last four papers thus do not deal with fundamental physics, but rather with the use of well-established and often simple techniques of modern physics to probe the basic mechanisms of vastly more complicated chemical and biological systems. The large scale success of such endeavors would be of enormous significance, and this possibility in itself would support their inclusion in this book.

Proceedings of the Second International Congress on Rheology. Edited by V. G. W. Harrison. 451 pp. Academic Press Inc., New York, 1954. $10.00. *Reviewed by Abraham S. Friedman, National Bureau of Standards.*

The Second International Congress on Rheology was held in July of 1953 at Oxford, England. The papers presented at this meeting and the discussions on them are included in this fine book, edited by V. G. W. Harrison. The articles, representing contributions from the laboratories and universities of about ten countries, indicate that the aim of the Conference—to cover the field of the "study of the deformation and flow of matter"—has been liberally interpreted and successfully fulfilled.

The papers are arranged in five groups. The first includes six general lectures on rheological problems related to biology, plastics, colloids, applied mechanics, hydrogels, and relaxation phenomena. There then follows a series of experimental and theoretical papers, representing about half of the book, on high polymers. The third group of papers is made up of an uneven collection of articles on viscosity and plasticity. The remaining papers are grouped in a small section on biology and one on oils and greases. Most of the papers are in English; several are in French and in German. The book is introduced by Sir Geoffrey Taylor's presidential address on "Rheology for Mathematicians". This amusing article is well-written and most appropriate to the subject.

A comparison of this volume with the *Proceedings of the First International Congress on Rheology* held in 1948 in The Netherlands, and published by the North-Holland Publishing Company in 1949, graphically demonstrates the rapid advances made in this field in the past several years.

This book will be of interest, not only to the rheologist, but to the biophysicist, the thermodynamicist, the solid-state physicist, and the physical chemist, as well.

A Brief Text in Astronomy. By William T. Skilling and Robert S. Richardson. 327 pp. Henry Holt and Co., New York, 1954. $4.00. *Reviewed by S. F. Singer, University of Maryland.*

This book represents another collaboration (their earlier volume was *Sun, Moon and Stars*) of an experienced teacher and a practicing astronomer. The result,

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-