physics for the initiate, and as a useful reference (and in part text) for the novice.

Astrophysical Quantities. By C. W. Allen. 263 pp. (The Athlone Press, England) John de Graff, Inc., New York, 1955. $10.00. *Reviewed by Arthur Beiser, New York University.*

In most fields of science there is a good deal of quantitative information that an active worker must have handy in order to operate efficiently. The usual procedure is to write some numbers down on a scrap of paper or perhaps in the back of a notebook; the source and vintage (and, sometimes, the meaning) of most of the numbers are omitted. Now C. W. Allen has come to the rescue of the astrophysicist with an impressive compilation of relevant data, from the interior of the earth to the most remote nebulae. Even the Greek alphabet is provided. In fact, the very bulk of information included in the book makes this reviewer a bit uneasy—a nonspecialist in a particular subject might attribute a greater significance to a given number, presented without qualification, than it may deserve. An example is a list of the characteristics of the ring current around the earth presumed to account for certain geophysical phenomena, figures by no means universally believed. This caveat excepted, however, Professor Allen has rendered a valuable service, and his book will be appreciated by the student as well as by the professional astronomer.

Microwave Spectroscopy. By C. H. Townes and A. L. Schawlow. 698 pp. McGraw-Hill Book Co., Inc., New York, 1955. $12.50. *Reviewed by M. L. Stitch, Varian Associates.*

This is the third book published with the title "Microwave Spectroscopy". But in so far as the microwave spectra of gases is concerned, it is the first definitive work to appear.

The work (and the term is used advisedly as this is no rambling collection of descriptive material interspersed with ill digested formulae plucked from the blue) is a cohesive reference-text-book which, as the authors assert, treats fully "those phases of the theory of molecular spectra which older types of spectroscopy have not been able to test adequately. . . . In addition, some attention is directed toward obtaining information about nuclear and molecular properties from the interpretation of molecular spectra".

The 18 chapters are divided into 14 which are mainly theoretical and 4 which are concerned with practical aspects, techniques, and apparatus of microwave spectroscopy. In addition, there is an unusually complete bibliography up to January, 1955 and 149 pages of useful and in many cases rare tables.

The theory is handled in a pleasing way. Almost every chapter begins with simple physical principles and models and, using many examples, proceeds to

greater and greater sophistication. Frequently the same material is examined from several viewpoints of varying sophistication. One will find, tucked into the most theoretical chapters, sections on practical applications of the theory. For example, one finds in the chapter on Stark Effects, sandwiched between "Stark Effects when Hyperfine Structure is Present" and "Forbidden Lines and Change of Intensity Due to Stark Effect", a section on determination of molecular dipole moments explaining a practical technique and giving typical measurements.

The senior author is one of the pioneers of modern high resolution spectroscopy and as head of the large spectroscopy group at Columbia has made an enormous number of significant theoretical and experimental contributions to the field ranging from quadrupole coupling, L-type doubling, mass determinations, sensitivity of spectrometer to resonance modulation, free radicals, pressure broadening, molecular oscillators, and nuclear shell structure to name a few. It is not surprising therefore that the book is written with the authority and assurance of a master. For the same reason the book is amazingly current. Some of the topics such as spectra of free radicals and the maser were published in the journals close to the publication date of the book.

This work is unreservedly recommended to anyone with an interest in microwave spectroscopy or molecular structure.

Combustion

The *Fifth Symposium on Combustion* (802 pp.; Reinhold Publishing Corp., N. Y., 1955; $15.00) consists of eleven survey papers, ninety contributed papers, and the summaries of two panel discussions. The survey papers, and many of these contributed, deal with problems on combustion in engines and the kinetics of combustion processes. The panels are concerned with heterogeneous burning and the theory of the kinetics of combustion reactions. In addition, there are papers on the combustion of fuel droplets, combustion of solids, propellant burning, instrumentation, diffusion flames and carbon formation, flame spectra and dissociation energies, and a group on special techniques which includes microwave and probe studies of the ionization in flames. The material was presented at an international symposium held at the University of Pittsburgh, August 30–September 3, 1954.

Electrical Discharges in Gases

The *Report of the International Symposium on Electrical Discharges in Gases* held in Delft in April 1955 is a collection of more than 70 papers, all of them considerably shortened. The subjects covered are in the fields of fundamental processes in gas discharges, instabilities, high frequency discharges, arc and spark discharges, and new methods for studying discharges. The volume would be of interest primarily to the active research worker in these fields. There is no index. (In English, German, and French; 344 pp.; Martinus Nijhoff, The Hague, Netherlands; 1955.)

Books Received

Cosmologie et Chimie. (In French) By A. Dauvillier. 215 pp. University of France Press, Paris, France, 1955. Paperbound 900 fr.

Temperature: Its Measurement and Control in Science and Industry. Vol. II. Edited by Hugh C. Wolfe for the American Institute of Physics (Symposium, Washington, D. C., 1954). 467 pp. Reinhold Publishing Corp., New York, 1955. $12.00.

College Physics (4th Edition). By C. E. Mendenhall, A. S. Eve, D. A. Keys, R. M. Sutton. 660 pp. D. C. Heath & Co., Boston, Mass., 1956. $6.25.

Low Temperature Physics (4th Edition). By L. C. Jackson. 158 pp. (Methuen, England) John Wiley & Sons, Inc., New York, 1956. $2.00.

Man and Energy. By A. R. Ubbelohde. 247 pp. George Braziller, Inc., New York, 1955. $5.00.

Mesons and Fields, Vol. 1: Fields. By Silvan S. Schweber, Hans A. Bethe, and Frederic de Hoffmann. 449 pp. Row, Peterson & Co., Evanston, Ill., 1955. $8.00.

11th General Assembly of the International Scientific Radio Union (URSI). Volume X, Part 6, Commission VI on Radio Waves and Circuits. (The Hague, 1954) 140 pp. International Scientific Radio Union, Brussels, Belgium, 1954. Paperbound $3.00.

X-Ray Protection. National Bureau of Standards Handbook 60. 41 pp. U. S. Government Printing Office, Washington, D. C., 1955. Paperbound $.20.

Regulation of Radiation Exposure by Legislative Means. National Bureau of Standards Handbook 61. 60 pp. U. S. Government Printing Office, Washington, D. C., 1955. Paperbound $.25.

Bulletin of the Academy of Sciences of the USSR Physical Series (Translation). Vol. 18. No. 5. 1954. 212 pp. Columbia Technical Translations, White Plains, N. Y., 1955. Paperbound. Single issue $20; annual subscription $110.

Conference of the Academy of Sciences of the USSR on the Peaceful Uses of Atomic Energy, July 1–5, 1955. Session of the Division of Physico-Mathematical Sciences (Translation). 262 pp. Consultants Bureau, New York, 1955. $175.00. Any single article $12.50.

Tables of Thermal Properties of Gases. National Bureau of Standards Circular 564. 488 pp. US Government Printing Office, Washington 25, D. C., 1955. $3.75.

The Microbe's Contribution to Biology. By A. J. Kluyver & C. B. van Niel. 182 pp. Harvard U. Press, Cambridge, Mass., 1956. $4.00.

La Resonance Paramagnetique Nuclaire. Edited by Pierre Grivet. 298 pp. Centre National de la Recherche Scientifique, Paris, France, 1955. Fr. 1.800.

Principi di una Teoria Generale sulla Fisica Atomica (In Italian). By Ruggero Santilli. 172 pp. Naples, Italy, 1955. Paperbound.

Spheroidal Wave Functions. By J. A. Stratton, P. M. Morse, L. J. Chu, J. D. C. Little, F. J. Corbató. 613 pp. The Technology Press of MIT & John Wiley & Sons, Inc., New York, 1956. $12.50.

Nuclear Level Schemes: A = 40–A = 92 (Ca-Zr). By K. Way, R. W. King, C. L. McGinnis, R. van Lieshout. 221 pp. (AEC, NAS-NRC) US Government Printing Office, Washington 25, D. C., 1955. Paperbound $1.75.