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TOPICS IN ASTROPHYSICS
AND SPACE SCIENCETHE THEORY OF
STELLAR
SPECTRABy Charles R. Cowley, *University of Michigan*1970 Cloth, \$19.50/Prepaid, \$15.60
272pp. Paper, \$ 8.50/Prepaid, \$ 6.80

This book describes the theory of stellar spectra as it is currently used in the actual analysis of stellar spectrograms. Considerable emphasis has been placed on the physical background of the ideas employed. Separate chapters discuss the theory of radiation statistical mechanics, and the quantum mechanical theory of line broadening. The discussion of the calculation of spectra features and abundances is oriented to the modern techniques which employ high-speed computers.

CODE NUMBER: 0240

THE BOOK OF
MARSBy Samuel Glasstone, *NASA*1970 *Professional, \$ 8.50/Prepaid, \$ 6.80
322pp. Reference, \$17.50/Prepaid, \$14.00

"An engaging, thorough and exceptionally clear discourse . . . the book begins with an excellent historical introduction to Mars . . . followed by a quite well done descriptive section . . . proceeds to discuss the physical environment, the Martian atmosphere, surface, clouds and haze . . . discusses modern ideas about the possibility of life on Mars." —*Science Magazine*

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meter kelvin. The proposed reciprocal unit, for thermal resistivity would be symbolized by "rf." It is a pleasing commentary on physicists' occasional rationality that most responses object to the new unit and urge the explicit use of specific units, preferably SI (Système Internationale), in data presentation.

This volume contains a good deal of new experimental data and compilations (especially on thermal diffusivity of elements). It will be of interim value as a supplementary reference work. Its primary value probably lies in enumerating experimental techniques, in theoretical analysis schemes and in the data inconsistencies. It is apparent that much remains to be done in this field. Perhaps this in itself justifies publication of yet another conference report.

PAUL P. CRAIG

*Brookhaven National Laboratory*Ondes Electromagnétiques:
Relativité Trouvée Dirigée

By Nicole Hulin-Jung

175 pp. Hermann, Paris, 1968. 36F

It is a truism in the teaching of any discipline that the only true education is self-education. This is undoubtedly the chief motivation behind the introduction of programmed instruction and the teaching machine. The aim of this paperback volume, one of a series designed to supplement volumes that introduce theoretical physics, is to stimulate self-instruction.

The author is a graduate of the École Normale Supérieure de Sèvres and is presently teaching at the University of Paris. The goal set by the book is twofold. The first is to provide a brief but thorough review of the basic elements of electromagnetic theory, particularly electromagnetic-wave propagation and special relativity. The other is to enable the student to test his grasp of the principles by reviewing some 115 problems, most of which are solved completely or partially in the text.

The problems appear to be well chosen with laudable emphasis on illustrations from contemporary atomic physics and electronics. The solutions are adequate and assure an understanding of the physics involved, and the accompanying diagrams are clear and well drawn. It is somewhat surprising, however, to see Ohm's law as-

sociated with the fundamental Maxwell's equations of the field.

The author is to be congratulated on a thorough job. His book should prove very useful to students who wish to develop a well founded grasp of electromagnetic-wave theory and special relativity.

R. BRUCE LINDSAY

*Hazard Professor of Physics
Brown University*The Physical Principles
Of Ultra-High Vacuum
Systems and Equipment

By Norman W. Robinson

270 pp. Barnes and Noble, New York, 1968. \$12.00

"The chief aim of this book is to present the physical principles underlying the attainment and measurement of ultrahigh vacuum . . ." The author's aim is admirable, as is the title he selected. However good the aim might have been, the shot fell far short of the target.

Admittedly Norman Robinson's self-assigned task was a tall order; at present the design of ultrahigh vacuum systems and equipment is largely empirical and not based on detailed understanding of each of the many phenomena involved. Nevertheless, ignoring the implications of the title, the most severe criticism of this book would be the inadequate and incorrect explanations given for various phenomena. An example, taken from the first page of the text, should alert the reader as to what to expect; we find in a description of a Bayard-Alpert ion gauge, "The ions arriving at the collector give up their charges and the majority remain as atoms *adsorbed on the surface*" (my italics). To the contrary, ample proof may be found in the literature that the majority of the incident ions are not adsorbed, nor even ionically pumped or imbedded in the collector.

The first chapter contains, in addition to discussion of the Bayard-Alpert gauge, brief descriptions of several other gauges and calibration of gauges. The second chapter is concerned with pumping by ion burial, gettering and sorption. Considerable attention is devoted to engineering aspects, such as definition and tabulation of the "figure of merit" for various configurations of sputter-ion pumps, at the expense of discussion of, for ex-

ample, limitations of the pumps with respect to attainment of very low total and specific partial pressures. Valves, seals, motion-transfer mechanisms and mass spectrometers that have been applied to vacuum studies are cursorily reviewed. Much of the chapter called "Residual Gases in Ultrahigh Vacuum Systems" is devoted to experimental results obtained at pressures *higher* than 10^{-8} torr. Similarly, in the chapter covering "Degassing Phenomena," the emphasis is not on ultrahigh vacuum, generally taken to imply pressures less than 10^{-9} torr. Perhaps the intended audience is the electron-tube processing engineer, a supposition based on the author's 20-year career with Mullard of England. The two most interesting chapters deal with leak detection and the flow of gases. In both cases phenomena frequently neglected in practice are considered.

The book is subject to criticism on many counts: incompleteness, inaccuracy, typographical errors, and generally poor proof reading. References in particular are poorly handled; not only are there many errors and serious omissions but some of those few, presumably selected, inclusions are to Robinson's own unpublished results.

It is difficult to find any recommending reason for inclusion of this volume as one of the publisher's "High Vacuum Series," because the material presented is much more completely and accurately dealt with in another volume entitled "The Physical Basis of Ultrahigh Vacuum."

W. J. LANGE

Manager, Vacuum Laboratory
Westinghouse Research Laboratories

Handbook of Vacuum Physics, Vol. 2: Physical Electronics

A. H. Beck, ed.

199 pp. Pergamon, New York, 1968.
\$8.50

I will begin by registering a difference of opinion with A. H. Beck, the editor, about his definition of vacuum physics. He does not give one in this volume, but it may be inferred from the preface to volume 1, where he says: "Every worker who uses vacuum apparatus or works on the diverse applications of high-vacuum technology . . . has . . . experienced the need for a source in which he could find the essentials of

all the many different scientific disciplines involved." Therefore, "The Handbook was . . . conceived as a set of three volumes, volume I on gases and vacua, volume II on physical electronics, and volume III on vacuum technology."

My disagreement stems from the conviction that physical electronics is not necessarily part of vacuum physics. Although physical electronics can not be done without good vacuum conditions and without adequate technology, the obverse is not automatically true. Many other branches of physics also require excellent vacuum conditions, but they are not mentioned in the handbook.

I also question the inclusion of electron optics, heavy-current electron beams and gridded valves, which are the three parts of this volume, under the heading of physical electronics. This, however, is a matter of semantics, but if I were to search for information on these subjects, it would never occur to me to look for it in a book on vacuum physics.

Although the general plan of all three parts is well conceived and executed with considerable skill, it is regrettable to see evidences of haste. The references are meager and none of the volumes have indexes. To put it mildly, I am somewhat lukewarm about this book. The presentation is too condensed to serve as a textbook and too technical for the nonspecialist.

LADISLAUS MARTON

Office of International Relations
National Bureau of Standards

Dynamics and Mechanical and Electromechanical Systems

Stephen H. Crandall, ed.

466 pp. McGraw-Hill, New York, 1968.
\$13.50

S. H. Crandall and his colleagues in the mechanical-engineering department at MIT (Dean Karnopp, Edward Kurtz Jr and David Pridmore-Brown) have collaborated in a notable contribution. Their book is not just another undergraduate systems text; it uniquely presents a strong espousal of variational methods. Essentially, it is an excellent treatment of dynamics in the broadest sense.

The first half mainly concerns classical mechanics. Hamilton's principle is emphasized early, but Newton's sec-

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