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satellites and interplanetary flight in commemoration of the 100th anniversary of the birth of Tsiolkovskii, the Russian space flight pioneer. The first paper solves the variational problem associated with the launching of an artificial earth satellite under certain simplifying conditions. This problem received adequate attention in papers published in the United States and in England in the open literature but is of little practical importance since in practice staged rockets are used to launch satellites and coasting periods are introduced to attain higher release altitudes. The second paper investigates the lifetime of artificial earth satellites in the presence of an atmosphere. The authors also consider the simple perturbations due to the earth's equatorial bulge leading to the precession of the orbital plane. Here again there are a number of papers in the open literature going back as far as 1950 but they are not referred to.

The third paper covers material very similar in content to that of the second but again without references to any previously published papers.

The fourth paper by V. A. Egorov deals with problems of flight dynamics in the earth moon system, including hitting the moon and also lunar circumnavigation and return to the earth. This paper is excellent and quite comprehensive, containing a large number of new results which have not appeared in the open literature before. The paper is based on some analytical work as well as a large number of machine calculations to define classes of orbits. The paper is well referenced. (I understand that the author used it for his thesis.) The last paper by V. L. Ginzburg very briefly describes the use of artificial earth satellites for verifying the general relativity theory. This appears to be the restatement and condensation of a more extensive paper written by Ginzburg in 1956. The previous paper, however, did not include a practical method for eliminating first-order Doppler shifts.

Many of the papers dealing with physical measurements in satellites appear in Part 2 and not in the present volume.

Physical Optics. By R. A. Houstoun. 300 pp. Interscience Publishers, Inc., New York, 1958. \$6.25. Reviewed by James MacLachlan, Earl Haig Collegiate Institute.

Here is an intermediate text that makes a real distinction between *physical* optics and what might be called *mathematical* optics. The author does not avoid mathematics, but its role in the development of the subject is definitely secondary to that of physical intuition. The book is directed more to students in fields which depend on physics, in engineering, chemistry, and biology, than to the physics major. It lacks the expanse and depth of Strong's much larger recent text, or of the author's own classic, *A Treatise on Light*. But it is admirably suited to those whose major aim is to apply the principles of physical optics to practical working situations.

The aim of the book is to elucidate physical princi-

Just published

STATISTICAL PHYSICS

By L. D. LANDAU and E. M. LIFSHITZ

Translated from the Russian by E. Peierls and R. F. Peierls

Continuing its publication of American Editions of the Landau and Lifshitz *Course of Theoretical Physics*, Addison-Wesley is pleased to announce the availability of Volume 5, devoted to an exposition of statistical physics and thermodynamics. This volume is an *entirely new* book, rather than a revised edition of the authors' previous book by the same title.

The authors' earlier book on statistical physics, which was published in the English language in 1938, contained only an exposition of classical statistics. However, a separate presentation of classical and quantum statistics is unsuitable both for the exposition of the general foundations, and for the treatment of many applications. Consequently, the authors have prepared this entirely new book, which not only brings these topics together in one volume, but also includes a complete revision of the treatment of those problems included in the previous book. For this English-language edition they have made a number of changes and additions intended to eliminate some of the weaknesses in the presentation, and to incorporate some essentially new results which have been obtained since the appearance of the Russian edition.

496 pp, 1958—\$12.50

QUANTUM MECHANICS—Nonrelativistic Theory

By L. D. LANDAU and E. M. LIFSHITZ

Translated from the Russian by J. B. Sykes and J. S. Bell

Although only published in May 1958, this text has already been adopted by nearly two dozen colleges and universities. It offers a complete exposition of the subject, including a wide range of problems in quantum mechanics which can be treated without the use of relativistic theory. A unique feature of the book is its inclusion of a substantial amount of material on group theory, which aids the student in gaining a deeper understanding of the quantum mechanics.

515 pp, 51 illus, 1958—\$12.50

FUNDAMENTAL ASPECTS OF REACTOR SHIELDING

By HERBERT GOLDSTEIN, *Nuclear Development Corporation of America*

This new book by the author of the distinguished *Classical Mechanics* will be of keen interest to physicists, biologists, health physicists, chemical, mechanical, and nuclear engineers—in a word, to all who are concerned with reactor and shield design. The twofold aim of the work is to encourage further investigations into the basic physics of shields, and to supply an exposition of the fundamental shielding processes, which serve as the basis for design of any reactor shield. The author concentrates on the "fundamentals"—the factors affecting the permissible radiation levels, the sources and characteristics of the radiation to be shielded against, how bulk shielding measurements are made and, at greatest length, how the attenuation of neutron and gamma rays in shield materials is calculated, theoretically or empirically.

c. 400 pp, 95 illus, 1958—\$9.50

CONSTITUTIONAL DIAGRAMS OF URANIUM AND THORIUM

By FRANK A. ROUGH and ARTHUR A. BAUER, *Battelle Memorial Institute*

Written in cooperation with United Kingdom scientists and engineers, this valuable compilation of U. S. and U. K. uranium and thorium constitutional diagrams is a compact and highly useful source of reference material for all working in the field. It is divided into two major sections, uranium alloys and thorium alloys, each preceded by a discussion of the transformation and melting temperatures of the base metal. The various systems are listed in alphabetical order, including both binary and ternary systems.

c. 192 pp, 72 illus, 1958—\$5.00

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LOW TEMPERATURE PHYSICS & CHEMISTRY:

Proceedings of the Fifth International
Conference

Edited by Joseph R. Dillinger

The one hundred and ninety-eight contributed papers and the twenty-seven invited papers contained in this volume were presented at the Fifth International Conference on Low Temperature Physics and Chemistry held at the University of Wisconsin from August 26 to 31, 1957. These papers deal with current experimental and theoretical research involving studies of the properties of matter at temperatures near absolute zero.

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ples. It also satisfies an oft-expressed need of engineering students. After studying a subject for a while they like to feel that they know more about the devices that depend on the fundamentals they have learned. Here, applications of principles to cameras, telescopes, spectroscopes, etc., are inserted frequently. In addition, the way in which instrumental results have been used to establish theories is well illustrated.

Two thirds of the book is devoted to the traditional topics of interference, diffraction, polarization, and electromagnetic theory. The final third is a rather more descriptive survey of spectroscopy, photometry, color vision, and photography and includes two chapters on the relevant aspects of relativity and quantum theory. More than 150 problems and questions are included, though there are no answers. Many of the problems are applications in design and practice. A number of them have been taken from the examinations of British professional optical associations.

Where it is applicable, Houstoun uses Fresnel's elastic-solid theory to develop results, "though we render lip service to Maxwell". His justification is the greater ease with which the earlier theory can be visualized. We can hope that eventually students may be led in elementary physics courses to visualize waves and fields more easily so that this will no longer be true.

The text is well illustrated, including 116 plates and a chromaticity diagram in color. One particularly interesting photograph is a discharge spectrum taken by the author with a school spectroscope and a box camera.

Zone Melting. By William G. Pfann. 236 pp. John Wiley & Sons, Inc., New York, 1958. \$7.50. *Reviewed by N. H. Nachtrieb, Institute for the Study of Metals.*

Here is an excellent little book, the first to appear on the subject of zone melting. Written by the outstanding authority in the field, its nine chapters summarize both the theory and practice of this mode of fractional crystallization.

Zone melting comprises a variety of techniques for controlling the distribution of soluble impurities in crystals. First adapted to the purification of germanium, it has since been employed for the refinement of metals, intermetallic compounds, salts, and organic compounds. This, its most familiar use, is based upon the fact that impurities are generally soluble to different extents in the solid and liquid phases. A liquid zone, perhaps 1/10th of the length of an ingot, is slowly moved from one end of the ingot to the other. Impurities, depending upon their distribution coefficient between the solid and liquid phases, either concentrate in the liquid zone and move with it ($k < 1$) or concentrate in the solid phase behind the freezing interface ($k > 1$).

There is more to zone melting than simple purification, however, and the author describes a number of variants. Among the more important is zone leveling, in which inhomogeneities in solute concentration are removed. At the other extreme is the deliberate establishment of steep solute concentration gradients, neces-