

RECENT books from Pergamon Press NOW distributed by MACMILLAN

ELECTROLUMINESCENCE

By Heinz K. Henisch—University of Reading, England

The first comprehensive study of electroluminescence and related phenomena from transistor physics to photoluminescence, and from insulators to orthodox semiconductors. It covers the practical application of electroluminescent devices, fundamental processes and materials. Significant attention is also given to light transmission from single crystal and microcrystalline phosphors, and to emission processes which are essentially associated with crystal boundaries.

(International Series of Monographs on Semiconductors—Volume 5) 300 pages \$12.50

SEMICONDUCTOR STATISTICS

By J. S. Blakemore

An unusually extensive coverage is given to the concentration of free charge carriers in semiconductors and the electrical properties of these materials. The author gives a thorough account of: carrier recombination under extrinsic and intrinsic conditions, magnetic level splitting, multivalent flaws, cooperative impurity phenomena, trapping processes and donor-acceptor compensation.

(International Series of Monographs on Semiconductors—Volume 3) 386 pages \$12.50

PHOTO AND THERMOELECTRIC EFFECTS IN SEMICONDUCTORS

By Jan Tauc

The work of an internationally famous scientist is discussed in this unified treatment of the generation of electromotive forces in semiconductors in the context of photoelectric, thermoelectric, photomagnetic and thermomagnetic phenomena. It deals specifically with the effect of illumination, the presence of temperature gradients, magnetic fields and localized variations of impurity.

(International Series of Monographs on Semiconductors—Volume 2) 248 pages \$10.00

SEMICONDUCTING III-V COMPOUNDS

By C. Hilsum and A. C. Rose-Innes

This is the first detailed account describing the variety of semiconducting substances formed by combining elements from groups III and V of the periodic table. The subjects discussed include: band and crystal structure, preparation, electrical and optical properties, and applications. The important applications of these elements in diodes, transistors, galvanometers, photocells, solar batteries and optical filters are thoroughly covered.

(International Series of Monographs on Semiconductors—Volume 1) 239 pages \$10.00

THERMAL CONDUCTION IN SEMICONDUCTORS

By J. R. Drabble and H. J. Goldsmid

Since thermal conductivity and thermal conduction processes in semiconductors have a profound influence on all efficiency considerations, and some of the materials concerned are available in highly pure and ordered form—they are especially suited for an investigation of this kind. The authors cover: the technique of measurement relationships of irreversible thermodynamics, the variational principle of maximum entropy production and the transport of heat by electrons and phonons.

(International Series of Monographs on Semiconductors—Volume 4) 248 pages \$10.00

Send for your copies of the above books on approval.

**NEW PERGAMON
CATALOG** of books
in print now available.
Write for your
free copy.



PERGAMON BOOKS
THE MACMILLAN COMPANY
60 Fifth Ave./N. Y. 11, N. Y.

the literature or in hard-to-locate dissertations. The last two articles both deal largely with nonequilibrium problems. The article by Mori, Oppenheim, and Ross is concerned with the distribution-function formulation of the theory of strongly interacting fluids. The article by Dresden, on the other hand, deals extensively with very simple model calculations designed to elucidate the mathematics of irreversibility (but not necessarily the physics).

In my opinion, this volume represents an extremely valuable contribution to the growing literature of statistical mechanics and sets a standard which other collections should attempt to achieve. The only demerit I wish to enter concerns the time lag in publication. The translation of the book by Bogoliubov was available in preprint form three years ago and Mori, Oppenheim, and Ross comment in a footnote that their article was completed in 1959. There is little excuse for such a long delay in publication. Fortunately, the particular articles in this volume have a timeless quality which makes them valuable, but the publisher has no guarantee that this will be the case in the future. Greater efforts should be made in the future to publish succeeding volumes more promptly.

Handbook of Astronautical Engineering. Heinz Hermann Koelle, ed. 1814 pp. McGraw-Hill Book Co., Inc., New York, 1961. \$27.50. Reviewed by R. E. Street, University of Washington.

HERE is the first real handbook in the field of astronautical engineering. The distinguished editorial board, and the fact that the list of contributors includes enough of the best engineers and scientists actively engaged in pushing back the frontiers of space, is sufficient to this reviewer to enable him to categorically state that this volume will be, for some time at least, an authoritative reference. He does not claim to have read all of the book; 1800 pages are just too many. However, sampling sections of greatest interest, it appears that in most of the chapters the basic equations are clearly derived and, if not in full detail, references are made to the original publications. The figures are good and sufficient, and the applications are indicated without too much emphasis upon the hardware. The result is a well-balanced compendium of fundamental data and theory which will be useful to students and designers of spacecraft. The scientist concerned with the development of experiments in space will also find much useful information here as well.

Broken down into six parts and twenty-eight chapters, all of the scientific, engineering, and human aspects of space flight are included. This means that there is considerable information on orbits, trajectories, all forms of propulsion, navigation, vehicle design, and operations. Most chapters, like the ones on aerodynamics, propulsion, and design, give a large number of formulae for the simpler cases without derivation,

Physics Research at ALLISON

● These familiar symbols, representing broad areas of investigation at Allison, add up to our guiding theme, "Energy Conversion Is Our Business."

Long-range objective of Allison scientific investigation is the creation and development of practical energy conversion devices for such applications as direct nuclear conversion systems . . . plasma acceleration for space flight propulsion . . . energy depots and other forms of energy conversion systems.

An immediate objective centers on the Military Compact Reactor (MCR). Allison has been selected by the Atomic Energy Commission to design and develop MCR—a highly mobile, completely self-contained nuclear fission power system—to provide electric power in remote areas.

*To implement these expanding and long-range programs,
we need additional scientists and engineers—both theoretical and experimental:*

NUCLEAR PHYSICISTS—(Shielding)—Ph.D. or M.S. or equivalent, with capabilities in nuclear reactor shielding field, including experience in experimental shielding investigations and associated minimum weight shield configurations.

(Reactor)—Ph.D. or M.S. or equivalent with substantial experience in reactor physics field to analyze nuclear behavior of projected reactors; generate new concepts in design or control of nuclear reactors.

(Experimental)—Ph.D. preferably in nuclear physics, or equivalent with experience in experimental nuclear physics, to plan, conduct and analyze critical experiments on compact reactor core configurations.

SOLID STATE PHYSICISTS—(Section Chief)—Ph.D., 5-10 yrs. experience in experimental solid state physics to direct group of materials in experimental research on conversion.

(Senior Research)—Ph.D. in theoretical physics. Energy conversion experience desirable. Will carry out theoretical work on the thermodynamics and physics of energy conversion devices. Considerable use will be made of computing systems (analog and digital). Radiant energy conversion, thermionic, liquid metal systems will be analyzed initially.

(Research)—Ph.D. Must be capable of carrying out independent research in property evaluation of semiconductors and metals. Some attention also to liquid state

physics. Radiant energy conversion devices emphasized in early work.

MATHEMATICAL PHYSICISTS—Ph.D. or M.S. in mathematics, or equivalent. Prefer experience in reactor analysis and programming for digital and analog computer. Must be capable of carrying out all computer operations (digital or analog) required by nuclear engineering.

M.S. in mathematics with courses in nuclear physics. Requires strong analytical training in field of mathematics with experience in nuclear reactor field.

THERMIONIC RESEARCH PHYSICISTS—Ph.D. with established reputation in field of thermionic energy conversion, or thermionic emission. As group leader, he must provide technical leadership in all areas related to development of practical thermionic converters (nuclear, solar, and chemical heat sources).

M.S. or Ph.D. preferred to direct work in planning and performing experiments on test diode configurations. Requires strong academic background in theoretical and experimental plasma physics with emphasis on gas discharges, plasma dynamics, diagnostic techniques and thermionic emission.

Ph.D. or equivalent (solid state physics)—Requires good knowledge of solid state physics associated with high temperature materials used in thermionic converters. Will require study of new materials and/or new processes for emitter and collector electrodes in a thermionic converter.

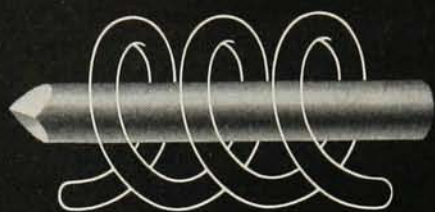
PLASMA PHYSICISTS—(MHD Power Generation Research)—Ph.D. in physics or engineering. Must be well-versed in theory of plasmas and gaseous discharges. Will be required to lead a research and development program in field of MHD power generation.

(Propulsion)—Ph.D. in physics or engineering. Must be well-versed in plasma physics and experienced in application of important diagnostic methods such as probes, spectroscopy, and microwaves. Will lead an established research program in pulsed plasma propulsion.

(Basic Research)—Ph.D. in physics or mathematics. Background should include vector and tensor analyses, fundamentals of probability theory, fundamentals of classical mechanics and electrodynamics, the kinetic theory of plasmas, and the principles of magnetohydrodynamics. Will conduct theoretical studies in support of experiments in a low density plasma tunnel.

Openings available NOW. A promising future for those who qualify is available in the creative environment at Allison—plus all the opportunities and advantages offered through an organization with the character of General Motors. Interested? Let us hear from you. Send your resume or write to: Mr. V. A. Rhodes, Professional and Scientific Placement, Dept. 511, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

An equal opportunity employer



NOW! Optically Corrected Single Crystal Laser Rods

Meller offers optically corrected laser rods in ruby or sapphire-clad ruby, doped calcium fluoride, calcium tungstate, glass and other single crystals.

Only Meller offers these outstanding guarantees: all faces flat to 1/20th wave or better . . . ends optically parallel within 2 secs. of arc. Chisel right angle correct within 5 secs. of arc . . . apex of angle parallel to flat end within secs. of arc so that maximum TIR (total internal reflection) will be attained. Guarantees apply to ruby rods from 1½" to 9" . . . and up to 2" lengths on other single crystals.

Meller offers round, square, triangular, and other configurations. Also white sapphire tubes for any size ruby rod-piston fit. Trumpet shape ruby/sapphire completely lapped and silvered available for less than \$1,000.00!

For new technical brochure and price schedule, write or call ADOLF MELLER CO., Box 6001, Providence, Rhode Island Phone (401) 331-3717



Synthetic Sapphires • Ruby Lasers & Masers
Alumina Powder

while a few of the chapters like the ones on trajectories and orbits give a greater amount of theoretical and mathematical development. It is intended to be a handbook for engineers and in this respect it succeeds very well, since the majority of articles follow the avowed policy of being practical and informative.

To quote from the Foreword by W. von Braun: "... the book will help to advance the state of the art at an even faster rate, and will bring us closer to the final goal: Manned Conquest of Space."

The Theory of Probability. By B. V. Gnedenko. Transl. from Russian by B. D. Seckler. 459 pp. Chelsea Publishing Co., New York, 1962. \$8.75. Reviewed by T. Teichmann, General Atomic Division, General Dynamics Corporation.

THE theory of probability is an outstanding example of the natural combination of mathematical ideas and scientific thought, and its content in each of these areas is so significant that any treatment necessarily concentrates on one or the other of them. Gnedenko's book is aimed at the mathematical aspects of the theory, but a number of examples discussed in the text (as well as those at the end of chapters) serve to make it a very useful introduction to the application of the theory in several important areas of physics and statistics.

The introductory section of the book, dealing with the basic concepts and different possible approaches to the theory (including the axiomatic), is distinguished by its clarity, and a number of illuminating examples ("paradoxes"), as well as by several unnecessary dialectical interpretations ("realism" vs. "idealism"). Fortunately, there are only one or two additional irritations of this type in the rest of the book. The treatment then proceeds to sequences of independent trials, Markov chains, random variables, distribution functions, and laws of large numbers. The latter are clearly presented, but are given only in the limiting forms with no error estimates (e.g., no law of the iterated logarithm). There follows a discussion of mathematical problems related to continuous distributions, including characteristic functions, positive functions, limit theorems, and infinitely divisible distributions. The penultimate chapter on stochastic processes and the Kolmogorov equations includes an elegant and instructive discussion of Birkhoff's ergodic theory. The book concludes with a rather general description of statistical estimation with details given for normal distributions. There are some useful tables, and an extensive bibliography including an unusual number of references to non-Russian contributions! The translation is good (i.e., English, not transliterated Russian!), though it is surprising that it was not found necessary to use the words "sample" or "sample space". The printing and type are up to Western standards, unlike many other recent Russian translations.

It is worthwhile comparing this treatment with Feller's *An Introduction to Probability Theory and its*