

NUCLEAR PHYSICIST

A position is available in a small group for an MS or PhD with experience in nuclear weapons effects. Background should be in instrumentation and/or engineering. Excellent salary and unusually comprehensive benefits program. Home city is in metropolitan center of nearly a million. Good educational and recreational area. Battelle is adjacent to Ohio State University. Support provided if interested in further education at graduate levels. Write to Mr. L. G. Hill,

BATTELLE MEMORIAL INSTITUTE COLUMBUS LABORATORIES

505 King Avenue, Columbus, Ohio 43201

There are several opportunities in other fields at Battelle. Write and tell us about your qualifications.

An Equal Opportunity Employer



NEW SELF-HEALING LIQUID Q SWITCH

FOR RUBY LASERS

- ☐ Passive
- ☐ Self-healing
- ☐ Self-synchronizing
- ☐ Giant pulses of high spectral purity
- ☐ Long life
- ☐ Economical
- ☐ Easy to use

The new Liquid Q Switch consists of a treated cryptocyanine solution sealed between optically flat windows in a precision, refillable cell designed for easy mounting in laser systems. Beckman & Whitley also offers rotating prism and thin film laser Q switches. For information contact:

Beckman & Whitley
A SUBSIDIARY OF TECHNICAL OPERATIONS, INC.
SAN CARLOS, CALIF. 951-8241 CODE 415

computation, counting, and enumeration problems; Part 2 to control and extremization; and Part 3 to problems of constriction and existence; and as an appendix there are reprinted four interesting and thought-provoking lectures of H. Weyl.

Among the various papers there are several presentations of Pólya's theory of counting, the most complete in de Bruijn's paper specifically devoted to the subject. The note by Montroll on lattice statistics includes a lucid explanation of the Pfaffian method, one of those mathematical curiosities of an earlier age for which a use has now been found. Tompkins' paper on Sperner's lemma can serve as an excellent introduction for the student who wants to know a little of what combinatorial topology is about. Trueblood's paper on crystallography is a masterpiece of compression, though the reviewer does not understand how either the paper or the subject came to be classed under the general title of the book.

The whole is beautifully printed and illustrated and will be a valuable aid to those seeking a short introduction to any of the subjects covered.

The Theory and Practice of Scintillation Counting. By J. B. Birks. 662 pp. (Pergamon, Oxford) Macmillan, New York, 1964. \$17.50.

Reviewed by F. W. K. Firk, Nuclear Physics Division, Harwell.

Everyone concerned with the theory and application of scintillation counting will welcome the appearance of a second treatise on the subject by Birks. The book contains a great deal of information on work published in a wide range of scientific journals. Bearing in mind the primary interests of the author, it is not surprising that the book covers most thoroughly the theoretical aspects of the scintillation processes in organic materials. These chapters provide a definitive review of the theory suitable for both the research worker and the advanced student. The chapters devoted to applications of scintillators are naturally of a more transient nature. The author has almost succeeded in living up to the claim on the dust cover that "every known application of scintillation counting is considered in

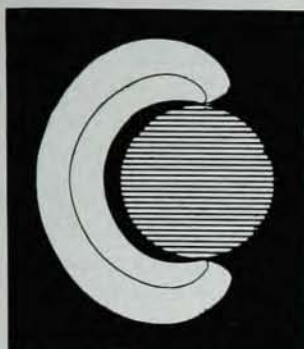
detail and all advances in the field are covered." The presentation of so much in a single volume has its disadvantages; many important experimental topics are given little, if any, mention (e.g.: Haddad's impressive 4000-litre liquid scintillator used as a total γ -ray absorption detector in (n,γ) experiments). Other topics, of somewhat restricted application (e.g.: Hoogenboom's sum-coincidence NaI γ -ray spectrometer) are, however, given more than adequate treatment. These minor criticisms do not detract from the fact that this book is a valuable addition to the scientific library and will doubtless remain the standard work in the field for many years. How many readers will wonder what this book is doing in the same series as *Problems in the Design and Development of 750 MW Turbogenerators* or *Asynchronised Synchronous Machines*?

Fluctuation Phenomena in Solids. R. E. Burgess, ed. 389 pp. Academic, New York, 1965. \$14.00.

Reviewed by George Weiss, National Institutes of Health.

Noise and fluctuations have long been of interest in solid-state physics, particularly in semiconductor and ferromagnetic phenomena. To date there have been few books on noise in solids, and none that gives as comprehensive an account of the field as the present volume.

Of particular interest is an article by Favro in which the theory of rotational Brownian motion is discussed. Several cases are presented corresponding to the different constraints possible on the motion. The theory presented should find many applications, not only in the study of solid-state phenomena but also in physical chemistry. A long review article by Münster gives an account of the thermodynamic basis of the theory of fluctuations in solids. The theory is then applied to a variety of phenomena, such as the critical scattering of x rays by binary alloys, neutron scattering by ferromagnetic crystals, neutron scattering near the order-disorder transition point, and several others. The thorough treatment of the material will be a valuable guide for those interested in critical fluctuations. Another noteworthy article is that by



NEW BOOKS ON PLASMA PHYSICS

REVIEWS OF PLASMA PHYSICS

A systematic, multi-volume review of the present status of plasma theory, serving both as an introduction for students and for researchers entering the field, and as a convenient, authoritative, up-to-date presentation of current knowledge for workers in plasma physics. This continuing series, prepared by internationally known Soviet experts in specific fields, is under the editorship of Academician M. A. Leontovich, of the Kurchatov Institute of Atomic Energy. Each volume contains a number of integrated tutorial reviews, covering in depth and in breadth specific aspects of the theory of the given field of plasma physics. In many cases, new material is presented. Translated by Herbert Lashinsky, University of Maryland.

Volume 1: A comprehensive introduction to "classical" plasma physics, contains authoritative papers on: Orbit Theory, by D. V. Sivukhin; Collisions in Fully Ionized Plasmas, by B. A. Trubnikov; Plasma Transport Phenomena, by S. I. Braginskii; and Plasma Thermodynamics, by A. A. Vedenov. Much of the material in the first two papers is presented here for the first time. Although the theoretical analyses are quite advanced, the experimental aspects of the subject are kept firmly in view throughout. This is especially true of the article on transport phenomena, in which the kinetic approach is developed in parallel with qualitative physical descriptions of transport phenomena, including some of the less familiar "transverse" thermal transport effects

in plasmas in magnetic fields. Many physical examples and applications of the theory are given.

336 pages \$12.50

Volume 2: Contains four review papers concerned primarily with the problem of plasma confinement: Magnetic Field Geometries; Plasma Equilibrium in Magnetic Fields; Hydromagnetic Plasma Stability; and Motion of Charged Particles in Electromagnetic Fields.

Approx. 280 pages \$12.50

Volume 3: Devoted to plasma waves, includes: Electromagnetic Waves in a Plasma; Oscillations of an Inhomogeneous Plasma; Introduction to the Theory of a Weakly Turbulent Plasma; and Symmetric Magnetohydrodynamic Flow and Helical Waves in a Circular Plasma Cylinder.

Approx. 300 pages \$12.50

Volume 4: Contains three papers: Hydrodynamic Descriptions of a Highly Rarefied Plasma; Collective Phenomena in Collisionless Plasma Shock Waves, and Coulomb Collisions in Fully Ionized Plasma. The latter paper contains new material on the relevance of this topic in mirror machines, provided by the author (D. B. Sivukhin) for the English edition.

Approx. 290 pages \$12.50

Volume 5: To be published late in 1965 in the Soviet Union is to comprise a comprehensive review of radiation phenomena in plasmas. An English translation will be published promptly.

SPACE PHYSICS WITH ARTIFICIAL SATELLITES

By Ya. L. Al'pert, A. V. Gurevich, and L. P. Pitaevskii

The first study of its kind, this monograph is devoted to a theoretical investigation of phenomena attending the movement of satellites through a highly rarefied plasma. In approaching his problem, the author employs the kinetic approach in place of usual hydrodynamic and aerodynamic principles. Two cases are considered: a body with velocity greater than the thermal motion of neutral particles and ions and with dimension larger than the Debye radius; and a body with dimension comparable to or smaller than the Debye radius and velocity comparable to that of the particles. The results of calculations of the disturbances in the concentration of neutral particles, ions, and electrons and the consequent disturbances of the electric and

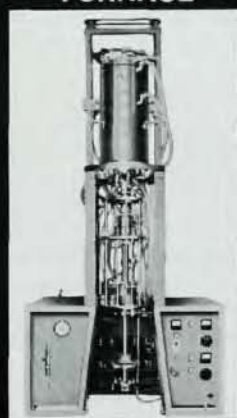
magnetic fields in the satellite's vicinity are presented in Chapters II through VI. Chapter VII is devoted to an investigation of the scattering of radiowaves in the satellite's wake. Disturbances in the plasma in the vicinity of a body at rest are calculated in Chapters VIII and IX, enabling the development of a more rigorous theory of a probe in a rarefied plasma. Also considered is the question of the influence of an alternating electric field (field of the transmitting antennas) on the plasma. This work represents the first investigation and generalization of an extremely complex and manifold problem urgently being posed by contemporary physics and technology. Translated from Russian.

244 pages \$25.00



CONSULTANTS BUREAU 227 West 17th Street, New York, New York 10011

for
a
BREAKTHROUGH
in
your
research
Use
Gakei's
**HIGH-TEMPERATURE,
HIGH-PRESSURE
ELECTRIC
FURNACE**



Company and university laboratories
are getting revealing results with
these furnaces.



Designed for research scientists of compound crystals, Gakei's high-temperature, high-pressure electric furnace offers these proven features:

- Grows single crystals of compounds with high vapor pressure characteristics, e.g., II-VI compounds.
- Generates heat up to 4,500° F, permits pressure up to 4,000 psi, with power consumption of 30 kw.
- Heating element (graphite) mounted in the pressure chamber permits use of high pressure of controlled atmosphere such as argon gas, nitrogen gas, oxygen gas.
- Complete with program-controlled temperature controller and temperature control transformer (saturable core reactor type).
- Can be converted to a ZONE REFINING FURNACE for zone melting grown crystals, by equipping an up and down mechanism of crucible and two heaters.

FOR DETAILED INFORMATION PLEASE WRITE

GAKEI
ELECTRIC WORKS CO., LTD.
3108, Senju-Sakuragicho, Adachi-ku, Tokyo, Japan

van Vliet and Fassett on fluctuations due to electronic transitions and transport in solids. Several other papers in this collection deal with fluctuations in magnetic and dielectric solids, ferromagnetic solids, solid-state plasmas, nonlinear systems, and the fluctuations of hot electrons.

Although one could wish for more material describing the experimental manifestations of solid-state noise, this book can be highly recommended for those interested in a wide-ranging account of current research in the area.

Configurational Statistics of Polymeric Chains. By M. V. Volkenstein. 562 pp. Interscience, New York, 1963. \$20.00. Reviewed by Herbert Leaderman, National Bureau of Standards.

It is often necessary, in introducing a book or treatise on high polymer physical chemistry or physics, to remind the reader that the foundations of polymer chemistry were established by Staudinger with his demonstration of the existence of the long-chain molecule; the foundations of polymer physical chemistry and physics were established by Kuhn and by Guth and Mark with their treatments of the flexible randomly kinked long-chain molecule in Brownian motion. Because of the relative newness of this field of study, it was possible in the not too distant past for one authority to write a treatise on the whole field of polymer science. With the great expansion of this branch of science, this can no longer be done. Fortunately, in recent years, authorities on various aspects have published valuable treatises covering their specialties; this book belongs to this category.

The rapid recent growth of polymer science has possibly been stimulated by commercial interest in certain aspects. However, polymer science is not to be regarded as a branch of technology or applied science, but a bona fide new aspect of classical physics and physical chemistry. Workers engaged in basic academic research in this field need not feel apologetic, as the author does in his introduction, for the technological applications of his subject. In this field of study, we are continuously witnessing radical changes and even overthrow not only of de-

tails but also of fundamental concepts. In view of the time involved in the preparation of a comprehensive treatise, and the further time-lag when a translation is necessary, it is to be expected that such a treatise will be somewhat out of date even on fundamentals when the book finally appears. This is part of the occupational hazard in treatise writing, which is well understood by the readers and also the writers of such treatises, and so here again the author has no need to apologize for such lacunae.

The central part of the book is concerned with the statistical configuration of the long semiflexible molecule. Starting with the simplest model, the freely jointed zero-thickness chain, the model is progressively refined to include the effect of finite valence angle and restricted rotation. The dimensions of chains containing more complicated repeat units are considered. The physical nature of the model, and the significance of the results of the calculations, are discussed in detail. The conformations of real polymer chains in crystals, and also of some aspects of crystallization in polymers are considered. Using in part these and other theoretical and experimental results, the calculated conformation of real polymer chains is compared with experimental observations.

Introductory material in the front part of the book deals with the chemical structure of some polymeric systems, and the physical chemistry of such systems. The nature of restricted rotation around covalent bonds is discussed. Finally, the polarizability of polymer chains, optical birefringence, and equilibrium elasticity of stretched polymer networks are treated.

The book concludes with a critical discussion of the present status and possible future lines of development of the theory of the configuration of polymer chains as related to the experimentally observed physical properties of polymeric systems. A detailed study of this scholarly work is indispensable to theoretical and experimental workers for information concerning the present status of and previous developments in the theory of the conformation of polymer molecules.