

This book is clearly and concisely written with a large but carefully selected number of figures. Particularly commendable is the fact that the instrument illustrations are accompanied by a very clear description in the text so that the functioning and design of a given piece of equipment can be easily followed and understood. This book should be heartily welcomed by workers in the field, particularly those who have assumed the experimental responsibility of determining number-average molecular weights and related thermodynamic properties.

POLYMER STRUCTURE SECTION
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Annual Review of Nuclear Science. Volume 8. EMILIO SEGRÈ, Editor, University of California, GERHART FRIEDLANDER, Associate Editor, Brookhaven National Laboratory, and WALTER E. MEYERHOF, Associate Editor, Stanford University. Annual Reviews, Inc., Grant Avenue, Palo Alto, California. 1958. vii + 417 pp. 16 × 23 cm. Price, \$7.00 (U.S.A.); \$7.50 (elsewhere).

The volumes of "Annual Review of Nuclear Science" have probably become so familiar to most persons interested in pure and applied nuclear physics, that the reviewer might dispense with a general description of the character of this series. For the few uninitiated readers, it may be stated that each volume contains a collection of about a dozen articles, with a balanced distribution between pure nuclear physics and its applications to chemistry, biology, geology, etc. No effort is made to cover every year advances in all branches of nuclear science. The much more opportune procedure followed is to review each year those fields where a considerable amount of knowledge has accumulated since the last review appeared in this series or elsewhere, and therefore it is desirable that the present status of the problem be summarized. In the past such articles have proved invaluable both to the specialist in deciding the direction of his future investigations, and to the person wishing to survey a field close to but not exactly his own. One feature that greatly enhances the value of these books, and for which editors and authors must be congratulated, is the short time elapsing between the appearance of results in the technical papers and their coverage in these reviews. In the present volume, literature up to the spring of 1958 (about 6 months before the appearance of the book) is fully taken into account, and even data personally communicated to the authors and still unpublished at that time are included.

The volume opens with a high-caliber article of a theoretical nature, *Invariance principles of nuclear physics* by G. C. Wick. Parity, charge conjugation, time-reversal, charge independence, baryon and lepton conservation, and strangeness are discussed. These problems are viewed from the vantage point of the field-theoretical methods of quantum mechanics, and the treatment is masterful in its clarity and completeness. In contrast to many articles on parity non-conservation and related subjects that have appeared elsewhere, this is definitely not an elementary approach for the uninitiated.

The optical model and its justification, by H. Feshbach, covers the principles and applications of a method for reducing many problems of nucleon-nucleus interaction to the study of a two-body system. The article is excellently written and condenses material previously scattered in numerous and lengthy papers.

Hyperfragments, by W. F. Fry, is a brief but comprehensive account of the properties of light nuclei where a neutron is replaced by a lambda-zero hyperon. These peculiar objects supply valuable information on strange-particle interactions.

Antinucleons by E. Segrè is a clear and authoritative account of the discovery and properties of these constituents of "antinatter."

Gamma-ray spectroscopy by direct crystal diffraction, by J. W. M. DuMond, is an excellent review of the work done by the author (who spent a life-time in perfecting high-resolution X-ray and gamma-ray spectrometers) and by a few others who have undertaken these difficult experiments. This technique of measuring gamma-ray wave lengths, while requiring exceptionally strong sources, supplies a precision unequalled by any other method. A large number of lines

have been determined, which will serve the same purpose as standard wave lengths in optical spectra.

Conceptual advances in accelerators, by D. L. Judd, is a compact but complete summary of the principles involved in the design of the present accelerators and of the ideas advanced, in this country and elsewhere, to improve attainable energy, current intensity, accessibility of the beam, length of duty cycle, and other desirable features. The alternating-gradient focusing has been the greatest advance of the past few years; intersecting-beam accelerators to attain higher useful particle energies, and use of plasma to increase current intensities, are some of the ideas that have been proposed, but their practical application seems rather remote.

The primary cosmic radiation, by H. V. Neher, describes the chemical composition of the primary cosmic-ray particles in relation to the abundance of nuclear species in the universe. The energy distribution and the suggested mechanisms of cosmic-ray acceleration also are discussed.

The radioactivity of the atmosphere and the hydrosphere, by H. E. Suess, describes recent determinations of tritium, C¹⁴, and other radioactive elements, either liberated from radioactive elements in the earth, produced by cosmic-ray interactions in the atmosphere, or introduced by man's nuclear explosions.

Geochronology by radioactive decay, by L. T. Aldrich and G. W. Wetherill, deals with a subject that had been reviewed in this series only 4 years ago. The necessity for a new summary emphasizes the progress realized in this brief period. The potassium and rubidium methods, in their infancy at that time, now rival the uranium-lead methods in accuracy and are of much more general application as they involve common elements. Excellent consistency exists on the ages of many pre-Cambrian igneous rocks. On the other hand, no progress has been made on the important task of pegging the conventional geologic time-scale, from the Cambrian to the Recent, to absolute, radioactively determined dates. Geologists still rely on a few points, determined many years ago and open to question. A massive attack on this problem is urgently needed. The present article deals essentially with the methods of age determination rather than their geological implications.

Nuclear astrophysics, by A. G. W. Cameron, is a most interesting account of our present knowledge of nuclear reactions going on in the stars, in relation to the origin and abundance of the various nuclear species.

Practical control of radiation hazards in physics research, by B. J. Moyer, should prove useful to many nuclear physicists, chemists, etc., whose notions about the dangers of exposure to radiations seem generally rather vague, if the reviewer and his associates can be taken as examples.

The purpose of cellular radiobiology, by T. H. Wood, is, in the author's words, "a review of those papers published in 1957 that deal with the effects of ionizing and ultraviolet radiations on simple biological systems." The large bibliography cited and the frequency of reviews in this field indicate its rapid development. A special topic of this subject, *Information theory in radiobiology*, is the object of a separate, brief article by H. Quastler. It discusses the statistical principles that govern in an organism the macroscopic consequences of the primary radiation effects.

The above summary of the contents of the individual articles clearly shows that the eighth volume of this series is fully as useful as its predecessors to all students of pure and applied nuclear science. The list of authors and topics for the forthcoming 1959 issue will doubtless induce a feeling of keen expectation in all those interested in what probably is the fastest progressing branch of human knowledge.

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Internal Conversion Coefficients. By M. E. ROSE, Chief Physicist, Oak Ridge National Laboratory. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. xxi + 173 pp. 23 × 30.5 cm. Price, \$6.25.

The internal conversion of γ -rays supplies a most useful tool to the investigator concerned with unravelling nuclear decay schemes; it also supplies a very nice example, with a fair number of subtle features (some of which have been apparent only in the last couple of years), of the interaction of a system of charged particles with the electromagnetic field.