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OF CABBAGES AND KINGS

Title Advances in Nuclear Science and Technology, Vol. 4

Editors Paul Greebler and Ernest J. Henley

Publisher Academic Press, Inc., 1968

Pages xiv + 394

Price \$18.50

Reviewer J. Chernick

The proliferation of books, journals, and miscellaneous documents in nuclear science and engineering is staggering to one who is trying to keep abreast of the entire field. The specialist has long since given up the attempt and has narrowed his selection of reading material. Bibliographies and review papers are of some help, but in the end one must concentrate on the work of one's peers in his specialty.

The best review books are still those that are painstaking labors-of-love by individual experts. However, the law of demand and supply has led to reviews with a variety of authors and subjects. Examples of the latter are the USAEC's *Quarterly Technical Progress Reviews, Reactor Technology Selected Reviews* in 1964 and 1965, and the continuing annual publications by Academic Press of *Advances in Nuclear Science and Technology*. Since libraries will buy almost any book, there has been a rush by publishers to print in book form the papers presented at almost any conference. By chance, a good paper in your chosen field just might appear in one of these books.

Advances in Nuclear Science and Technology, 4 contains articles on 1) gas-cooled reactor technology, 2)

3) a 1000 MWe fast breeder design, 4) the doppler effect in fast reactors, 5) optimum control theory, 6) perturbation theory, and 7) industrial uses of ionizing radiations. The authors are respectively 1) H. B. Stewart, C. L. Richard, and G. B. Melese, 2) K. P. Cohen and G. L. O'Neill, 3) R. B. Nicholson and E. A. Fischer, 4) R. A. Meyer and B. Wolfe, 5) J. Lewins and A. L. Babb, 6) J. Lewins, and 7) S. Jefferson, R. Roberts, F. J. Ley, and F. Rogers.

The authors are all recognized experts and make a careful attempt to bring the state of the work in their topic up to date. However, the tendency for review papers to become rapidly dated is shown by the fact that the General Atomic paper does not include recent experience on Peach Bottom, and the General Electric BeO moderated fast reactor design does not include the effect on their design of the recently discovered uncertainties in the capture-to-fission ratio of plutonium at intermediate energies. The paper by Nicholson and Fischer lacks a quantitative discussion of the influence of different spin states for ^{239}Pu resonances, while the work of Meyer and Wolfe fails to include important recent work such as that of Moss and Rhoades of Atomic International.

Despite such shortcomings, the above papers on fast breeders and advanced gas-cooled power reactors are all thorough critical reviews that are well worth reading.

In addition, the book contains a balanced review of industrial applications of ionizing radiations by a team from the AERE Wantage Research Laboratory. Finally, the two articles, involving J. Lewins as an author, review work using bang-bang theory on reactor control problems, and some possible extensions of perturbation theory including the formulation of perturbation theory for heterogeneous systems.

Jack Chernick is a senior physicist and Associate Head (for theoretical physics) of the Reactor Physics Division at Brookhaven, where he has been since 1947. An alumnus of the University of Chicago and of Brooklyn College, Fellow of the ANS, and a member of both the Editorial

Advisory Committee for Nuclear Science and Engineering and Brookhaven's Scientific Council, he has authored numerous papers on reactor physics theory.

LUCID, AUTHORITATIVE, AND CURRENT

Title Progress in Nuclear Techniques and Instrumentation, Vol. III

Editor F. J. M. Farley

Publisher North-Holland Publishing Co., 1968

Pages 3 + 255

Price \$13.50

Reviewer D. Allan Bromley

This slim volume maintains the high standard that Farley has established for this Progress series. It comprises three articles: by B. W. Montague, of CERN, on Radio Frequency Separation; by G. T. Ewan, of Chalk River, on Semiconductor Spectrometers; and by T. Alväger and J. Uhler, of the Swedish Research Institute of National Defense, on Electromagnetic Isotope Separation for Laboratory Purposes. These four authors are internationally recognized experts, and their articles are lucid, authoritative, state-of-the-art presentations.

In Montague's case, the discussion is focused on the future inasmuch as only three radio frequency separators have yet been realized (and two of these at CERN and Brookhaven are essentially identical). He provides an excellent introduction to separator theory based on the discovery of the previously unsuspected solution to Maxwell's equations—surely considered to have been among the most thoroughly understood physical situations!—leading to the hybrid E_{11}/H_{11} separator cavity mode and discusses its practical applications. Particularly useful is the discussion of limitations of various designs in terms of transmission, maximum momenta, etc. This article is essential reading for anyone seriously interested in the rf separation problem in elementary particle physics.

Ewan's article is, as stated, predominantly a status report on utilization of semiconductor detectors in nuclear physics applications with particular emphasis on the newest area of gamma radiation detection with relatively large volume lithium drifted germanium spectrometers. The basic semiconductor theory involved is treated in cursory fashion as is the associated instrumentation requirement. The article collects a number of useful tabulations and nomographs of interest to anyone using semiconductor spectrometers. It specifically does not concern itself with any of the witchcraft involved in the spectrometer fabrication area but does provide a very complete bibliography for readers with such interests.

The paper by Alväger and Uhler is very complete and, to a much greater extent than the other two in this volume, is concerned with the practical details involved in actually carrying out isotopic separations electromagnetically. Questions of ion sorcery, beam formation, magnetic design, sample collection, etc., are treated in detail. This article provides a very useful compendium of technical details in addition to a brief but complete historical introduction and a description of state-of-the-art devices such as the new on-line mass separators used in the study of fragments from accelerator targets. It will be useful not only to the mass spectroscopist but also to anyone concerned with problems of ion beam formation and handling.

One of the outstanding features of this volume is the excellent set of bibliographies appended to the articles. It is gratifying to find that in each article the relevant literature has been surveyed almost to the date of publication; this is unfortunately rare in most multi-author volumes, reflecting the usual difficulties in obtaining all manuscripts at roughly the same time.

Despite the excellence of its three articles, the volume exhibits one of the all-too-prevalent defects of Progress series. It would be a rare scientist indeed who would find all three of the articles of direct interest. Recognizing the difficulty of finding and coordinating appropriate authors, it would nevertheless appear very much worthwhile to work toward more related topics in any one volume with perhaps separators,

bubble and spark chambers, storage rings, etc., in one volume and semiconductor detectors, ion sources, new nuclear accelerator designs, etc., in another. This problem of heterogeneity is very much accentuated in a Progress series devoted to instrumentation as opposed to one concerned with research progress in a broad field where the heterogeneity could be advantageous in broadening horizons and breaking down specialization.

In a mechanical sense, the volume is extremely well produced and a pleasure to read. One of the authors, G. T. Ewan, might well have cause to complain, however, since he appears as G. T. Evans on the dust jacket and as G. T. Owen in Farley's Preface!

D. A. Bromley is Professor of Physics and Director of the A. W. Wright Nuclear Structure Laboratory at Yale University. Chairman of the National Academy of Sciences Committee on Nuclear Science, a member of the Council of the American Physical Society and of the Executive Committee of the National Research Council Division of Physical Sciences, and a Director of the United Nuclear Corporation, he has worked extensively in research in nuclear structure and nuclear reaction mechanisms utilizing particularly ³He and heavy ion projectiles; he has been actively involved in the development of new nuclear physics accelerators and, with J. M. McKenzie, fabricated and used the first germanium surface barrier detectors in nuclear reaction studies as well as the first room temperature semiconductor detector—a silicon surface barrier unit.

WILL BRUSSELS SPROUT?

Title Preservation of Fruit and Vegetables by Radiation

Publisher International Atomic Energy Agency, 1968

Pages 152

Price \$3.00

Reviewer D. K. Salunkhe

This small book emphasizes the practical side of radiation preserva-

tion of fruits and vegetables. The subject matter is divided into twelve chapters with specific viewpoints of practical application—each one amply documented. In addition, there is a fine chapter on summary, conclusions, and recommendations.

In my opinion, the book represents a broad and fascinating new field. The subject matter is written by various authorities in their fields in a clear and interesting style without diluting the scientific information. This book will be useful to professors and students of horticulture and food technology and also to personnel in the food industry.

The International Atomic Energy Agency and Food and Agricultural Organizations of the United Nations must be congratulated for this excellent and timely book.

For the past 15 years, Dr. Salunkhe (PhD, Michigan State, 1951) and his co-workers have conducted extensive research on radiation effects on fruits and vegetables and authored many papers on radiation preservation of fruits and vegetables. One of his review articles, "Radiation Effects on Fruits and Vegetables," Economic Botany, 18, 28, 1960, was selected as an outstanding article in biological journals in that year. He is considered as one of the pioneers in the field of radiation pasteurization of fruits and vegetables.

WELL WORTH YOUR DINARS AND RIELS

Title Operation and Control of Ion-Exchange Processes for Treatment of Radioactive Wastes

Publisher International Atomic Energy Agency, 1967

Pages 147, 31 fig., 27 tables

Price \$3.00

Reviewer Friedrich G. Helfferich

To assist in providing guidance, mainly for developing member states, for treatment of radioactive wastes, the IAEA has commissioned books on the three principal waste-treatment techniques: precipitation, evaporation, and ion exchange. The