

Book Reviews

Internal Conversion Processes. Edited by Joseph H. Hamilton. Academic Press (1966). 669 pp. \$22.50.

Internal conversion has had a long, and sometimes important, part to play in the development of the understanding of nuclear structure. Furthermore, a knowledge of internal conversion coefficients is necessary in many current applications of nuclear science.

The appearance in the mid-fifties of Rose's and of Sliv and Band's comprehensive tabulations of conversion coefficients for the K and L shells ended an era in which the multipolarities of transitions had to be derived by comparison with more approximate calculations, or with the semi-empirical K/L and L -subshell ratios of Goldhaber and Sunyar, Mihelich, and others. Assiduous experimenters, however, have continued to improve techniques, until the precision of many current experiments is comparable with, or exceeds, the accuracy of the great tabulations. The important new area of angular correlations involving conversion electrons has been studied in some detail in the last few years. Finally, the hope that new kinds of information could be derived from the study of transitions in which some of the conversion is due to those parts of the electron wave functions which penetrate inside the nucleus, and thus where the conversion coefficient is nuclear-structure dependent (Church-Weneser effect), has been at least partially fulfilled.

It was primarily for the discussion of these last three topics that an international conference, with J. H. Hamilton as chairman, was held at Vanderbilt University in May of 1965. The proceedings of the conference provide the bulk of the present book, which also contains some specially written introductory material.

Rose's introductory chapter is a very useful discussion of the theory of internal conversion. The reviews of Stelson (conversion coefficients from Coulomb excitation and lifetime measurements) and Geiger (conversion of high-multipole-order transitions) are especially good. A rather complete account of current work on angular correlations is contained in the four invited papers of Gerholm and Pettersson, Thun and collaborators, Yamazaki, and Deutch and Hornshøj. Interesting work on the angular distribution of conversion electrons emitted by an oriented sample is reported by Stone, Frankel, and Shirley.

Ways to improve the luminosity of the classic double-focussing spectrometer are detailed by Bergkvist, and a new kind of high-resolution spectrometer is described by Daniel and collaborators. Many important uses of semiconductor spectrometers in conversion and gamma-ray work are reviewed by Hollander.

The beginnings of new calculations, in some ways improving on, and in some ways extending, the classic ones, are briefly reported by Seltzer and Hager, and by Bhalla. It may be expected that, in the years to come, much more emphasis will be placed on the study of conversion elec-

trons emitted during nuclear reactions; some examples are included by Sakai et al. ($p, 2n$ reactions) and by a Berkeley group (fission fragments). Nuclear-structure effects in conversion are discussed by Herrlander and Ewan, by Hager and Seltzer, and in several of the angular-correlation papers.

While comparison with the classic tabulations is usually sufficient to determine a multipolarity (if it is unique) it is of interest in some cases to determine multipole mixing ratios with a high degree of accuracy. The difficulties involved are reviewed by Novakov. Some evidence that the classic tabulations are not in accord with experiment for L -shell conversion of low-energy $E2$ transitions is presented by Mladjenovic et al. (It has since been reported that the discrepancy is about five percent.)

The proceedings of the conference are lucidly summarized by Rasmussen. The volume closes with 65 pages of tables and graphs; all of them will be useful to workers in the field, and the tables of conversion matrix elements and particle parameters are a new and important supplement to those previously available.

The volume is more smoothly edited and conveniently arranged than most conference proceedings. Its high price makes one reluctant to recommend it for most personal libraries; no student of internal conversion can consider himself up to date, however, if he is not acquainted, in one way or another, with most of the contents.

Guy T. Emery

Indiana University
Bloomington, Indiana 47401

January 5, 1967

About the reviewer: Guy Emery studied at Bowdoin and at Harvard, where his thesis concerned internal and external conversion studies of the thorium active deposit. He has been a member of the nuclear spectroscopy group at Brookhaven National Laboratory, and in 1966 joined the faculty of Indiana University. His recent work has included collaboration on a study of chemical effects in internal conversion.

Irradiation Damage to Solids. By B. T. Kelly. Pergamon Press (1966). 232 pp. \$4.50.

The field of research covered by the title of this book is too large to permit more than a brief introduction to be encompassed in a book of this size (232 pages). The author recognizes this fact and points out that many currently important areas of research have necessarily been omitted or treated only sketchily. Nonetheless, the general approach taken by the author has considerable merit. Rather