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# Book Reviews

**Beta Decay.** By C. S. Wu and S. A. Moszkowski. Interscience Publishers, John Wiley & Sons, New York-London-Sydney (1966). 394 pp. $16.00.

In 1956 one of the most profound revolutions in physics took place, the downfall of parity. It transformed the somewhat static area of $\beta$-decay into a most exciting one with many connections to the whole of elementary particle physics. The present book, whose authors themselves have made important contributions to the field, is intended to give a coherent account of the weak interactions, that is, the leptonic decay of nuclei and of other particles. In this they succeed admirably. The treatment is neither encyclopedic nor elementary. The prerequisites are a knowledge of quantum mechanics and a familiarity with at least the terminology of nuclear and particle physics, such as Feynman diagrams, isobaric spin, and strangeness. The Dirac equation and the various symmetry operations are explained in appendixes, but it is perhaps too much to ask that this short introduction should be sufficient as the sole source of information. With the necessary background, the book offers easy and exciting reading. It avoids tedious calculations and technical details of experimental arrangements. The formulas for allowed transitions are derived in full in the appendixes. Those for forbidden transitions are only quoted, as are detailed nuclear structure considerations. However, throughout the book, physical arguments are given to provide an understanding of the results.

The arrangement of the material is roughly in historical order. After an introduction which sketches the development of the field, the classical theory of $\beta$-decay is given that is still valid as long as one does not look for pseudoscalar quantities, and which permits the classification of $\beta$-decays. Then comes a thorough discussion of the experiments on parity violation and of their consequences for theory. Here, as everywhere else, very careful comparisons between experiment and theory are given, and it is always clearly stated how far and to what extent the facts confirm, suggest, or deny speculative inferences. After a discussion of related processes and other leptonic decays, the last chapter deals with recent developments. The authors state in their preface, "This chapter was written with great emotion and enthusiasm." It gives a very readable description of the concept of a universal Fermi interaction, the theory of conserved vector current, the question of an intermediate boson, and the discovery of two kinds of neutrinos ($\mu$ and $e$).

This book is written by physicists for physicists, and not for nuclear engineers. It conveys everywhere the excitement of discovery. There is an excellent list of references, but the proofreading could have been done more carefully.

After a tortuous path with many false starts, all fully described, the field of weak interactions has reached a degree of maturity that sets it apart from the other branches of elementary particle physics. There are good reasons why the main features, two component massless neutrinos, lepton conservation, and universal Fermi interaction, will have long range validity. Thus the book will not soon be out of date. Certainly there are new and unexpected discoveries to come, but the reader of this volume will be well prepared for them.

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*About the Reviewer: Lothar Nordheim is a Senior Research Advisor at General Atomic where his work covers a broad spectrum in theoretical physics, including nuclear and reactor physics. Among his contributions was the first extensive systematics of $\beta$-decays on the basis of the nuclear shell model, in part in collaboration with Maria Mayer and Steven Moszkowski, one of the present authors. He was educated in Goettingen, Germany, taught at Purdue and at Duke University, and spent several years at Oak Ridge and at Los Alamos. Dr. Nordheim is a Fellow of the American Nuclear and of the American Physical Societies and is a member of the Editorial Advisory Committee of* Nuclear Science and Engineering.

**Reactor Physics in the Resonance and Thermal Regions.** Edited by A. J. Goodjohn and G. C. Pomraning. Cloth bound. The MIT Press, Cambridge, Mass. (1966). Vol. I, 421 pp. Vol. II, 452 pp. $15.00.

This two-volume set contains the formal papers presented at the National Topical Meeting sponsored by the San Diego Section of the American Nuclear Society on February 7-9, 1966. Volume I contains the papers dealing with neutron thermalization, while Volume II presents those dealing with resonance absorption. An addendum, which reports discussions at the meetings, has been issued separately as BNL-50004 (C-48) and is not part of the set.

Volume I contains papers dealing with the theoretical and experimental aspects of neutron thermalization. Although the theoretical papers are far more numerous than the experimental, many of the theoretical results are compared at great length with experiments.

The experimental papers by Brugger and by Beyster and his co-workers are very interesting. Brugger discusses the possibilities of extracting useful information about the physical properties of a sample from scattering law data for solids, liquids, and gases. Beyster is concerned with integral neutron thermalization measurements, and, in particular, measurements of neutron spectra, and angular and total neutron cross sections. In addition, future problems which seem of considerable interest are discussed.