

Book Review

Annual Review of Nuclear Science, Volume 16, 1966. Edited by Emilio Segré. Annual Reviews, Inc. (1966). 662 pp. \$8.50.

It is a pleasure to find in this age of specialization a series like *Annual Review of Nuclear Science* which covers such a wide subject matter so comprehensively. In the latest volume (16), there are 15 articles, several of which may be of particular interest to readers of *Nuclear Science and Engineering*.

One review, "Economics of Nuclear Power," will interest many. The author, J. A. Lane, explains how, without any change in nuclear science, nuclear power has within a six-year period emerged from pessimism to a booming economically competitive industry. The review presents only the domestic US scene observed from Oak Ridge and Washington, DC. The trick is presented as the discovery of ingenious routes to reducing tax payments that are explained and the offer of lower prices per kilowatt by manufacturers for the plants because of their larger size. Projections into the coming century are presented still with the refrain, "you'll burn to death"—low-cost uranium resources and nuclear power—"we told you so" by not having moved faster to develop breeders, and, in particular, thermal breeders of ten-year doubling time. No mention is made of the different views from Canada or the United Kingdom presented at Geneva in 1964.

A review entitled "Thermal Reactor Neutron Beams" by H. Maier-Leibnitz and T. Springer reviews applications of beams of neutrons of energy less than 1 eV to investigations of condensed matter. After discussing the properties of reactor neutron sources, there is a survey of the characteristics of neutron guide tubes, filters, crystal monochromators, and other devices used to fashion beams with special properties. The last two-thirds of the paper is a concise panoramic review of experiments employing elastic and inelastic scattering of neutrons. About 100 of the 144 references relate to this section. The fields covered include scattering cross sections, neutron diffraction, disorder scattering in zero-order diffraction, the scattering law, inelastic scattering in crystals and liquids, and magnetic phenomena. Although one or two of the examples chosen for illustration have been superseded by more comprehensive investigations, the authors have provided a well-rounded picture of recent progress in the field. A masterful understanding of the techniques peculiar to each experiment and of the basic requirements for optimum design of equipment is clearly evident. The application of reactor beams in nuclear physics is not discussed.

"On-line Computer Techniques in Nuclear Research" by S. J. Lindenbaum is largely a description of a series of high-energy scattering experiments in which the author has been involved, using the on-line computer facilities at the Brookhaven AGS. The magnitude of the data handling in these complex counter hodoscope experiments is such that real-time processing demands the most advanced and powerful computers available. Economically these can be justified by improved quality of the data and increased efficiency of use of the high-energy accelerators that have running costs of several k\$/h. The other topics touched

on scantily are the analysis of bubble and spark chamber photographs and applications in low-energy nuclear physics.

Space permits only briefer notes on some further articles.

"Thermal Equilibrium Nuclear Orientation" by D. A. Shirley gives an excellent review of recent advances in technique and applications in nuclear and solid-state physics of low-temperature nuclear orientation. The fact that, by one or another of several techniques, most nuclei can now be orientated, may be a revelation to many readers outside the field.

"Nuclear Fission" by J. S. Fraser and J. C. D. Milton is a valiant attempt to condense the present knowledge of the many experimental facets and the few crude theories of the fission process. We still understand embarrassingly little of the phenomenon on which so much has been built.

The survey by D. Robson on "Isobaric Spin in Nuclear Physics" comes at a time when this old idea has been brought into focus again with the discovery of isobaric analog states and the realization that at least relative isobaric spin may be meaningful even for heavy nuclei. The only new theory (all too briefly discussed) is the author's own investigation of the different asymptotic wave functions of neutron and proton.

The review by T. D. Lee and C. S. Wu on "Decays of Charged K-Mesons" is the second installment of "Weak Interactions" (Part I contained in Volume 15). This is a particularly informative and useful reference article (and series).

"Neutrinos in Astrophysics and Cosmology" by Hong-Yee Chiu discusses clearly the latest conjectures on the role played by neutrinos in the evolution of stars. Possible astronomical evidence for the weak (ev_e, ev_e) interaction occurring and supporting the conserved vector current hypothesis is mentioned and an argument is sketched suggesting that the energy of all the neutrinos in the universe is insufficient to account for the missing mass necessary to ensure closure of the universe in the "big-bang" theory.

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About the Reviewers: Our reviewers are associated with Atomic Energy of Canada Limited and are stationed at Chalk River. Dr. Lewis, who is Senior Vice-President, Science, is a nuclear physicist with particular interest in power and the direction of research toward its development; Dr. Harvey is a theoretical physicist; Dr. Broude is a nuclear physicist; and Dr. Bartholomew, now Head of the Neutron Research Branch, has done much work in neutron capture phenomena. Dr. Lewis is a past president of the Society.