

BOOK REVIEWS

Nuclear Physics. Luke C. L. Yuan and Chien-Shiung Wu, eds. Vol. 5, Part B, *Methods of Experimental Physics*, edited by L. Marton and Claire Marton. 886 pp. Academic Press, New York, 1963. \$22.50. *Reviewed by L. J. Lidofsky, Columbia University.*

AS specialization increases within the various branches of high- and low-energy nuclear physics, it becomes rather easy for an experimenter in one of the branches to lose touch with the details of advances in the methods and techniques of the others. Yet, many facets of apparently different techniques may well be valuable to experimenters in areas other than those for which they were originally developed.

This text, which presents detailed descriptions of many of the methods and techniques of experimental nuclear physics, is especially valuable in providing a point of contact not only for such experimenters but also for beginning research students. The discussions and intercomparisons between methods are often at the detailed level one would associate with hallway discussions and personal contacts at Physical Society meetings. In addition, the very complete lists of references make the retrieval of background information from other published sources especially easy.

The generally high level of the individual contributions makes it difficult to single out only one or even only a few of the articles as especially worth while. The article by Duckworth on mass spectroscopy, for instance, summarizes and compares the properties of modern mass spectrometers. Very important, however, is his discussion of the limitations and advantages of each in a way that brings out the basis for errors in earlier measurements. The descriptions of specific techniques as well as methods are quite complete in the articles on atomic-beam methods by Hubbs and Nierenberg, on magnetic and quadrupole resonance by Jefferies, and in the articles on the determination of polarizations, of correlations, and of lifetimes by Frauenfelder and Rossi and by Deutsch. The discussions of sources of possible errors in the determination of nuclear reactions and of cross sections are conducted in unusual detail by Ajzenberg-Selove and by Rosen and Miller.

The systematic treatment of beam transport systems by Sternheimer covers essentially all useful combinations of magnets and strong focussing lenses. Treatment by matrix methods is introduced, and the reader is "taken by the hand" and led through several worked examples. Finally, the book closes with a series of appendices on statistical methods and kinematics, with

especial emphasis on the problems of high-energy physics.

Throughout this book, one is struck by the desire of the individual authors to define each method completely; to give its advantages, capabilities, and limitations. It is true that such detailed treatment may tend to become dated sooner than would a vague, less meaningful approach. Should this occur, I would look forward to another edition of Yuan and Wu's *Nuclear Physics*.

Nuclear Instruments and Their Uses. Arthur H. Snell, ed. Vol. 1, Ionization Detectors, Scintillators, Cerenkov Counters, Amplifiers: Assay, Dosimetry, Health Physics. 494 pp. John Wiley, New York, 1962. \$7.50. *Reviewed by H. H. Bolotin, Argonne National Laboratory.*

DESPITE the title of this volume and the editor's introduction, a thorough reading of the articles presented leaves one wondering for what type of reader the book was intended. On one hand, a few articles seem to be aimed at those who have only a general interest in the individual subject treated while, at the same time, other essays are so detailed as to discourage all but those requiring the most exacting and exhaustive exposition. This characteristic is rather disconcerting in that the articles alternately swing between minutiae of interest only to the instrument maker and the more general discussions of use to instrument users. With few exceptions, there is very little middle ground.

The book jacket, preface, and contents leave the impression that the purposes and aims of this volume were not particularly defined before publication. The book seems to be designed to serve "every man", and thus does not particularly serve "any man" to any appreciable extent. The contents do not significantly differ from those of other similar compendia published in the last decade, nor does this volume hold out the advantage of being particularly up to date.

The article on ionization and proportional counters was originally written in 1951, and any attempt to make it more contemporary has only served to emphasize that these detectors have declined in use and popularity in the last decade, and that not much has been added to their development since the article was originally written and circulated as a technical report.

Although the guiding philosophy of this volume seems to have been to "... discuss instruments that have behind them a solid understanding in experience and theory ...", there is certainly no excuse for

omitting transistor circuits from the article on electrometers and amplifiers and thereby implying that they are too modern an innovation to be included in this category. In fact, too much of this book seems to give inordinate attention to what is venerable and not as much as one would desire to what is modern and in current use.

Some of the articles are well written, well diagrammed, and well referenced. It is, therefore, unfortunate that their aims, objectives, and modernity are not consistent and that they have been included in the same volume. Since one must judge this book on the basis of a compendium and not on any one or two individual contributions, this reviewer is left with the impression that one can do better elsewhere.

Programming and Utilizing Digital Computers.

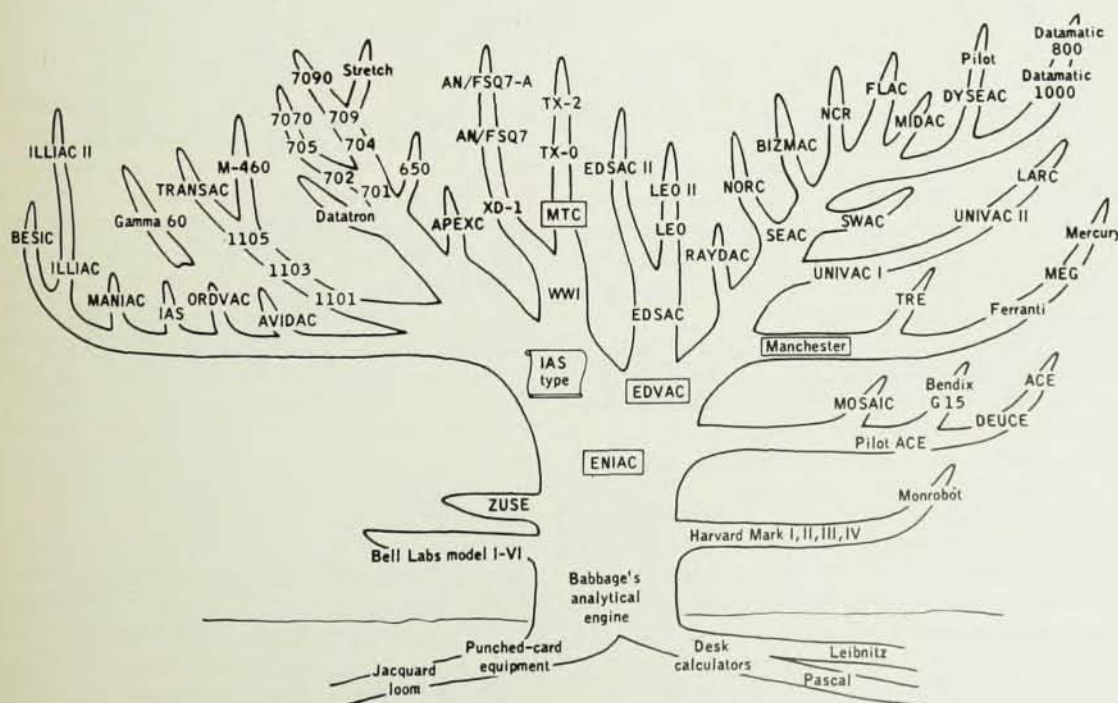
By Robert Steven Ledley. 568 pp. McGraw-Hill, New York, 1962. \$12.50. Reviewed by Peter L. Balise, University of Washington.

ONE of the questions in science and engineering education today is how best to introduce machine computation. This reviewer favors making it a part of other courses, rather than a special course on computer techniques. But Dr. Ledley's work shows how digital-computer programming can be taught with the emphasis on analysis that is appropriate in college courses. He does this by avoiding details which can be learned from manuals and by devoting attention to fundamental subjects like Boolean algebra, mathematical optimization,

and numerical analysis. Yet there are so many specific examples (and over 500 problems) that the text is eminently practical.

Essentially, it is a modernized version of the author's earlier *Digital Computer and Control Engineering*, with a considerable shift in emphasis. The last half of the older volume, logical design of computer circuitry, is eliminated except for an introductory treatment of logic independent of its application to electronic circuits. Parts 1 and 2 of the older volume, quite detailed discussions of machine-language programming and data processing, are almost completely retained, with revisions. The very significant new material concerns automatic-programming languages, particularly ALGOL and COBOL, for whose general acceptance the author argues effectively as a solution to the "tower of Babel" problem in computer languages. Student motivation is enhanced by a chapter that gives an appreciation of how the machine actually handles interpretive and compiling routines. Another stimulating chapter, somewhat apologetically titled "Programming to Achieve Intelligence", gives good introductions to accomplishing deductive and inductive inference and creativity by computers, with brief examples of language translation, medical diagnosis, proving geometric theorems, and musical composition.

Simple figures very clearly illustrate such topics as iteration and optimization. Too often, in this reviewer's opinion, authors seem to feel that the mathematical essence of a subject is irrevocably prejudiced by a graphical representation. In its clarity and coverage, Dr. Ledley's text is suitable for a variety of courses;



The evolutionary tree of digital computers (from the book *Programming and Utilizing Digital Computers*).