Book Reviews

Nuclear Radiation Physics, Fourth Edition. By Ralph E. Lapp and Howard L. Andrews. Prentice-Hall. (1972). 447 pp. $13.95.

Since the first edition in 1948, *Nuclear Radiation Physics* by Lapp and Andrews, has played an important role in the training of physicists and especially health physicists. This new edition represents a growth of ideas and presentation. The order of presentation has been changed so that the book begins with a discussion of ionization and ionization chambers. Gas filled pulse counters are presented with a discussion of counting statistics, resolving time, and counting schedules. This introduction of measuring devices at the beginning of the course, gives the student an appreciation and understanding of how information concerning radioactivity is obtained. It is especially advantageous when the course is associated with a laboratory.

Classical mechanics, relativity, and quantum theory are presented factually rather than from the viewpoint of derivation customarily employed in physics courses. This type of development of ideas is characteristic throughout the book. It would be pedologically impossible to cover the scope of material included in this book from the viewpoint of careful derivation of theoretical ideas. The presentations are, however, lucid and clear cut and give the reader an appreciation of the physical ideas involved. It is somewhat doubtful that the Schrodinger equation has much meaning for the student when presented this way. The Bohr atom is presented in sufficient detail so that it should be understood by the reader. The discussion of the structure of the atomic nucleus is descriptive. Many have a preference for an historical approach in teaching modern physics. Lapp and Andrews have done very differently. X rays and the discovery of naturally occurring radioactivity are dealt with after the discussion of the structure of the atomic nucleus!

Chapter 8, which has the heading Ionizing Radiation, starts with Roentgen's discovery of x rays followed by Becquerel's discovery of radioactivity. Then alpha, beta, and positron emission, electron capture, and internal conversion are presented. This chapter is followed by natural radioactivity with the usual presentation of the uranium, thorium, actium, and neptunium series. In Chaps. 10 and 11 alpha particle emission is studied in more detail followed by beta-ray emission, Fermi's theory of beta-ray decay, parity conservation, and the binding energy parabolas. Photon absorption and scattering including pair production are discussed and the relative importance of photo-electric, Compton scattering, and pair production are well presented.

The discussion of exposure and absorbed dose and the problems inherent in ion chamber measurements of the roentgen and the rad are a most welcome addition so frequently missing from more customary texts. The chapter on absorption of charged particles has been extended to include tissue dose.

Nuclear reactions and the concept of the compound nucleus are followed by a chapter on charged particle accelerators. The discussion of neutron physics includes a section on fluence-dose calculation and the definition of kerma.

The book ends with a presentation of fission reactors and the hopes for a controlled fusion source of energy and, lastly, a very brief presentation of cosmic and terrestial radiation and transuranium elements.

The book contains more material than can be presented in a semester course; however, it is so arranged that appropriate topics can be selected by the instructor without undue complications. Problems are included at the end of each chapter.

This reviewer is anticipating with pleasure using the book as a text in a course in modern physics designed primarily for those interested in health physics and radiological science.

Newton Underwood

School of Public Health
The University of North Carolina
Chapel Hill, North Carolina 27514

August 23, 1972

About the Reviewer:

We again welcome Newton Underwood to these columns where his reviews of books treating health physics have appeared before. His tenure in the Physics Department of Vanderbilt bracketed very significant contributions to the gaseous diffusion process for the separation of the uranium isotopes. With dual interest in physics and biology, Dr. Underwood is presently professor of both physics and of public health at the University of North Carolina.

Education and Research in the Nuclear Fuel Cycle. By David M. Elliot and Lynn E. Weaver, (Eds.). University of Oklahoma Press, Norman, Oklahoma. (1972). +334 pp.

The 18 contributions to this volume provide a reasonably good summary of the status of nuclear fuel design, development, and manufacture, and of the related ex-reactor fuel cycle, as of mid-1970. There are significant gaps, however, particularly in the areas of environmental considerations, waste transportation and management, and nuclear safety. The contributions consist of papers presented at a symposium of the same title held at the University of Oklahoma in October, 1970. They do not appear to have been significantly edited or updated.

The list of authors is impressive and most have done well at what they appear to have set out to do; however, the preface is sketchy and the organization somewhat