

BOOK REVIEWS

Selection of books for review is based on the editor's opinions regarding possible reader interest and on the availability of the book to the editor. Occasional selections may include books on topics somewhat peripheral to the subject matter ordinarily considered acceptable.



The Unity of the Fundamental Interactions

Editor Antonino Zichichi
Publisher Plenum Press, New York (1983)
Pages 827
Price \$110.00
Reviewer Paul F. Zweifel

This book represents the proceedings of the 19th course of the International School of Subnuclear Physics held July 31–August 11, 1981, in Erice, Sicily. Included are six lengthy theoretical lectures and seven seminars on specialized topics, plus a conference summary (by Edward Teller). However, by far the most interesting contents for readers of this journal are three contributions on “The Glorious Days of Physics.” These personal historical essays were presented by P. A. M. Dirac, Teller, and E. P. Wigner, and the reminiscences they contain alone make the volume worth acquiring. In fact, as I write this review I have just finished reading Dirac’s obituary in the *Washington Post*, which makes his story “My Life as a Physicist” all the more poignant.

Dirac’s portrait appropriately occupies the frontispiece of the book because the major technical contribution to the volume is Sidney Coleman’s 100-page discussion, “The Monopole Fifty Years Later.” This of course refers to the magnetic monopole whose existence was predicted by Dirac in a 1931 paper in the *Proceedings of the Royal Society*. Coleman’s presentation is, as is usual for him, brilliant and eminently readable. I would doubt that many nuclear engineers could read and/or enjoy it, but for those who, like myself, started life as physicists, it represents a good opportunity to bring themselves up to date on this exciting frontier of physics research. Other contributions of particular interest to the nonexpert include F. Wilczek’s 59 pages on cosmology and V. L. Fitch’s short 18-page contribution on CP violation.

Other contributions include theoretical lectures by M. J. Creutz, G. G. Ross, S. Dimopoulos, F. Wilczek, and E. Witten, and seminars by D. Jovanovic, M. Basile and 14 others, K. Berkelman, R. Cashmore, P. Duinker, and M. Basile and 19 others.

Paul Zweifel, university distinguished professor of physics and of nuclear engineering at Virginia Polytechnic Institute, is also director of the Center for Transport Theory and

Mathematical Physics. He has just returned from Florence, Italy, where he served as visiting professor of mathematics during the academic year 1983–84. Among his professional distinctions include the E. O. Lawrence Award in 1972 and a Guggenheim Fellowship in 1974–75.

Models and Parameters for Environmental Radiological Assessment (Report DOE/TIC-11468, 1984)

Editor Charles Miller
Publisher The Technical Information Center,
U.S. Department of Energy,
Oak Ridge, Tennessee 37831
Pages 150
Price \$12.00
Reviewer Anton Bayer

This booklet describes the basic knowledge for environmental radiological assessment. It is divided into 14 chapters written by various authors. After a general essay on exposure pathways, 9 chapters deal more specifically with the main pathways and the basic equation for the measurement of exposure:

1. dispersion and deposition in the atmosphere and hydrosphere
2. terrestrial and aquatic food-chain transport
3. food intake and air breathing rate
4. dose factors for external and internal exposure
5. special methods for the radiological assessment of ^3H and ^{14}C .

Further chapters contain a collection of sample calculations and an essay on uncertainties associated with predictions derived from models and parameters. These chapters are completed by concise lists of references containing detailed investigations.

The booklet, although written by various authors, is very well written and excellently informative, which can probably be credited to the editor. The chapters cover the main features of the special problems and the inserted tables give

enough information to make first generic assessments possible. In this connection the collection of example calculations provides a good tool for gaining a sound knowledge of this field. The only improvement the reviewer could recommend would be to include a list of the literature in which methods and examples of handling uncertainties are given.

The booklet can be recommended to everyone who encounters radiological assessment problems for the first time and wishes to avoid being overwhelmed by a host of theories, formulas, and detailed information. It may be recommended especially to students, who represent the largest group of those individuals using it as a textbook. It may be also used in connection with private study. It should also stand on the shelf of anyone who through his profession occasionally comes into contact with these problems. Moreover, it can be recommended to everyone who is interested in this subject, which from time to time is a topic of controversial discussion by the public and in the media.

Anton Bayer worked in the field of reactor physics until 1971 and then on radiological impact of nuclear facilities and on risk analysis. He is a scientist at the Kernforschungszentrum Karlsruhe and a professor at the University of Karlsruhe. He has been a member of the German Radiation Protection Commission since 1980 and has participated on various national and international advisory committees. From 1974 to 1975 he was a visiting professor at the University of Washington, Seattle, and in 1985, he was a visiting professor at the Federal Institute of Technology in Zürich, Switzerland.

Radionuclide Distribution and Transport in Terrestrial and Aquatic Ecosystems
(Volumes I, II, ,III)

Authors P. J. Coughtrey, D. Jackson, and M. C. Thorne
Publisher A. A. Balkema Publishers, Rotterdam, The Netherlands (1984)
Pages Volume I, 496; Volume II, 500; Volume III, 372
Price \$40.00 per volume
Reviewer Gerald A. Schlapper

This three-volume work presents a very systematic review of available data and provides guidance for use of this data to assess the radiological impact on man of radioactive effluents. Emphasis is placed on routine releases, but most of the data would also be relevant to accident assessments. Most of the data deals with the deposition of material on plants and soils, transport within soil media, uptake and dispersal of radioactivity in plants via roots and foliage, metabolism of varied compounds in domestic animals, and transfers through elements of the aquatic environment. The authors present and compare the data and conclusions of numerous researchers.

The current concern over the movement of radionuclides in terrestrial and aquatic ecosystems emphasizes the need to better describe the transport of these materials. The processes

that are involved depend on the physical and chemical properties of the material, the pathway the nuclide follows until it reaches the environment, and/or the characteristics of the ecosystem that the material is entering. These volumes review the wealth of information on models and parameter values applicable to a wide range of conditions. Using data obtained from field and laboratory studies of stable element behavior as well as an accumulation of radiological data, the authors recommend models and parameter values to be used in a variety of circumstances. The authors have organized this information by grouping the elements by method of production, chemical similarities, and like environmental interactions.

To maintain consistency, the authors have organized the numerous chapters into essentially five sections. Following a brief introduction, the first major section deals with the chemistry of the subject material. After this discussion, the distribution and transport of the element in its parent media and soils are outlined. The third section details the uptake and distribution of the material in plants, while the next two sections discuss the metabolism of the element in domestic animals and man and the behavior of the element in the aquatic environment. Exact details of the processes of atmospheric and hydrospheric dispersal are not presented. However, the first chapter of the first volume contains a conceptual outline of the various processes involved. References for atmospheric-dispersion processes and models to include available computer codes are included. Calculation of dose to man due to ingestion or inhalation of radionuclides transported through all pathways through the environment is not emphasized.

The authors note that they had difficulty selecting the "best" data and models from the wealth of information available. Because of recent improvements in the precision and reliability of analytical techniques, all data were not equally weighted, but data from experiments most relevant to the topic being considered were used. Model parameters recommended were those shown to be most accurate for analysis of the impact of the pollutant on man, because to extend this analysis to all components of the environment was beyond the scope of this work. Since radionuclide contamination is a relatively small part of the overall contamination of the environment, restricting analysis of radionuclide contamination to effects on man is generally accepted.

The scope and detail of this work indicate that it will be considered for several years as a reference work for assessing the movement of radioactivity in the environment. According to the authors, further volumes are currently in preparation to cover those major elements that are not addressed in this three-volume set. It should be emphasized that the data presented are also of use in determining the distribution and transport of a variety of stable pollutants, so use of these volumes is not restricted to the area of transport of radionuclides but would be of equal use in the analysis of dispersion of stable chemical pollutants.

Gerald A. Schlapper was involved with the operational health physics program while on the staff of the University of Missouri Research Reactor. He also served as a research fellow in the nuclear medicine department of the Harry S. Truman Veterans Administration Hospital. In January 1981 he joined the faculty of the Radiological Health Engineering Program of the nuclear engineering department at Texas A&M University.