of the final chapter on health physics, designed to give the experimenter an understanding of the precautions required for reactor research.

The scientific contribution of the book is significant, since it pulls together a wealth of unorganized research data appearing in the normal periodical literature as well as Atomic Energy Commission reports and gives them a logical sequence. The fitting together and interpretation of the recent work on the optical properties of cold neutrons are perhaps especially significant.

The appendixes include the most recent set of thermal neutron cross sections tabulated as total, activation, and various scattering cross sections. A set of experiments used for instruction at Argonne National Laboratory has been included to show the varieties of studies open to first year graduate students.

Pile Neutron Research, although not intended as a classroom text, has been so used successfully. It was found more satisfactory than other presentations in the field. It is a significant contribution to a growing field of research and will certainly be a cornerstone in this branch of nuclear physics.

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Metallurgical Equilibrium Diagrams. By W. Hume-Rothery, J. W. Christian, and W. B. Pearson. 311 pp. The Institute of Physics, London, England, 1952. 50s.

To a physicist, metallurgical equilibrium diagrams resemble medieval maps of the world: some of them describe apparently well-known territories but many are either totally or partially blank or with wrong rivers and with nonexistent mountain ranges. Most physicists would prefer to leave to someone else the rather uninteresting job of exploring these puzzling territories. Unfortunately this attitude entails also a lack of criticism of the value of results obtained by various methods. It is thus gratifying to have this book which deals in a concise way with the diverse experimental techniques used in the study of equilibrium diagrams and with the limitations of such techniques. The book gives a very good survey and covers all of the basic techniques used by metallurgists. The material is divided into 32 small chapters grouped into: general principles, experimental methods, determination of the liquidus, determination of the solidus, determination of phase boundaries in the solid state, ternary systems and presentation of results. The material is presented expertly and one feels that much is based on the authors' own wide experience. It should be mentioned that the title of the book is somewhat misleading since it is not a collection of metallurgical equilibrium diagrams as one might think but a survey of experimental methods for determining such diagrams. It should be well received by physicists interested in the theories of phase transformations in solids, of existence of solutions and compounds, etc.

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Antennas: Theory and Practice. By Sergei A. Schelkunoff and Harald T. Friis. 639 pp. John Wiley and Sons, Inc., New York, 1952. $10.00.

"This book is about antennas: about the physical principles underlying their behavior, the theory needed in sound antenna design and in planning meaningful experiments, the applications of theory to antennas in various frequency ranges. We have written it primarily for students and practioners of radio engineering. . . ." It is also of interest to physicists in illustrating current problems and certain physically ingenious methods of obtaining practical solutions. The book is not a collection of engineering data, but rather a physically motivated study of fundamental theory and accepted practice by two men who are well known for their various contributions to the subject. With the above in view the text is perhaps the most comprehensive treatment of the subject on an intermediate level.

Starting with a survey of fundamental radiation phenomena, Maxwell's equations are introduced and their plane and spherical wave solutions discussed. Following chapters treat directional properties and impedance of antennas, the effect of the ground, and antenna currents. The remainder of the text deals with conventional antennas, antenna arrays, horns, slot antennas, reflectors and lenses. Particularly noteworthy are Sec. 4.13 ff on the dipole and Ch. 8 on antenna current.

Not much more than a general background of elementary physics and calculus is required to follow the text, the authors relying on physical arguments to circumvent the more usual analytical treatment. However, a greater flexibility could have been gained by the explicit use of vector methods. Vector analysis has been respectable for some time so that the somewhat Victorian attitude of the authors in this connection (not that they use quaternions) is scarcely justified.

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Advanced Antenna Theory. By Sergei A. Schelkunoff. 216 pp. John Wiley and Sons, Inc., New York, 1952. $6.50.

This book gives a unified account of recent applications of advanced mathematical methods to the solution of antenna problems. The author's mode theory of antennas forms the backbone of the development and much hitherto unpublished material concerning this approach is included. The text is divided into six chapters: spherical waves, mode theory of antennas, spheroidal antennas, integral equations, cylindrical antennas, and natural oscillations. The text is followed by a collection of problems and numerical tables of antenna impedance functions.

The major part of the text deals with the author's work on biconical antennas and thin antennas of arbitrary shape. However, brief expositions of Hallén's