

points out, FET's are a perfect device for introducing small-signal analysis. Other aspects of linear circuitry are thoroughly covered, as are oscillators and delay lines. If any criticism can be made of this book, it would be the lack of extensive material on operational amplifiers and digital circuitry. There is however, an excellent chapter on noise. While most of the examples are from nuclear electronics (an entire chapter discusses applications in this area) the material is not so specialized that it detracts from the utility of the book for scientists working in other specialties. The author does assume a knowledge of dc and ac circuits but uses standard notation.

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The Velocity of Light And Radio Waves

By K. D. Froome, L. Essen
157 pp. Academic, New York, 1969.
\$5.00

At the National Physical Laboratory in the UK, time-standard authorities Keith D. Froome and Louis Essen have pioneered modern measurements of the vacuum speed of electromagnetic waves, a constant of unique theoretical and practical importance. Including their own work, they have presented a well balanced survey of the field in an excellent monograph, much of which can be understood by the scientific generalist.

The book contains a pre-1900 survey, discussions of the nature of light, standards, measurement accuracy, de-

scriptions of the time-of-flight methods of Albert A. Michelson and the electro-optical shutter improvement, electrical methods involving the ratio of charge units, transmission lines and cavity resonators. Three chapters describe radiowave interferometers and modulated light beam and radiowave devices. The latter two, the geodimeter and tellurometer, are operational field instruments for accurate surveying by trilateration and claim accuracy of 1 part in 10^7 .

The authors quote $c_0 = 299\,792.5 \pm 0.4$ km/sec as the value recommended by authorized international commissions in 1958 and still generally accepted at the time of writing, and they emphasize that the main problem is to eliminate systematic rather than random errors. The book closes with a delineation of several proposed methods such as gamma rays in the Mössbauer effect, a laser beat method and a light-pulse recycling oscillator.

Richard A. Rhodes II
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Isospin in Nuclear Physics

D. H. Wilkinson, ed.
751 pp. American Elsevier (North Holland), New York, 1970. \$43.50

It has been nearly four decades since Werner Heisenberg introduced the concept of isotopic spin to distinguish between the neutron and the proton. During that time, this convenient dichotomic variable has assumed an ever growing importance in our description of nuclear phenomena. This growth, of course, reflects the close connection between the isotopic spin (isospin) and

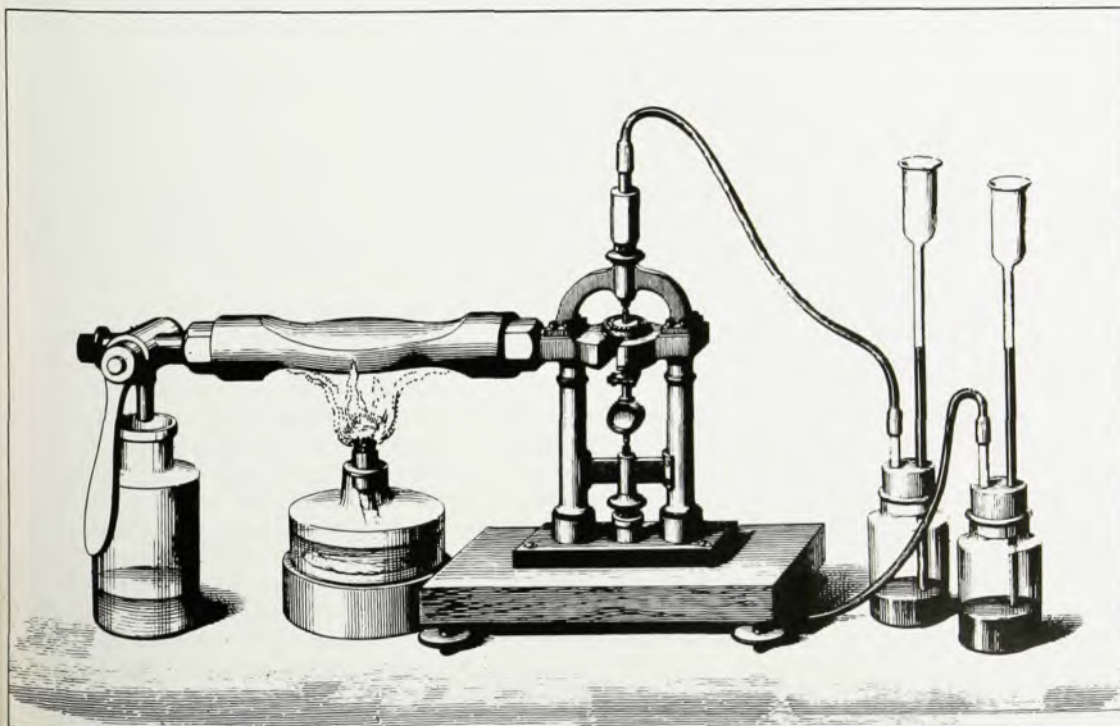
the charge independence of the nuclear force.

Denys H. Wilkinson, the editor, is a professor at the University of Oxford. In his words this book represents "a current review of growth points in all parts of the nuclear structure field . . . where charge independence is a dominant factor." As such it is eminently successful.

After an historical introduction by Wilkinson, there are 13 chapters on all aspects of isospin, each by a different author. The first of these, by Ernest Henley, develops evidence for charge independence and charge symmetry in nuclear forces. His conclusion on the basis of experimental findings (to 1968) and on theoretical corrections strongly supports the validity of these symmetries. More quantitatively, he finds that charge symmetry for hadronic forces holds to within 0.8% and that charge independence is broken by about 2%, thus fixing this cornerstone of the isospin concept.

The role of such symmetries in nuclear physics and their description by group-theoretic techniques is the subject of chapter 3 by J. P. Elliott. He considers first exact or near-exact symmetries, such as charge independence, and then goes on to the more approximate ones associated with the unitary groups. The exposition is succinct, and in less than 40 pages it carries the reader from basic concepts to a discussion of Elliott's own contributions to the understanding of spectra in the sd shell using SU(3).

Having established in the first three chapters the background, the validity and the mathematical formulation of charge independence and isospin, Wilkinson devotes the remaining parts of



Air turbine that rotated a small mirror at constant velocity in J. B. L. Foucault's laboratory determination of the velocity of light, in 1850.

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Edited By Academician D. V. Skobel'tsyn, Director, P. N. Lebedev Physics Institute, Academy of Sciences of the USSR, Moscow

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the book to discussions of specific areas of nuclear physics. For example the next two articles, by R. J. Blin-Stoyle and by E. K. Warburton and J. Weneser, elaborate on the role of isospin in beta and electromagnetic transitions, respectively. These are followed with chapters on the isospin purity of low lying nuclear states (J. M. Soper), isospin distributions (J. Bruce French) and the systematics of Coulomb energies (Joachim Jänecke). The latter examines the behavior of Coulomb energies for a wide range of nuclei and concludes with a compilation of experimental Coulomb displacement energies (between ground states and their analogues) and excitation energies of isobaric analogue states. There is a discussion by G. R. Satchler on the isospin dependence of the optical model potentials used in describing nuclear scattering. The theoretical character of some of Satchler's treatment complements rather well the more experimentally oriented article of J. P. Schiffer on the role of isospin in transfer reactions.

This relation between the contributions of different authors is, in fact, typical of the entire book. For example, the work of Warburton and Weneser provides a good theoretical framework for the later discussion by Stanley S. Hanna of the electromagnetic decay of isobaric analogue states. Similarly the remaining articles of D. Robson, A. M. Lane and G. Temmer on various facets of analogue resonances and states show a refreshing awareness of each other's contributions.

The obvious care and coordination that Wilkinson and his colleagues have displayed in the preparation of this volume make it a readable and relatively self-contained work of value to any serious graduate student or researcher in nuclear physics.

Henry S. Valk

Dean of the General College
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Methods of Molecular Quantum Mechanics

R. McWeeny,
B. T. Sutcliffe, eds.

298 pp. Academic, New York, 1969.
\$13.50

This book is concerned with the methods available for finding approximate electronic wave functions for isolated molecules in stationary states, and with some application of these functions. It is intended to be complete enough to achieve this goal without constant reference to the journal literature, and I feel that it has accomplished this end.

The first four chapters are introductory in nature, and form a general dis-

cussion of electronic behavior in isolated molecules. Succeeding chapters deal with calculational techniques and the application of these to particular molecular problems. Thus, after the material in the first four chapters is understood, the remainder of the book can be used as a reference work for the calculation of molecular properties.

It is unfortunate that the authors of this book, in common with many other authors, feel it necessary to preface their work with so much introductory material. Most of this material is covered in courses in quantum mechanics, and it seems redundant to be constantly repeating it in various books. It certainly delays, and reduces, the presentation of the useful material in the book. Even so, I feel that this book will be useful as a summary of theoretical methods of dealing with electronic wave functions of molecules.

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Nuclear and Particle Physics

By E. B. Paul

494 pp. American Elsevier (North Holland), New York, 1969. \$15.00

If the reader construes from the title that he will be presented with an integrated development of the facts and theories of nuclear physics and particle physics, he will be disappointed. The major structural flaw in this work is that it continues the accepted but artificial bifurcation of the fields of nuclear and particle physics. This may be understandable, because each field is so vast in facts (if not in unifying principles, that is, theories) that it is too much for one man to chronicle, let alone integrate.

The presentation is unbalanced. A description of nuclear phenomena constitutes, by volume, a full 60% of the text. Thirteen percent is devoted to particle properties, and 6% is assignable to either, as it is a description of nuclear forces by means of the two-nucleon problem. The relative emphasis on nuclear physics, although it probably underestimates E. B. Paul's research interests, does not detract from the merits of his concise description, as an interested spectator, of particle physics.

Nonessential material is included in distressing amounts. The author devotes 20% of the book to discussing certain physical phenomena and their engineering ramifications, which do not directly contribute to the orderly development of the subjects at hand. An understanding of energy-loss phenomena and the detection devices that use these physical phenomena and accelerators is necessary for a critical