

**The Theoretical Significance of Experimental Relativity**  
By R. H. Dicke. (Documents on Modern Physics.) Pp. xii+153. (London and Glasgow: Blackie and Son, Ltd., 1964.) Cloth 32s. 6d. net; Paperback 17s. 6d. net.

**T**HIS book is a reprint, without change, of the contribution by R. H. Dicke to the Les Houches Summer School in 1963, which originally appeared in the larger volume *Relativity, Groups and Topology*, published by Gordon and Breach (1964). Possibly because of a difference in paper, the overall appearance of the book is slightly less clear than in the original form. The author takes the position that the experimentalists should not be working on the complicated applications of general relativity but rather on its foundations. He begins by discussing null experiments like that of Eötvös, and then considers in some detail the three so-called 'crucial' tests. There are fairly complete references to experimental results, and the greater part of the book consists of appendixes—mostly on the author's characteristic theories of Mach's principle. The contents of these is best summarized by their titles: "Experimental Tests of Mach's Principle"; "Mach's Principle and Invariance under Transformation of Units"; "Long-range Scalar Interaction"; "Field Theories of Gravitation"; "Cosmology, Mach's Principle and Relativity"; "Significance of Spatial Isotropy"; "Mach's Principle and a Relativistic Theory of Gravitation"; "Lee-Yang Vector Field and Isotropy of the Universe"; "The Earth and Cosmology"; "Implications for Cosmology of Stellar and Galactic Evolution Rates"; "Dating the Galaxy by Uranium Decay"; "Dirac's Cosmology and the Dating of Meteorites".

The book fulfils a useful purpose in collecting together published work on experimental checks of the theory, although from a rather idiosyncratic point of view.

C. W. KILMISTER

### Quantum Electrodynamics

By A. I. Akhiezer and V. B. Berestetskii. Translated from the Second Russian edition by G. M. Volkoff. (Interscience Monographs and Texts in Physics and Astronomy, Vol. 11.) Pp. xix+868. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1965.) 170s.

**Q**UANTUM *Electrodynamics* gives a detailed and systematic presentation of quantum electromagnetic theory. Like all good books on the subject, it does not conceal the defects of the theory, and emphasizes that a complete removal of the unsatisfactory features of quantum theory will probably not be achieved without new and basic physical concepts. The authors have therefore given much care to expressing the existing theory in its most logical and consistent form; for example, in preparing this second edition of the book they have extensively revised the section on renormalization, so as to present the concept from a simple physical point of view, avoiding purely prescription-like methods of eliminating divergences.

The book is divided into nine chapters. The first chapter, which starts from Maxwell's equations and is devoted to deriving the quantum mechanics of the photon, is followed by a chapter on the relativistic quantum mechanics of the electron. In the next two chapters the Lagrangian, the method of second quantization, and the scattering matrix are introduced and explained in detail, leading to a chapter on the interaction of photons and electrons, and the retarded interaction between two charges. In Chapters 7 and 8 the investigation of the scattering matrix is extended to higher orders (radiation corrections). Finally, there is a chapter on particles of spin zero.

The great range of the book, and the mathematical detail of the applications, will make it a valuable reference book for workers in the subject; but it will appeal equally

to non-specialist readers, since it assumes only a very elementary knowledge of quantum mechanics. Even when the mathematical development becomes very elaborate, the lucid accompanying text would enable the reader to obtain a clear idea of the procedure without following the mathematics in detail. P. M. DAVIDSON

### Dictionary of $\pi$ -Electron Calculations

By Prof. C. A. Coulson and A. Streitwieser, jun. Pp. xxx+358. (London and New York: Pergamon Press, 1965.) 100s. net.

**D**ICTIONARY of  $\pi$ -*Electron Calculations* is a compilation of the results of simple molecular orbital calculations on planar conjugated hydrocarbons such as polyenes, polyacenes, various conjugated radicals and hydrocarbons and some heteromolecules. It will be very useful to people who are interested in the electronic structures of conjugated systems; I have already used it twice in connexion with a series of lectures on electronic theory.

The essential thing about a compilation of this sort is that it should be accurate. The risk of error has been minimized by photographing directly the printed output of the Mercury Computer at Oxford. This is about as fool-proof a method of ensuring accuracy as one could reasonably demand.

The book also contains an introduction which outlines the essential features of the Hückel method. The introduction is an excellent little monograph which could be recommended to people who want to find out the bare bones of the theory. There is also a section entitled "How to Use the Tables", which will teach the reader something about elementary group theory. Altogether, a most business-like and attractively produced volume and one which should be on the shelves of every chemistry library.

H. C. LONGUET-HIGGINS

### Technique of Inorganic Chemistry

Vol. 4. Edited by Prof. Hans B. Jonassen and Arnold Weissberger. Pp. ix+401. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1965.) 115s.

**T**ECHNIQUE of *Inorganic Chemistry* is the fourth volume of a series which sets out to give an account of the techniques used in inorganic chemistry and contains, like its predecessors, a rather mixed selection of topics, of which the chapters on "Magnetochemistry" by B. N. Figgis and J. Lewis and "Optical Rotatory Dispersion and Circular Dichroism" by F. Woldbye are of the most immediate interest and value; both of these are very comprehensive and pleasingly written, and the book is well worth having for them alone.

Of the remaining chapters, those on "The Growth of Oxide Single Crystals from the Fluxed Melt" by E. A. D. White and "High Temperature Technique" by R. G. Bautista and J. L. Margrave are of less general application, but are likewise extremely interesting, well-written and documented accounts, and may well suggest potential applications of the techniques to the reader who has hitherto had no occasion to use them; the chapter on "Ion-Exchange" by R. Kunin is, unfortunately, far too brief an account and suffers, in comparison with the other chapters, because of its brevity and an extremely short bibliography, although it does give a fair picture of the uses and techniques involved.

This volume is as well produced as the earlier volumes, and there are very few errors of any kind; those observed were innocuous, such as the extra metal *d* electron in  $\text{Cs}_2\text{CoCl}_4$  (Fig. 8, page 169), and actinides are not all transuranics and vice versa, as is implied on page 144. The value of the book, as of the rest of the series, lies in the good coverage of most of the topics and in the bibliographies; it is these which make it well worth having.

K. W. BAGNALL