"sacred-direction" on page 201, or in the general formulation of the Hamiltonian operator on page 59 and in the appendix, there are real contributions to the teaching of quantum mechanics at this level.

Astonishingly, the book is based on a course given to graduate electrical engineers at Stanford University, but, if this had not been stated on the first page of the preface, it would not have been possible to gather it from anywhere else in the book. In Britain it will be eminently suitable for mathematicians and physicists in the latter stages of their undergraduate course.

L. R. B. ELTON

TRIBUTE AND TREATISE

Quantum Theory of Atoms, Molecules, and the Solid State

A Tribute to John C. Slater. Edited by Per-Olov Lowdin. Pp. xvi+641. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1966.) 200*s*.

Insulators, Semiconductors and Metals

By John C. Slater. (Quantum Theory of Molecules and Solids, Vol. 3.) Pp. xiv+549. (New York: McGraw-Hill Book Company, Inc.; Maidenhead: McGraw-Hill Publishing Company, Ltd., 1967.) 124*s*. 6*d*.

THE custom of presenting a Festschrift volume to a distinguished scholar on his retirement from academic office is aggreeable in spirit, and no one is more worthy of this honour than Professor J. C. Slater, who has made so many contributions, both personal and through his students and collaborators, to quantum chemistry and physics.

Nevertheless, I hope I will not be thought a spoil-sport if I say that such volumes—of which this is a very typical example—are an embarrassment to the scientific community. Although most of the authors are very distinguished, their "essays" are very uneven, and the whole thing inevitably becomes a motley collection without coherence, philosophy or viewpoint. The book as such can never be worth the few excellent papers which should certainly have got into print; but which would be far more valuable in the ordinary journals, where they would automatically be taken by libraries, indexed, abstracted, and receive the attention they deserve.

It is sad that the energy and expense that have gone into this particular collection should not have been devoted instead to the task of creating a synthesis of our present knowledge of this important scientific field. The unco-ordinated brush strokes of innumerable individuals do not fuse into an intelligible picture of reality. The intellectual fragmentation inherent in a book of this sort is a disgrace to the scholarly world; as we all admit privately, whatever we practise or let pass in public, it is both stupid and inefficient.

Professor Slater's own book, which is the third in a four-volume treatise, is an effort in the right direction. He aims to give a clear and simple account of the physical properties of solids, as explained by quantum theory; as he himself points out, much of it could have been written about thirty years ago, when the foundations of the subject were so firmly laid on the bed-rock of classical physics.

Yet I am not convinced that we have made no significant conceptual progress since then. For example, do we not understand the physics of semiconductors a little more deeply than seven pages about effective mass, impurity levels and how the conductivity varies with temperature? What about the nearly-free-electron theory of ordinary metals, which, for all its imperfections, provides quantitative explanations of so many properties—for example, band structure, lattice dynamics electrical conductivity—in terms of the same few parameters? Since the Second World War we have, I believe, achieved something more than merely numerical evaluation of the quantities defined and derived theoretically by the previous generation.

It is, of course, always a pleasure to read anything from Professor Slater's wise, lucid and fluent pen. Yet I felt in the end that there were relatively too many words and not enough symbols or pictures. Most books of theoretical physics are indigestibly algebraic—but it is a mathematical subject, where one well chosen equation or diagram is often worth a page of plain-language text. Even at this elementary level, the student might find some well articulated mathematical formulae easier to bite on than mere verbal ratiocination. And then again, as if to atone for this vagueness, the author suddenly knocks us on the head with a solid page or two of citations of the literature: a bibliography of about 5,000 references occupies about two-fifths of the book. Surely a few good review articles would be much more useful to the unsophisticated reader than this undigested catalogue of "primary sources", which must inevitably date very rapidly.

Reluctantly, therefore, and without any wish to denigrate Professor Slater's scientific work over many years, I must report that, while both these books should certainly be available in specialist libraries, they seem scarcely worth their high cost to the individual.

J. M. ZIMAN

FERROMAGNETISM

Handbuch der Physik

Herausgegeben von S. Flügge. Band XVIII/2: Ferromagnetismus. Bandherausgeber: H. P. J. Wijn. Pp. 560. (Berlin und New York: Springer-Verlag, 1966.) 168 D.M.

IL s'agit essentiellement d'un traité théorique composé de quatre articles d'inégale importance rédigés par les meilleurs spécialistes.

Le premier, en anglais, de F. Keffer, de 260 pages, intitulé "Spin Waves", nécessite du lecteur une bonne formation théorique. C'est un excellent exposé critique des travaux nombreux et modernes consacrés au ferromagnétisme, au ferrimagnétisme et à l'antiferromagnétisme, en s'appuyant principalement sur la notion d'onde de spin et les méthodes modernes et puissantes de les mettre en oeuvre. Citons notamment d'intéressants paragraphes consacrés à l'anisotropie, aux parois de Bloch et aux bandes d'énergie, aux transitions de phase, à l'hélimagnétisme, à la résonance magnétique, aux interactions magnon-magnon et magnon-phonon et aux mécanismes de relaxation.

Le deuxième article, également en anglais (soixante-cinq pages) de W. J. Carr, jun., intitulé "Secondary Effects in Ferromagnetism", est consacré à l'anisotropie, à la magnétostriction, à la magnétoélasticité, aux effets de la pression et au phénomène magnétocalorique.

Le troisième article, de soixante-cinq pages, en allemand, intitulé "Mikromagnetismus" est dû à W. Döring. Il contient notamment d'excellents exposés sur la structure des parois de Bloch et de Néel, sur les phénomènes de germination et sur les processus d'aimantation dans les petits monocristaux.

Enfin dans un quatrième exposé de soixante-cinq pages, en allemand: "Theorie der Magnetisierungkurve kleiner Kristalle", E. Kleiner étudie les particules fines, le superparamagnétisme ainsi que le rôle des interactions entre les grains.

Dans l'ensemble, si la conception même de cet ouvrage conduit à d'inévitables rédites, il ne faut pas y chercher cependant un traité complet de ferromagnétisme: beaucoup de questions théoriques importantes n'y sont