

the effects which the facilities and costs of transport have on the geography of energy. These include a useful comparison of the economics of transport by pipe-lines and by tanker, as well as of the location of electricity generating plant and gas plant. It may well surprise many readers to learn that the factors which influence the geography of the coke and steel industries ultimately determine the distribution of more than half the gas production in Britain. Two chapters on the influence of the market—its size, its location and its nature—follow, and two more on political factors conclude the book: these, in particular, are a valuable contribution to the important consideration of power policy in Britain. Mr. Manners insists unequivocally that some form of public action aimed at trying to reconcile immediate demands with the long-term goals of conservation, by preventing the sheer waste of natural resources, is one corner-stone of a national policy.

Mr. Manners fully recognizes that policy must be dynamic. Economics, demands and techniques are constantly changing so that the geography of energy is in a constant state of transformation, and the final criterion for a national energy policy concerns the means of achieving it as much as the final objectives. Policy must be designed to limit the speed of change, for example, so as to minimize the degree of social distress during the periods of adjustment. Above all, political discussions with regard to the energy industries should be consistent and in the long-term national interest, not of some sectional interest. Moreover, Mr. Manners raises the question whether national energy policies are sufficient unless determined at international level. He points out that the interests of the producers of energy in the underdeveloped countries, and of the consumers in the highly developed countries, are by no means antagonistic and that there are already gropings towards international co-operation. Policy decisions made by any supra-national organization and afterwards observed by member Governments provide the critical political framework within which other factors mould the details of the geography of energy.

Valuable as this discussion of political factors is, which Mr. Manners illustrates in some detail with reference to the location of oil-refining, it is not the feature of the book that the teacher looking for a new approach will find most stimulating. He will not, indeed, find here a textbook. He will, however, find much material which could be used imaginatively and constructively to engage the interest of his pupils in the way in which factors within their own understanding are, from day to day, shaping the world in which they live.

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FAST NEUTRON PHYSICS

Fast Neutron Physics

Edited by J. B. Marion and J. L. Fowler. Part 2: Experiments and Theory. (*Interscience Monographs and Texts in Physics and Astronomy*, Vol. 4.) Pp. xii+985-2292. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1963.) 340s.

FAST Neutron Physics is Volume 4 of the *Interscience Monographs and Texts in Physics and Astronomy*. Part 1, which appeared some three years ago, dealt exclusively with experimental techniques, while Part 2, which has just been published, treats the actual experiments and theory. The two parts together comprise an exhaustive survey, more than 2,000 pages long, of this field, and it is scarcely surprising that many authors have been involved in such a large undertaking. It is a pity that Part 2 has been so long delayed, a delay which the editors attribute to the late arrival of one or two chapters. However, this explanation can give little satisfaction either to the readers who obtained Part 1 in the expecta-

tion of the early appearance of the rest of the book, or to those authors who had in consequence to bring their contributions up to date by extensive revisions.

The book is effectively a series of review articles, each written by unquestioned authorities in their fields, and will undoubtedly be of great value to the student and research worker alike. A careful balance has been held between experimental and theoretical material, and the 22 sections cover the field with great thoroughness. References to original sources are generously provided and the index has been carefully prepared. Naturally, with such a large number of authors contributing, no amount of editing can prevent some variation in the manner of presentation, nor can it avoid a quite appreciable amount of overlap both between the chapters and with Part 1. Quite properly the experimental and theoretical sides of a particular facet of the subject are often treated together, and one is sometimes led to question the wisdom of segregating so much of the description of experimental techniques into Part 1.

Among the purely theoretical chapters are those on "Optical Model Theory" (contributed by W. S. Emmerich), on "Direct Reaction Theories" (by N. Austern), on "Statistical Model Theory" (by H. Goldstein) and on "Channel Analysis of Fission" (by J. A. Wheeler). Both experimentalist and theorist will find the first-mentioned extremely easy to read, and a very practical section is included on the use of optical model theory to provide nuclear data for reactor physics. In contrast, the chapter dealing with direct reaction theory is written at a level which demands a considerably greater mathematical ability from the reader. Two widely separated chapters on resonance processes with fast neutrons and neutron cross-section in the keV region concern themselves with resonance phenomena. These could with profit have been combined. Furthermore, the reader is left with the impression that there is something fundamentally different between resonance processes induced by fast and slow neutrons, and the description of experimental work in consequence almost completely ignores the decisive and rapidly increasing volume of work in the resonance region which is carried out by the time-of-flight method, mostly using electron linacs. Apart from these limitations in approach, either chapter could stand alone as an informative review; what is lacking is certainly not quality of subject-matter, but rather the coherence and completeness which are necessary for a comprehensive work such as this book sets out to be. The same impression is gained from the sections on "Neutron Induced Reactions", "Neutron Spectroscopy" and "Coincidence Studies", where subjects are grouped together according to the experimental method used rather than their significance in physics. In a book in which the first thousand pages are devoted solely to the techniques, this approach seems unimaginative.

The book, taken as a whole, illustrates very clearly the difference between a review article and a book, and so raises the question as to whether there is any justification for publishing the articles in this form, rather than as separate monographs. In the case of Part 1, the format adopted seemed to have merit; the essential coherence was there. This is not so clear for Part 2, and if it would be unwieldy to publish each section separately, there seems at least a good case for dividing the book into two or three more specialized volumes, and in some cases dropping the restriction to fast neutrons.

It is, of course, easier to pick out the faults of a book than its merits. This book has considerable merit, the chapter on channel analysis of fission and those on inelastic scattering of neutrons being especially worthy of mention. A comprehensive book on neutron physics has been much needed, and even though this one may not be ideal it will fill that need for a long time. It is to be regretted that its price will put it beyond the reach of many students.

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