BOOK REVIEWS

Irreversible Processes

Irreversibility in the Many-body Problem. Edited by J. Biel and J. Rae. Pp. xiv+470. (Plenum: New York and London, 1972.) $34.

PROFESSOR GARRIDO should be congratulated for having organized a very timely school of physics on one of the main problems facing statistical mechanics. The lectures presented are clear and stimulating. They cover some of the main aspects of the statistical theory of irreversible processes. A general introduction is given by L. Rosenfeld. As usual the lectures by Professor Rosenfeld reflect his deep understanding of the physical problems involved and give in addition an excellent historical perspective. It is a pity that he could not devote more space to the discussion of the dissipativity condition he mentions at the end of his lectures and which plays a fundamental role in the breaking of the time reversal symmetry of dynamical systems.

Professor I. E. Farquhar has written an excellent account of ergodicity and related topics. Of special interest for physicists is his illuminating discussion of the application of abstract dynamical theory to physical systems. The lectures of Professor H. Wergeland, "Irreversibility in Many-Body Systems", include the study of energy transport in linear and non-linear chains, a subject to which his group has greatly contributed. Some rigorous properties of infinite dynamical systems and time evolution are summarized by Professor S. Miracle. Professor R. Balescu gives a very clear presentation of some of the main aspects of non-equilibrium statistical mechanics as developed by the Brussels school. This includes the concept of subdynamics which is likely to play an important role in the future developments in the dynamics of large systems.

In Professor P. Resibois's lectures on hydrodynamical concepts in statistical physics we find a summary of what probably are the most advanced applications of non-equilibrium statistical mechanics to concrete physical problems. This includes a discussion of the effect of long range potential on transport coefficients (the so-called Van der Waals fluid). This theory which is due to Resibois, Piasecki and Pomeau is presented in a masterly fashion; Professor N. G. Van Kampen's account of macroscopic fluctuation theory is also excellent.

I consider this volume a very successful presentation of a fascinating field and recommend it very warmly to all scientists interested in statistical physics. I only regret that the price is so high ($34).

I. PRIGOGINE

Crystal Group Theory

The Mathematical Theory of Symmetry in Solids. By C. J. Bradley and A. P. Cracknell. Pp. xii+745. (Clarendon: Oxford; Oxford University: London, April 1972.) £28.

THIS book has been written by experts for experts. Its essential aim is to order and exhibit all the group-theoretical material relevant in the quantum mechanics of crystals. Extensive tables of irreducible representations of the crystallographic groups are provided. The bibliography lists about 1,200 references, ranging from the dissertation by N. Steno in 1669 to papers by J. Sivardière in 1970.

Comparatively little attention is paid to crystal symmetry as such. For example, the construction of the point groups does not bring out that $\bar{1}, \bar{2}, \bar{3}, \bar{4}, \bar{6}$ are cyclic groups generated by the rotation-inversion operator. This common feature is the sole justification for what would otherwise be a thoroughly misleading symbolism, albeit sanctioned by the International Tables, because $\bar{4}$ does not possess either the mirror plane characteristic of $\bar{2}$, $\bar{6}$ or the inversion centre characteristic of $\bar{1}$, $\bar{3}$. Table 2.4 does not include 3 amongst the cyclic groups, and Table 2.2 does not list $\bar{3}$ with $\bar{6}$, $\bar{6}$ or $\bar{3}$m with 622, $\bar{6}$mm, $\bar{6}$2m. No errors ensue, but some explanation would be welcome. Similarly in Fig. 1.7 one wonders why the trigonal cell is preferred to the doubly-central hexagonal and why the end-centres monoclinic cell is preferred to the body-centred.

The book's sub-title, "Representation Theory for Point Groups and Space Groups", gives an accurate idea of its main emphasis. Hence the treatment is extremely thorough and remarkably error-free (so far as a single reader can judge). This is a notable achievement in a tricky field, and it will undoubtedly rank as an enduring contribution.

M. A. JASWON

Inclusive Processes

A Compilation of Data on Inclusive Reactions. By M. E. Law, J. Kasman, R. S. Panvivy, W. H. Sims and T. Ludlam. Pp. 757. (CERN: Geneva, 1972.) n.p.

IN the study of high multiplicity high energy interactions it is not yet completely agreed what are the correct kinematical variables to measure. Nor is it clear exactly what can be learned from the large quantities of data that are accumulating. This new compilation gives almost comic emphasis to the situation.

Most of the 757 pages contain graphs taken from the literature, arranged according to the particles involved. Each graph occupies one side of a sheet with the reference and a brief definition of variables on the back. The binding is "burstable", and the compilers promise further material, to be inserted into filed copies. A review paper on the kinematics and phenomenology of inclusive processes is included.

The compilation will certainly be a useful source of information, both to experimenters and to theorists, but each piece of data is presented without comment and each graph is plotted in terms of the particular variables chosen by its authors, so it is difficult to make critical comparisons or to check relative normalizations. As a consequence, many users may come to regard the compilation as a collection of abstracts, from which it will frequently be necessary to refer back to the sources.

The review paper gives a brief description of the various forms of "scaling" theory and of the three-particle optical theorem. A sensible comparison table of kinematical variables is given and there is a well organized bibliography of theoretical publications.

D. J. MILLER