zones, which has proved so useful in the theory and interpretation of electron energy bands in metals. Essentially, it is a study of the wave properties of the solutions of Schrödinger's equation for periodic potential fields, which depend on the degrees of symmetry (group properties) associated with various crystallographic forms. Therefore, the theory and its applications for the determination and classification of energy states in crystals is based on the single-electron model, which, in spite of its shortcomings, has been very successful in the understanding and interpretation of the experimental data.

The author begins with a discussion of the solution of the one-dimensional Schrödinger equation in a periodic field, the Block functions, a detailed account of Brillouin zones for various crystallographic groups, and symmetry properties of the wave functions of these groups. This is followed by a detailed analysis of group operations and their reduction to regular representation for point groups, and tables of characters of point groups, and the classification of electronic states associated with different crystallographic groups. Of particular importance is the discussion and analysis of electron states in space groups containing slide and screw displacements with application to closely packed structures (especially the diamond) and the extensions of the theory to large zones. The last two chapters contain a treatment of the determination of the wave functions and energy bands by using such methods as the linear combination of atomic orbitals, the method of superposition of plane waves, and the so-called cellular method. The latter procedure has yielded successful results when the degree of symmetry is high. A discussion of the effects on the structure of the states brought about by the coupling of the spin with the angular momentum of the electron is also included. The references accompanying each chapter, although not exhaustive, provide the reader with sources on recent developments.

Theorie des Aufbaues der Materie. By Friedrich Hund. 313 pp. B. G. Teubner Verlagsgesellschaft mbH, Stuttgart, 1961. DM 37.60. *Reviewed by R. Landshoff, Lockheed Missiles and Space Company.*

INTERATOMIC forces play an important role in determining the structure of matter; they are responsible for the binding of atoms into molecules and for their association in crystals, as well as less regular solids or liquids. The long-range electrostatic forces between ions are a familiar concept of classical theory; most other forces between atoms or molecules can only be explained with quantum theory.

This book introduces the reader to the most important ideas which give an understanding of how the various types of association come about. After a discussion of condensation, the book turns to crystal lattices and to the factors which influence the type of lattice formed by specific atoms and ions.

After a brief introduction to quantum theory, it is shown how one can explain interatomic forces. The formalism is developed for the diatomic molecule and then extended to more complicated types of chemical binding. An important aspect of this theory is the existence of symmetries and their utilization by means of group theory. The latter part of the book deals with properties of solids, particularly those which are influenced by the grouping of electronic energy levels into bands. The Bardeen-Cooper-Schrieffer theory of superconductivity has unfortunately been omitted.

The book emphasizes a qualitative rather than a quantitative understanding and steers away from detail which might detract from the main argument. Such a program has an obvious appeal, but in the process of eliminating detail, the book occasionally goes a bit too far. For the trained physicist, who can reproduce missing links, this presents no difficulty, but the novice may require a helping hand or additional source material. With such help, the presentation will indeed give him a clear understanding of the basic concepts which are used to explain the structure of matter.

Enrico Fermi

Notes on Quantum Mechanics. A Course Given by Enrico Fermi. 171 pp. U. of Chicago Press, Chicago, Ill., 1961. Paperbound $1.50. *Reviewed by Kamal K. Seth, Duke University.*

ALMOST all of the creators of quantum mechanics have at one time or another written a book on the subject, and most of these books, for example Heisenberg's or Dirac's, have become classics. They vary in their approaches as well as in level of presentation. Consequently, a teacher of quantum mechanics usually has to formulate his own approach to the subject. Several excellent texts in the field also exist (for example Schiff's, which has in its own right become a classic) and new ones are constantly appearing. The point is that, although many good books on quantum mechanics are available, this little booklet stands out amongst them as a gem. It is neither a treatise like those by Dirac or Kramer nor a precise text like the book by Schiff. It is rather a collection of mimeographed notes of a great teacher's lectures on quantum mechanics as he presented them the last time he ever taught the subject (1954). The notes are sketchy and sometimes difficult to read, but remarkably systematic and orderly. Fermi begins with Maupertuis' principle and concludes with a brief description of the Dirac Theory. In between, he covers all that usually comprises a first course in quantum mechanics, and at times more. However, because of its sketchy nature, its value is less as a text in quantum mechanics than as a book in which one may catch glimpses of what made Fermi a great teacher. In the latter role it has great emotional impact, especially for those who, like me, were not fortunate enough to have had Fermi as a teacher.

The Stability of Motion. By N. G. Chetayev. Transl. from Russian by Morton Nadler. Transl. edited by A. W. Babister and J. Burlak. 200 pp. Pergamon Press, London and New York, 1961. $9.50. *Reviewed by T. Teichmann, General Atomic, Division of General Dynamics.*

THE present tendency toward more elaborate and flexible control systems (and dynamical systems in general), including the conscious use of nonlinear elements, and of the "adaptive" principle, has stimulated interest in the stability theory of differential equations, a field to which the Russian school of mathematicians has given a great deal of attention. This work by Chetayev provides a valuable account of the basic results and methods of Lyapunov and illustrations of their application to a number of typical practical problems. As such, it can make a legitimate claim to a place in the library of anyone interested in understanding and using these techniques.

In addition to a discussion of the general features of stability problems, and of Lyapunov's basic theorems and methods, notable features include a very thorough discussion of the stability of linear systems and of the stabilizing effect of dissipative and gyroscopic terms on the motion. The stability of transient motions is also discussed, though somewhat more abstractly than the rest of the motion. Special attention is given to zero and purely imaginary roots of the equations of first approximation, as well as to periodic motions. A number of interesting examples are worked out, including several from mechanics and one from aeronautics (longitudinal stability of rectilinear flight). Unlike most Russian books, there are an appreciable number of references to Western mathematicians (about one-third), but, regrettably, not to any living ones!

The translation is syntactically correct, though not always quite idiomatic. The book is produced by a nonletterpress photographic process, which is not very