obtained in any other way. Second, would they change the three photographs which have been printed with white dots on a black background. The appearance of the precession photographs would put any student off the precession camera, which would be a pity, but in the back-reflexion Laue photograph, three of the annotating letters have got lost in the black background, which is a solid technical reason for having it the same as all the other excellent reproductions.

J. W. JEFFERY

Department of Crystallography
Birkbeck College
Malet Street
London W.C.1.
England

Festkörperphysik I & Festkörperphysik II. BY WOLFGANG LUDWIG. I:Pp. vi + 206; II:Pp. viii + 422. Frankfurt/Main: Akademische Verlagsgesellschaft. 1970. Prices not known.

Die vorliegenden Bändchen sind als Einführung in die Festkörperphysik gedacht. Es handelt sich dabei um einen Kurzgefassten Überblick mit mehr theoretisch-mathematischem Charakter.

Angesichts des geringen Umfanges wird ein sehr weites Gebiet behandelt, etwa entsprechend den beiden bekannten Werken C. Kittels. Daraus ergibt sich, dass Vieles zu knapp behandelt wird. Das gilt nicht nur für die experimentellen Aspekte, sondern oft auch für die physikalische Begründung der Theorie. Man findet z.B. kein Wort über die physikalische Natur der Austauschkräfte.

Vom Studenten wird einige Kenntnis der Quantenmechanik verlangt, gelegentlich auch etwas mehr. So werden etwa die Holstein-Primakoff'schen Transformationen, sowie auch die Onsagerschen Reziprositätsrelationen der Thermodynamik irreversibler Prozesse ohne Erläuterung verwendet.

In Band II, seite 223 wird die Knight-shift als zusätzliches Moment des untersuchten Kerns gedeutet, was zumindest als irreführend zu bezeichnen ist.

Die Bände werden, trotz dieser Mängel, neben einer ausführlichen Vorlesung brauchbar sein; gewissermassen als kommentierte Formelsammlung. Für das Selbststudium sind sie aus den oben angeführten Gründen nicht zu empfehlen.

H. BITTNER

Institut für Physikalische Chemie
Universität Wien
A–1090 *Wien*
Währingerstrasse 42
Österreich

Crystal acoustics. By M. J. P. MUSGRAVE. Pp. xv + 288. San Francisco: Holden-Day, 1970. Price: $24.00.

In recent years the elastic and inelastic properties of crystals, of ever increasing complexity, have been studied extensively with ultrasonic waves and neutron beams. This text by a well-known theorist provides an authoritative and up-to-date introduction to both the propagation of elastic waves in crystals and the dynamics of crystal lattices. It develops the mechanical and dynamical theory that is essential for an understanding of the anisotropy of crystalline solids. In many chapters experimental evidence for the validity of the calculations is provided, but this is a mathematical text and for a description of the experiments the reader is referred to recent papers and reviews. The result is a concise and logical treatment of the elastic properties of materials that will be welcomed by solid-state physicists, electronic engineers, crystallographers and geophysicists.

The first and major part of the book describes the mechanics of anisotropic continua and is divided into 16 chapters. The static and dynamic elasticity of crystals is developed from first principles for all crystal systems. The relations between the velocity, slowness (inverse velocity) and wave surfaces of elastic waves are derived for a general aeolotropic continuum and used to study the propagation of these waves in unbounded media of hexagonal, cubic, orthorhombic, tetragonal and trigonal symmetry. An introduction is given to some of the elastic properties of finite solids in chapters on reflexion and refraction, surface waves, vibrational modes of crystalline plates and rods and the elastic properties of structural materials (aggregates). In this part of the book the author has provided a concise statement of the tensor properties of crystals and shows clearly the relationships between the different conventions used in elasticity theory that have been so confusing to many students in the past.

The second part of the book is a brief introduction to lattice dynamics and is divided into 4 chapters. The dispersion relations for monatomic, diatomic and perturbed chains are derived and followed by the basic theory of the rigid-ion model of a crystal. This is subsequently illustrated by simple models of cubic crystals having metallic, covalent and ionic binding. Finally there are a few remarks on anharmonicity, phonons and phase transitions.

In such a good book there are only a few minor criticisms to be made. The rather pedantic distinction between the anisotropy of materials and the aeolotropy of crystal structures is not one universally accepted and hardly necessary. On the other hand it is a pity that the acoustical branch of the phonon dispersive curve is incorrectly called the acoustic branch, especially as the author is quite correct in his use of the adjectives dynamical and optical. There is a list of references and a useful bibliography at the end of each chapter, but the complex indexing of the references by chapter sections has led to some omissions and errors (*e.g.* 18.6.6, Fedorov is missing, while 18.9.1 is listed as 18.8.1, *etc.*). The usefulness of the five appendices listing the densities and elastic constants of many crystals, often to 4 significant figures, is severely limited, since it is not stated whether these are for the absolute zero, 0°C or room temperature.

These remarks should not discourage all those who study the crystalline properties of solids from reading this book. It is an excellent introduction to crystal acoustics, it is well written and amply illustrated with clear, precise figures. Unfortunately its exorbitant price means that it is likely to be found in institutional, rather than personal, libraries.

E. R. DOBBS

Department of Physics
University of Lancaster
Lancaster
England