

ored gray. They catch the eye and admirably supplement the main text. As might be expected, there are also numerous problems at the end of each chapter.

It is my opinion that *Fundamentals of Statistical and Thermal Physics* by F. Reif is an outstanding text. As is characteristic of such a text, the authors presentation provides insights to both students and instructors. Although there are several aspects of the general presentation with which I am not in complete agreement (some examples were cited above—another case concerns the author's description of the exchange of energy and matter be-

tween systems in an ensemble and its connection with invariants of the motion and the constraints that define the ensemble) in every case the disagreement is basically a matter of preference. The good features of the text so overwhelm any such matters of taste that I have no hesitation in recommending this book to all instructors, both physicists and chemists, who teach courses in the general area of statistical and thermal physics.

* * *

The reviewer is director of the James Franck Institute at the University of Chicago.

Experiments, observations and their interpretation

ADVANCES IN MATERIALS RESEARCH, VOL. 1: EXPERIMENTAL METHODS OF MATERIALS RESEARCH. Herbert Herman, ed. 316 pp. Interscience, New York, 1967. \$14.95

by Henry M. Otte

It is becoming the rule, rather than the exception, that each new technical book published is one of a continuing series. No doubt the fact is well established that this will lead to the purchase of unwanted books in order to maintain the "continuing series" complete and current. The merits of each volume thus tend to be displaced to a secondary consideration, and criticism of any lack of completeness is eschewed on the grounds that omissions can be corrected in future volumes. Such a plea is entered for the book under review, which is the first in a new series entitled *Advances in Materials Research*. The editor of this series, H. Herman (University of Pennsylvania), is also the editor of the first volume. Opposite the title page we may survey an impressive list of fourteen people who form an international editorial advisory board. On the basis of this we should be entitled to expect high-quality technical presentations, and indeed volume 1 does come up to expectation.

Ten articles have been assembled under the title *Experimental Methods of Materials Research*; they were originally presented as lectures during the 1964-65 academic year at the University of Pennsylvania, and sponsored by

the School of Metallurgical Engineering and the Laboratory for Research on the Structure of Matter. The goal of the lecture series was to have critical evaluations of significant experimental techniques of materials science presented by men who were themselves prominent contributors to the development of these techniques. A glance at the names of the ten lecturers suggests that this goal was achieved successfully. Lack of completeness in the subject matter covered by them hopefully will be "corrected," as already noted, in future volumes of the series.

The first six articles deal with techniques based on the interaction of radiation with matter: "X-Ray Diffraction" by C. S. Barrett, "Neutron Diffraction" by C. G. Shull, "Electron Microscopy" by V. A. Phillips, "Field-Emission Microscopy" by A. J. Melmed, "Electron-Probe Microanalysis" by K. F. J. Heinrich and "Applications of the Mossbauer Effect to Problems in Materials Science" by P. A. Flinn. Three articles are related to techniques for studying deformation: "Anelastic Techniques: Iron, A Case History" by D. N. Beshers, "Low-Temperature Deformation Techniques" by R. J. Arsenault and "Determination of the Stored Energy of Deformation of Metals and Alloys" by R. O. Williams. The last article is by C. T. Tomizuka on "Some Experimental Aspects of Diffusion in Metals."

Barrett singles out the very interesting x-ray topography methods for



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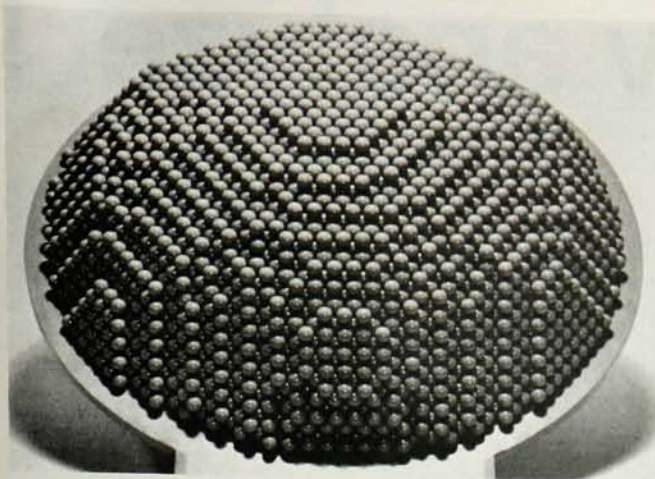
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review of recent advances. Shull describes some typical applications that make use of three characteristics (also discussed) unique to neutron radiation; he thus covers the interpretation of crystal structures, of phonon distributions and of electronic structures in materials. Techniques associated with electron transmission microscopy form the main theme of Phillips's review. Melmed, in his article, covers both field-electron and field-ion (emission) microscopy. Heinrich's short paper on the probe gives a very brief survey of the instrument, the techniques and the applications. Flinn's article presents ways in which the Mossbauer effect has been used to study magnetic solids, lattice dynamics, crystal defects and diffusion. The complexities involved in the interpretation of internal friction peaks in iron are considered in some detail by Beshers. A distinction is made by Arsenault between those low-temperature deformation techniques used to obtain engineering data and those used to obtain information about dislocation mechanisms; his presentation is accordingly divided into two parts. The problems of stored-energy measurements are defined by Williams, who then goes on to discuss and compare the methods that have been used and the results obtained with them. Finally, Tomizuka covers briefly selected topics of diffusion in metals. All the papers are very readable and well referenced; they can be used as introductory articles to the field.

According to the editor, it is planned to produce a volume annually, with future volumes containing

most frequently review articles on diverse areas. The first volume reviewed here is well produced and contains a subject index as well as an author index, both fairly extensive. However a few disturbing printer's errors were noticed. The caption to figure 9 made reference to figures 9 and 10 instead of to 8 and 9. The diagram on page 54 was upside down. On page 199 figure 2(c) was not properly aligned with figures 2(a) and 2(b). Errors in the type-setting were also found. However, these are all minor defects in a book that, although already dated by two years, still presents a timely survey of numerous recent experimental techniques both in materials and solid-state research.

* * *

The reviewer is manager of the materials research laboratory at Martin Marietta Corp., Orlando, Florida.

Applied abstract spaces

BOUNDARY VALUE PROBLEMS OF MATHEMATICAL PHYSICS, Vol. 1. By Ivan Stakgold. 340 pp. Macmillan, New York, 1967. \$12.95

by George H. Weiss

More and more the subject matter of mathematical physics is phrased in the terminology of abstract spaces. It is therefore a matter of good education to have some acquaintance with this terminology, particularly for theoretical physicists. However, a course that deals only in the formulation of boundary-value problems in the abstract can hardly be adequate prepara-

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