

Books

Progress in Low Temperature Physics. Vol. 2. Edited by C. J. Gorter. 480 pp. (North-Holland, Holland) Interscience Publishers, Inc., New York, 1957. \$10.75. *Reviewed by E. A. Lynton, Rutgers University.*

In little more than a year, the book shelf of the low-temperature physicist has been enriched with a number of such excellent volumes that the concomitant drain on his pocketbook has been painful but eminently worthwhile. The first in the series of *Progress in Low Temperature Physics* was soon followed by two *Handbuch* volumes devoted to cryogenics, and to these has now been added the second compilation of review articles edited by Professor Gorter. Perhaps the most astonishing collective feature of these four books, aside from their uniformly high quality, is the manner in which they complement one another with little overlap. Both *Progress* volumes contain excellent and informative articles on liquid and solid helium, a subject only sketchily covered in the *Handbuecher*, while the latter in turn contain a lot of material on cryogenic techniques which is deliberately left out of the former. And where there is duplication, as, e.g., in electronic transport phenomena, the approach and treatment are generally sufficiently different to make the repetition useful.

The volume under review contains five articles on helium: De Boer on quantum and exchange effects on the thermodynamic properties of liquid helium, Kramers on liquid helium below 1°K, Winkel and Wansink on liquid transport phenomena in slits and capillaries, Atkins on the helium film, and Domb and Dugdale on solid helium. Matthias discusses empirical criteria for superconductivity, Sondheimer throws much light on electron transport phenomena in metals, Johnson and Lark-Horovitz review low-temperature data on semiconductors, and Spedding and co-workers provide welcome compilation of the properties of the rare earth metals. The De Haas-Van Alphen effect is reviewed by Shoenberg, paramagnetic relaxation by Gorter, nuclear orientation by Steenland and Tolhoek, specific heats and thermal expansion of solids by Byl, and the helium temperature scale by Van Dyk and Durieux.

With only few exceptions, each of these chapters is either a useful clarifying review of a complex subject, or a theoretical progress report generally containing original and interesting speculations. Outstanding in clarity is Sondheimer's discussion of electronic transport phenomena, which is almost matched by Shoenberg's and Atkins' contributions, each of whom manages to

present very clearly a great deal of experimental data and their theoretical implications. Highly interesting also are De Boer's molecular approach to the problem of liquid helium and Byl's suggestion of a novel way to lessen the confusion about the Debye temperature of a solid. The articles mentioned I enjoyed particularly, but my reaction to most of the other contributions was almost as enthusiastic.

The principal weakness of the book is one for which it can hardly be blamed. Several of its chapters appear today tantalizingly incomplete because in the few months which have elapsed since most of the material was written, major theoretical and experimental advances have been or are just on the point of being made in various fields. Experiments at the Bureau of Standards with oriented nuclei have confirmed parity-nonconservation in weak interactions. The group at Duke University has established the logarithmic nature of the specific heat singularity at the λ -point of He⁴; and has obtained fascinating clues about the nature of He³. Brueckner has been able to calculate a reasonably accurate dispersion relation for He⁴ from first principles. Bardeen and co-workers have achieved a microscopic theory of superconductivity with which Pines has been able to explain Matthias' empirical criteria. To blame anyone for the omission of these matters from Volume 2 of *Progress in Low Temperature Physics* is to expect a measure of extrasensory perception not commonly found, but there is certainly much reason to look forward eagerly to Volume 3! In the meantime one must applaud the present book as an outstanding and valuable addition to cryogenic literature.

Theories of the Universe: From Babylonian Myth to Modern Science. Edited by Milton K. Munitz. 437 pp. The Free Press, Glencoe, Ill., 1957. \$6.50. *Reviewed by C. Payne-Gaposchkin, Harvard College Observatory.*

A description of the development of human thought about the nature of the universe is an extremely interesting and ambitious project. The volume now reviewed presents a series of excerpts, either from original writings or from scholarly summaries. It is not the first of such "source books", but it is one of the most satisfactory because its scope has been limited to a single theme.

The book falls into four sections that deal with early speculations; classical and mediaeval ideas; the "Copernican revolution"; and modern theories.

The selections are interesting; few of them are hackneyed, as they might well have been. The extracts from Ptolemy's "Almagest", from Cusanus, Bruno, Huygens, and Thomas Wright are well chosen, and the selection of Newton's "Four Letters to Richard Bentley" is a happy one.

But there is a danger in putting such a book into the hands of the "general reader". Even though he may follow the short extracts that have been chosen, he can hardly appreciate them out of their context. If the book had covered only one of its four sections it could

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Here R. G. Rickey (left), components specialist, discusses new accelerometer designs with E. V. Stearns head of the Inertial Guidance Department.



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By **F. A. JENKINS**, *University of California, Berkeley*, and **HARVEY E. WHITE**, *Pittsburgh Radio Station WQED*. New Third Edition. 640 pages, \$8.50

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scarcely (even with an extensive commentary) have given the uninstructed reader a real idea of the issues involved. And this is the more unfortunate because the general reader may be tempted to think that from these short excerpts he has mastered the whole subject. The book will therefore be more useful and more instructive to the trained scientist than to the general reader, and to him it can be recommended without reservation.

This criticism applies most strongly to the final section, which deals with modern cosmology. This is, most unfortunately, a subject that the general reader has been led to believe that he can grasp without the essential background of mathematics and physics. The superficial ideas of such general readers (which are not unknown among college students) are the despair of the serious scientist.

If a section is to be devoted to modern cosmology, it should, in fairness to the reader, be representative. It should, moreover, contain at least one excerpt that does not elide the mathematical difficulties. Rather than including the frank popularizations of Gamow and Hoyle, this section might have included one of Weyl's carefully reasoned expositions. And instead of ending with three simplified essays on the "perfect cosmological principle", it should have included the now classic paper by Bondi and Gold, in which the matter was first presented to the scientific world. It is no kindness to the general reader to lead him to believe that he understands what in fact he does not.

The final bibliography does indeed include some technical books; brief appraisals and descriptions would have added to its value.

Chain Reactions: An Introduction. By F. S. Dainton. 183 pp. (Methuen, England) John Wiley & Sons, Inc., New York, 1956. \$2.90. Reviewed by Henry Wise, *Stanford Research Institute*.

More than twenty years have passed by since Semenov's book on chain reactions was published. During the intervening period a large number of chemical reactions have been studied which proceed by a chain mechanism. Therefore it is rather timely to come across a text which examines the underlying principles which account for some of the properties of the individual reactions involving chain centers.

Chain Reactions is written for the reader who is already acquainted with the general principles of reaction kinetics. After a very brief review of the kinetics of simple homogeneous reactions in gaseous or liquid systems, the author describes certain distinguishing features of chain reactions including the special experimental procedures employed in their study. Among these one finds methods for the determination of explosive boundaries in gaseous systems and the initiation of chains in polymerization reactions in the condensed phase. The following chapter is devoted to an analysis of the various types of individual reactions which may occur in a chain mechanism, such as initiation, propagation, branching, and termination. A few typical reac-