are not experts in the field, is quite welcome.

This little book is aimed at the "nonspecialist and intelligent layman." It emphasizes the qualitative crystallographic origins of the phenomena, with only an occasional, and always very simple (with the exception of the last appendix) mathematical discussion. The author is more concerned with making the reader *feel* why a given fact is so than with giving a rigorous proof or analytical description. Thus the text, which is generally clear and is written in a pleasant and sometimes even lively style, often resembles that of the more technical articles in *The Scientific American* with just a pinch of mathematics sprinkled in. In addition, the reader is given glimpses of a wide variety of solid-state phenomena and concepts, as these are gradually introduced to provide the necessary background.

The first two-thirds of the book is approximately evenly divided between four topics: crystals, basic diffusion concepts, diffusion in metals, and diffusion in ionic crystals. The remaining third is devoted to shorter discussions of diffusion in covalent crystals, grain boundaries, temperature gradients, effects of pressure and electron drift, and several brief mathematical appendices. For the most part I think the author has reached his goal of making diffusion phenomena seem real, ordered, and reasonable to the nonspecialist reader. One distressing defect of the book, however, is that the quality of the figures does not match that of the text. Several of the diagrams seem to have been carelessly produced; several more are confusing; and a few contain significant errors. It is to be hoped that this blemish in an otherwise attractive book will be corrected in a second printing.

It might be of value to compare this work with another thin and recent book on the same topic, Shewmon's *Diffusion in Solids* (McGraw-Hill, New York, 1963). Shewmon's text presumes a background knowledge of the physics of solids, is somewhat more technical, and specializes a bit more on metals. Thus, the two books are written for different readers and have different aims; therefore I am (fortunately) spared the task of making a difficult choice between two well-done volumes.

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Elementary Particles

Elementary Particle Physics. Gunnar Källén. Addison-Wesley, Reading, Mass., 1964. xiv + 546 pp. Illus. $15.

Gunnar Källén tells us in the foreword that his book is based on a course given at Lund for students with a theoretical background. But the text leaps along at a lively pace with prodigal use of connective phrases such as "it is easily verified that . . ."; "we leave the working out of details to the reader . . ."; "it is a straight forward task to verify . . ."; "as is well known . . ."; "the integration can be performed by straight forward methods and . . ."; "we do not insist on the algebraic details here but leave them as an exercise for the reader . . ."; and similar expressions, without reference to sources where the missing material may be found. Therefore, if you want to use this book as one of the major texts in a graduate course on elementary particles, you will have to expend considerable effort to fill the gaps.

Actually, although few people will want to teach directly from this book, it is going to be a very useful one for the experimentalist working on the frontiers of elementary particle problems to keep at hand. For example, there is a lengthy treatment of dispersion relations and a (sketchy) comparison with experimental details, and there is a chapter on meson photoproduction with an excellent comparison of theory with experiment, containing a fair-minded statement on the uncertainty of identification of the quantum numbers of the higher resonances. Moreover, the chapter on pion production in pion-nucleon collision has an extremely valuable derivation of the cross section for one pion exchange and an extensive comparison with experiment. Multiple pion resonances, strange particle resonances, and associated phenomenological theoretical treatments (for example, Dalitz diagrams, methods of spin determinations, and expressions for phase space) are very usefully discussed. There is an entire chapter on nucleon form factors, concluding with a brief discussion of possible relation to multipionic resonances.

There is a nice treatment of space reflection and of charge conjugation, but unless you already know how, you will have to work out G parity for yourself. The subject of time reflection is similarly briefly treated. The optical theorem is mentioned only in a brief paragraph, and, in fact, diffraction theory is omitted. On the other hand, about one third of the book treats weak interactions with great detail—for example, beta decay selection rules, energy spectrum angular correlations, conserved vector current, decay probabilities, and the $\Delta T = \frac{1}{2}$ and $\Delta Q = \Delta S$ rules. Sufficient reference is given to the experimental literature so that the reader can nearly always go on into the subject.

Group theoretic treatment of elementary particles is not discussed in this book, nor is nucleon-nucleon and hyperon-nucleon scattering.

This is a book with limits and strengths that strongly reflect its author's personal tastes and disciplines. I am glad to have it on my shelf.

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Mathematics

Integral Equations. And their applications to certain problems in mechanics, mathematical physics, and technology. S. G. Mikhlin. Translated from the Russian edition (Moscow, 1959) by A. H. Armstrong. Pergamon, London; Macmillan, New York, ed. 2, 1964. xiv + 341 pp. Illus. $12.50.

This is the second English edition of this work, which was originally published in Russian in 1944. Of course, revisions have been made, but the differences between the first translation (1957) and this volume seem to be relatively minor.

The book is divided into two parts. The first, and smaller, is devoted mostly to the Fredholm theory and states the most important theorems. The author furthermore outlines the various methods of proving existence and uniqueness, which methods are later used as practical means for getting approximate answers to physical problems.

The second part covers several different types of integral equations that serve as mathematical models of some physical problems. Most of the equations can be reduced to the Dirichlet type, however, and a goodly number are symmetric (self adjoint) equations.