cally inclined reader to skip this chapter.

It should be stated that Källén's treatment avoids all analytic continuations into the complex plane and, because of its publication before the recent resurgence of interest, almost all group theory. It is of course, a reflection on the speed with which knowledge is acquired rather than on the author's ability to foresee future developments if the section on the decay of the neutral K meson, which assumes *CP* invariance, is now obsolete. The student who is aware of these limitations is not likely to find a better mentor than Professor Källén.

The book has an inadequate subject index, but the quality of the printing is very high.

The Language of Nature. An Essay in the Philosophy of Science. By David Hawkins. 372 pp. W. H. Freeman, San Francisco, 1964. $7.50.
Reviewed by R. B. Lindsay, Brown University.

It is generally agreed that the philosophy of science is a very important branch of scholarly activity, but as is the case with other interdisciplinary subjects, there is no single interpretation of its essential character. Some would see in it merely the logical analysis of the language of science, while others believe that its task is the thoroughgoing examination of the basic concepts and hypotheses of scientific theories, particularly with reference to their relations to the world of experience and to each other. Still another view stresses the historical evolution of scientific ideas and in particular the influence of successful concepts in one branch of science, e.g., physics, on the development of another branch, e.g., psychology or sociology. Finally, a detailed development of some interpretation of a scientific theory, e.g., the theory of measurement in quantum mechanics, which many will consider to *be* quantum mechanics, and hence an investigation in physics may by others be treated as essentially philosophical in character. It is clear that the discipline provides considerable scope for operation, and this doubtless explains the relatively large numbers of works on the philosophy of science which now claim readers' attention.

The book under review represents to a certain degree a synthesis of the various approaches to the philosophy of science, though in his preface the author asserts that it has also been his aim to "show that the content of positive knowledge reacts upon the ways of thought from which that knowledge evolved". Thus he covers a very wide range of topics from the nature of mathematics to the theory of the soul, with way stations on measurement, motion and its laws, probability, quantum physics, thermodynamics, biology, ethics, and economics. In such a wide-ranging study, it is obviously a major task to make clear to the reader the relevant connections, and not all would agree that this has been done with complete success. So far as physical ideas are concerned, the author evidently bases his considerations in general on a sound knowledge of the subject with the possible exceptions of inadequate definition of wave motion, as well as of entropy in thermodynamics, and a misleading reference to the history of the origin of quantum theory.

The presentation is rather heavily laden with metaphors, which, though they add to the freshness and novelty of the discussion, tend to provide in some cases an obstacle to the reader's clear understanding of what the author is trying to say. This is unfortunate, since the book contains much material of interest to scientists in general and to physicists in particular.

Structure and Function in Biological Membranes, Volume I. By J. Lee Kavanau. 321 pp. Holden-Day, San Francisco, 1965. $10.95.
Reviewed by George Weiss, National Institutes of Health.

It is fashionable these days to try to account for all biological phenomena in terms of physical or chemical processes. Particular examples for which clear answers are not yet available include the analysis of how and why cells become differentiated and combine in limited configurations. At least some of the explanation must be sought in the physical and chemical properties of cell membranes.

It is apparently the purpose of Kavanau's book to bring to the attention of biologists results in phys-

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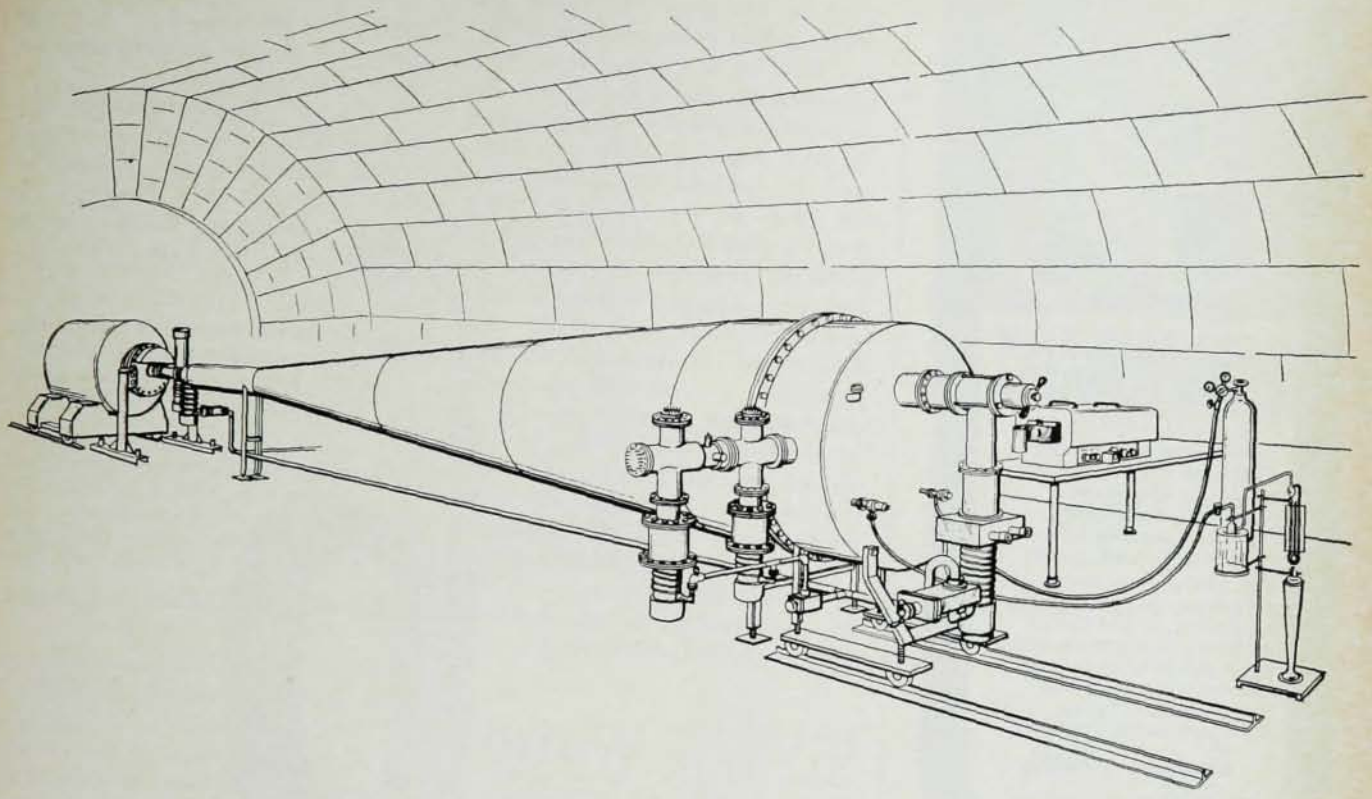

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ical chemistry which might be relevant to biological membrane phenomena. As the book is written, it is not likely to be of interest to physicists since it consists mainly of a long recitation of research by many chemists and physicists without giving a sense of emphasis on what is, or is not likely to be important. There is no detailed account of what are the biological problems, nor are the results cited applied in any detail to specific problems. Some of the topics discussed are the formation and transformation of micelles, membrane transformations, and the structure of membranes. It is possible that there is much material of ultimate value in this volume. However, the author presents only plausibility arguments rather than experimental verification to support his arguments, and these are not likely to be too convincing without detailed confirmation.

Strong Interaction Physics. A Lecture Note Volume. By Maurice Jacob and Geoffrey F. Chew. 154 pp. Benjamin, New York, 1964. Cloth $9.00; paper $4.95. *Reviewed by John E. Mansfield, Harvard University.*

As one would surmise from the title, this is really two sets of lecture notes, both of good quality and up to date.

Jacob presents phenomenological aspects of pion-nucleon interactions on an elementary level. The basics of helicity amplitudes are given briefly, as are isospin and the phase-shift analysis. A clear and orderly collection of facts on the multipion resonances makes the book a good one to have on the shelf.

Analytic properties of scattering amplitudes are stated and some phenomenological applications of dispersion relations are given. The calculation of the pion-nucleon coupling constant is described. Mention is made of subtracted and spin-flip dispersion relations. Some arguments leading to peripheral models are presented.

Chew's half of the book is on bootstrap dynamics. He defines maximal analyticity of the first degree (all singularities are those of the analytic continuation of unitarity) and of the second degree (absence of CCD poles). These are illustrated in a simple nonrelativistic model. The bootstrap program is described very well; partial wave calculations are done in the strip approximation, and there is a page devoted to the not inconsiderable successes of the approach.

An index is supplied, covering both articles. The book, especially Chew's article, is designed to be read and not worked through. Yet it contains all that is necessary to put one on the doorstep of the literature.

Electromagnetic Fields and Interactions. Vol. 1, Electromagnetic Theory and Relativity. By Richard Becker. Fritz Sauter, ed. 439 pp. Blaisdell, New York, 1964. $9.50.

Electromagnetic Fields and Interactions. Vol. 2, Quantum Theory of Atoms and Radiation. By Richard Becker. Fritz Sauter, ed. Transl. by Ivor De Teissier. 403 pp. Blaisdell, New York, 1964. $9.50.

Reviewed by D. B. Lichtenberg, Indiana University.

The first of these volumes is a translation of the sixteenth German edition of 1957; the second is a translation of the eighth German edition of 1959. A new third volume, subtitled *Electrical and Magnetic Phenomena in Matter*, is promised, but was not available at the time of this writing.

It is useful to compare Volume 1 to the much earlier English edition of Abraham and Becker, *Classical Electricity and Magnetism*. This work is by now a classic, and Sauter wisely made few essential changes in the newer version. The major addition is the incorporation into Volume 1 of a section on special relativity, which a number of editions ago appeared in Volume 2. This beautiful treatment of relativity rightly belongs in the volume devoted to the classical theory. Its addition makes this book a very suitable graduate text in electromagnetic theory.

Volume 2 has not been previously translated. It is primarily an exposition of certain aspects of the quantum theory of electrons and radiation which are relevant for a modern treatment of electromagnetic interactions in matter.

The approach is partly historical. First, the theory of the electron is treated by classical principles. Then the development of the quantum theory is sketched from Planck's radiation