Warren's retirement from MIT. The papers read on this occasion made it clear that all basic features of the most modern versions of kinematical and dynamical theories had been included in the original Darwin treatment, so that all those who followed have primarily elaborated and expanded his classical work.

In 1944, the theory of x-ray diffraction was completely rederived by W. H. Zachariasen, and was published in book form: *Theory of X-Ray Diffraction in Crystals* (Wiley, New York, 1945). By the time this elegant treatise was allowed to go out of print, a renaissance of interest in the dynamical theory has made it popular to discuss x-ray diffraction theory using the notation and mathematical formulation developed by Zachariasen. The present book is no exception. It is a particularly welcome addition to the literature because it again makes available, in book form, a complete treatment of the basic equations describing the diffraction of x-rays by perfect and imperfect crystals. The presentation is terse and intended for the more serious reader rather than a neophyte. Since Richard J. Weiss has been primarily interested for many years in exploring electronic structure of atoms in crystals, his treatise emphasizes those aspects of the diffraction theory that must be fully appreciated before results having requisite physical validity can even be sought.

The book contains four chapters and five appendices that will prove to be extremely useful to anyone planning to carry out similar investigations. Chapter 1 discusses scattering by free atoms while chapter 2 considers what happens in perfect and imperfect single crystals as well as in polycrystalline aggregates. Chapter 3 then takes up the various experimental precautions that must be adhered to in order to obtain intensities accurate to 1%. This is probably the most important contribution of this book because it points out just how difficult it is to obtain quantitative information about the electron distribution from x-ray diffraction studies. Some of the more successful applications of these procedures are described in Chapter 4. Weiss refrains from commenting on numerous less carefully conducted investigations and suggests instead, in a concluding statement, that newcomers to this field should begin by repeating some of the more successful measurements of others to assess the reliability of their own procedures. Such newcomers will find this book an invaluable guide as will those who wish to discover what the limitations and potentialities of x-ray diffraction methods are for the determination of electron distributions in crystals.

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Leonid V. Azároff has written three books on x-ray diffraction and on the solid state. He received his PhD in 1954 from MIT, following an interdepartmental program emphasizing crystallography.

Photons and excitons

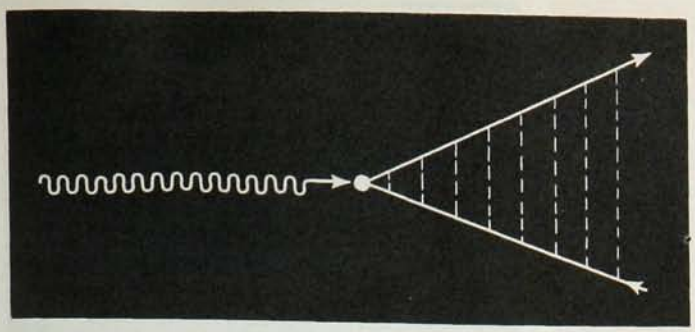
THE OPTICAL PROPERTIES OF SOLIDS. (Enrico Fermi School, Varenna, July, 1965) J. Tauc, ed. 434 pp. Academic Press, New York, 1966. $22.00

by Thomas A. Scott

This book comprises the proceedings of course 34 of the Enrico Fermi International School of Physics, held at Varenna under the sponsorship of the Italian Physical Society.

The course was devoted to the optical properties of solids and was designed to bring the participants into contact with current research in the field. 18 topics by 20 authors are listed in the table of contents. Some of the contributions consist of a single lecture on a specific problem, but most are derived from a series of formal lectures on broad aspects of the field. One of the best examples is an excellent review of magnetooptical effects in solids by G. Dresselhaus and M. S. Dresselhaus of the MIT Lincoln Laboratory.

Like most books of this nature, the coverage is not uniform. Some authors have exercised commendable care and effort in transforming their lectures to manuscript form, but other chapters read little better than lecture notes. Happily, the former are in the majority. One of the faults common with this kind of book is that there is inevitably some duplication of material, which at the price of books today is at least annoying. More serious still is the omission or too brief treatment of material, usually of an introductory



FEYNMAN DIAGRAM for creation of electron-hole pair by photon absorption.

nature, which gets dropped among the authors. Therefore a review of a field compounded of contributions from many loosely coupled authors rarely competes in overall value or quality with a review by a single expert. *The Optical Properties of Solids* suffers from this syndrome no more than the average but enough to render it unsuitable as a textbook.

For the person with a sound basic training in optical properties who wishes an up-to-date survey of many aspects of the field, this book can be enthusiastically recommended. All the lectures deal with current research and touch on unsolved problems, and each chapter contains an extensive bibliography of recent publications. Magnetoöptical effects, band structure and interband transitions, excitons, photon-photon interactions, and plasma effects are among the many topics discussed. Semiconductors and metals are the focus of interest, but some attention is given also to solid rare gases and silver halides. It was disappointing that there was not a more thorough discussion of nonlinear optical phenomena.

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Thomas A. Scott, professor of physics at the University of Florida, has built up a solid-state laboratory that specializes in magnetic resonance and low-temperature, high-pressure experiments.

Symmetries and dynamics

PARTICLE SYMMETRIES. (Vol. 2, Brandeis University Summer Institute, 1965). M. Chretien, S. Deser, eds. 691 pp. Gordon and Breach, New York, 1966. $35.00

by Don B. Lichtenberg

This book of lectures by well known research workers in elementary-particle physics is more than a book on symmetry, but includes topics in the dynamics of weak and strong interactions. As such its usefulness is considerably enhanced.

The lecture notes are arranged alphabetically by author rather than in any logical order. Thus, for example, the most elementary lectures by F. E. Low, which give a general introduction to the idea of symmetry in particle physics, should be read first. However due to the accident of Low's name, these lecture notes are presented next to last.

I particularly welcome the lectures by A. H. Rosenfeld on the phenomenology of mesons. We cannot be reminded too often that physics is an empirical science, and we cannot hope to understand symmetries and the dynamics of nature if we do not have more than just a nodding acquaintance with the facts. However the facts about baryons are just as important as those about mesons, and it is a weakness of the book that lectures were not given on the baryons as well.

The different sets of lectures vary both in level of presentation and in quality. Part of this variation can be attributed to the different notetakers, and part to the differences in the style of the lectures. However, much of the variation undoubtedly arises from the nature of the material presented.

As an example of the contrast between different sections of the book, I shall consider the lectures of N. Cabibbo on weak interactions and those of R. E. Cutkosky on bootstrap models of strong interactions. The Cabibbo