view the richness and scope of the theory that has been developed in such a relatively brief time period and in such a field as thin-film optics, which has certainly never been a glamour spot in the realm of research in physics.

Optics of Thin Films, as the title implies, is in essence a theoretical study of the problem of plane lightwave propagation in stratified media (based upon Maxwell's electromagnetic theory), with applications to methods of thin-films computation and to the design of optical filters. The author, Zdenek Knittl, has, for the most part, limited his treatment to "conventional" thin-film optics by introducing the usual idealized assumptions concerning the properties of the individual layers (that is, all media are optically isotropic; layer boundaries are plane parallel, smooth and of infinite extent, and so on) and by omitting treatment of such topics as wave guiding and non-linear optical effects. Some treatment of non-ideal-film properties is provided in a concluding chapter entitled "Perturbations." In other respects, the abovementioned limitations in treatment are really in keeping with the avowed purposes of this work.

The author has noted in his introduction that his book is intended primarily to be used a a theoretical text for university courses or as a reference book for workers in the thin-films field. I believe his intention has been very adequately achieved. The book has a basic pedagogical flavor. It contains rather intensive treatment of certain areas of the mathematical theory, and at the same time it is a veritable storehouse of useful and practical information on computational and design methods in thin-film optics. A good selection of exercises at the end of each chapter, together with an excellent bibliography, adds much to the value of the book as a text–reference work.

Some specific features of the book are:

- a thorough treatment of basic theory and the optics of single films, as well as the more sophisticated studies on multilayer systems;
- a predominant use of the powerful matrix methods in the theoretical developments;
- an extensive treatment of multilayers with absorbing layers, and
- separate chapters devoted to methods of exact synthesis of multilayers and a study of inhomogeneous layers.

Knittl has done a fine job of assembling and presenting the material in this new contribution to the literature on thin-film optics, which includes some of his own work previously unpublished. He presents to the reader an up-to-date and true "world view" of pertinent developments in the field (within the scope of the aforementioned limitations) and at the same time retains a good historical perspective, giving rightful tribute to the pioneer workers of the past years. This is a book that should be welcomed by students and professionals alike.

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Thermal Conductivity of Solids

J. E. Parrott, A. D. Stuckes
157 pp. Academic, New York, 1975.
$10.50

Heat conduction is governed by the Fourier equation, but this field of study has been vacated by physicists to become the domain of applied mathematicians and of engineers. The thermal conductivity, however, which enters these equations as a material parameter, is determined by the properties of the substance on a microscopic scale and is thus very much the concern of solid-state and atomic physicists. There has been no review of the thermal conductivity of solids for several years; one earlier account is given in relevant chapters of *Thermal Conductivity*, edited by R. P. Tye (Academic, London, 1969).

A theoretician, J. E. Parrot, and an experimentalist, Audrey D. Stuckes, have combined to write this compact and very readable book. They explain the equation of heat conduction but use it only to discuss methods of measuring the thermal conductivity. Stationary and time-varying techniques are treated compactly; the principles are well explained, but not much attention is given the pitfalls that have caused so much confusion in the literature of the 1950's and 60's. The theory of thermal conductivity is treated straightforwardly. Conduction electrons and lattice waves are introduced, and their interactions are discussed in a semi-quantitative way; that is, the authors state the processes and interference conditions, but they do not treat the strength of the interactions—they only state the results. This is, of course, in line with the given level of the book, which is for senior students. It is customary at this stage to discuss energy levels and classify interactions, but to shy away from problems of intensity. When treating transport properties, intensity is the salient property of the interactions. The theoretical treatment in this book therefore becomes a catalogue of theoretical papers, and not always a sufficiently critical one. However, it is difficult to see what else could have been done in that space, and the account is very readable.

The authors compare the theory with the experimental data, covering all important cases. Semiconductors are particularly well treated, as could have been expected from the authors' background. The last chapter, on technological materials (that is, on inhomogeneous materi-

als), is most unique and valuable; the theoretical problem is very difficult, and nowhere is there such a good summary of the useful approximations and the salient results.

While aimed at senior students, the book will be very useful to mature workers who need to gain a quick mastery of the field. It is doubtful whether this volume would be used in this country as a course text, but it would make good supplementary reading in a solid-state course and could be used as a basis for special student projects.

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Cosmological Letters on the Arrangement of the World-Edifice

J. H. Lambert (trans., S. L. Jaki)
245 pp. Science History (Neale Watson), New York, 1976. $18.00

Historians of science are again in debt to Stanley L. Jaki, for another excellent work on the history of cosmology. This new book is a complete, annotated translation of Johann Heinrich Lambert's *Cosmological Letters on the Arrangement of the World-Edifice*.

A modern translation of the *Cosmologische Briefe über die Einrichtung des Weltbaues* (Augsburg, 1761) has long been needed. Although some parts of it have received wide circulation due to Milton K. Munitz's *Theories of the Universe*, the only English-language edition of the entire *Cosmologische Briefe* to date has been a 19th-century translation of a French summary of the original German.

A bust of Lambert. The original resided in the Stadtmuseum Mülhausen in Alsace. This photograph appears in *Johann Friedrich Lambert: Leistung und Leben*, Braun and Co., Mülhausen, 1943, kindly supplied by S. Jaki.

The cosmological ideas of Lambert, and their relation to those of Immanuel Kant and Thomas Wright of Durham, are the traditional starting point for historical studies on the discovery of the nature and extent of the Milky Way, the galaxies and the universe as a whole. Jaki's edition of this important work finally provides the companion volume to W. Hastie's translation of Kant's *Universal Natural History and Theory of the Heavens* and Michael Hoskin's treatise on Wright's *Original Theory and New Hypothesis of the Universe*.

The *Cosmological Letters* contains the translation of Lambert's original work (with 27 pages of footnotes) and a 42-page introduction (with 16 pages of notes) by Jaki. The introduction describes Lambert's life and work, the origin of the *Cosmologische Briefe*, a synopsis of each of the 20 "letters," the cosmological background of the work, its reception and its relation to modern cosmology. Jaki's careful, detailed study of the influences among Lambert, Wright, Kant and the other scientists of the era and his authoritative assessment of Lambert's arguments and theories are really the most important features of this new book. While the translation of the *Cosmologische Briefe* will undoubtedly become an essential source book for historians of science, it is Jaki's analysis that makes this volume a fundamental contribution to the subject.

One of the issues Jaki addresses concerns the claim of other historians that the ideas of Lambert are similar to those of Wright and Kant. Jaki demonstrates clearly that not only are the details of the theories fundamentally different, but also that the motivations for constructing cosmologies were different. While Wright based his theories on mystical and religious grounds and Kant based his on evolutionary ideas and Newtonian mechanics, Lambert was influenced by teleological considerations and by comets.

The appearance of a comet in 1759, predicted by Edmund Halley, had a strong influence on Lambert. Much of the *Cosmologische Briefe* is concerned with comets—their number, their nature and the possibility of their collision with other bodies. This concern with comets, coupled with Lambert's belief in a purposeful universe, led him to construct a system of the world that was unevolving, collision-free and built up of hierarchies of stellar systems.

Like Jaki's other major studies on the history of cosmology, *The Milky Way* and *The Paradox of Olbers's Paradox*, the *Cosmological Letters* is an authoritative, scholarly work. Jaki's study of all of the published material, his thorough search of Lambert's unpublished correspondence and his fine talent for translating difficult German into lucid English are combined in a richly documented volume that is easy to read, enormously instructive and thoroughly enjoyable.

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book notes

Energy from Solid Wastes. P. N. Cheremisinoff, A. C. Morresi. 505 pp. Marcel Dekker, New York, 1976. $35.00

According to the authors, "The energy locked up in trash in the United States alone amounts to over 900 trillion BTU annually." We've been hearing about the vast potential in the extraction of energy from waste products for some time; here is a book that describes *available* conversion methods. Its audience will include not only environmental and pollution-control engineers, but also scientists, businessmen and all those concerned about energy sources. The book contains chapters on plastics recycling, pyrolysis and solid-waste separation methods, as well as on many other topics.

Mathematical Methods for Physics. H. W. Wyld. 628 pp. W. A. Benjamin (Advanced Book Program), Reading, Mass., 1976. $26.50 clothbound, $16.50 paperbound

Henry Wyld tells us in his Preface that this text has its origins in a lecture course he has given for "a number of years" to graduate students. He restricts the treatment to standard classical-analysis topics in mathematical physics, with no coverage of group-theoretical methods or Hilbert space. Nonetheless, the book is intended to give students the basic background necessary to perform calculations in quantum, as well as in classical, physics. The volume consists of three parts: Homogeneous Boundary-Value Problems and Special Functions; Inhomogeneous Problems, Green's Functions and Integral Equations, and Complex-Variable Techniques.

Principles of Cosmology and Gravitation. M. Berry. 179 pp. Cambridge U. P., New York, 1976.

A novel feature of this book is the author's avoidance of tensor calculation in his development of general relativity theory. Michael Berry accomplishes this feat by confining himself to highly symmetrical spacetimes; he determines the metric tensor by use of Gauss's formula for the curvature of an ordinary two-dimensional surface. The book is intended for the physics student in his final undergraduate year, and Berry assumes familiarity with special relativity and a