

our day, e.g., logical positivism and existentialism. The style is elegant and the arguments persuasive, though the reader will doubtless find numerous points to question. Thus, the reviewer would take issue with the implied view that thermodynamics might well be dropped from the elementary college physics course on the ground that it is too factual and empirical. On the contrary, it and its fundamental statistical basis constitute for many one of the greatest theoretical structures ever conceived by the mind of man. An elementary physics course based on thermodynamics with all its implications might serve a more useful purpose in general education than most of the courses now current.

In later chapters, the author explores the tentative character of the postulates of scientific theories, the role of esthetics in physical science with particular reference to invariance and the theory of relativity, the decay of materialistic conceptions in contemporary physics, the decline from favor of concrete models in modern atomic structure, and the problems of determinism in contemporary quantum physics. The last topic inevitably raises in the lay mind questions about its relation to human freedom, and the author sets forth his stand on this problem, though his treatment is very brief. The final chapter, from which the volume takes its name, is a composite look at cosmic physics on the one hand and the relation between science and religion on the other. The discussion here well reflects the author's breadth of interest and his concern for human problems which to many transcend the scientific description of experience.

This is a thought-provoking book, which should appeal to scientists and humanists alike.

Optics of Thin Films. By A. Vašíček. Transl. from Czechoslovakian by H. Watney-Kaczér. 403 pp. (North-Holland, Amsterdam) Interscience Publishers, Inc., New York, 1960. \$12.50. Reviewed by Nicholas Chako, Queens College.

THE study of the optical properties of thin films has, in the last two decades, attained such prominence that it has become a new branch of optics. Among its many applications, both in the laboratory and in industrial establishments, one could mention the measurements of refractive indices of dielectric films, their reflective and transmittive power, the optical constants of metals, and the construction and design of optical instruments of high reflectivity or light transmission, such as camera lenses, interferometers, filters, etc.

The present book deals primarily with the theoretical aspects and their applications to interpretations of the experimental observations of the subject. Although the author does not aim at presenting a comprehensive treatment, he nevertheless covers in a substantial manner the recent developments in this field, including his own researches, which are not easily accessible to many people in this country.

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(planar), the author proceeds to develop the theory of reflection and transmission properties of thick and thin films for single and multiple dielectric layers, including Forsterling's and Drude's theory and Murmann's generalization of Forsterling's theory, as well as his own method. General formulas are derived for reflection and transmission coefficients for multiple thin films when both single and multiple internal reflections are assumed to take place at the interfaces and on the dielectric material which result from an incident monochromatic or white light. The author also makes a point of distinguishing a thin film from a thick one; in the former both the amplitudes and the phase differences of the light beams in the film must be considered, whereas in the latter only the intensities are taken into account. Among other topics one finds a critical discussion of the Murmann-Forsterling theory, an alternate approach to this problem by the author, and an illuminating discussion of the merits, limitations, and shortcomings of these theories in explaining the experimental observations of the reflection and transmission properties of single- and multiple-layer thin films (dielectric and metallic) on dielectrics and metals. Other topics of interest include discussions of nonhomogeneous films; the achromatization problem in such optical systems as lenses, prisms, interferometers, etc.; the influence of thin films in the polarization of light at total reflection; interference filters; and application of matrix methods in studying the reflective properties of single- and multiple-layer thin films on dielectrics.

The reviewer wishes to record his pleasure in reading this book and to congratulate the publishers for their excellent typography and binding. Undoubtedly, others will enjoy reading this book, both for its clear exposition of the subject and for the valuable material and information it contains within its covers. The mathematical methods used here are within the grasp of juniors and seniors, thus making the book useful, both as a text in colleges and universities and a valuable reference book for the specialist in the laboratory or industrial establishment working on theoretical or practical problems.

Introduction to the Theory of Ionized Gases. By J. L. Delcroix. Transl. from French by Melville Clark, Jr., David J. BenDaniel, Judith M. BenDaniel. No. 8 of Tracts on Physics and Astronomy, edited by R. E. Marshak. 149 pp. Interscience Publishers, Inc., New York, 1960. Paperbound \$2.50, clothbound \$4.50. *Reviewed by Rolf Landshoff, Lockheed Missiles and Space Division.*

OUR understanding of the properties of ionized gases and of the phenomena to which these properties give rise has advanced along two major avenues using either a macroscopic or a microscopic description. Delcroix's preface points out this difference and states that his book is intended to supplement Spitzer's *Physics of Fully Ionized Gases* which uses mainly the macroscopic equations. In this spirit he puts a consid-

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