ter is dealt with briefly in the eighth and last chapter; diffuse methods are described thoroughly in the previous six chapters, the first chapter being a brief general discussion of reflection. The discussion on the method of diffuse reflection includes the role of grain size, regular specular reflexion, concentration of absorbing components, moisture content and influence of scattering interfaces on the results obtained.

A salient feature is the excellent presentation of Rayleigh scattering, Mie scattering and radiation-transport theory as foundation for a theoretical background of multiple scattering. The author points out that no complete theory of multiple scattering has yet been developed. The Schuster (1905) equations for isotropic-multiple scattering are presented in chapter 4 as the historical precursors of the Kubelka–Munk (1931) theory. Exponential and hyperbolic solutions of the latter theoretical equations are arrived at, and form the basis for tables of the Kubelka–Munk function given in an appendix. The derivation of that function and presentation of its tables makes this a useful and unique book. It marks the recent rapid progress of diffuse-reflection spectroscopy as an analytic science.

The one chapter on total-internal-reflection spectroscopic methods is relatively minor. The 29 pages barely hint at well established possibilities of internal-reflection procedures. Yet the book is highly commendable: Literature citations and illustrations are generous and there is a table of contents and subject index. The applied physicist and experimentalist will find food for thought along new spectroscopic lines.

JOSEPH G. HOFFMAN
Professor of Physics
State University of New York, Buffalo

Relativity and Cosmology

By H. P. Robertson, Thomas W. Noonan
456 pp. Saunders, Philadelphia, 1968. $17.85

Relativity and Cosmology is the joint effort of two authors, one of whom died before the book itself was written. Thomas Noonan was the last student of H. P. Robertson at Cal Tech. After Robertson's untimely death, he undertook the task of organizing Robertson's notes into book form. Much of the material in this book, then, is Robertson's, and the scientific community can be thankful to Noonan for making available the thoughts of one of the greatest cosmologists of this century. Noonan's contribution to this work, however, was more than just that of an editor. For the most part Robertson's notes were aides memoires, so that their publication required a considerable amount of reconstruction and expansion.

The book's main development follows along fairly standard lines and is quite similar to that found in a number of other texts on relativity. However, there are a number of discussions that are not standard and that make the book well worth owning. There is an extensive discussion of the Poynting–Robertson effect, of special-relativistic gravitational theories and automorphisms of the metric, to mention a few of these special topics. However, it is the last five chapters that make this book especially valuable. These last chapters are devoted to cosmology and are pure gold. They contain a considerable amount of material that can be found only with some difficulty (and some that can not be found at all) in other places. It is also in these chapters, I feel, that Robertson comes through most directly and where one can appreciate the beauty of his work. We can all be grateful that this material is finally available.

Nevertheless, and despite its many fine discussions, a number of serious omissions make it less than ideal as a text on relativity (if such a thing even exists). For one thing, there are no problems, which is admittedly a minor inconvenience for the teacher. Perhaps more serious is the almost complete lack of discussion on the important developments in relativity over the past ten years. Thus there is no discussion of gravitational radiation except in the linearized approximation, of the initial-value problem, nor of global properties of solutions of the gravitational equations that have played such an important role in modern cosmological thinking. A student would have to look elsewhere to find out what has happened in relativity in recent years.

Finally, there are several places in the text that require further clarification. Why, for instance, is the second postulate of special relativity taken to be the existence of the Fitzgerald contraction instead of the more common constancy of the velocity of light? Then there is a derivation of the Lienard–Wiechert potentials that proceeds by transforming the potential in the rest frame of the charge to an arbitrarily moving frame. One gets the right answers by this method, but one should at least explain why it only works for the potentials and not for the fields. I also feel that the underlying principles of general relativity need more discussion than is given in this book. Finally, there is a discussion of the role of the photon in special-relativistic gravitational theories that I find rather baffling and in particular the statement that no special-relativistic-gravitational theory can predict the gravitational red shift.

On the whole, I feel that *Relativity and Cosmology* is a valuable addition to the literature and will be of interest to both specialists and nonspecialists alike, although perhaps more so to the former than the latter. The fact that it is based on the notes of Robertson will also make it valuable to those who are interested in the history of the development of cosmology up to the time of his death.

JAMES L. ANDERSON
Professor of Physics
Stevens Institute of Technology

Cours De Physique: Mechanique Ondes

By Julien Bok, Pierre Morel
316 pp. Hermann, Paris, 1968. 42 F

This book is the first of a series intended for the new courses in the mathematics–physics and physics–chemistry programs in French universities, consequent on higher educational reforms introduced in 1966. Its level is about equivalent to junior–senior texts in American universities.

The authors are alumni of the Ecole Normale Superieure and are presently professors in the Faculty of Sciences of the University of Paris. In their preface they comment on the relatively recent interest in the restructuring of physics education in many countries, and they especially praise new experiments along this line, particularly those at the University of California at Berkeley, Cal Tech and the Massachusetts Institute of Technology.

From the American point of view there is little novelty in the work. As

is practically always the case in French texts, the writing is clear and graceful. There is an abundance of beautifully drawn figures, and the composition shows a very high order of excellence. I am happy to note that the treatment of wave motion begins with acoustic radiation, an obvious mode of departure.

The student using this book is expected to have a substantial background in elementary calculus and differential equations, both ordinary and partial. However, the authors have felt it wise to include a 40-page appendix on mathematical methods, which should make the book more valuable for self-study. The volume contains no exercises for the student to work out. For both class and home use, it is intended to be accompanied by a separate volume with problems and review summaries.

R. Bruce Lindsay
Hazard Professor of Physics
Brown University

Semiconductors and Semimetals, Vol. 4: Physics of III–V Compounds

R. K. Willardson, Albert C. Beer, eds. 511 pp. Academic, New York, 1968. $22.00

This book represents the fourth volume of physics of III–V compounds. Three of the eight chapters are written by Russian authors; none by the two editors. However, all the chapters are written by authorities in the respective fields, and they are made even more valuable by the extensive literature cited in the many footnotes. Certain chapters, therefore, can well be used by graduate students.

It summarizes the advances and the results of measurements made with various III–V compounds and uses literature data starting with 1891. However, the most frequent references are from 1950 to 1963. The literature of the later years (up to 1967) is seldom mentioned, except in the chapter on diffusion by Don L. Kendall.

The book discusses the following properties of semiconductors, including the methods of determination and measurement: hardness, including microhardness of semiconductors and solid solutions; heats of formation and fusion (in the extensive chapter by N. N. Sirota); diffusion, including self-diffusion and impurity diffusion; the effects of pressure, of nuclear radiation, of electric fields and of radiation generally; impurity effects in solid solutions, and electrical properties of nonuniform crystals. All the chapters contain additional information on phase diagrams and transitions, lattice parameters, lattice defects, electrical and thermal conductivities, bonding, light emission, ionization rates, vapor pressures and other thermodynamic data and so on. In short, the book contains a wealth of useful information and many hints for further work. It is well written and contains many illustrations.

Martin E. Straumanis
Professor of Metallurgical Engineering
University of Missouri–Rolla

NEW BOOKS

CONFERENCE PROCEEDINGS

Supernovae and Their Remnants. (Conf. Proc. on Supernovae, Goddard Institute for Space Studies, NASA, 1967). P. J. Brancazio, A. G. W. Cameron, eds. 240 pp. Gordon and Breach, New York, 1969. $17.50

Cargèse Lectures in Physics, Vol. 3. (Summer School at Institut d'Etudes Scientifiques de Cargèse, 2–28 Sept. 1968). M. Jean, ed. 678 pp. Gordon and Breach, New York, 1969. Cloth $37.00, paper $24.50

Astrophysics and General Relativity, Vol. 1. (Brandeis Univ. Summer Institute in Theoretical Physics, 1969). M. Chrétien, S. Deser, J. Goldstein, eds. 300 pp. Gordon and Breach, New York, 1969. Cloth $17.50, paper $9.75

Proceedings of the 1969 CERN School of Physics. (Conf. Proc. of the 1969 CERN School of Physics, Leysin, 31 Aug.–13 Sept., 1969). 208 pp. CERN, Geneva, 1969.

Strahlenschutzprobleme Bei Der Freisetzung Und Inkorporation Radioaktiver Stoffe. (Conf. Proc. of 4th Annual Meeting of Fachverbandes Für Strahlenschutz E. V., Berlin, 28–30 May 1969). 638 pp. Tagungsbericht, Berlin.

Quantum Chemistry: Part 2. (Conf. Proc. of the International Symposium on Atomic, Molecular and Solid-State Theory and Quantum Biology at Sanibel Island, Florida, 13–18 Jan., 1969). Per-Olov Löwdin, ed. 910 pp. Interscience, New York, 1970. $32.50

ATOMS, MOLECULES, CHEMICAL PHYSICS

Case Studies in Atomic Collision Physics 1. E. W. McDaniel, M. R. C. McDowell, eds. 593 pp. American Elsevier, New York, 1969. $35.00

Electron Spectroscopy for Chemical Analysis Applied to Free Molecules. By K.