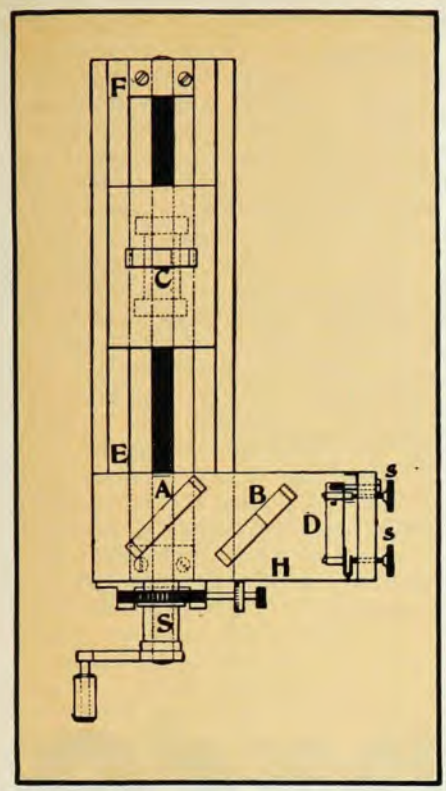

The Michelson interferometer has found many applications in physics—from atomic spectroscopy to astronomy. Elements A, B, C and D are the optical components of the instrument. The sketch is from Michelson's 1903 book, *Light Waves and Their Uses.*

chapters 2 and 3. The authors discuss wave forms and wave propagation and they present various techniques for their representation culminating in the wave equation. Then, from the basic laws of electromagnetic theory, the integral form of the Maxwell equations is obtained. However, they relegate the transition to the differential form to an appendix. The introduction to the vector notation and the nabla operator is done slyly. The circle is closed with the wave equation emerging from the Maxwell equations.

The chapters on geometrical optics are detailed and well illustrated. The sections on the superposition of waves, polarization and interference are comprehensive, although the use of trigonometric functions instead of the complex exponential to represent harmonic wave forms strikes me as unnecessarily awkward. Along with sections on interference and diffraction, Fourier optics, coherence, and quantum optics there are short summaries on information theory, lasers, holography and nonlinear optics. The book therefore touches all bases.

Optics is appropriate as an undergraduate text, particularly for students beginning engineering optics or technical areas in optics. For this the numerous problems are ideal. It would also be appropriate as a text in a course for students not preparing for technical career but who desire a cultural background in optics. For the undergraduate student interested in a career in the sciences this text must be reinforced by careful classroom instruction and supplemental reading. On the graduate level this book would best serve as a source of review material.

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Quantum Physics

S. Gasiorowicz
514 pp. Wiley, New York, 1974.
$16.95

Wave Mechanics and Its Applications

P. Gombás, D. Kisdi
230 pp. Pergamon, New York, 1973.
$10.50

After one of his lectures on the notion of complementarity, Niels Bohr was once asked, "What variable is complementary to truth?" His answer after a moment's reflection was: "Clarity."

Stephen Gasiorowicz of the University of Minnesota, known for his earlier popular textbook, *Elementary Particle Physics* has produced an excellent introductory textbook in quantum mechanics. Very much aware of the many companions his volume will have on the library shelf, he has kept them in mind throughout his comprehensive work, and has amply referenced key publications that can help the reader find deeper probes. The book begins its 500-page Odyssey with a chapter on the failure of classical laws and ideas. Twenty-six chapters, five special topics, and two appendices later, the reader can look back upon his visits to wave mechanics, the Schrödinger equation, operator calculus, angular momentum, N-particle systems, electricity and magnetism, hydrogen, helium and—for spice—some elementary-particle physics. The illustrations are good, as are the problems at the end of the chapters. Besides presenting manipulations and formulas, the book emphasizes the importance of ideas. The Aharanov–Bohm effect, the Mössbauer effect, and lasers are among the inspiring topics he presents. There are, however, occasional episodes of rough sledding. In chapter 22 on radiation from atoms I became uncomfortable during a derivation of the transition probability, only to read, "As things stand, the reader undoubtedly feels swindled." "Indeed he does!", or something of that sort, I felt like shouting. But one's frustration is minimal. Indeed, the author's care makes us conclude that the difficulties

Physics: A Modern Perspective

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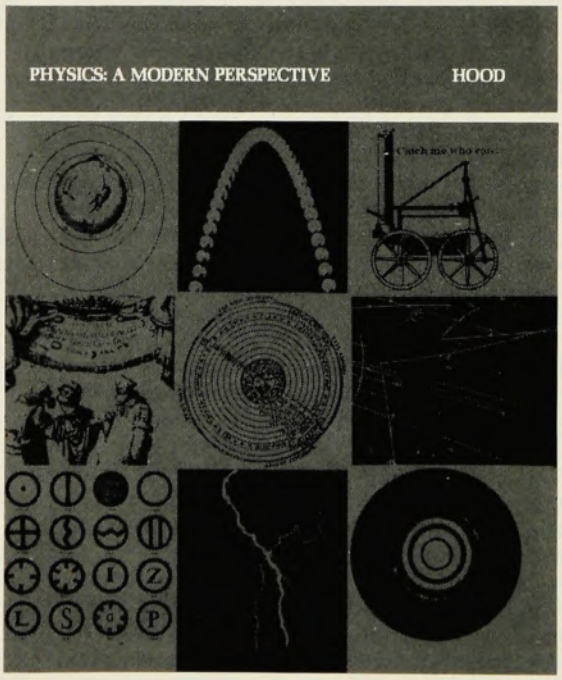
Physics: A Modern Perspective is a whole new way of looking at the physical universe. Don't miss Hood's exciting performance.

tour de force



Physics: A Modern Perspective
C. Gregory Hood
With Instructor's Manual and twenty 35mm slides, about 400 pages.
February 1975.

Houghton Mifflin

Atlanta 30324 / Dallas 72535 / Geneva, Ill. 60134 / Hopewell, N.J. 08525 / Palo Alto 94304 / Boston 02107

Circle No. 31 on Reader Service Card

of the passage are probably more related to Bohr's statement on complementarity, than to the author's ability to present his subject. *Quantum Physics* is worthwhile reading for anyone wishing a broad, serious introduction to the physics of microscopic phenomenae.

It is barely possible to perceive that the work by P. Gombas and D. Kisdi of the University of Technical Science in Budapest comes to us in translation. The prose flows smoothly, and ersatz-phrasing comes but rarely. While this book has commendable features, its style is not well matched to the primary needs of an introductory student. There is no index at the back of the text (although there is a detailed table of contents), there is not a single citation of another published work; and there are no problems at the end of the chapters. But rather than being a comprehensive discourse on a diverse collection of profound ideas, this relatively thin, parochial book is really a detailed presentation of the applications of the Schrödinger equation to interesting, classical problems in wave mechanics, from potential wells and rotators to scattering and perturbation theory. The book would be a good supplement for the first-year graduate student, and it is worth having in any physics library.

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Propagation of Visible and Infrared Radiation in the Atmosphere

V. E. Zuev
405 pp. Halsted, New York, 1974. $32.50

Vladamir E. Zuev is the director of the Institute for Optical Physics of the Siberian Branch of the Soviet Academy of Science. The Institute is the third largest group in the USSR devoted to the study of atmospheric optics. Zuev has a background in atmospheric spectroscopy, but in recent years he has been involved in studies related to atmospheric aerosols. He is currently pursuing investigation of lidar probing of the atmosphere as a meteorological tool, and is an advocate for the establishment of a network of such units for evaluation of their meteorological forecasting utility.

In addition to his own research work and the direction of the activities of the Institute, he is a member of the Supreme Soviet. As such, he is, politically speaking, one of the most highly placed active scientists in the world.

Zuev is well-known for his own contributions in the subject of atmospheric optics and for the work being done under his leadership. In view of the scope of the work at his institute, he is in an excellent position to write a book summarizing the subject of propagation of visible and infrared radiation in the atmosphere. A complete treatment of the total subject is, of course, a gargantuan undertaking and, in fact, beyond comprehension in a single volume. Nonetheless, Zuev has apparently labored mightily, and has accomplished a great deal. This book attempts to cover all aspects of the subject, and for its accomplishments deserves a place on the reference shelf of all researchers whose work makes them consider the optical properties of the atmosphere. The book certainly belongs alongside the older references on this subject, such as Goody and Kondratyev.

The approach taken in this book has been to cover all relevant areas of the subject to the depth that the existing body of knowledge would allow. Where the body of knowledge could not be assembled into a simply presented and tidily organized set of facts, it offers the reader an extensive bibliography of most of the relevant work with commentaries describing what each of the references presented. This seems to me to be an admirable approach, making the book the natural first place to turn when one looks into a new subject area in atmospheric optics. When the subject can be easily organized and presented, the presentation will be found here, and when the subject is still somewhat amorphous, the book will present the user not only with an extensive relevant bibliography, but with a general description of how the pieces seem to come together, or where they diverge.

Zuev has separated the book into three parts. The first two concern what we might call "conventional," as distinct from "laser," optics. Part I treats the subject of gaseous absorption of radiation in the atmosphere. It is unfortunate that the date of preparation of this book (the Russian edition was published in 1970) antedates the general availability of the outstanding work of R. A. McClatchey and his co-workers on molecular absorption in the atmosphere. Otherwise, I believe Zuev would have built a large part of Part I around that work. Part II treats the problem of scattering and absorption of radiation by particulate matter and precipitation. The discussion of single-particle scattering is particularly noteworthy for its treatment of the polarization aspects of the problem in terms of the Stokes parameters. In Part III of the book, which is the shortest and unfortunately the weakest section, Zuev treats the effects of the atmosphere on laser beams, emphasizing those effects that are uniquely associated with the finite diameter of the beam. It is here that the actual age of the book (four years since the Russian publication) be-