

Musical Sound must on the whole be considered an adult, contemporary, well organized and interesting presentation. It is a book that will be read with pleasure and gain by a variety of audience ranging from the non-scientist and beginning physics student to the experienced nuclear physicist, who may have happened to wonder what an increase in pressure on the violin bow does to the distribution of overtones.

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Pleasurable and useful

WAVE PHENOMENA. By Dudley H. Towne, 482 pp. Addison-Wesley, Reading, Mass., 1967. \$12.50

by *Howard B. Levine*

The diversity of physical phenomena described by the wave equation is so great as to defy listing. Although experienced physicists are aware of this, and recognize the consequent common thread uniting many fields, the undergraduate physics student cannot be expected to be similarly aware. To remedy this defect, a required one-semester course on wave phenomena is taught at Amherst College in the second half of the junior year. The primary emphases are on optics and acoustics. Dudley H. Towne's book was written for this course, although the quantity of material in it is sufficient for a two-semester course if one

wants coverage that is more detailed.

Beginning from an inductive derivation of the equation for transverse waves on a string, the student is led through successively more complex subjects such as acoustic plane waves, boundary-value problems, energy content of a wave, electromagnetic plane waves, polarization, optical anisotropy, interference, diffraction, dispersion, three-dimensional waves, and many others too numerous to mention.

The material is superbly chosen and brilliantly written. The language is clear, direct and rigorous. The discussions are full of physical insights, which serve a reader well in developing that "feel" for the material that is of first importance. The derivations at the same time are concise and precise. The large number of problems at the end of each chapter are excellent, and in fact are in themselves a pleasure to study. Answers to about half of them are provided in the back of the book. The figures are well done and the typography first rate.

This reviewer has been out of school many years, and does not know how

many courses presently are being given that might use this book, but was so taken with it that he finds it an argument in itself for introducing such courses. Aside from that, it can also perform a useful function on the shelf of almost any physicist who needs to reintroduce himself to optics or acoustics from time to time. It seems so good in this latter respect that the only point on which the author and publisher might be chided is their excessive modesty in suggesting potential audiences for it. In fact it would be the exceptional individual who would not find it useful, or at least pleasurable, to have this beautifully written book at hand for use from time to time. It is one of those books that are fun just to open to a random page and read. Altogether, Towne's *Wave Phenomena* would be a superb addition to the library of any physicist.

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Thoroughly modern relativity

PRINCIPLES OF RELATIVITY PHYSICS. By James L. Anderson. 484 pp. Academic Press, New York, 1967. \$14.75

by *Peter G. Bergmann*

This book is intended for graduate students of special and general relativity who have acquired the basic knowledge and sophistication implied by the customary first two years of graduate work. It is a thoroughly modern presentation, both as regards approach and selection of topics. In

some respects it is unconventional, but the departures from the well trodden paths are always thoughtful. Certainly, Anderson's text is a valuable addition to the textbook literature of the subject.

The book is divided into three parts, of which part I represents background material. To the reviewer this part contains some of the most interesting discussion of the book; though probably a student will not discover some of its motivation until a second or third round of study. In addition to providing the material on differential geometry that is needed for relativity but usually not taught to physics students

beforehand, the first part discusses with considerable care basic aspects of physical theories in general. In assessing the real contents of the requirement of "general covariance," which played such a decisive heuristic role in the creation of the general theory of relativity, Anderson is led to distinguish between "absolute" and "dynamical" objects of a theory. The former are variables whose values, though not necessarily the same in all frames of reference, have no part in the identification of a particular physical situation.

Proceeding from this separation of the variables into two classes, Ander-