

discussion of particles with zero spin follows a very long mathematical discussion on vacuum expectation values of expressions bilinear in the current. Pauli is best when he does not try to be as concise as possible and includes more discussion; but this is rare—a pity.

Since the contents of this book represent a series of lectures Pauli gave in 1950–1, it does not include any of the more modern field-theory formulations (LSZ or Wightman). Although the text devotes a small chapter to Feynman's approach to quantum electrodynamics, nowhere does he exhibit a single Feynman diagram!

In summary we have here a technical book written for a narrow audience. To appreciate it you have to think like Pauli (few do!). If you know what you want to do, Pauli will show you how to do it, but the necessity for doing it must be found elsewhere.

However, its mathematical completeness makes it a useful supplementary book to any of the better, standard treatments in the field.

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Acoustics: Historical and Philosophical Development

R. Bruce Lindsay, ed.

465 pp. Dowden, Hutchinson & Ross, Stroudsburg, Pa., 1973. \$24.00

This volume is a most impressive selection of classics in acoustics ranging from Aristotle to Wallace Sabine, with contributions from many of the great figures of physics throughout the entire period, including Galileo, Boyle, Newton, Euler, LaGrange, Laplace, Faraday, Green, Joule, Stokes, Helmholtz, Rayleigh. Each selection is introduced by R. B. Lindsay with an explanatory paragraph; illuminating footnotes provide essential continuity and clarification.

Sixteen of the papers have been beautifully translated into English by the editor himself from the Latin, French and German originals. Lindsay's fine "Story of Acoustics" has been reprinted as the first entry and provides an excellent historical introduction, especially for physical acoustics. His unobtrusive, but authoritative, scholarship is an essential ingredient to the usefulness of this impressive collection.

This introductory volume of the

"Benchmark" series on acoustics carries the reader to the year 1900, and ends with Wallace Sabine's great paper on reverberation, which initiated so many of the present developments in architectural acoustics. The progress in acoustics since 1900 will be presented in some ten additional volumes treating the specialized fields into which acoustics has grown in recent times. With few exceptions Lindsay's choice of historical material is excellent, although perhaps somewhat heavily weighted toward his own speciality of physical acoustics.

However, his choice of material from Vitruvius is not the most helpful. The choice is, of course, limited to the fifth book of this famous classic, but the omission of chapters III, VI, and VII, is unfortunate for these together with chapter VIII (which is included) provide the modern worker in architectural acoustics with the only surviving insights into the Greek contributions. Lindsay's choice of chapter IV on harmonics and Greek scales is understandable but his inclusion of chapter V on "Sounding Vessels in the Theatre" may well be misleading, especially since he provides no footnotes to explain, on physical grounds, why such sounding vessels could not have functioned as amplifiers of sound as Vitruvius claimed. Not a single bronze vessel of the type described has been found in spite of diligent search.

I find several serious omissions from the book. It would have been helpful to include Fourier's great contribution, even at the cost of selections by less prominent scientists, J. J. Waterson for example. To better balance the coverage, A. Kircher's famous tome "Murgia Universalis" might properly



Underwater acoustics apparatus of the 19th century. This plate from Colladon's "Experiments on the Velocity of Sound in Water" appears in Lindsay's *Acoustics: Historical and Philosophical Development*.

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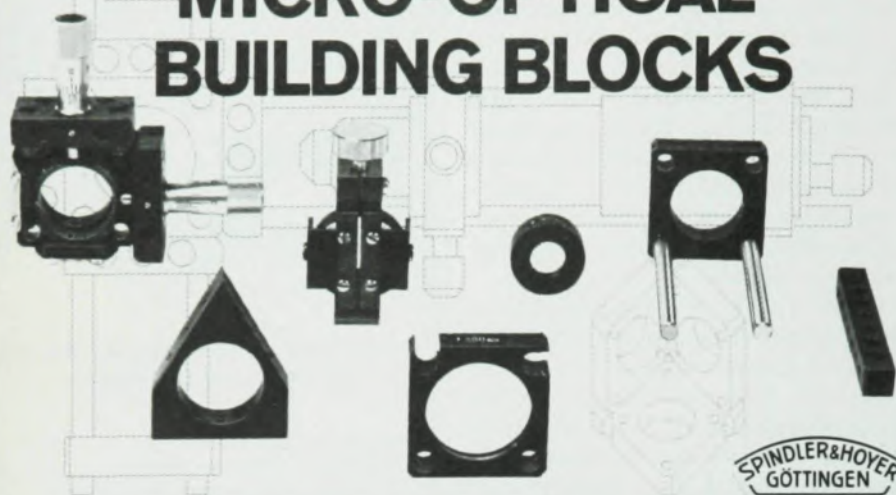
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have been represented. A most serious omission is the absence of Joseph Henry's report on "Acoustics Applied to Public Buildings," not only for its inherent merit but also because it has been buried for over a century in the forgotten annual report of the Smithsonian Institution for 1856, and is almost unknown to present-day acousticians. Henry's contributions deserve much greater credit than is usually acknowledged for his pioneer work in architectural acoustics in general, and above all for his experimental discovery and application of the "precedence effect" in early reflected and scattered sound in the design of the original Smithsonian lecture hall.

The attractiveness of this book would have been greatly enhanced by including more (and better reproduced) figures. However, in general, it is a fine production that should appeal, not only to active workers in acoustics and to those concerned with the development of mechanics, but also to scholars in the history of science. In addition to providing fascinating background for the other volumes in this series, the book stands on its own merits as a highly useful source of papers that would otherwise not be readily available to most physicists.

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The Pion-Nucleon System

B. H. Bransden, R. G. Moorhouse

538 pp. Princeton U. P., New Jersey, 1973. \$20.00 hardcover, \$8.95 paperback

Since no quantitative theory of the strong interactions of fundamental particles exists, this field involves many different principles and techniques and is changing constantly. Therefore, most books on strong interactions are either limited to some specialized topic, or are compilations of research papers or conference talks. This situation has made it extremely difficult for graduate students to familiarize themselves with the physics of strong interactions.

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