lattices; (3) Atoms, molecules, and fluids; (4) Quantum mechanics; (5) Field theory; and (6) Commemorations. The books of the author, many of which are popular among physicists, are not included in the collection. The papers are reproduced by offset from the original publications, and presented in an excellent typographical form.

In the great wealth of memorable results presented, Section 4 on quantum mechanics stands out. We can follow here all the excitement of the discovery of matrix mechanics, initiated by Heisenberg and developed to a large extent by the Göttingen Group of which Born was the senior and mathematically most sophisticated member. We find here also the memorable papers on collision theory which contributed fundamentally to the interpretation of Schrödinger's "field scalar ψ." Incidentally, Born's method of approximation has also become, thanks to its simplicity, one of the most popular in practical calculations and has a practically unlimited number of applications. Second in importance is the group on lattice theory, one of the foundations of solid-state physics.

Many of the papers contained in this book are familiar in their original form to middle-aged physicists. The younger generation will have learned their contents from textbooks because most of them have been absorbed in the standard physics books. The historian will be grateful for this beautiful collection reflecting the work of one of the important scientists of our century.

Radiation and Optics. An Introduction to the Classical Theory. By John M. Stone. 544 pp. McGraw-Hill, New York, 1963. $11.75.

Reviewed by ***W. T. Wintringham****, Bell Telephone Laboratories, Incorporated.*

All too often an author's style in the text of a book intended for classroom use reveals his low regard for the intelligence of his students. The rare exception, of which *Radiation and Optics* is an example, through its organization and by the author's choice of language, displays high esteem for the competence of the classes to which the text is directed.

Despite the fact that Dr. Stone's text is intended for undergraduate students, he has written an advanced and comprehensive book on physical optics. Following material which might be considered either as brief reviews of, or introductory texts on, vector analysis and the complex representation of sinusoidal oscillations and waves, the book contains a derivation of Maxwell's equations, and their application to the calculation of the field produced by an infinitesimal dipole radiator in a uniform isotropic medium. This leads logically to consideration of the subject of diffraction. At this point Dr. Stone introduces the Fourier integral and the Fourier transform and illustrates the application of these powerful tools to problems of diffraction and of imaging.

By another logical step, the author takes up the spectrum of radiation from Lorentz atoms, spectrographs, coherence, and interferometry. In an orderly fashion, Dr. Stone then treats scattering and the related problems of waves incident on crystal lattices, etc.

Following a development of the *macroscopic* Maxwell theory, the student finds himself prepared to study boundary problems and the optical performance of doubly refractive materials. This leads naturally and inevitably to a treatment of electro- and magneto-optics. A discussion of the quantum theory as distinct from the classical theory of atomic behavior brings the book to a close.

Each chapter in Dr. Stone's text includes a number of well-chosen problems. There are five appendices, in which are presented detailed derivations of the more difficult matters discussed within the text proper. In many places Dr. Stone directs the student to the literature on the topic under discussion. A bibliography of 104 items serves as a guide to this extension of the text.

It should be evident that this reviewer has found *Radiation and Optics* to be a capable and scholarly presentation of physical optics. He was so well impressed with Dr. Stone's text that one minor flaw came as a distinct shock. In his discussion of the *Faraday effect,* Dr. Stone presents the equation for optical rotation as the product of the Verdet constant, the strength of the magnetic field, and the

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length of the path in the medium. Unfortunately the units of field strength are specified to be gauss and the symbol B is used for this quantity. This error is apt to be especially troublesome to students, since the symbol H is used in this expression in all of the standard references and, as is indicated in the second edition of the *American Institute of Physics Handbook*, the proper unit for field strength in this equation is the *oersted*. As a practical matter, it would be difficult to evaluate the magnetic induction (flux density) B in a solid specimen.

With this single exception, this reviewer is highly enthusiastic about *Radiation and Optics*. Not only should this book prove to be a successful text for a course in physical optics, but it will serve as a remarkably useful reference book.

Engineering Analogies. By Glenn Murphy, David J. Shippy, and H. L. Luo. 255 pp. Iowa State University Press, Ames, Iowa, 1963. $8.50.
Reviewed by ***Peter L. Balise,*** *University of Washington.*

Every science and engineering teacher makes some use of analogy, a most cogent means of aiding the understanding of students (and of instructors). The "systems" approach that is now receiving so much attention is based on analogy—the idea that a mathematical model can represent many diverse physical systems. Particularly with the increasing demands upon curricula, it is essential to use analogies if only for efficiency, not to mention their intellectual stimulation value.

However, most of us in teaching and research cannot find enough time to investigate in the breadth and depth required to use analogies widely and well. So it is very helpful to have several good books (Huskey & Korn, *Computer Handbook*, Section 9, McGraw-Hill; Karplus & Soroka, *Analog Methods*, McGraw-Hill; Murphy, *Similitude in Engineering*, Ronald).

This volume differs from the above in being a compilation with no general discussions of theory and by far the most complete compilation that has been published to my knowledge. The analogs include systems employing electricity, magnetism, optics, acoustics, heat transfer, fluids (liquid and gas), and a great variety of mechanical models such as bars and membranes. Of course there must be omissions (I happened to notice no mention of W. E. Rogers and some of A. D. Moore's work), but no significant area seems to be neglected.

The book is divided into about two hundred successive subsections (100: Flow of Fluids in Conduits, 120:Closed Conduits, 121:Unsteady Flow, 121B: Gas, 121BB:Acoustical Systems, 121-BBC:Electrical Analogy C), an arrangement that makes the table of contents a logical index, obviating need for an alphabetical index, usually considered essential by a reviewer. Two appendices give further classifications for the very important subject of potential fields. Each entry is a summary of a paper, with analogous equations, essentials of procedure, and diagrams where appropriate. For details one would usually refer to the original references, of which about 1500 are listed. There are also about 50 "General References," although very few of these are really general.

This work is a most significant contribution towards the worthwhile use of analogies (the mathematically similar relations) and analogs (the physical models).

Mécanique quantique, Vol. 2. By Albert Messiah. 544 pp. Dunod, Paris, 1960. 48 NF.

Quantum Mechanics. By Albert Messiah. Translated into English: Vol. 1, 504 pp., by G. M. Temmer, 1961, $15.00; Vol. 2, 529 pp., by J. Potter, 1963, $16.00. North-Holland, Amsterdam, and Interscience, New York.
Reviewed by ***Nicholas Chako,*** *Queens College.*

With the publication of the second volume, the author's plan for writing a modern treatise on quantum mechanics has been fulfilled.

As we had expected, Dr. Messiah has preserved the same high standard, both in the selection of the topics and the clarity of exposition as in the first volume of this treatise. In the second volume he has presented a detailed and comprehensive account of the most advanced parts of quantum mechanics, which are usually reserved for a second course in this field. Leaning more on the pedagogical side, the