

that is well planned, well written and well produced.

* * *

Julius Miklowitz is a professor of Applied Mechanics at the California Institute of Technology. During the last 15 years he has published 35 papers in the area of waves in solids.

Cosmic Rays at Ground Level

A. W. Wolfendale, ed.

233 pp. Institute of Physics, London, 1973. \$12.00

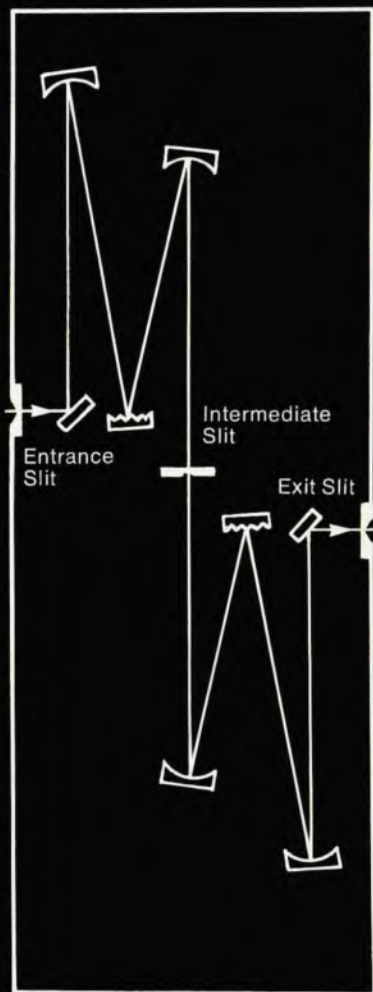
Arnold W. Wolfendale, for many years a leader in research to determine the precise momentum spectrum of energetic cosmic-ray muons deep in the atmosphere, has organized a very useful "festschrift" in honor of George D. Rochester, FRS, whose retirement occurred this year. The shock is that Rochester has been retired, a victim of an indiscriminating system that dictates age 65 as the most probable end of academic capability. One can only hope that he now will have more time to enjoy his research and continue to contribute to advancement of understanding of the ultrahigh energy radiation provided by nature. Rochester's discovery in 1947 (in collaboration with Clifford C. Butler) of the first "strange" particles—the so-called V-particles that were the unstable heavies among cosmic-ray shower secondaries—certainly gave rise to the succeeding great revolution in elementary-particle physics and a large number of Nobel Prizes connected with it.

Wolfendale and many of his colleagues presently (or lately) at the Universities of Leeds and Durham, including several former students of Rochester, have compiled a series of reviews and reports covering the nature of the primary cosmic radiation, the composition and spectrum of the sea-level particle radiation, muon and electron-neutrino physics, searches for quarks, magnetic monopoles and tachyons, extensive air showers (much of the shower work being done at Haverah Park in Yorkshire, an observatory that Rochester helped to create) and some details of special observational techniques developed to a high degree of precision at Durham (including magnetic cloud-chamber spectrometers and neon flash-tube detector arrays).

As is unavoidable in the case of such a compendium, the style and coverage are uneven, but the level of performance is generally good throughout. The authors have mostly succeeded in giving a broad and nonparochial view of their various topics; most of the ref-

a new Chromatix double spectrometer

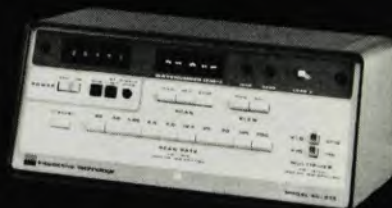
Now! Chromatix introduces the DS-40—a new coma-corrected double spectrometer with unique features. Computer ready, not just computer compatible, the DS-40 is controlled by TTL/DTL logic—it takes orders from you, your computer, or your experiment. Superior stray light characteristics—the result of flocked baffles and no mirrors at intermediate slits. Additive dispersion and coma correction, which increase both throughput and contrast. Non-vignetting ($<8\%$), high-flux, oversize mirrors. What does it all mean? You can now obtain a unique computer-ready, additive double spectrometer that won't cramp your experiment or your budget. Interested? Contact Chromatix.



DS-40 Additive Double Spectrometer: coma corrected, asymmetrical Czerny-Turner mount, with straight through optical path.

chromatix

1145 Terra Bella Avenue
Mountain View, California 94040
(415) 969-1070
Telex: 910-379-6440



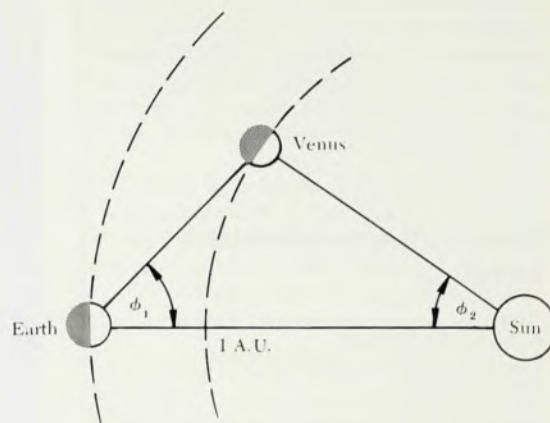
Pushbutton Remote Control with wavenumber display.

Marion & Davidson: **MATHEMATICAL PREPARATION FOR THE PHYSICAL SCIENCES**

Here's help for the student who stumbles through physical sciences courses because of his own inability to perform the necessary mathematical procedures. Designed for use by the student on his own time, the book offers a comprehensive review of elementary mathematical topics covering basic addition, subtraction, multiplication and division, and working up to algebra, geometry, graphs and vectors. Numerous problems are provided so that the student can test his understanding of each new idea and technique.

By Jerry B. Marion and Ronald C. Davidson, both of the University of Maryland.

About 145 pages. Illustrated. Soft Cover. About \$4.50. Ready March. Order code 6076.



Marion & Davidson: **MATHEMATICAL PREPARATION FOR GENERAL PHYSICS**

Writing for non-physics majors, the authors confine their discussions to non-calculus topics; the most advanced material is concerned with the basic concepts of trigonometry and vector algebra.

230 pages. Illustrated. Soft Cover. \$4.75. February 1972. Order code 6070.

Davidson & Marion: **MATHEMATICAL PREPARATION FOR GENERAL PHYSICS WITH CALCULUS**

The authors offer a presentation of basic mathematics similar to that in the previous volume, but now add coverage of calculus. They discuss differential and integral calculus, exponential functions, natural (as well as common) logarithms, log-log plots, semilog plots, vectors that change with time, etc.

263 pages. Illustrated. Soft Cover. \$4.95. April 1973. Order code 2818.

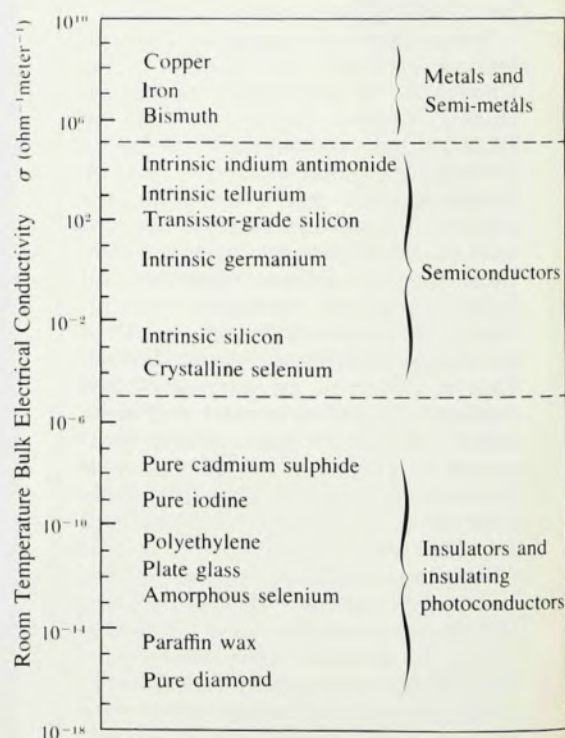
Blakemore: **SOLID STATE PHYSICS** *New Second Edition*

Designed to serve as a text for one-semester courses in the physics of solids, this new edition is primarily concerned with the theories of solid state physics and of experimental data which relate to these theories. Primary emphasis is devoted to the periodic structure of a crystalline solid, the effects periodicity has on the motion of electrons and the allowed spectrum of lattice vibrations.

By John S. Blakemore, Florida Atlantic University, Boca Raton. About 400 pages, 200 illustrations. About \$15.00. Ready March. Order code 1701.

Table of Contents (Abridged)

1. **Crystallinity and the Form of Solids:** Forms of Interatomic Binding ■ Symmetry Operations ■ Crystal Diffraction ■ Reciprocal Defects ■
2. **Lattice Dynamics:** Elastic Waves, Atomic Displacements and Phonons ■ Vibrational Modes of a Monatomic Lattice ■ Phonon Statistics and Lattice ■ Thermal Conduction ■
3. **Electrons in Metals:** Some Features of Metallic State ■ Classical Free Electron Theory ■ The Band Theory of Solids ■ Dynamics of Electron Motion ■ Superconductivity ■
4. **Semiconductors:** Equilibrium Electron Statistics ■ Electronic Transport in a Semiconductor ■ Excess Carrier Phenomena ■
5. **Dielectric and Magnetic Properties of Solids:** Dielectric Properties ■ Magnetic Properties of Solids ■ Magnetic Resonance ■ **Index**



Earth, solar system, stellar astronomy, home galaxy, cosmology—here is a clearly written new text in astronomy and astrophysics geared to freshmen and sophomores with a solid grounding in high school geometry, algebra and trigonometry. The authors emphasize modern astronomy and elementary astrophysics without neglecting the heritage of classical astronomy. From atomic theory to cosmogony, from stellar evolution to quasars, students will find a complete, well-balanced storehouse of information.

By Elske V.P. Smith, *Univ. of Maryland*, and Kenneth C. Jacobs, *Univ. of Virginia*.

564 pages. 284 illustrations. \$15.95. July 1973. Order code 8387.

Table of Contents (Abridged)

Part I: INTRODUCTION ■ Astronomy and Astrophysics ■ Aspects of the Celestial Sphere ■
Part II: THE SOLAR SYSTEM ■ Celestial Mechanics ■ Motions of the Earth ■ The Solar System in Perspective ■ The Earth-Moon System ■ Inferior and Superior Planets ■ Electromagnetic Radiation and Matter ■ **Part III: BASIC STELLAR CHARACTERISTICS** ■ The Sun ■ Stellar Distances and Magnitudes ■ Binary Stars ■ **Part IV: THE STRUCTURE AND CONTENT OF OUR GALAXY** ■ Our Galaxy ■ Stellar Motions ■ The Structure and Evolution of Stars ■ Variable and Unusual Stars ■ **Part V: THE UNIVERSE** ■ Contents of Extragalactic Space ■ Our Universe and Cosmology ■ **Appendices**

Megaw: **CRYSTAL STRUCTURES A Working Approach**

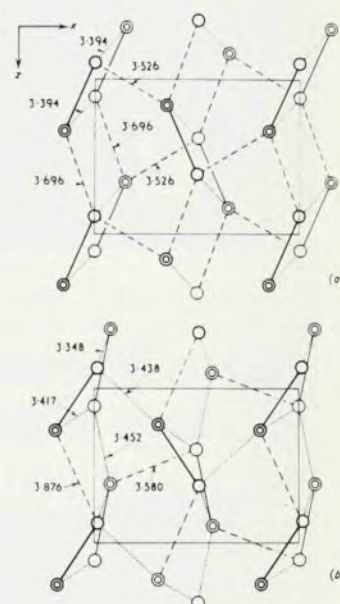
This new volume is both a text and reference concerned with crystal structures as resulting from the interplay of symmetry requirements on the one hand, and physical factors such as atomic size and interatomic forces on the other. Designed for the senior and graduate student, no knowledge of crystallography is assumed. The author uses an empirical approach. Geometrical ideas are constantly applied to actual structures so that the reader is building up a repertoire of technically important structures and their variations.

By Helen D. Megaw, *Univ. of Cambridge, England*.

563 pages. 208 illustrations. \$19.50. July 1973. Order code 6260.

Table of Contents

- | | |
|---|---|
| 1. Introduction | 9. Partly Periodic Groups and Colour Groups |
| 2. Interatomic Forces and Structure Building | 10. Geometrical Transformations |
| 3. Lattice and Lattice Complexes | 11. Structures of Oxides |
| 4. Some Simple Structures | 12. Families of Structures |
| 5. Directions and Planes | 13. Structures of Compounds Containing Hydrogen |
| 6. Symmetry and Its Application to Finite Objects | 14. The Effects of Temperature |
| 7. Symmetry of Lattices | 15. Phase Transitions |
| 8. Space Groups | References |



Diefenderfer: **PRINCIPLES OF ELECTRONIC INSTRUMENTATION**

Discussing subjects ranging from the rudiments of ac and dc theory to the principles of circuit design, Professor Diefenderfer provides an easy-to-understand introduction to electronic instrumentation for students enrolled in a one-semester course. No prior knowledge of electronics is assumed. The principles behind the operation of semiconductors and transducers are fully developed. Throughout the text practical results and applications are emphasized. A laboratory manual, *Basic Techniques in Electronic Instrumentation*, is also offered.

By A. James Diefenderfer, *Lehigh University*.

Text: 675 pages. 750 illustrations. \$14.95. April 1972. Order code 3075.

Manual: 375 pages. 257 illustrations. Soft Cover. \$7.50. April 1972. Order code 3072.

Booth #125 Physics/Optics Show

For examination copies write:

Textbook Marketing Department

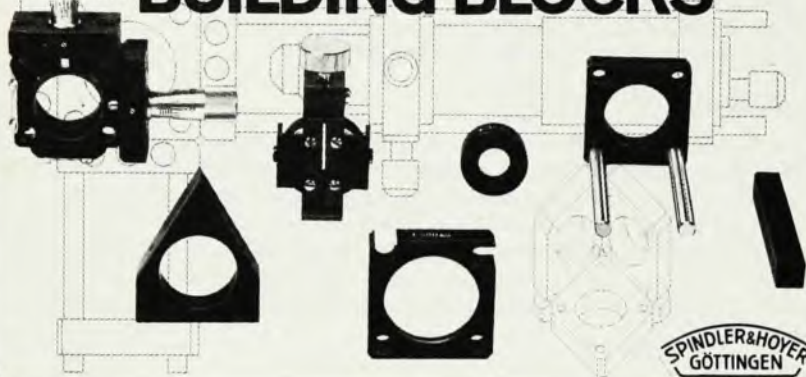
W. B. SAUNDERS COMPANY

West Washington Square, Philadelphia, Pa. 19105

Circle No. 64 on Reader Service Card

KLINGER "Precision at Work"

MICRO-OPTICAL BUILDING BLOCKS



- Facilitates quick, easy construction of numerous optical assemblies including three-dimension and short focal length types.
- Modular mounting elements include: rods, adapter plates, cross slides, etc. for an almost infinite number of connections.
- Ideal for demonstrations, advanced lab work or practical uses thru linear, plane or spatial assemblies.
- Components available in kit form or individually.



Send for Catalog #86.

KLINGER SCIENTIFIC APPARATUS CORP.
83-45 Parsons Blvd., Jamaica, N.Y. 11432 (212) 657-0536

Booth #73 Physics/Optics Show
Circle No. 65 on Reader Service Card

Now Measure Light Directly - in Any Optical Units*

The New IL 700 Radiometer with easily
programmable 20-decade readout

*even luminous phosage, milliphot, finsens, vitons, etc.

Features

- measures UV, visible, infrared—240-1100nm—flash or DC
- sensitive—measures 10^{-13} watts/cm² or 10^{-6} footcandles
- integrates—resolves flashes from 5×10^{-9} sec. to 5 min.
- 3½ digit readout—400% overranging
- lightweight, field-portable . . . battery or AC operation

Applications

- Radiometry, photometry, spectroradiometry, densitometry
- Ultraviolet radiation hazards • Photolithography (photoresist)
- Environmental studies—atmospheric and oceanographic.

For complete details contact
International Light, Inc.

Dexter Industrial Green, Newburyport,
Ma. 01950 Tel. (617) 465-5923



international light_{inc.}

Booth 92 Physics/Optics Show
Circle No. 66 on Reader Service Card



erence lists are very comprehensive and take us well through the 1972 literature. Actually this collection of articles would be a good choice for bright intermediate graduate students who wish to get a fairly comprehensive insight into problems of concern to cosmic-ray researchers. The emphasis is that of physicists of the British Midlands, who have contributed so importantly to our current state of understanding, and, in the spirit of George Rochester, their reports have related very clearly and unselfishly to the parallel work done at other places in the world. The publisher has done a handsome production job as well.

ROBERT L. CHASSON
University of Denver
Denver, Colorado

Physics of Atoms and Molecules

U. Fano, L. Fano

592 pp. U. of Chicago Press, Chicago, Ill.
1973. \$14.50

As evidence by a burgeoning number of new and occasionally novel physics textbooks, the past several years have seen a marked overhaul in the undergraduate physics curricula of many colleges and universities. Although the most noticeable course-content revisions have been established at the introductory level and in courses designed for nonphysics majors, significant changes also have occurred in the advanced-undergraduate course sequences.

In the undergraduate curriculum it has been customary to include a survey course on modern physics as a prerequisite to formal quantum-theory courses. The long list of recent modern-physics texts and elementary quantum-mechanics texts suggests that the evolution of courses providing a first exposure to modern physics has been especially active. *Physics of Atoms and Molecules* by U. Fano and L. Fano deals with the quantum mechanics of isolated atoms and molecules and is intended to provide the basic ideas necessary for more advanced treatments of quantum theory and of specialized topics. In that respect, and unlike the more frenetic character of many modern-physics survey texts, this book offers an introduction to the fundamentals of quantum theory in the same way that traditional undergraduate courses in mechanics or electricity and magnetism serve as bases for analytical dynamics or electrodynamics.

Both in their design and in its realization, the Fanos have succeeded extraordinarily well. With many new, thoughtful and thought-provoking