

Thomas, Enrico Fermi and John C. Slater—one paper each—and thus gives the original expositions for some important concepts considered in the text. Several problem exercises conclude each chapter.

Granted its restricted range of subject matter, this book should prove useful for its compact survey of Thomas-Fermi theory. One could recommend it for beginning students of solid-state physics interested in the concepts of atomic theory that underlie practical energy-band calculations. However, March neglects the important developments since Slater's paper in our theoretical understanding of the effective exchange potential, including the significance of density-gradient effects and the still somewhat controversial choice of the coefficient of  $\rho^{1/3}$ .

For an introduction to atomic physics, one needs a companion volume, one which emphasizes angular-momentum theory for complex atoms, the theory of atomic spectra and the important quantitative developments of atomic theory in the last twenty years, based on Hartree-Fock and electronic-correlation calculations by variational and perturbation methods. Even with a clearly restricted choice of subject matter, March would have been more helpful to the student had he at least included references to review articles and monographs on these aspects of atomic theory or to major compilations of results relevant to current research.

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## Twentieth Century Physics

J. Norwood Jr

405 pp. Prentice-Hall, Englewood Cliffs, New Jersey, 1976. \$16.95

## Landmark Experiments in Twentieth Century Physics

G. L. Trigg

309 pp. Crane, Russak, New York, 1975. \$18.50

The two books here reviewed should prove valuable in a complementary way for the physics student entering on specialized work. In *Landmark Experiments in Twentieth Century Physics* George Trigg presents highly informative and perceptive discussions of sixteen major areas of achievement. Trigg has described with clear insight how physicists planned and conducted their researches, and he emphasizes how the experiments are related to the development of physics as a whole. The essential elements in planning and the effort needed to surmount obstacles and interpret

findings are discussed in masterful exposition.

The choice of experiments clearly reveals highly personal views on the relative importance of advances in recent physics. However, every experiment included certainly deserves a place and has received general recognition. Among the classic experiments of the early years of the century, Trigg has included Max Von Laue's work on x-ray diffraction, J. J. Thomson's discovery of isotopes, Henry Moseley's x-ray work on atomic number and the periodic system and the early work on superconductivity and liquid helium. The remainder of the book treats more recent experiments, including four chapters on notable work done at Columbia University and four chapters on work basic to solid-state applications and the background relationship to post-war developments in solid-state physics (with emphasis on tunneling and superconductivity).

One finds only single chapters on particle physics and astrophysics, but the experiments on the neutrino and the disproof of certain conservation laws are accorded proper emphasis. However, there seems to be a distinct bias for work done in or near New York, which will prove disappointing to physicists in other parts of the country. For example, Trigg makes no mention of the truly landmark work of Robert Millikan, Arthur Compton, Clinton Davisson and Lester Germer, Felix Bloch, Edward Purcell, Cecil Powell, Patrick M. S. Blackett, Carl Anderson or several at Berkeley. However, I would be loath to delete anything from the present volume, and we must assume that space limitations as well as Trigg's personal interest governed his selections. A second volume, written in the same masterful way, that more accurately acknowledged the scope of twentieth-century physics would be most welcome.

The second book under review, *Twentieth Century Physics* by Joseph Norwood, Jr, is in fact in the nature of a textbook suitable both as an introduction for physics majors and as a one-year course for other physical-science majors. This highly ambitious book includes special and general relativity, the development of the old quantum theory and quantum mechanics, and some treatment of both nuclear and particle physics. All of these subjects Norwood develops with care and adequate rigor within space limitations for the intended purpose of the book, which is "an understanding of the fundamental ideas of relativity and quantum mechanics."

The general discussions by Norwood help fill gaps in Trigg's selections. For example, the classical experiments of Millikan, Compton, and Davisson and Germer (to mention a few) are appropriately considered. To illustrate Norwood's attractive approach, I make mention of his theoretical treatment of the

Compton effect wherein he employs four-vectors to emphasize the intimate relationship between energy and momentum conservation in the photon-scattering process. Other treatments of this character throughout the book should give the mathematical developments vital meaning for the beginning student. One encounters good discussions of spectroscopy, atomic physics, basic nuclear physics and Rutherford scattering, and an introduction to particle physics. In spite of its ambitious coverage, *Twentieth Century Physics* should prove a useful book for both student and teacher; it includes background information often missing from standard textbooks. These two books together provide a good introduction for the resourceful physics student who is beginning his advanced work. Trigg's volume should also find favor among both general readers and specialists.

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## book notes

**Science in America since 1820.** N. Reingold, ed. 334 pp. Science History (Neale Watson), New York, 1976. \$8.95 cloth-bound, \$5.95 paperback

This volume, which consists of 21 selections culled from the pages of *Isis*, appears with some appropriateness in this bicentennial year. A majority of the 17 authors have distinguished themselves as students of American history rather than as scientists, but a number of the articles appear to be intended for scientific readers. Nathan Reingold recounts the story of science in the War Between the States, and there also appear two articles about the researches of Henry A. Rowland and one on the search for a transneptunian planet. Other contributors describe the processes of professionalization and political awakening in American science. Several pieces deal with biographical material, including one on George Hale, former director of the Yerkes and Mount Wilson Observatories.

**The Pursuit of Knowledge in the Early American Republic: American Scientific and Learned Societies from Colonial Times to the Civil War.** A. Oleson, S. C. Brown, eds. 372 pp. Johns Hopkins U. P., Baltimore, 1976. \$16.50

Alexandra Oleson of the American Academy of Arts and Sciences and MIT physicist Sanborn C. Brown present an overview of the activities and cultural import of learned and scientific societies in antebellum America. Twenty-one

writers contributed essays on subjects that range from Brooke Hindle's "The Underside of the Learned Society in New York, 1754-1854" to "The Early Development of Scientific Societies in Canada" by Peter J. Bowler. A number of contributors focus on regional aspects of such organizations in Albany, Boston, Philadelphia, the Southeastern US and the Ohio Valley. Some have chosen to concentrate on narrowly defined times and topics, as in Sally G. Kohlstedt's account of the American Association for the Advancement of Science in the years 1848-1860; others span many years in broad treatments of medical and agricultural societies. This scholarly compilation's potential audience includes not only historians of science but the more broadly based students of intellectual development in North America.

**Films on Solid Surfaces: The Physics and Chemistry of Physical Adsorption.** J. G. Dash. 273 pp. Academic, New York, 1975. \$26.00

In the first chapter of a work "written for the community of physical and biological scientists now working in fields involving physical adsorption and surface science," J. Gregory Dash suggests as motivations for the study of his topic such areas of application as adhesion, biological membranes, composite materials, heterogeneous catalysis, corrosion, fracture, lubrication and thin-film electronics. He begins by introducing the reader to the atomic basis of adsorption and the statistical thermodynamics of physisorption, along with a review of the relevant experimental approaches. There follow four chapters on the various states of films and their phase transitions; Dash concludes with an examination of heterogeneous-film problems and an account of another phenomenon of contemporary interest, superfluidity. Electron micrographs illustrate the volume.

**Atlas of Light Scattering Curves.** P. J. Wyatt, ed. Science Spectrum, Santa Barbara, 1975. \$95.00

The nature of this atlas defies the achievement of any meaningful page count; perhaps it will prove most helpful to note that the volume includes more than 300 light-scattering curves for a variety of model particles. Printed on semi-transparent vellum stock, the curves should lend themselves to direct comparison with the experimenter's data. Four sections comprise the atlas: scattering from single homogeneous spheres (136 curves), from individual spherically symmetric aerosolized bacterial cells (64 curves), from particles of complex refractive index (58 curves) and from particle distributions in aqueous suspension. The publishers, who periodically produce additional scattering curves, offer all supplements issued during the year after purchase free of charge to atlas buyers;

also, they grant a ten-day examination period to those ordering the book.

**The Genesis Strategy: Climate and Global Survival.** S. H. Schneider (with L. E. Mesirow). 419 pp. Plenum, New York, 1976. \$14.95

The "strategy" espoused by Stephen Schneider may be summed up in two words: Be prepared. Credit for this prescription goes not to Schneider, nor even to international scouting, but rather to Joseph, the biblical seer who interpreted Pharaoh's dream cattle as fat years and lean years. The survival of humanity is the issue in this volume, and the author considers food politics and the overpopulation predicament as well as climate modification, inadvertent and otherwise. The presentation appears balanced and sometimes hopeful; this is no doomsday book.

**Holography in Medicine** (Proc. of an Int. Symposium, New York, 1973). P. Greguss, ed. 149 pp. IPC Science and Technology, Guildford, Surrey, England, 1976. £9.00

Numerous photographs—of apparatus, of holograms, of Moiré patterns and of fringes formed on a cat's fundus—enliven what might otherwise have appeared to be just another book of proceedings; the illustrations actually outnumber the pages, 165 to 149. Forty-two authors have contributed to this volume, including Dennis Gabor, whose Nobel prize-winning discovery of holography was marked by this twenty-fifth anniversary meeting. Pal Greguss has edited a diverse collection, with sections on holographic principles, use of the technique as a diagnostic tool and in ophthalmology, and bioholography. The contributors attempt to show how the holographic approach may lead to a better understanding of nature, as well as to improvements in clinical practice and biomedical tools.

## new books

### Elementary Particles and Fields

**Hadron Interactions at Low Energies: Physics and Applications, Vol. 1** (Proc. of the Triangle Meeting, Bratislava, November 1973). D. Krupa, J. Pisut, eds. 437 pp. Veda, Bratislava, 1975.

### Nuclei, Nuclear Physics

**Peaceful Nuclear Explosions, Vol. 4** (Proc. of a Technical Committee on the Peaceful Uses of Nuclear Explosions, IAEA, Vienna, January 1975). 479 pp. International Atomic Energy Agency, Vienna, 1975. \$30.00

**Steps to Nuclear Power: A Guidebook** (Technical Reports Series, Vol. 164). 106 pp. International Atomic Energy Agency, Vienna, 1975. \$7.50

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## LASER HANDBOOK



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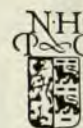
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