

constituting the last one-third of the book, are essentially unrelated to the first part and to each other. A discussion of Josephson junctions and superconducting devices occupies a little over 40 pages, while the rest is devoted to nonlinear optical properties and parametric optical devices.

Most of the chapters are easy to read, illustrated by numerous helpful figures and uncluttered by unnecessary algebra. Unfortunately, the last chapter is somewhat less successful in this re-

spect. The heavier dose of algebra tends to obscure the simple physical ideas of parametric optical processes. This chapter also contains some disturbing inaccuracies. On page 264 the statement appears:

"We are therefore neglecting the anisotropy of real crystals and confining ourselves to a discussion of second-order non-linear effects in a hypothetical isotropic dielectric solid. (Strictly speaking, an isotropic optical medium

cannot have a second-order non-linearity)."

On page 274 the reader finds a table with the cubic, isotropic dielectric materials GaSb, GaAs and GaP used in second harmonic generation. The student may be confused. On pages 277 and 278 an erroneous (and unnecessary) argument is used to prove that $\text{div } \mathbf{E} = 0$ in a nonlinear medium. There may well be longitudinal components of the second harmonic nonlinear polarization and electric field.

I recommend the book for undergraduates and beginning graduate students who desire an introductory survey of the world of solid-state applications. Those interested in more advanced study or research should consult the reading lists and extensive references which are provided at the end of each chapter.

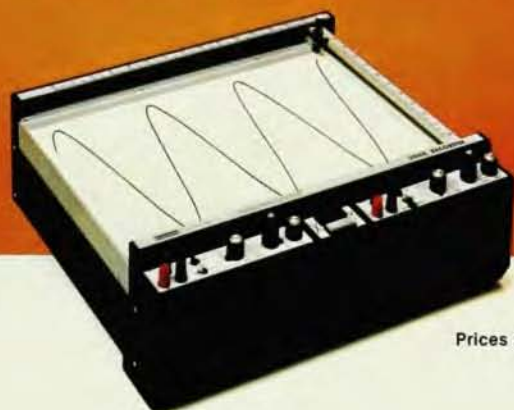
NICOLAAS BLOEMBERGEN
Division of Applied Sciences
Harvard University

Einstein books

The following is a survey of eight recent books on Einstein: **Albert Einstein: His Influence on Physics, Philosophy and Politics.** P. C. Aichelburg, R. U. Sexl, eds. 220 pp. Vieweg, Braunschweig, Fed. Rep. Germany, 1979. DM 48; **Albert Einstein, The Human Side: New Glimpses from his Archives.** H. Dukas, B. Hoffmann, eds. 167 pp. Princeton U., Princeton, N.J., 1979. \$8.95; **Albert Einstein: Autobiographical Notes.** P. A. Schlipp, ed. 89 pp. Open Court, LaSalle and Chicago, Ill., 1979. \$9.95; **Einstein: A Centenary Volume.** A. P. French, ed. 332 pp. Harvard U., Cambridge, Mass., 1979. \$20.00; **General Relativity: An Einstein Centenary Survey.** S. W. Hawking, W. Israel, eds. 919 pp. Cambridge U., New York, 1979. \$74.50; **Albert Einstein's Theory of General Relativity: 60 Years of its Influence on Man and the Universe.** G. Tauber, ed. 352 pp. Crown, New York, 1979. \$14.95; **Albert Einstein, 1879-1955: A Centenary Exhibit of Manuscripts, Books, and Portraits Selected from the Humanities Research Center Collections.** A. C. Lewis. 40 pp. Humanities Center, U. Texas at Austin, Austin, Texas, 1979. \$6.75; **Images of Einstein: A Catalog.** J. N. Warnow, ed. 77 pp. Center for History of Phys., Amer. Inst. Phys., New York, 1979. \$10.00.

The centennial of a celebrated person's birthyear has often been the occasion for the publication of numerous books focusing on that person and 1979—the year of Albert Einstein—was no exception. The reader will find, in the eight books under review, a feast of Einsteiniana: excerpts from published writings and private correspondence, assessments of his contributions

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to science and philosophy and of his involvement (or, at other times, noninvolvement) in politics, religion and world affairs; reminiscences of him by collaborators, colleagues and contemporaries, and reviews of the present status of the field—relativity—that he created. Four of the books are anthologies or collections of writings by a large number of authors as well as by Einstein himself; two are catalogs of Einstein-related material; and the other two present the words of Einstein himself.

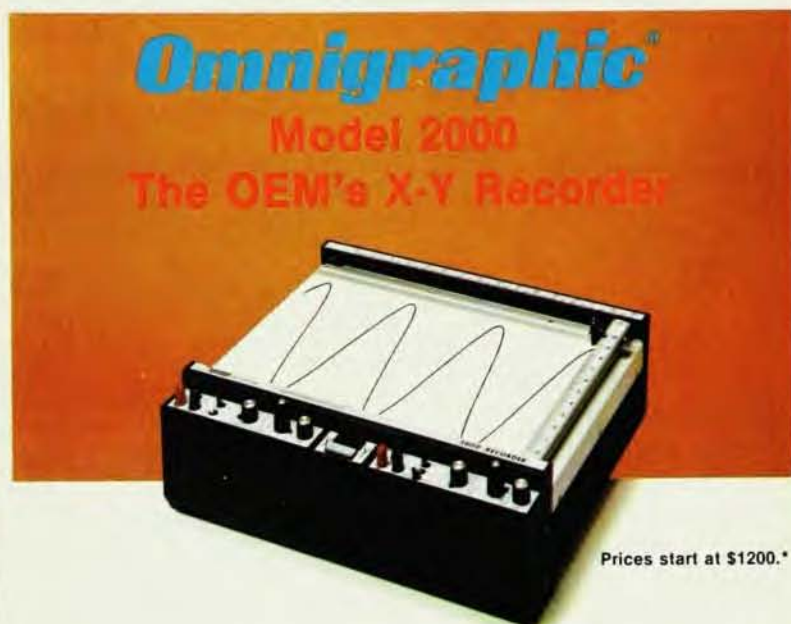
Einstein's Own Writings. The year 1979 saw the welcome return to print of Einstein's *Autobiographical Notes*, which was first published in 1949 under the title *Albert Einstein, Philosopher-Scientist* as volume 7 of Open Court's "Library of Living Philosophers" (and since reprinted several times under that guise). It now appears separately for the first time and the original German and Paul Arthur Schilpp's English translation are presented on facing pages. When Einstein wrote this essay, after "quite some persuasion" by Schilpp, he saw little or no need to recall the external events of his life—the places where he had been, the people whom he had met, and so on. Rather, Einstein took this opportunity to give an account of his intellectual development. He began by recalling childhood events that initiated his scientific curiosity. Then, after assessing the status of physics when he entered it, he related how he successively turned his attention toward problems in quantum mechanics, thermodynamics, relativity and unified field theory.

The other volume devoted entirely to Einstein's own writings is *Albert Einstein, The Human Side*, which presents a collection of Einstein's letters selected by Helen Dukas, Einstein's long-time secretary, as especially revealing of his character and personality. Dukas and Banesh Hoffmann, who previously collaborated on a biography, *Albert Einstein: Creator and Rebel* (Viking, New York, 1972), have edited these epistolary excerpts (nearly all hitherto unpublished) and described the original circumstances surrounding each. The correspondents range from royalty and fellow physicists to schoolchildren and others who did not know Einstein personally. The inquiries posed by these correspondents range over a wide variety of subjects, but the charm of the book derives from the manner in which Einstein replied to them. The editors, according to the dust jacket, wanted to reveal "not only Einstein's modesty and humor but also his compassion, sensitivity, and wisdom" and they have succeeded admirably in this goal. I have only one minor criticism. In presenting the letters in sequences that "leap from remem-

brance to linked remembrance" the editors seem to have felt that a book with "no chapters, no table of contents, no index, and, at first glance, no plan or structure" would arouse few complaints. The lack of any of these aids, however, prevents readers from returning to the book at a later time and locating quickly a favorite passage.

In contrast to the letters selected by Dukas, A. P. French, the editor of *Einstein: A Centenary Volume*, presents a collection of letters that are

mostly scientific in character. The "Einstein's Letters" section of the French volume begins with an essay by Pierre Speziali, the editor of the correspondence between Einstein and Michele Besso, Einstein's lifetime close confidant and one-time colleague. Speziali here presents a selection of excerpts from this correspondence as well as the full text of the last letter of this series, written by Einstein on 10 August 1954, when Besso was 81 and Einstein was 75. Excerpts of letters of



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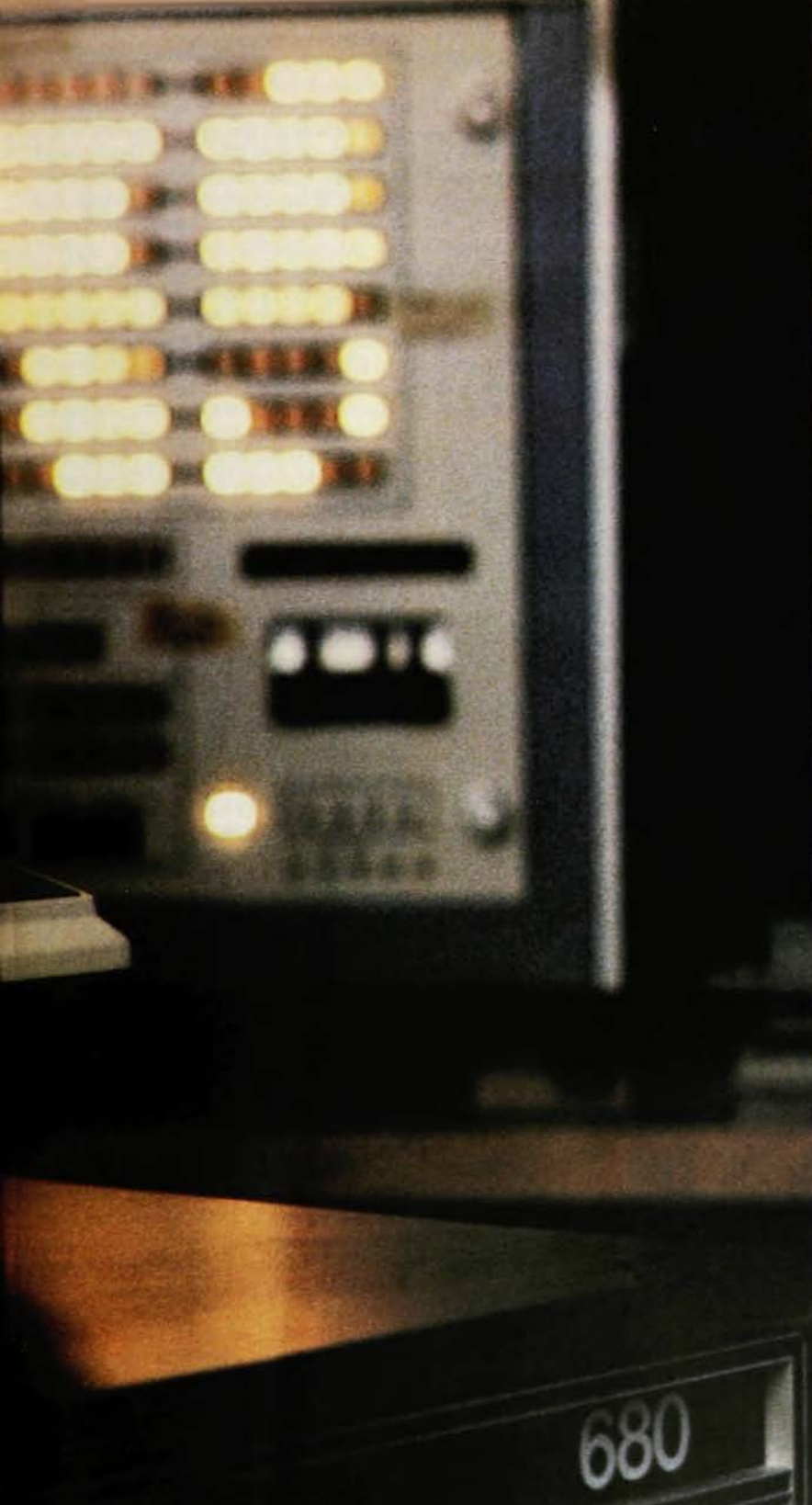
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A large, stylized number '2002' in a light beige color, positioned vertically on the right side of the page. The digits are thick and rounded, with the zeros having a slight inward curve at the top and bottom. The number is set against a dark background, making it stand out.



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Maurice Solovine and Max Born and a pair of letters exchanged between Einstein and Niels Bohr follow.

French also reprints a selection of Einstein's published essays and scientific writings that are "intended to illustrate Einstein's articulateness both as a commentator on human problems and as an expositor of his scientific discoveries." This section opens with a translation of the introduction and Part I (kinematical part) of the 1905 *Annalen der Physik* paper that introduced the special theory of relativity. It also includes "Notes on the Origin of the General Theory of Relativity" from his *Mein Weltbild* (Querido Verlag, Amsterdam, 1934), "An Elementary Derivation of the Equivalence of Mass and Energy" from *Out of My Later Years* (Philosophical Library, New York, 1950), excerpts from his *Ideas and Opinions* (Crown, New York, 1964), various essays on geometry and experience, the method of theoretical physics and education, and the somewhat unusual paper on "The Cause of the Formation of Meanders in the Courses of Rivers and the So-called Baer's Law," (*Die Naturwissenschaften*, 14 (1926)).

Albert Einstein's Theory of General Relativity, edited by Gerald Tauber, also contains numerous excerpts from Einstein's writings on relativity, gravitation, and unified field theory. Most are from his popular-level *Relativity: The Special and the General Theory* (1916; Eng. trans., Crown, New York, 1961) but others are from magazine and newspaper articles and speeches before various assemblies.

Assessments of Einstein's Work. The French and Tauber books, as well as

Albert Einstein: His Influence on Physics, Philosophy and Politics, edited by Peter C. Aichelburg and Roman U. Sexl, contain assessments of Einstein's work in both scientific and nonscientific areas by other scholars. His work on special and general relativity is reviewed by Arthur I. Miller (Aichelburg and Sexl), by French and Silvio Bergia (French) and by numerous past and present scholars in the Tauber volume; on quantum mechanics by Nathan Rosen (Aichelburg and Sexl) and Martin J. Klein (French); on statistical mechanics by Hiroshi Ezawa (Aichelburg and Sexl); and on philosophy of science by Gerald Holton (all three books), Bernulf Kanitschneider and Carl Friedrich von Weizsacker (both in Aichelburg and Sexl). Einstein's connections with Zionism are examined by Banesh Hoffman (Aichelburg and Sexl) and Gerald E. Tauber (French) and his views on education and the academic establishment are reviewed by Klein and Arturo Loria (both in French). French also includes in his volume two essays by himself, "Einstein—A Condensed Biography," and "Einstein and World Affairs," and one by Boris Kuznetsov on "Einstein, Science, and Culture;" Tauber also reprints a general essay by Carl Lanczos on "The Greatness of Albert Einstein."

Reminiscences. The letters appearing in the Dukas and Hoffman volume allow the reader to appraise Einstein the human being, but the reader can determine how Einstein's collaborators, colleagues and contemporaries judged him through reminiscences of him appearing in the French, Aichelburg and Sexl, and Tauber books. Most

of these brief tributes are by fellow scientists, but French also includes reminiscences of the photographer Philippe Halsman, cellist Pablo Casals, and historian I. Bernard Cohen, who interviewed Einstein two weeks before the latter's death. John Archibald Wheeler's reminiscence appears (in various edited forms) in all three volumes; it is accompanied in the Tauber and Aichelburg-Sexl volumes by the recollections of Einstein's last lecture by Wheeler and three of his students, who visited Einstein at his home in 1953.

Surveys of Current Research. Another way of assessing the influence of Einstein's scientific work is to review the current state of research in general relativity. *General Relativity: An Einstein Centenary Survey*, edited by S. W. Hawking and W. Israel, provides such an assessment for the physicist. After an "Introductory Survey" by the editors, fifteen articles by 20 specialists in relativity focus on various special topics dealing with gravitational theory, astrophysics and cosmology and related subjects. The lay reader, will probably find the first four essays in the Aichelburg-Sexl volume—by Peter G. Bergmann ("The Development of the Theory of Relativity"), Dennis W. Sciama ("Cosmology"), Joseph Weber ("Gravitational Radiation") and Roger Penrose ("Black Holes")—easier to read. Of intermediate difficulty are scattered essays in the Tauber volume.

Catalogs. The appeal of *Einstein: A Centenary Volume* is certainly enhanced by the many photographs (as well as line drawings and facsimile reproductions) placed throughout the text. *Images of Einstein: A Catalog*, compiled by Joan R. Warnow with other AIP staff members, concentrates on this aspect of Einstein. In order "to handle efficiently the many requests for Einstein materials" expected in 1979, the AIP Center for History of Physics issued a catalog of reproductions of 605 photographs of Einstein, his family and his predecessors and contemporaries. The photographs have been classified into eight categories: portraits and studies, informal alone, with one or two additional people, informal group, formal group, family, miscellaneous, and predecessors and contemporaries. Within each category the photographs are numbered in the order that AIP located them. Photographs made by Lotti Jacobi, which account for nearly one-fifth of the photographs reproduced, are presented separately. The identification and source of each photograph is given at the rear of the volume.

Many perusers of this catalog may wish that the photographs could have been arranged (to whatever extent possible) in chronological order. Such an arrangement of this large collection of



Paul Ehrenfest, his son and Albert Einstein at Ehrenfest's home in Leiden (ca. 1921). W. J. Luyten's photograph may be found in *Images of Einstein: A Catalog*, compiled by J. N. Warnow.

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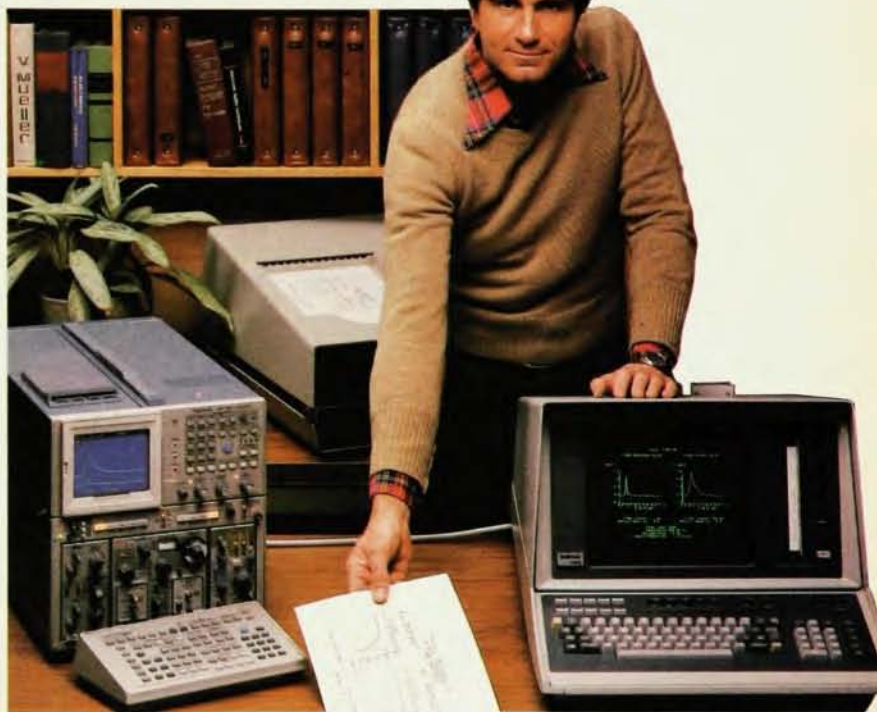
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photographs could have allowed one the extraordinary opportunity to watch Einstein as he matured from childhood to old age.

Centennial celebrations are the occasion not only of the publication of books, but also of the mounting of exhibitions. Undoubtedly many were held around the world in 1979. The catalog *Albert Einstein: A Centenary Exhibit* details the collection (176 items in all) of manuscripts, books and portraits that were used at the University of Texas at Austin in February and March of last year. The value of this exhibit catalog is enhanced by the reproduction of numerous photographs and book and manuscript excerpts as well as by Albert Lewis's informative annotations, which detail the significance of the exhibit items to Einstein's life.

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Dynamical Systems and Microphysics (Papers presented at a seminar, Udine, Italy, September 1979). A. Blaquiere, F. Fer, A. Marzollo, eds. 419 pp. Springer, New York, 1980. \$39.00

Atomic, Molecular and Chemical Physics

Advances in Chemical Physics, Vol. 16. I. Prigogine, S. A. Rice, eds. 539 pp. Wiley-Interscience, New York, 1980. \$47.50

Potential Energy Surfaces. K. P. Lawley, ed. 610 pp. Wiley-Interscience, New York, 1980. (Price not stated)

Atomic and Molecular Processes in Controlled Thermonuclear Fusion (Proc. of a NATO Adv. Study Inst., Castera-Verduzan, France, August 1979). 505 pp. Plenum, New York, 1980. \$55.00

Basic Chemical Kinetics. H. Eyring, S. H. Lin, S. M. Lin, 493 pp. Wiley-Interscience, New York, 1980. \$35.00

Atomic Structure. E. U. Condon, H. Odabasi. 674 pp. Cambridge U., New York, 1980. \$49.95 clothbound, \$18.95 paperbound.

Direct Imaging of Atoms in Crystals and Molecules (Proc. of a symp., Lidingo, Sweden, August 1979). L. Kihlberg, ed. 294 pp. Royal Swedish Acad. of Sci., Stockholm, Sweden, 1979. (Price not stated)

Spectroscopy in Chemistry and Physics: Modern Trends (Proc. of a congress, Frankfurt am Main, Fed. Rep. Germany, September 1979). F. J. Comes, A. Muller, W. J. Orville-Thomas, eds. 351 pp. Elsevier, New York, 1980. \$87.75

Handbook of Stopping Cross-Sections for Energetic Ions in All Elements. J. F. Ziegler. 432 pp. Pergamon, Elmsford, N.Y., 1980. \$50.00

Handbook of Range Distributions for Energetic Ions in all Elements. U. Littmark, J. F. Ziegler. 493 pp. Pergamon, Elmsford, N.Y. 1980. \$65.00

Vibrational Spectroscopy of Molecular Liquids and Solids (Proc. of a NATO Adv. Study Inst., Menton, France, June-July 1979). S. Bratos, R. M. Pick. 472 pp. Plenum, New York, 1980. \$49.50

NMR of Chemically Exchanging Systems. J. I. Kaplan, G. Fraenkel. 176 pp. Academic, New York, 1980. \$19.50

Physical Chemistry. R. S. Berry, S. A. Rice, J. Ross. 1300 pp. Wiley, New York, 1980. \$34.95

Introduction to Molecular Energy. J. T. Yardley. 319 pp. Academic, New York, 1980. \$34.00

Polymers, Part A: Molecular Structure and Dynamics; Part B: Crystal Structure and Morphology. R. A. Fava, ed. 601 and 441 pp. Academic, New York, 1980. \$55.00 and \$45.00

Optics and Acoustics

Optical Fibre Communications Systems. C. P. Sandbank, ed. 353 pp. Wiley-Interscience, New York, 1980. \$49.00

Applied Optics: A Guide to Optical System Design, Vol. 2. L. Levi. 1148 pp. Wiley, New York, 1980. \$75.00

Applied Optics and Optical Engineering, Vol. 6. R. Kingslake, B. J. Thompson, eds. 511 pp. Academic, New York, 1980. \$49.50

Color Measurement. F. Grum, C. J. Bartleson, eds. 372 pp. Academic, New York, 1980. \$39.50

Light Scattering by Irregularly Shaped Particles (Proc. of a workshop, Albany, N.Y., June 1979). D.W. Schuerman, ed. 334 pp. Plenum, New York, 1980. \$39.50

Physical Basis of Musical Sounds. J. Morgan. 145 pp. Krieger, Huntington, N.Y., 1980. \$9.50

Remote Sensing: Optics and Optical Systems. P. N. Slater. 591 pp. Addison-Wesley Adv. Books, Reading, Mass., 1980. \$34.50

Electricity Magnetism and Fields

Waves in Layered Media (Second Edition). L. M. Brekhovskikh. 516 pp. Academic, New York, 1980 (Russian edition, Nauka, Moscow, USSR, 1973). \$58.00

Foundations of Radiation Theory and Quantum Electrodynamics. A. O. Barut, ed. 230 pp. Plenum, New York, 1980. \$27.50

Classical Electromagnetic Radiation (Second Edition). J. B. Marion, A. Heald. 503 pp. Academic, New York, 1980 (first ed., 1965). \$22.50

The Classical Theory of Fields (Fourth Edition). L. D. Landau, E. M. Lifshitz. 411 pp. Pergamon, Elmsford, N.Y., 1975 (first English ed., 1951). \$22.90

Quantum Electronics and Lasers

Free-Electron Generators of Coherent Radiation (Lectures from a workshop, Telluride, Colorado, August 1979). S. F. Jacobs, H. S. Pilloff, M. Sargent III, M. O. Scully, R. Spitzer, eds. 833 pp. Addison-Wesley Adv. Books, Reading, Mass., 1980. \$36.50

Laser Handbook, Vol. 3. M. L. Stith, ed. 900 pp. North-Holland, New York, 1979. \$122.00

Principles of Quantum Electronics. D. Marcuse. 507 pp. Academic, New York, 1980 (first published, 1970). \$35.00

Materials Science and Condensed Matter

Physical Properties of Liquid Crystalline Materials. W. H. De Jeu. 141 pp. Gordon and Breach, New York, 1980. \$32.00

Neutron Spin Echo (Proc. of a workshop, Grenoble, France, October 1979). F. Mezei, ed. 253 pp. Springer, New York, 1980. \$19.00

Laser and Electron Beam Processing of Materials (Papers presented at a symp., Cambridge, Mass., November 1979). C. W. White, P. S. Peercy, eds. 782 pp. Academic, New York, 1980. \$40.00

Non-Homogeneous Media and Vibration Theory. E. Sanchez-Palencia. 407 pp. Springer, New York, 1980. \$24.00

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Field Theoretical Methods in Particle Physics (Proc. of a NATO Adv. Study Inst., Kaiserslautern, Fed. Rep. Germany, August 1979). W. Rühl, ed. 606 pp. Plenum, New York, 1980. \$69.50

Models of High Energy Processes. J. C. Polkinghorne. 141 pp. Cambridge U., New York, 1980. \$24.95

Hadronic Matter at Extreme Energy Density (Proc. of a workshop, Erice, Italy, October 1978). N. Cabibbo, L. Sertorio, eds. 366 pp. Plenum, New York, 1980. \$42.50

Quantum Flavordynamics, Quantum Chromodynamics, and Unified Theories (Proc. of a NATO Adv. Study Inst., Boulder, Colorado, July 1979). K. T. Mahanthappa, J. Randa, eds. 504 pp. Plenum, New York, 1980. \$59.50

Growth Points in Nuclear Physics, Vols. 1 and 2. P. E. Hodgson. 230 and 218 pp. Pergamon, Elmsford, N.Y., 1980. \$81.00 for each vol.

Neutron Interferometry (Proc. of an int. workshop, Grenoble, France, June 1978). U. Bonse, H. Rauch, eds. 498 pp. Oxford, New York, 1980. \$58.00

Theory of Meson Interactions with Nuclei. J. M. Eisenberg, D.S. Koltan. 415 pp. Wiley-Interscience, New York, 1980. \$39.95

The Physics of Nuclear Reactions. W. M. Gibson. 344 pp. Pergamon, Elmsford, N.Y., 1980. \$15.00