

more broadcast publicity. The physics and chemistry of developers is very well described and the chapters on sensitometry are of special excellence.

The final chapter, "The Structure of the Developed Image," was written by F. D. Perrin, one of the five authors who contributed to the first edition of 1942 and to the present volume. (The others are L. G. S. Brooker, B. H. Carroll, R. P. Loveland and A. Weissberger.) This chapter is of special merit and forms a fitting conclusion for the book. The author considers first the fundamental mathematical concepts required for an understanding of image structure and gives proper emphasis to the optical

transfer function; this leads to a description of the imagery of points, lines and edges and to a discussion of the resolving power of emulsions. His treatment of the errors of density and position is excellent. The value of *MT* curves is demonstrated throughout. Recent studies of granularity and of image evaluation are of special interest. The relation of the photographic process to the varied technologies of information recording and storage forms the conclusion to this chapter and to the entire volume.

The design, figures, tables and illustrations are of the highest quality. The references are extensive, accurate and most helpful for the interested

reader. Author and subject indices are, as always in a volume such as the present one, indispensable.

Along with their editor, the authors of the 23 chapters manifest their high competence together with a clarity of exposition and an accuracy of description of the diverse branches of photographic theory. All their colleagues who employ photographic techniques in their own researches are indebted to them for the excellence of this superb treatment of the photographic process.

* * *

An astrophysicist, Father McCarthy is a member of the staff of the Vatican Observatory at Castel Gandolfo.

One-volume encyclopedia

ENCYCLOPEDIA OF PHYSICS. Robert M. Besançon, ed. Reinhold, New York, 1966. 832 pp. \$25.00.

by H. M. Otte

Should the need arise to fill a lull in the conversation during a social evening's gathering of scientists, one could broach the topic of the value of "Encyclopedias of This and That." The editor of this particular volume felt that an *Encyclopedia of Physics* would be of use to physicists who need information outside of their own special areas of interest, to teachers and librarians who must answer inquiries, to students who wish to add to their funds of knowledge, and to engineers and scientists who encounter physical concepts in pursuit of their professions. For this diffuse but large audience Besançon obtained the contributions of 320 "internationally" prominent authorities each of whom wrote about one article (some two and a half pages long) in his field.

No attempt was made to hold all articles at the same technical level; in fact, the level for each entry was supposedly aimed at those readers who would be most likely to look for information on that specific topic. In effect, the contents of each article were left to the discretion of the author, who in most cases provided references to summary articles and books; cross references to other articles in the *Encyclopedia* were added where they were thought to be of help.

Unquestionably the most difficult problem for the editor was deciding which topics to include and which to leave out since space was clearly at a premium. The choice of audience ensured inclusion of introductory articles on physics, on the history of physics, on measurements, and on symbols, units and nomenclature, plus general articles on the major areas of physics, as well as more detailed ones on the divisions and subdivisions of the major areas. Entries were also made on subjects that include both physics and other disciplines, such as astrophysics or mathematical biophysics. It is an easy temptation to judge the book not on what has been included, but rather on what has been omitted, since the omissions have necessarily been many, in some cases in areas that were supposedly to be emphasized. Thus, no mention could be found of the nomenclature for the elastic constants (that is, compliances and stiffnesses).

The contributors and their contributions are listed at the beginning of the book and present an imposing array. A most creditable feature of the book is the very comprehensive and detailed index, although a brief perusal did reveal at least one omission: under "Dislocation," no reference is made to page 145, where there is an important discussion of the topic. Finally, this reviewer feels that it would be of great interest, if not also

actually of considerable value, to be able to determine to what extent such books as this one do indeed fill a genuine need and if so, how well.

* * *

The reviewer is manager of the Materials Research Laboratory of the Martin Company at Orlando, Fla.

BOOKS RECEIVED

ELEMENTARY PARTICLES AND FIELDS

Many-Body Theory. Part I of 1965 Tokyo Summer Lectures in Theoretical Physics. Edited by Ryogo Kubo, 1966. 160 pp. Benjamin, New York, \$6.75

Exchange Reactions. Symp. Proc. (Brookhaven, 1965). 417 pp. IAEA, Vienna, 1965, \$9.00

High Energy Physics. 1965 Les Houches Lectures. C. DeWitt and M. Jacob, eds. 509 pp. Gordon and Breach, New York, 1965. Cloth \$10.50, paper \$8.50

Lectures on High Energy Physics. Conf. Proc. (Hercegovina, 1961). B. Jaksic, ed. 532 pp. Gordon and Breach, New York, 1965. \$29.50

High Energy Physics. Part 2 of 1965 Tokyo Summer Lectures in Theoretical Physics. Edited by Gyo Takeda. 121 pp. Benjamin, New York, 1966. \$5.75

Accélérateurs circulaires de Particules. Introduction à la Théorie. By H. Bruck, 358 pp. Presses Universitaires de France, Paris, 1966

Internal Conversion Processes. Conf. Proc. (Nashville, May 1965). Joseph H. Hamilton, ed. 669 pp. Academic Press, New York, 1966. \$22.50

Methods in Computational Physics. Advances in Research and Applications. Nuclear Particle Kinematics. Berni Alder,

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**PARTICLE WAVES AND DEFORMATION
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By EDWIN R. FITZGERALD, *The Johns Hopkins University*. How wave mechanics can—in actual practice—permit the calculation of macroscopic mechanical quantities such as transition velocities, non-elastic resonance frequencies, co-efficients of sliding friction, and characteristic stresses. Fully explains the usefulness of the new particle-wave view. An Interscience book. 1966. 249 pages. \$11.95.

RADIATION PROCESSES IN PLASMAS

By GEORGE BEKEFI, *Massachusetts Institute of Technology*. Presents, for the first time, a balanced account of experiments and theory on the emission, absorption, and scattering of electromagnetic waves in gaseous plasmas. 1966. Approx. 360 pages. Prob. \$15.75.

**NUMERICAL PROCESSES
 IN DIFFERENTIAL EQUATIONS**

By IVO BABUSKA, MILAN PRAGER, and EMIL VITASEK, *Czechoslovakia, in cooperation with R. RADOK, University of Adelaide, Australia*. Covers important aspects of the numerical solution of differential equations. Concentration is on calculations common to both floating and fixed points. An Interscience book. 1966. 351 pages. \$9.50.

**THE MIDDLE ULTRAVIOLET:
 Its Science and Technology**

Edited by ALEX E. S. GREEN, *University of Florida*. A comprehensive monograph bringing together the scientific and technological information on solar, atmospheric, atomic, and molecular physics related to the middle ultraviolet. 1966. 390 pages. \$15.75.

X-RAY DIFFRACTION METHODS

By E. W. NUFFIELD, *University of Toronto*. A complete, practical treatment—in one brief volume—of the basic principles, concepts, and modern methods of X-ray crystallography. 1966. 409 pages. Prob. \$12.50.

INTERMETALLIC COMPOUNDS

By J. H. WESTBROOK, *General Electric Research and Development Center*. The first comprehensive work in over fifty years devoted exclusively to this subject. 1966. Approx. 576 pages. Prob. \$28.50.

HILL'S EQUATION

By WILHELM MAGNUS, *New York University*, and STANLEY WINKLER, *International Business Machines Corporation*. Full coverage of the class of homogeneous, linear, second-order differential equations known as Hill's equation. Includes basic theory, refinements, and special cases (Tracts in Pure and Applied Mathematics, Vol. 20). An Interscience book. 1966. 136 pages. \$8.50.

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Sidney Fernback and Manuel Rotenberg, eds. Vol. 5. 264 pp. Academic Press, New York, 1966. \$11.50

Les Radioéléments. By Daniel Blanc. 284 pp. Masson et Cie, Paris, 1966. 59F

The Slowing Down and Thermalization of Neutrons. By M. M. R. Williams. 582 pp. (North-Holland, Amsterdam) Wiley, New York, 1966. \$19.50

Proceedings of the International Symposium on Electron and Photon Interactions at High Energies. (Hamburg, June 1965) G. Höhler, G. Kramer, U. Meyer-Berkhout, eds. Vol. 1, 182 pp.; vol II, 457 pp. Springer-Verlag, Berlin, 1965.

Weak Interaction of Elementary Particles. By L. B. Okun'. Transl. from Russian by S. and M. Nikolić. 292 pp. Pergamon Press, New York, 1966. \$9.75

The Analytic S-Matrix. By R. J. Eden, P. V. Landshoff, D. I. Olive, J. C. Polkinghorne. 287 pp. Cambridge U. Press, Cambridge, 1966. \$14.00

Diffusion des Electrons de Haute Energie. By M. Gourdin. 229 pp. Masson & Cie. Paris, 1966. Paper 54F

Relativistic Theory of Reactions. By J. Werle. 467 pp. North-Holland, Amsterdam, 1966

Nuclear Spin-Parity Assignments. Conf. proc. (Gottengen, Nov. 1965) N. B. Gove, R. L. Robinson, eds. 463 pp. Academic Press, New York, 1966. \$7.50

NUCLEI

Nuclear Forces. By D. M. Brink. 232 pp. Pergamon Press, New York, 1966. Paper \$2.95

Nuclear Structure Study with Neutrons. Conf. Proc. (Antwerp, July 1965). M. Nève de Mévergnies, P. Van Assche and J. Vervier, eds. 588 pp. North-Holland, Amsterdam, 1966. \$16.80

Thermal Neutron Scattering. P. A. Egelstaff, ed. 523 pp. Academic Press, New York, 1965. 115s

The Theory of Beta Radioactivity. By E. J. Konpinski. 403 pp. Clarendon Press, Oxford, 1966. \$12.00

Physics of Nuclear Reactors. By D. Jakeman. 356 pp. American Elsevier, New York, 1966. \$10.00

Experimentelle Methoden der Kernphysik. By P. Stoll. 178 pp. Springer-Verlag Berlin and New York, 1966. Soft-bound DM 10.80

Kolloquium über β -Zerfall und schwache Wechselwirkungen. Conf. Proc. (Heidelberg, 1965). 317 pp. Max-Planck-Institut für Kernphysik, Heidelberg, 1966. Paper \$2.50

High Energy Nuclear Reactions. By A. B. Clegg. 130 pp. Clarendon Press, Oxford, 1966. Paper \$2.90

Weak Interactions and Nuclear Beta Decay. By H. F. Schopper. 417 pp. North-Holland, Amsterdam, 1966. \$15.40

The Theory of Neutron Slowing Down in Nuclear Reactors. By J. H. Ferziger, P. F. Zweifel. 310 pp. Pergamon Press, Oxford, 1966. \$12.50

ATOMS AND MOLECULES

Lasers: A Series of Advances. Vol. 1. A. K. Levine, ed. 365 pp. Marcel Dekker, New York, 1966. \$14.50

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The Theory of Quantum Liquids. Volume 1: Normal Fermi Liquids. By David Pines and Philippe Nozières. 355 pp. W. A. Benjamin, New York, 1966. \$15.00

The Statistical Mechanics of Simple Liquids. An Introduction to the Theory of Equilibrium and Non-Equilibrium Phenomena. By Stuart A. Rice and Peter Gray. 582 pp. Interscience, New York, 1965. \$19.75

Fundamental Phenomena in Hypersonic Flow. Symp. Proc. (Buffalo, June, 1964). J. Gordon Hall, ed. 354 pp. Cornell University Press, Ithaca, N.Y., 1966. \$12.50

Basic Developments in Fluid Dynamics, Volume 1. Maurice Holt, ed. 447 pp. Academic Press, New York, 1965. \$17.50

Rarefied Gas Dynamics. Supplement 3, Vol. II. Symp. Proc. (U. of Toronto, 1964). J. H. de Leeuw, ed. 609 pp. Academic Press, New York, 1966. \$18.50

Kinetic Theory of Gases. By Walter Kauzmann. 248 pp. W. A. Benjamin, New York, 1966. Cloth \$8.50, paper \$3.95

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Plasma Physics and Controlled Nuclear Fusion Research. Vol. 2. Conf. Proc. (Culham, Sept. 1965). 1000 pp. IAEA, Vienna, 1966. \$21.00

Quantum Fluids. Conf. Proc. (Brighton, August 1965) D. F. Brewer, ed. 360 pp. North-Holland, Amsterdam, 1966. \$13.50

The Particle Kinetics of Plasmas. I. P. Shkarofsky, T. W. Johnston, M. P. Bachynski. 518 pp. Addison-Wesley, Reading, Mass., 1966. \$17.50

Shock Waves and Detonations in Gases. By R. I. Soloukhin, Trans. from Russian by B. W. Kuvshinov. 176 pp. Mono Book, Baltimore, 1966. \$7.00

Strömungen und Temperatur grenzschichten. By A. Walz. 245 pp. G. Braun, Karlsruhe, 1966. DM56

Fluid Amplifiers. J. M. Kirshner, ed. 295 pp. McGraw-Hill, New York, 1966. \$16.50

Magnetohydrodynamic Stability and Thermonuclear Containment. A. Jeffrey, T. Taniuti, eds. 222 pp. Academic Press, New York, 1966. \$7.50

SOLIDS

Moderne Probleme der Metallphysik. Vol. 2, Chemische Bindung in Kristallen und Ferromagnetismus. A. Seeger, ed. 489 pp. Springer-Verlag, Berlin, 1966. DM78.

Applications of the Mössbauer Effect in Chemistry and Solid-State Physics. Conf. proc. (Vienna, April 1965) 267 pp. IAEA, Vienna, 1966. Paper \$6.00

Materials Science Research. Vol. 3, The Role of Grain Boundaries and Surfaces in Ceramics. Conf. proc. (North Carolina State U., Nov. 1964). W. W. Kriegel, H. Palmour III, eds. Plenum Press, New York, 1966. \$22.50

Refractory Semiconductor Materials. By Yu. V. Shmartsev, Yu. A. Valov, A. S. Borshchevskii. Trans. from Russian by A. Tybulewicz, 93 pp. Plenum Press, New York, 1966. \$12.50

Semiconductors and Semimetals. Vol. 2, Physics of III-V Compounds. R. Willardson, A. C. Beer, eds. 432 pp. Academic Press, New York, 1966. \$16.50

CLASSICAL PHYSICS

Diffraction. Coherence in Optics. By M. Françon. Transl. from French by Barbara Jeffrey. 139 pp. Pergamon Press, New York, 1966. Paper \$3.50

Applied Optics and Optical Engineering. Vol. III. Optical Components. R. Kingslake, ed. 374 pp. Academic Press, New York, 1966. \$15.00

Introduction to Laser Physics. By Bela A. Lengyel. 309 pp. Wiley, New York, 1966. \$8.95

Elements of Mechanical Metallurgy. By W. J. McGregor Tegart. 259 pp. Macmillan, New York, 1966. Cloth \$8.95. Paper \$4.95

Potential Methods in the Theory of Elasticity. By V. D. Kupradze. Transl. from Russian by H. Gutfreund. 339 pp. Daniel Davey, New York, 1966. \$19.00

Theory of Elasticity. By M. Filonenko-Borodich. Transl. from Russian by M. Konayeva. 378 pp. Dover, New York, 1965. Paper \$1.75

Photo-Elastic Analysis. By A. W. Hendry. 155 pp. Pergamon Press, New York, 1966. Paper \$3.50

An Introduction to Coherent Optics and Holography. By G. W. Stroke. 270 pp. Academic Press, New York, 1966. 80s

Relativistic Kinematics. By H. Arzelies. Trans. from French. 298 pp. Pergamon Press, Oxford, 1966. \$12.00

Applied Underwater Acoustics. By D. G. Tucker, B. K. Gazey. 244 pp. Pergamon Press, Oxford, 1966. Paper \$4.50

Thermodynamics and Statistical Mechanics. By A. H. Wilson. 405 pp. (Reprint of 1957 ed) Cambridge U. Press, Cambridge, 1966. Paper \$2.95

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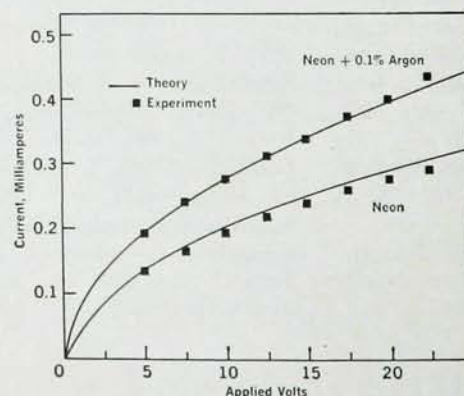
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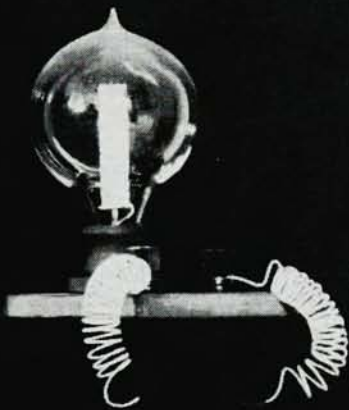
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Integral, Measure and Derivative: A Unified Approach. By G. E. Shilov and B. L. Gurevich. Transl. from Russian by R. A. Silverman. 233 pp. Prentice-Hall, Englewood Cliffs, N.J., 1966. \$11.35

Applied Bessel Functions. By F. E. Reinton. 191 pp. (Reprint of 1946 ed.) Dover, New York, 1965. Paper \$1.85

Disquisitiones Arithmeticae. By Carl Friedrich Gauss. Transl. from Latin by Arthur A. Clarke. 472 pp. Yale University Press, New Haven, 1966. Cloth \$12.50, paper \$2.95

Elements of Probability Theory. By L. Z. Rumshiskii. Transl. from Russian by D. M. G. Wishart. 160 pp. Pergamon Press, New York, 1965. \$5.50

Generalized Hypergeometric Functions. By Lucy Joan Slater. 273 pp. Cambridge University Press, Cambridge, England, 1966. \$13.50

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Asymptotic Expansions for Ordinary Differential Equations. By Wolfgang Wasow. 362 pp. Interscience, New York, 1966. \$14.00

The Monte Carlo Method. Yu. A. Shreider ed. Transl. from Russian by G. J. Tee. 381 pp. Pergamon Press, New York, 1966. \$12.50

Introduction to the Theory of Differential Equations with Deviating Arguments. By L. E. El'sgol'ts. Transl. from Russian by Robert J. McLaughlin. 109 pp. Holden-Day, San Francisco, 1966. \$6.95

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Geometric Transformations. Vol. 2, Projective Transformations. By P. S. Modenov

and A. S. Parkhomenko. Transl. and adapted from the first Russian edition by Michael B. P. Slater. 136 pp. Academic Press, New York, 1965. Paper \$2.45

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Combinatorial Group Theory: Presentations of Groups in Terms of Generators and Relations. By Wilhelm Magnus, Abraham Karrass and Donald Solitar. 444 pp. Interscience, New York, 1966. \$15.00

Homotopy Theory and Duality. By Peter Hilton. 224 pp. Gordon and Breach, New York, 1965. \$11.00

A Treatise on Bessel Functions and Their Applications to Physics. By Andrew Gray and G. B. Mathews, 1327 pp. (Reprint of 1928 ed.) Dover, New York, 1966. \$2.25

Numerical Solution of Partial Differential Equations. Conf. proc. (College Park, Md., May 1965) J. H. Branle, ed. 373 pp. Academic Press, New York, 1966. \$16.50

Perturbation Theory and Its Applications in Quantum Mechanics. Seminar proc. (Madison, Oct. 1965) C. H. Wilcox, ed. Wiley, New York, 1966. \$6.95

Boundary Value Problems. By F. D. Gakhov. Trans. edited by I. N. Sneddon. 561 pp. (Pergamon Press, Oxford) Addison-Wesley, Reading, Mass., 1966. \$15.00

INSTRUMENTATION

The Electron Microprobe. Symp. Proc. (Washington, D. C., 1964). T. D. McKinley, K. F. J. Heinrich and D. B. Wittry, eds. 1035 pp. Wiley, New York, 1966. \$27.50

Theory of Cyclic Accelerators. By A. A. Kolomensky and A. N. Lebedev. Transl. from Russian by M. Barbier. 403 pp. (North-Holland, Amsterdam) Wiley, New York, 1966. \$15.50

Accélérateurs circulaires de Particules. Introduction à la Théorie. Par H. Bruck. 358 pp. Presses Universitaires de France, Paris, 1966

Advances in Cryogenic Engineering. Conf. proc. (Houston, August 1965) Vol. 11 K. D. Timmerhaus, ed. 712 pp. Plenum Press, New York, 1966. \$19.50

Megagauss Magnetic Field Generation by Explosives and Related Experiments. Conf. proc. (Frascati, 1965) Euratom, Brussels, 1966

Neutron Dynamics and Control. Conf. proc. (U. of Arizona, April 1965) D. L. Hetrick L. E. Weaver, eds. 611 pp. USAEC, Washington, 1966. Paper \$4.50

Application of Fracture Toughness Parameters to Structural Metals. Conf. proc. (Philadelphia 1964) H. D. Greenberg, ed. 406 pp. Gordon and Breach, New York, 1966. Cloth \$24.95, paper \$10.50



IMPORTANT Conferences on Nuclear Physics

NUCLEAR SPIN-PARITY ASSIGNMENTS

edited by Norwood B. Gove, associate editor: Russell L. Robinson, Oak Ridge National Laboratory, Tenn.

Proceedings of the Conference on Bases for Nuclear Spin-Parity Assignments, Gatlinburg, Tennessee

This conference was motivated by the need to estimate the reliability of the methods for spin-parity assignments. Covered are techniques which give unambiguous nuclear spin and parity assignments, direct spin measurements, internal conversion, and angular distribution of nuclear radiation. Also treated are less reliable, established techniques including theoretical assumptions on nuclear reaction mechanisms, and speculative methods such as comparing the experiment with predictions based on nuclear models. Most of the papers submitted were invited, and much of this material is unavailable elsewhere.

May 1966, 453 pp., \$7.50

ISOBARIC SPIN IN NUCLEAR PHYSICS

edited by J. D. Fox and D. Robson, Florida State University, Tallahassee

Proceedings of the Conference of Isobaric Spin in Nuclear Physics, Tallahassee

These proceedings present the most recent experimental and theoretical developments in the study of isobaric spin in nuclear reactions and nuclear structure. The invited papers present a summary of the subject and will be most valuable to researchers beginning work in this field. This volume will thus serve as a unique reference on the subject.

August 1966, 898 pp., \$18.00

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CONFERENCE PROCEEDINGS*

APPENDICES: Tables of Conversion Matrix Elements and Phases. L Shell Particle Parameters for Angular Correlations of Conversion Electrons; Part 1: L_1 and L_2 Subshells, Part 2: L_3 Subshell. K/L, L_1/L_2 and L_1/L_3 Conversion Coefficient Ratios. Conversion Coefficient Standards. Table of Electron Binding Energies. Subject Index.

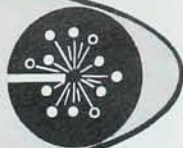
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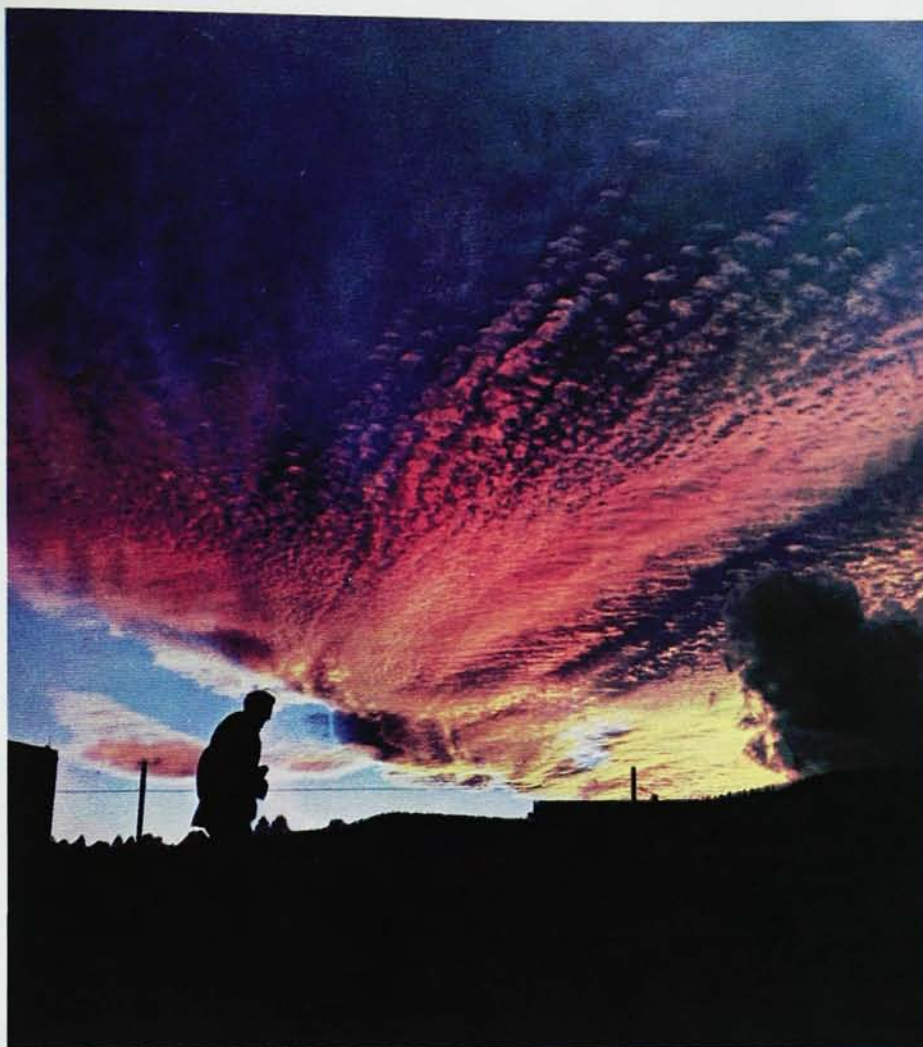
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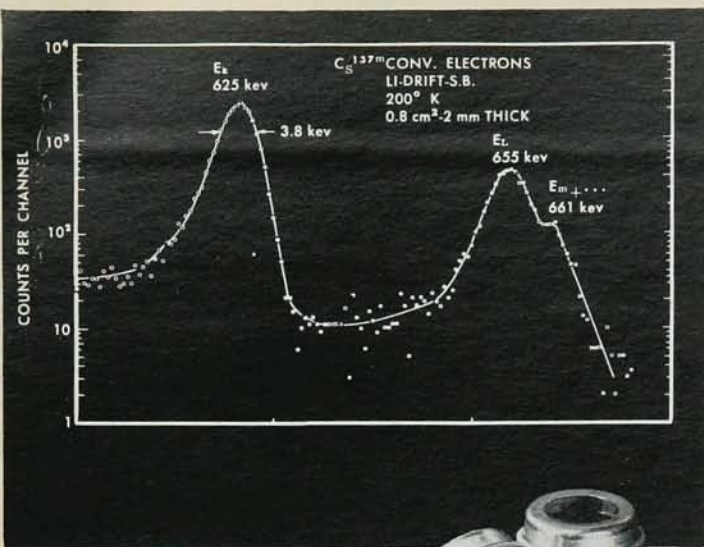
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Electromagnetic field matterons are decay products of emitted multiple-matteron particles (possibly those of the strong force), so at infra-small distances the force of interaction varies as the inverse first power of distance and is the mutual force of dipole photon particles. Photon properties result jointly from this and the velocity-quantizing force. Photon particles are of non-zero mass and are emitted and absorbed by elementary particles whose subsequent processes of mass-quantization underly the creation and annihilation of photons. These properties account for the observed particle- and wave-aspect of light, including spin; refractive index; Faraday effect; Fresnel drag coefficient; directional aberration; reflection at a moving surface; first and second order Doppler effects; gravitational effects on direction, frequency and speed of light; Michelson-Morley result with terrestrial or extra-terrestrial light source; De Sitter's invariant light velocity; Hubble's red shift; dilatation of time; the quasar phenomenon.

Due to the velocity-quantizing force only the component of a force normal to the velocity of a point-like particle is effective in accelerating it. This results in the gyroscopic precession of non-photonic binary particles and the oscillation of effective forces acting on them at the rate of one cycle per De Broglie wave length travelled. This underlies or is consistent with atomic quantization. It results also in the observed "variation of mass with velocity" at relativistic speeds and accounts for the "double magnetism" of the electron.

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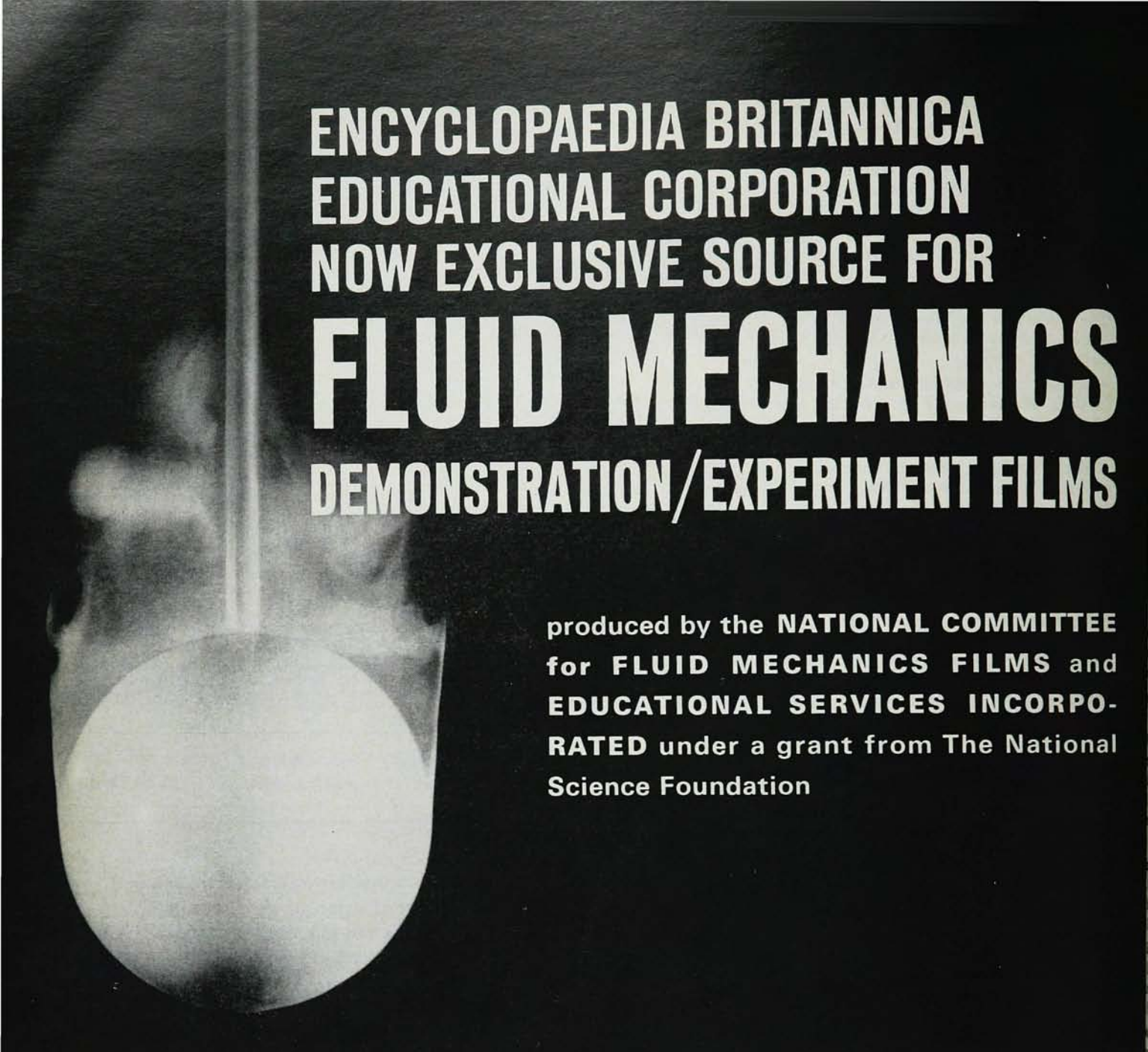
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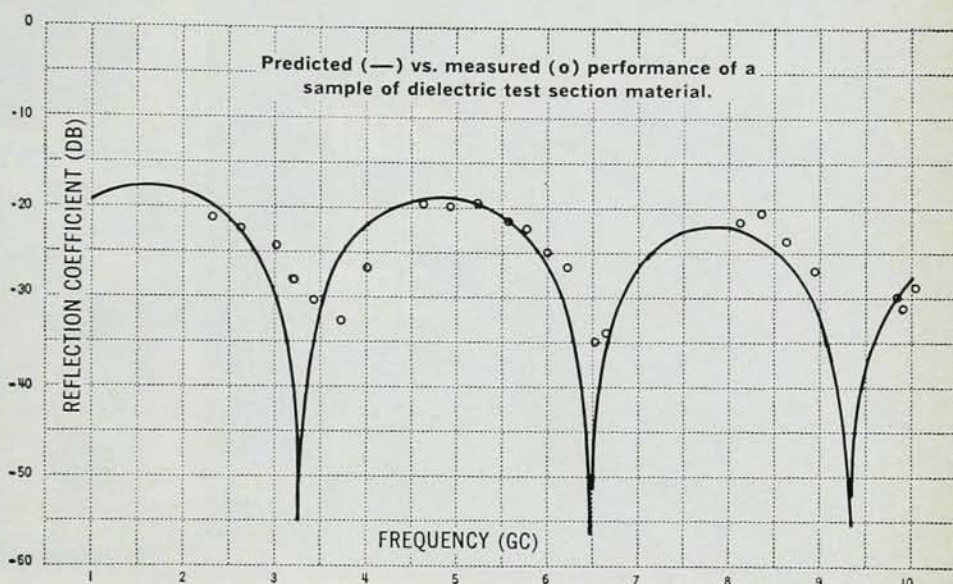
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