Laboratory Procedures

Progress in Microbiological Techniques. C. H. COLLINS, Ed. Plenum, New York; Butterworths, London, 1967. x + 231 pp., illus. $11.

Progress in Microbiological Techniques is another volume dedicated to presenting some of the techniques which have become commonplace in the microbiological laboratory. It is not a review of the progress made in developing new techniques in this field but rather an account of the current status of technology in the various facets of the science. A wide array of topics are included, as follows: "Complement fixation" (C. E. D. Taylor); "Fluorescent antibody techniques" (G. V. Heimer); "Freeze-drying methods" (D. W. G. Busby); "Assay of vitamins and amino acids" (S. A. Price); "Analysis of the bacterial cell" (A. C. Baird-Parker and R. C. S. Woodroffe); "Standardization of biological products by microbiological and serological methods" (P. B. Stones); "Gel diffusion and immuno-electrophoresis methods" (W. D. Brighton); "Yeasts and asexual fungi: some technical methods applying to their use in the brewing and antibiotic industries" (M. Richards); "Bacteriophage typing of *Staphylococci*" (Elizabeth H. Asheshov); "Recent advances in the bacteriological examination of water" (N. P. Burman); and "Serological methods in mycology" (A. G. Proctor).

Many manuals as well as books are already available wherein each of the above topics is dealt with more fully. Hence one might question the appropriateness of a short, single volume ranging from cytology to mycology to immunology. The virtue of the present volume may be in the very precise fashion in which the procedures are given. Numerous illustrations, protocols, and tabular data facilitate comprehension of the techniques.

Each chapter includes a substantial list of references which in itself is a valuable feature. Numerous citations are also made to sources of materials which are required for the performance of a specific procedure. This volume will, no doubt, provide a useful service to many individuals who find occasion to engage in areas of research outside their specific fields of specialization.

MICHAEL J. PELCZAR, JR.
Graduate School, University of Maryland, College Park

Many-Body Method

A Guide to Feynman Diagrams in the Many-Body Problem. RICHARD D. MATTUCK. McGraw-Hill, New York, 1967. xii + 294 pp., illus. $10.50.

The purpose of this book, most concisely described by its preface, "is to help bridge the pedagogical gap by providing an easy introduction to just one aspect of many-body theory, i.e. the method of Feynman diagrams." It succeeds very well. A beginner in the field can learn just through a reading of it what the crucial terminology means, how to interpret a diagram and translate it into mathematical terms, and what classes of diagrams might be considered most important in certain systems. For example, a term such as "quasiparticle," which tends to confuse the novice continually subjected to it at colloquia, is given a very reasonable, understandable description. The concept of a propagator and its importance to the many-body problems are worked out in nice physical terms so that it becomes a believable entity, rather than part of the credibility gap between experimentalists and theorists. Familiar, important problems are worked out in the new language at appropriate points (the Hartree and Hartree-Fock theories, for example, are incorporated in the chapter on Fermi systems).

The organization is also sensible. The first few chapters give enough information and examples to let the reader go into the structure of occupation number formalism, the Dyson equation, and finite-temperature situations with a feeling of confidence—no small accomplishment in a subject that has intimidated those who would like to understand it without becoming specialists. The possibilities for classroom use should be rather wide. The book could easily be adopted in graduate solid-state physics courses as a good supplement to lectures and as a reference. With lectures on general field-theoretic methods it could be used as supplementary reading to provide an example of a practical application of the abstractions studied.

A word should be said of the style, which is communicative, good-natured, and occasionally amusing in a pleasant unphysics-like way (none of those dreary quotations from *Alice in Wonderland* that seem totally unrelated to the chapter headings they follow).

ANGELO BARDASIS
Department of Physics and Astronomy, University of Maryland, College Park

Nuclear Reactions

Interaction of High-Energy Particles with Nuclei. Proceedings of the International School of Physics "Enrico Fermi," Course 38, Varenna, June–July 1965. T. E. O. ERICSON, Ed. Academic Press, New York, 1967. xiv + 330 pp., illus. $16.

The title of this course of lectures is somewhat misleading, since not all the material presented concerns the scattering of high-energy projectiles. The most attention is given to the study of elastic and inelastic electron scattering from nuclei, muon capture and muonic x-rays, hypernuclear physics, and some aspects of the theory of nuclear reactions at high energy.

The electron and muon are probes whose interaction with nuclei is well known. For these particles the interaction is weak, and the target structure effects are clearly separated from the description of the interaction mechanism. In the case of electron scattering or muon capture the experimental data provide a good deal of information concerning nuclear structure; properties such as electromagnetic transition rates and nuclear charge distributions are readily extracted from the data. In low-momentum transfer, elastic electron scattering determines the mean-square radius of the charge distribution, whereas high-momentum transfer experiments are sensitive to the charge distribution in the nuclear surface. The three-momentum transfer to the target may be varied for fixed energy loss of the electron; in this manner one can construct the Fourier transforms of the transition charge and current densities.

The study of the correlation structure of nuclei when distances between particles are small has been of continuing interest. In these lectures there is only a rather short treatment of this difficult problem. Some information concerning the influence of correlations on sum rules for electron scattering is presented by D. B. Isabelle. Other authors discuss the nuclear interactions involving an elementary particle and a pair of correlated nucleons.

It is somewhat disappointing that some of the recent work involving ap-

plication of the Glauber theory to the study of the influence of correlations on electromagnetic form factors and on nuclear scattering at very high energies has not been included.

There is some hope for understanding more about elementary-particle interactions from the study of their interactions with complex nuclei. For example, the study of hypernuclei provides some information concerning the interaction between the Λ-particle and the nucleon, information which is not obtainable from scattering experiments because of the short lifetime of the Λ-particle. Information concerning the Λ-Λ interaction may become accessible through the study of recently observed $\Lambda\Lambda$ hypernuclei. (The theoretical and experimental aspects of hypernuclear physics are reviewed by R. H. Dalitz and J. Sacton.)

D. H. Wilkinson provides a particularly clear review of methods for studying the properties of the nuclear surface. Questions pertaining to the nuclear charge and matter distribution in spherical and nonspherical nuclei are discussed, as well as the possible existence of correlated substructures, similar to α-particles, in the nuclear surface. It is interesting that measurements of nuclear size parameters from elastic electron scattering experiments and from μ-meson studies are in good agreement. Wilkinson expresses the hope that information obtained from the study of muonic x-rays and electron scattering may ultimately lead to a unique parameterization of the nuclear charged distribution.

The experimental and theoretical aspects of electron scattering, muon capture, and muonic x-rays are extensively discussed by J. D. Walecka, R. Engfer, C. Daum, U. Amaldi, Jr., and D. B. Isabelle. High-energy scattering theory is treated by I. S. Shapiro with the use of Feynman graphs. H. Feshbach discusses the semiclassical approach to high-energy scattering and provides some extensions of the Glauber theory.

The construction of optical potentials for elementary particles provides an interesting challenge for the theorist; research on the optical potential for pions is reported by T. E. O. Ericson. D. Koltun presents a short summary of some of his work on pion capture. There is also a discussion of cosmic rays by D. W. Sciama, and some new accelerator programs are briefly summarized by D. E. Nagle. The introduction to the volume is provided by A. de Shalit, who presents some speculations on the quark model.

Although much of the material in these lectures is available elsewhere in the literature, it is quite useful to have review articles that summarize the advances made in experiment and theory and point to the open questions. For this the volume will be useful to the student or the research scientist.

CARL SHAKIN

Department of Physics, Massachusetts Institute of Technology, Cambridge

Books Received

Air Pollution. Vol. 2, Analysis, Monitoring, and Surveying. Arthur C. Stern, Ed. Academic Press, New York, ed. 2, 1968. xx + 684 pp., illus. $35.

Air Transportation 1975 and Beyond. A Systems Approach. Report of the Transportation Workshop, 1967. Bernard A. Schriever and William W. Seifert, Cochairmen. M.I.T. Press, Cambridge, Mass., 1968. xviii + 516 pp., illus. $20.

A Brief History of Flying from Myth to Space Travel. Charles Harvard Gibbs-Smith. Her Majesty's Stationery Office, London, 1967 (distributed in the U.S. by British Information Services, New York). 77 pp., illus. Paper, $1.30.

A Chronicle of the Division of Laboratories and Research. New York State Department of Health. The First Fifty Years: 1914–1964. Anna M. Sexton. Stinehour Press, Lunenburg, Vt., 1967. xx + 252 pp., illus.

Dialogues on Fundamental Questions of Science and Philosophy. A. Pfeiffer. Translated from the German edition (Berlin, 1961) by Jutta Mendelssohn and Ursula Meadows. Pergamon, New York, 1967. xii + 128 pp.

Electrical Shock Waves in Power Systems. Traveling Waves in Lumped and Distributed Circuit Elements. Reinhold Rudenberg. Translated from the 4th German edition by Hanns J. Wetzstein. Harvard University Press, Cambridge, Mass., 1968. xvi + 336 pp., illus. $15.

Fossil Vertebrates. Papers presented to Dr. Errol I. White. Colin Patterson and P. H. Greenwood, Eds. Published for the Linnean Society by Academic Press, New York, 1967. viii + 260 pp., illus. $11.50.

Gammapathies, Infections, Cancer and Immunity. Proceedings of an international symposium, Milan, Italy, Sept. 1967. V. Chini, L. Bonomo, and C. Sirtori, Eds. Carlo Erba Foundation, Milan, 1968. viii + 95 pp., illus. Paper, 250 L.

Gem Identification Simplified. Richard M. Pearl. Maxwell, Colorado Springs, Colo., 1968. 43 pp., illus. Paper, $1.

Genetics of Fungi. Karl Esser and Rudolf Kuenen. Translated from the German edition (Berlin, 1965) by Erich Steiner. Springer-Verlag, New York, 1967. x + 500 pp., illus. $18.50.

Grundlagen der Tribochemie. Peter-Adolf Thiessen, Klaus Meyer, and Gerhard Heinicke. Akademie-Verlag, Berlin, 1967. 194 pp., illus.

Infrared Radiation. A Handbook for Applications with a Collection of Reference Tables. Mikaél' A. Bramson. Translated from the Russian edition (Moscow, 1964) by Richard B. Rodman. William L. Wolfe, Translation Ed. Plenum, New York, 1968. xiv + 623 pp., illus. $32.50.

Looking at History through Mathematics. N. Rashevsky. M.I.T. Press, Cambridge, Mass., 1968. xviii + 199 pp., illus. $10.

Man Faces His Destiny. Charles Leopold Mayer. Translated from the French edition (1967) by Heloise Norwell, J. S. Norwell, and D. C. Fox. Johnson, London, 1968. 246 pp. 30 s.

The Nucleus. Albert J. Dalton and Françoise Haguenau, Eds. Academic Press, New York, 1968. xviii + 244 pp., illus. $14.50. Ultrastructure in Biological Systems, vol. 3.

Science, Numbers, and I. Isaac Asimov. Doubleday, Garden City, N.Y., 1968. xiv + 226 pp., illus. $4.95.

Science, Technology, and Public Policy. A Selected and Annotated Bibliography. Vol. 1, Books, Monographs, Government Documents, and Whole Issues of Journals. Lynton K. Caldwell, William B. De Ville, and Hedvah L. Shuchman, Eds. Prepared for the National Science Foundation by the Program in Public Policy for Science and Technology, Indiana University, Bloomington, 1968. xii + 492 pp.

Seminar on Human Biometeorology. Papers presented at a seminar, Cincinnati Ohio, Jan. 1964. Sponsored by the National Center for Air Pollution Control and the Environmental Science Services Administration. U.S. Department of Health, Education, and Welfare, Washington, D.C., 1967. viii + 183 pp., illus.

Servicing Transistor Equipment. A Systematic Guide to the Servicing of Transistor Radio, Television, Tape and Hi-Fi Equipment. Gordon J. King. Hart, New York, 1968. viii + 151 pp., illus. $7.95.

Thorium Fuel Cycle. Proceedings of the 2nd International Thorium Fuel Cycle Symposium, Gatlinburg, Tenn., May 1966. Raymond G. Wymer, Coordinator. U.S. Atomic Energy Commission, Division of Technical Information, Oak Ridge, Tenn., 1968 (available from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). x + 839 pp., illus. Paper, $3.

"Torrey Canyon" Pollution and Marine Life. A Report by the Plymouth Laboratory of the Marine Biological Association of the United Kingdom. J. E. Smith, Ed. Published for the Marine Biological Association of the United Kingdom of Cambridge University Press. New York, 1968. xiv + 196 pp., illus. $9.50.

Tribal Education in India. Report of the National Seminar on Tribal Education in India, Rajasthan, Sept. 1965. Tribal Education Unit, Department of Adult Education, New Delhi, 1967. x + 221 pp.

II-VI Semiconducting Compounds. 1967 International Conference, Providence, R.I., Sept. 1967. D. G. Thomas, Ed. Benjamin, New York, 1967 xiv + 1489 pp., illus. $19.75.