

PROPAGATION AND INSTABILITIES IN PLASMAS

*The Seventh Lockheed Symposium
On Magnetohydrodynamics*

Edited by **WALTER I. FUTTERMAN**

Nine papers concerning recent experimental and theoretical results in the dynamics of plasma behavior, presented at the December, 1962 symposium. Contributors: S. J. Buchsbaum, R. A. Helliwell, S. E. Bodner and E. A. Frieman, B. Coppi, H. P. Furth, G. Rowlands, J. A. Fay, M. G. Haines and W. B. Thompson, and H. G. Ahlstrom. \$4.50

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presuppose a general knowledge of physics, and the reader is not left in doubt that for complete understanding he will have to dig deeper. However, the presented material will enable him to know where to dig. The level of presentation is such that an advanced graduate student should find the lectures stimulating and rewarding.

In addition to Alaga's contribution, the book contains the following lectures: Racah on mathematical techniques of shell-model calculations; Talmi on the independent-particle description; Mottelson on collective phenomena; Morpurgo on electromagnetic properties of nuclei; and Goldstone on the theory of nuclear matter. In addition, there are several short contributions on diverse subjects.

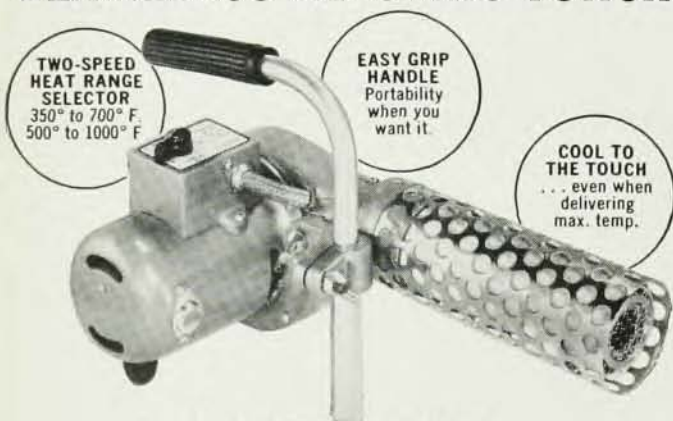
Finally, I do not know whether to praise, or to be critical of, the editors, the Italian Physical Society, for publishing the lectures in such a neat book form, since it seems to necessitate delay and considerable expense. Probably I should do the latter; it would have been more useful if the lectures had been issued with a smaller time delay and at a price which students could afford more easily.

Conjectures and Refutations. The Growth of Scientific Knowledge. By Karl R. Popper. 412 pp. Basic Books, New York, 1962. \$10.00. Reviewed by George E. Hudson, National Bureau of Standards, Boulder.

THE author's inquiry is a development of a theory of knowledge and its growth based on the central theme that "we can learn from our mistakes". In the light of this simple but powerful precept, he formulates and solves a whole series of philosophical problems. Popper points out that the tremendous variety of sources of knowledge, including empirical observation, inspired guess, journalistic authority, and dictatorial decree, are of no consequence in determining the validity of knowledge so obtained. With the question of how to detect and eliminate error goes the answer that all theories which purport to lead to knowledge must be subject to severe critical examination. If the theory corresponds with the facts, it is true. Thus, Popper is no believer in manifest truth. By the criterion of testability of a theory, he draws a sharp line between such theories and others like astrology, psychoanalysis, and racism. The verifiability of a theory and the feeling that it is therefore more probable are of very little scientific interest. A host of questions are considered, ranging from operationalism, determinism, relativism, and existentialism to dialectics and induction.

For the physicist, these considerations are of great but general interest, usually as philosophical background for teaching. Thus, Popper's approach is not of service in suggesting new physical theory but can be utilized for self-examination by a physicist who is tempted to put forward some new result, if he follows the criteria listed in the book. Popper's thesis seems to follow well-established principles of scientific method. Of still more interest is what he has to say in a nega-

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tive sense concerning some notions held by many physicists.

He takes to task the so-called instrumentalist view that knowledge is only a tool. Although later Einstein "repented", he was largely responsible for the widespread adoption of instrumentalism. Popper dismisses the closely related notion of operationalism by asserting that measurements presuppose theories. He is concerned with the naïve adoption of the instrumentalist "official view" of quantum theory held currently by most leading theorists and teachers of physics. He maintains that by adopting the Bohr principle of complementarity, they have accepted the subjective idealism of Berkeley and Bellarmine. Popper feels that this principle is ad hoc and has been completely sterile in

physics. Yet he does not believe in ultimate explanation by essences, but instead follows the theme set by Xenophanes twenty-five hundred years ago:

The gods did not reveal from the beginning
All things to us; but in the course of time
Through seeking, men find that which is the better.

But as for certain truth, no man has known it,
Nor will he know it; neither of the gods,
Nor yet of all the things of which I speak.
And even if by chance he were to utter
The final truth, he would himself not know it;
For all is but a woven web of guesses.

Only in this way can scientific knowledge grow.

BOOKS RECEIVED

ACOUSTICS

Molekularakustik. Eine Einführung in die Zusammenhänge zwischen Ultraschall und Molekülstruktur in Flüssigkeiten und Gasen. By Werner Schaafs. 497 pp. Springer-Verlag, Berlin, 1963. DM 78.

Random Vibration in Mechanical Systems. By Stephen H. Crandall and William D. Mark. 166 pp. Academic, New York, 1963. \$6.50.

Random Vibration, Volume 2. Summer Program (MIT, July 1963). Stephen H. Crandall, ed. 319 pp. M.I.T. Press, Cambridge, Mass., 1963. \$7.50.

Environmental Technologies in Architecture. (2nd ed.). By Bertram Y. Kinzey, Jr. and Howard M. Sharp. 788 pp. Prentice-Hall, Englewood Cliffs, N. J., 1963. \$16.00.

ASTRONOMY & ASTROPHYSICS

The Coming Age of Solar Energy. By D. S. Halacy, Jr. 241 pp. Harper & Row, New York, 1963. \$4.95.

Solar Flares. By Henry J. Smith and Elske v. P. Smith. 322 pp. (Collier-Macmillan, London) Macmillan, New York, 1963. \$12.95.

Interplanetary Dynamical Processes. By E. N. Parker. Vol. 8 of Monographs & Texts in Physics & Astronomy, edited by R. E. Marshak. 272 pp. Interscience, New York, 1963. \$12.50

Radio Astronomy. By J. L. Steinberg and J. Lequeux. Transl. from 1960 French ed. by R. N. Bracewell. 260 pp. McGraw-Hill, New York, 1963. \$9.95.

Origin of the Solar System. Conf. Proc. (New York, Jan. 1962). Robert Jastrow and A. G. W. Cameron, eds. 176 pp. Academic, New York, 1963. \$8.00.

CHEMISTRY & CHEMICAL PHYSICS

Colloidal Surfactants: Some Physicochemical Properties. By Kozo Shinoda, Toshio Nakagawa, Bun-ichi Tamamushi, Toshizo Isemura. Vol. 12 of Physical Chemistry, edited by Eric Hutchinson and P. van Rysselberghe. 310 pp. Academic, New York, 1963. \$11.50.

Ultracentrifugal Analysis in Theory and Experiment. J. W. Williams, ed. Conf. Proc. (Rockefeller Inst., June 1962). 282 pp. Academic, New York, 1963. \$10.00.

The Physics and Chemistry of Ceramics. Symp. Proc. (Penn. State U., May 1962). Cyrus Klingsberg, ed. 361 pp. Gordon & Breach, New York, 1963. Cloth \$14.50, paper \$9.50.

Techniques of Polymer Science. Symp. Proc. (London, Sept. 1962). 319 pp. (Soc. of Chemical Industry, London) Gordon & Breach, New York, 1963. \$13.50.

Magnetism and the Chemical Bond. By John B. Goodenough. 393 pp. Interscience, New York, 1963. \$12.50.

ELECTROMAGNETIC WAVES & ELECTRON PHYSICS

Low Noise Electronics. Conf. Proc. (Oslo, July-Aug. 1961). K. Endresen, ed. 359 pp. (Pergamon, London) Macmillan, New York, 1962. \$15.00.

Advances in Electronics and Electron Physics, Volume 17. L. Marton and Claire Marton, eds. 451 pp. Academic, New York, 1963. \$14.00.

Physics of Failure in Electronics. M. F. Goldberg and Joseph Vaccaro, eds. 255 pp. (Cleaver-Hume, London) Spartan, Baltimore, 1963.

HANDBOOKS, TABLES, ETC.

American Institute of Physics Handbook (2nd ed.) Dwight E. Gray, coordinating editor. 2062 pp. McGraw-Hill, New York, 1963. \$29.75.

HISTORY AND PHILOSOPHY OF SCIENCE

Ausgewählte Abhandlungen. Mit einem Verzeichnis der wissenschaftlichen Schriften. By Max Born. Vol. 1, 718 pp.; Vol. 2, 706 pp. Vandenhoeck & Ruprecht, Göttingen, 1963. DM 100 per set.

The Role of Science in Civilization. By Robert Bruce Lindsay. 318 pp. Harper & Row, New York, 1963. \$6.50.

La Notion de Temps. Equivalence avec l'Espace. By O. Costa de Beauregard. 207 pp. Hermann, Paris, 1963. 18 F.