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The Fundamental Constants of Physics, Vol. 1 of Interscience Monographs in Physics & Astronomy

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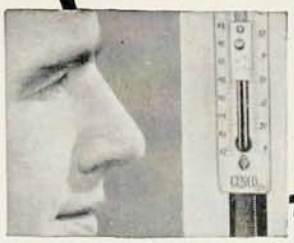

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and discussed. Considerable attention is given to non-stationary solutions, especially for pulsed excitation, the spin-echo techniques being treated very thoroughly. The quantum-mechanical theory is largely devoted to a lengthy survey of Van Vleck's work on line shapes in rigid lattices and to the Bloembergen theory of relaxation, which is given considerable elaboration. Quadrupole resonance is given a brief treatment.

The discussion of experimental methods is almost equally good, though somewhat more disjointed. Electronic techniques are very well treated; signal-to-noise ratios are calculated for various detection schemes, bridge circuits and regenerative detectors are discussed at length, and the design of rf heads is considered. Considerable space is devoted to material on the setting up, stabilization, homogenizing, modulation, and measurement of magnetic fields. The designs of several types of spectrometers are reviewed in detail.

The material on results and applications covers many topics, with a just sufficient degree of thoroughness. The classical material on determinations of spins and g factors is well-covered in a moderate space; the main emphasis is on effects giving line broadening, fine structure, and chemical shifts, with numerous applications to the elucidation of molecular structure in liquids and solids.

Everyone who is interested in nuclear resonance or its application will find this book rewarding reading and a valuable reference source. It may be confidently recommended.

The Fundamental Constants of Physics. Vol. 1 of Interscience Monographs in Physics & Astronomy. By E. Richard Cohen, Kenneth M. Crowe, Jesse W. M. DuMond. 287 pp. Interscience Publishers, Inc., New York, 1957. $7.50. *Reviewed by H. Mendlowitz, National Bureau of Standards.*

The title might sound somewhat drab and unexciting except to those whose interests are in the physical constants. However, the authors have been able to present in a very readable fashion the problems involved in delineating and defining the "fundamental" constants; the problems in the measurement of these constants; and the relationships among the various measurements. In this book one finds discussions of almost all aspects of what we may define as physics, and it is happily surprising that so much has been dealt with in so effective a manner as to hold the reader's interest; at least this reviewer found it so. The authors do not merely list the latest values of the fundamental constants (which in itself would be important), but they also introduce the reader to the history and reasoning behind the measurements. It is interesting to learn that very few of the prewar experimental data were good enough to be utilized in the present analysis.

This book is an expanded version of the article in Volume 35 of the *Handbuch der Physik* by the two senior authors (E. R. Cohen and J. W. M. DuMond). It is written in a more leisurely manner and is a better

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product. One of the major additions, the chapter on the masses of atoms and mesons, does not have the same "flavor" as the rest of the book, but this is probably because it had not been worked over as much by the authors as the other topics. The authors seem to be very much up to date on the literature—the results of the nonconservation of parity in weak interactions are mentioned.

This reviewer feels that the book is a very worthwhile addition to any scientific library.

Observation and Interpretation: A Symp. of Philosophers & Physicists (U. of Bristol, Apr. 1957). Vol. 9 of the Colston Papers. Edited by S. Körner with M. H. L. Pryce. 218 pp. (Butterworths, England) Academic Press Inc., New York, 1957. $8.00. *Reviewed by George Weiss, University of Maryland.*

Quantum mechanics and the theory of probability have this in common: formalism that has had astounding success in describing much of the empirically known world about us and the ability to provoke endless discussions about the philosophic implications of their success. This volume contains a complete record of the papers and subsequent discussion presented at the Ninth Symposium of the Colston Research Society at the University of Bristol on various topics which roughly overlap in quantum mechanics, probability, and their interpretation. As one might expect the result is a patch-quilt account of some current thinking in these fields.

From the physicist's point of view the potentially most interesting papers in this volume are on the recent proposals by Bohm for a "hidden-variable" interpretation of quantum mechanics. There are two papers on this subject included, one by Bohm and a second by J. P. Vigier, a collaborator in the development of the theory. Both Bohm and Vigier allude to calculations now in progress which would derive quantum mechanical laws from more fundamental considerations. Had these authors presented some concrete calculations their case might be more impressive; at present the arguments fall more into the category of shadowboxing. Many undiscovered phenomena in modern physics are conceivable but few are likely to be believed solely on philosophic grounds, even less so since the demise of the principle of sufficient reason at the hands of Yang and Lee. The paper following Bohm's by L. Rosenfeld is entitled "Misunderstandings About the Foundations of Quantum Mechanics". Rosenfeld is dogmatic in his rejection of Bohm's theory, on questionable grounds it seems to me, since he has not seen a definitive version of this theory.

The physical foundations of probability theory are just as controversial as those of quantum mechanics. It is generally conceded that the formalism of probability theory can be regarded as a subset of measure theory but there is little or no agreement of how we are to interpret the predictive power of probability theory in the case of a single flip of a coin or a bet on a horse race.

A paper by K. R. Popper, The Propensity Interpretation of the Calculus of Probability and the Quantum Theory, contains a good statement of a fairly recent interpretation which has attained some popularity among philosophers. According to Popper the probability of an event is the propensity of an experimental technique to give rise to certain characteristic frequencies when the experiment is often repeated. With this definition Popper goes on to show that the problems which occur in the foundations of quantum mechanics are closely related to those which occur in the nonformal foundations of probability theory. In the opinion of the reviewer Popper may have proposed a somewhat neater formulation of the problems of the foundations of probability theory but has not in any way given a solution.

In a very interesting and well-written paper, On Philosophical Arguments in Physics, S. Körner points out the distinction between a physical formalism and the underlying regulative nonexperimental principles which impel physicists to be more or less receptive to a given theory. Körner presents a brief argument against the positivist motion that all metaphysics is irrelevant to the natural sciences on a priori grounds.

Many other aspects of foundational problems are covered in this volume. There are papers on the quantum theory of measurement, on the role of statistics in quantum theory, on the dissection of linguistic usage à la logical positivism, and on the general relation between philosophy and the natural sciences. Although the level of the papers is very uneven, the volume as a whole is of some interest if only as an antidote against the current deluge of formalism in modern physics. Providing that one does not get entirely bogged down in the philosophic problems of physics, it is well occasionally to reflect on the wider implications of physical theories and view them in a wider perspective.

High-Speed Aerodynamics (Translated from Roumanian). By Elie Carafoli. 702 pp. Pergamon Press, London & New York, 1957. $15.00. *Reviewed by Robert E. Street, University of Washington.*

This book is a translation into English of the original Roumanian edition without any identification of the translator. It is printed in Roumania and apparently Pergamon Press imports the sheets which they bind and distribute in the Western countries. The quality of paper and print is not as high as would be expected from Western printers. The quality of the English used is very good, indicating a competent translator although his task was considerably lessened due to the extremely high density of mathematics. Every step in the calculations and derivations is so carefully worked out that the reader should have little trouble in following the argument. This is a good treatment for a second graduate course in compressible aerodynamics of a perfect

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