

*Paul Ehrenfest's*

THE CONCEPTUAL FOUNDATIONS  
OF THE STATISTICAL APPROACH  
IN MECHANICS

"... a celebrated article which the late Paul Ehrenfest prepared in collaboration with his wife Tatiana Ehrenfest for the German *Encyclopedia of Mathematical Sciences*. The article appeared in 1912 and has since become a classic. In spite of the passage of time it has lost little of its scientific and didactic value, and no serious student of statistical mechanics can afford to remain ignorant of this great work."—*from the Foreword by M. Kac and G. E. Uhlenbeck*. Translated by Michael J. Moravcsik.

130 pages, \$3.00 postpaid

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tion of the tracks of a positron-electron pair is provided (when the ends of the tracks cannot be seen) by the inelastic, large-angle scattering of an "ordinary" electron, that this (quasi-ambiguous) phenomenon is to be seen whenever electron tracks of whatever origin are photographed (with a magnetic field), and that even when a pair-producing source is being employed, it is of much more frequent occurrence than genuine pair-production in the gas of the chamber (unless very high pressures are used).

Professor Wilkinson's characteristically light-hearted remark "all sorts of people saw positrons . . ." must be judged correct, in so far as cosmic-ray positrons (and others) must certainly have produced tracks in expansion chambers, ever since C. T. R. Wilson, in 1923, showed how these could be operated at full sensitivity. But, in Professor Hanson's context, this statement is trivial, and beside the point. So far as the argument of this book is concerned, the author has entirely failed to convince. Professor Skobel'tzyn should have the last word: "No one else contrary to what you state did it at that time."

That should be the last word of this review, but it must also be stated that the experimenter will raise his eyebrows many times, in other places, whilst reading this book. Let him refer to pp. 6, 31, 33, 46, 56, and 140 for examples of some remarkable confusions.

Professor Hanson produces some telling epigrams: "As historians know, the primary-secondary distinction dissolved in George Berkeley's inkwell" (p. 50), "diffuse hunches that God isn't a dice-player" (p. 196), "Logicians can talk science to death"—but more is required here than an epigram, however much truth it may enshrine.

**Physical Adsorption of Gases.** By D. M. Young and A. D. Crowell. 426 pp. Butterworths, Washington, D. C., 1962. \$13.00. *Reviewed by Stuart A. Rice, University of Chicago.*

**ALTHOUGH** all bodies are necessarily bounded by surfaces, our knowledge of the surface state is meager. Of the many possible methods of studying surfaces, the adsorption of gases has been the most popular for many years.

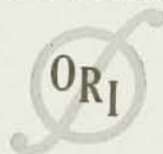
*Physical Adsorption of Gases* is an exhaustive survey of adsorption phenomena of gases on solids with extensive references to the literature and discussion of data. Except for the first chapter, the level of the book is uniform and suitable for use by graduate students. The first chapter is somewhat out of place in that it contains much elementary material which would presumably be known by those likely to use the rest of the book. The book contains very good discussions of experimental methods (but no mention of low-angle x-ray scattering techniques), a good discussion of the thermodynamic description of adsorption, and an adequate but sketchy treatment of the statistical theory of adsorption. The book would be improved if the treatment of the statistical theory were more detailed and if more



## DECISIVE THOUGHT

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emphasis were given to the very recent work on surface phenomena using field-emission microscopy. Although the work of Gomer and Ehrlich is mentioned, it is not treated in enough detail.

To summarize, *Physical Adsorption of Gases* is a useful text which can be recommended as a convenient summary and compilation of much of what is known about the adsorption of gases on solids. Although suitable for use by graduate students, the specialization of the subject makes the text of interest primarily to research workers in the field.

**Topics of Modern Physics.** Vol. 1, Geometrodynamics. By J. A. Wheeler. 334 pp. Academic, New York, 1962. \$6.50. Reviewed by R. Bruce Lindsay, Brown University.

**I**N spite of the important role it plays in our daily lives and its key position in macroscopic physics, gravitation remains a tantalizing mystery by no means entirely cleared up by the Einstein general relativity theory of 1916. Moreover, the many attempts to tie in electrodynamics with gravitation, as for example, that of Einstein to create a "unified field theory", have failed to produce satisfactory results. The search for further light on this whole business, however, continues, and the book under review is concerned with one promising lead in this activity.

For the past eight years or so, Professor Wheeler and his students have been studying the geometry of curved empty space to see whether one might not construct out of this alone a model for mass as well as an electromagnetic field. The content of this study Wheeler calls geometrodynamics. The present book is a collection of four articles in this general area, reprinted from

*The Physical Review*, *Reviews of Modern Physics*, *Annals of Physics*, and *Rendiconti della Scuola Internazionale di Fisica*. In essence, the task of geometrodynamics is to look upon fields and particles not as foreign entities that move around in space and time, but rather as things that are actually constructed out of space itself. This is a view of physics which essentially harks back to the older geometrizing attempts of Riemann, W. K. Clifford, and Einstein. With great ingenuity Wheeler has theoretically constructed entities called *geons* out of electromagnetic radiation in free space. The resulting gravitational field can be shown to be sufficient to hold such an entity together, and it can move through space as a particle exhibiting mass. Wheeler has carried through the construction of various types of geons, and has investigated their properties in detail. He has also sought to extend the treatment to quantum geometrodynamics, with the obvious ultimate aim of fitting the "elementary" particles of high-energy physics into his picture. Unfortunately, this part of the program has so far not met with success.

Genuine comprehension of the details of Professor Wheeler's program and its promise of future accomplishment is possible only to those with a thorough background in general relativity and its associated tensor calculus. Nevertheless, the style is so clear and the physical ideas are so engagingly expressed that most physicists will find a great deal of rewarding reading in these articles. To be sure, the unwary must be warned against possible misinterpretation of such catchy but cryptic phrases as "mass without mass" and "charge without charge".

The publishers are to be congratulated on bringing together these interesting and significant papers in such readily available form.

## BOOKS RECEIVED

### ATOMIC & MOLECULAR PHYSICS

**The Modern Theory of Molecular Structure.** By Bernard Pullman. Trans. from 1953 French ed. by David Antin. 87 pp. Dover, New York, 1962. Paper, \$1.00.

### BIOPHYSICS & MEDICAL PHYSICS

**Self-Organizing Systems 1962.** Marshall C. Yovits, George T. Jacobi, Gordon D. Goldstein, eds. Conf. Proc. (Chicago, May 1962). 563 pp. Spartan, Washington, D. C., 1962. \$12.00.

**Electrophysiological Methods.** Part B of Volume 6 of Physical Techniques in Biological Research. William L. Nastuk, ed. 425 pp. Academic, New York, 1963. \$14.50.

**Research Problems in Biology: Investigations for Students.** Prepared under the director of the American Institute of Biological Sciences. Series 1, 232 pp. \$.95; Series 2, 240 pp. \$.95. Doubleday Anchor, Garden City, N. Y., 1963. Both paper.

### ELECTRICITY & MAGNETISM

**Electromagnetic Waves in Stratified Media.** By James R. Wait. Vol. 3 of Internat'l Series of Monographs on Electromagnetic Waves, edited by A. L. Cullen, V. A. Fock, J. R. Wait. 372 pp. Pergamon, London, 1962. Distr. in US by Macmillan, New York. \$15.00.

**Alternating Current Polarography and Tensammetry.** By B. Breyer and H. H. Bauer. Vol. 13 of Chemical Analysis, edited by P. J. Elving and I. M. Kolthoff. 288 pp. Interscience, New York, 1963. \$12.00.

**Magnetic and Electric Resonance and Relaxation.** Proc. of Colloque Ampère, (Eindhoven, July 1962). J. Smidt, ed. 789 pp. (North-Holland, Amsterdam) Interscience, New York, 1963. \$25.00.

**Fundamental Electromagnetic Theory** (2nd ed; formerly titled: *Electromagnetic Engineering*). By Ronold W. P. King. 580 pp. Dover, New York, 1963. Paper \$2.75.

**Gas Discharges and the Electricity Supply Industry.** Conf. Proc. (England, May 1962). J. S. Forrest, P. R.