

The writing of a book requires a great deal of time and labor. To write one on a subject which is poorly understood and which is changing rapidly can only be construed as the act of a brave man, and we should all be grateful to Professor Brout for having provided us with the text in question.

Lectures on General Relativity. Summer School Proc. (Brandeis U., 1964). By A. Trautman, et al. 459 pp. Prentice-Hall, Englewood Cliffs, N. J., 1965. Paper \$5.00. Reviewed by Jacques E. Romain, Centre de Recherches Routières, Sterrebeek, Belgium.

The proceedings of the 1964 Brandeis Summer Institute of Theoretical Physics consist of two parts, devoted respectively to general relativity and to quantum field theory. This first volume is made up of three lectures by outstanding specialists. Pains have been taken to integrate the contributions and to provide cross-references among them.

A. Trautman's "Foundations and Current Problems of General Relativity", which takes over half the space, is a full book in itself. It constitutes a self-contained and up-to-date course covering the essential aspects of general relativity. It is written at a high level and contains brief expositions of the required mathematical tools. The approach is decidedly geometric. Trautman's exposition is one of the best available introductions to the new formalism which has recently invaded the field and which may obscure the physics behind the theory unless the physical interpretations of the mathematical concepts are clearly grasped. The author's profound remarks will be a great help in this respect. In order to take full profit from this presentation, the reader should have a reasonable advance knowledge of standard general relativity.

F.A.E. Pirani contributes a sizable and authoritative introduction to gravitational wave theory. Again the theoretical level is high. The author begins with physical aspects, then introduces spinors and bases the bulk of his exposition on spinor formalism.

Under the title "Some Special Solutions of the Einstein Equations", H.

Bondi presents not a complete and systematic exposition, but a beautiful, crystal-clear, and humorous discussion of the principles of both special and general relativity, followed by an analysis of problems principally related to gravitation-wave emitters and receivers. His purpose is to make the reader feel the physics behind the formalism, and to conjure away the "black magic" feeling. The approach is stimulating and illuminated by a lot of cleverly presented thought experiments. This essay is very good reading for anyone, including the seasoned specialists.

It is good fortune that such a unique and consistently excellent book is available at a moderate price. It must not be absent from the bookshelf of any relativist, even though it is, quite unfortunately, not provided with a subject index.

Progress in Optics, Volume 4. E. Wolf, ed. 327 pp. (North-Holland, Amsterdam) John Wiley, New York, 1965. \$13.50. Reviewed by H. E. J. Neugebauer, Xerox Corporation, Brussels.

Many are the branches of optics. This is evidenced by every new volume of *Progress in Optics*. Its editor does not seem to forget a single one. Volume 4 offers articles ranging from abstract theory to experimental studies almost falling into the field of chemistry. A critical remark may be in place: The volume would certainly have gained if the editor had had the time to rewrite two or three of the articles. He has demonstrated in his book and many scientific publications how lucid a writer he is.

Focke's clear and concise review of higher-order aberration theory can be recommended as summary for the experts and as introduction for the reader less familiar with this branch of optics. It is a welcome supplement to M. Herzberger's publications on the subject. Bryngdahl's "Applications of Shearing Interferometry" reflects the author's mastery of the subject, both experimentally and theoretically. Many people might think that surface deterioration of optical glass by chemical reactions is hardly a field of optics. Yet, Kinoshita's article should be read by everybody concerned with the design and use of optical systems. It

is also proof that a less known field may be represented in a way arousing the interest of an uninitiated reader. The article on optical constants of thin films by Rouard and Bousquet is remarkable for drawing a clear line between older determinations of optical constants based on erroneous assumptions and incomplete theories as opposed to more recent work. Much of the older work is relegated to that of historical interest. The reader obtains a vivid impression of how much must still be done after the older work has lost some of its value. Wedford's "Aberration Theory of Gratings and Grating Mountings" leaves the reader with the impression that this is one of the simplest chapters of optics. Yet, nothing of importance seems to be omitted.

Two articles are concerned with diffraction theory. Both authors, Rubinowicz on the Miyamoto-Wolf diffraction wave and Kottler on diffraction at a black screen, are given to reminiscing. Rubinowicz renders a good account of the modern theory of the diffraction wave in scalar, electromagnetic, and quantum field theory. Unfortunately, his melancholy statement that an ingenious theory sometimes produces little effect in related branches of physics may prove correct. Kottler confines himself to older scalar theories. It is hoped that the promised second part will include all the modern developments, both, in theory and experiment.

Studies in Penetration of Charged Particles in Matter. 388 pp. National Academy of Sciences—National Research Council, Washington, D. C., 1964. Paper \$7.00. Reviewed by J. E. Mansfield, Harvard University.

Often a program of preparing a state-of-the-art report so stimulates research that it is nearly impossible to produce a timely report. The fast pace of developments has brought about such a situation since a subcommittee of the NRC Nuclear Science Committee undertook to unify the extremely varied recent results in one of the pioneer branches of modern physics. The result is this collection of twelve reports in considerably greater detail than is usual in the literature. Fano's reprinted review of the theory of