THREE BOOKS ON RELATIVITY

The Mathematical Theory of Relativity. By A. S. Eddington. Cambridge, University Press, 1923. VI + 247 pp.

The Meaning of Relativity. By Albert Einstein. Translated into English by E. P. Adams. Princeton University Press, 1923. 123 pp.

The Theory of General Relativity and Gravitation. By L. Silberstein. New York, Van Nostrand, 1922. IV + 141 pp.

In attempting a combined review of these three books, I do not wish to give the impression that each does not merit extensive consideration. However, there are necessarily many points of similarity, and by pointing these out and emphasizing the differences I may be able to give an idea of the character of each book. Eddington's book is by far the most comprehensive and contains practically all of the mathematical treatment appearing in the other books, but the latter contain many helpful and stimulating observations and interpretations.

Einstein recalls in his first lecture some of the more fundamental ideas and equations of pre-relativity physics, and converts them into tensor form. In the second lecture the equations for the same physical concepts as interpreted in special relativity are given tensor form. This should be particularly helpful to those, who, not being entirely familiar with mathematical processes, have tried to acquire a knowledge of tensor analysis from the general treatments, such as was given by Einstein in his 1916 paper, and is largely followed in the books under discussion (Eddington, Chapter 2; Einstein, Lecture 3; Silberstein, Chapter 3). After following the first two lectures the reader begins to feel that, as Eddington says (3), "our knowledge of conditions in the external world, as it comes to us through observation and experiment, is precisely of the kind which can be expressed by a tensor and not otherwise." He may not yet be prepared to agree with the last part of this statement, but as he comes to appreciate the effective use which Einstein has made of tensor calculus in his general theory of relativity, he is forced to the conclusion that here is a great contribution to mathematical physics. Scientists may agree or not with Einstein's interpretation of his equations as regards the character of physical space and, in particular, the significance of the well known crucial tests of his theory, but they cannot afford to ignore the guidance of tensor calculus in their attempts to give mathematical formulation to the results of experiment.

The postulates and ideas of special relativity are set forth, more or less briefly, by all three authors in preparation for the transition to general relativity. In their generalized form the postulates may be stated in the explicit form: