

REVIEWS

- Einstein's Theory of Relativity.* By MAX BORN; trans. HENRY L. BROSE. New York: E. P. Dutton & Co., 1922. Pp. 290. \$5.00.
- Relativity for Physics Students.* By G. B. JEFFERY. New York: E. P. Dutton & Co., 1924. Pp. 150. \$2.40.
- Relativity and Gravitation.* By T. PERCY NUNN. London: University of London Press, 1923. Pp. 162. \$5.00.

Professor Born's book presents, within the technical limits set for it, a thorough welding of the main physical ideas of relativity and their antecedents in pre-relativity physics. It succeeds in preserving a rare balance between the points of view of the experimental and the speculative methods. The author takes pains to make clear his position in regard to the "physical reality" of admissible concepts. As an example we cite a passage on page 189 where, in discussing the mooted question of the aether, Professor Born remarks ". . . Theorists may use their own judgment in equipping a vacuum with phase quantities (denoting state), fields, or similar things, with the one restriction that these quantities serve to bring changes observed with respect to material things into clear and concise relationship." Expressions such as this prepare the way gradually for the abstract character of much modern theory.

The fact is that the main emphasis of this book falls on the process of historical amalgamation referred to above. The selection of material from the fields of mechanics, optics, electrodynamics, and the theory of electrons is such as to lead the reader logically and inevitably to just those rifts in the foundations that necessitated the reformulation of principles embodied in the special and general theories of relativity. In this treatment the physical and pictorial sides stand out with unusual clearness. Professor Born has, however, set himself the extraordinarily difficult task of presenting such theories as those of Maxwell and Einstein without using the mathematical theory of limits, or, for that matter, the elementary trigonometric functions. The result is that he is forced to advise the reader to consider Maxwell's field equations as "mnemonics." This procedure is very bold in its application to the general theory of relativity, where it is necessary to pass from a finite geometry to a differential one. It may be questioned whether the book presents to the non-mathe-