

outlined in the three extracts quoted above, and in the author's article dealing with mass and force (pages 116-118) there is a corresponding haziness of outline. It is distinctly unfortunate that the only definition of force given in the book is that of Newton, "Force is anything which changes or tends to change a body's state of rest or of uniform motion in a straight line." That this definition almost immediately precedes Maxwell's definition of equal masses quoted above, makes the omission still more serious. Still, the work should rank as the most important contribution of late years to the teaching of elementary mechanics.

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Theorie der Elektrizität. Von M. ABRAHAM. Zweiter Band :
Elektromagnetische Theorie der Strahlung. Zweite Auflage.
Leipzig, Teubner, 1908. xii + 404 pp.

THE earlier edition of Abraham's Theory of Electricity was reviewed in these pages,* and no very extensive mention of the present edition seems needed. Although the number of pages in 1908 remain identical with that of 1905, and neither the titles nor the numbers of the sections are disturbed until the last quarter of the book, there have been introduced into the new edition some considerable and important alterations and improvements aimed to keep the work up to date. A saving here and there of about 18 pages up to the point where the author discusses phenomena in moving bodies and a thorough rewriting of the theory of moving bodies enables him to give to this subject the careful and critical discussion which its rapid advance and numerous controversies of the last few years necessitate. As points of especial interest may be mentioned the presentation of the equations of Lorentz, Cohn, and Minkowski with a discussion of their individual characteristics, the development of the dynamics of the Hohlraum, the treatment of local time, and the investigation of the principle of relativity. These matters are all still under critical discussion in the scientific world and are perhaps likely to remain in the spotlight for some time. The account here given by Abraham seems particularly valuable in that it enables the reader to get a good knowledge of the subjects from a single author and a single reference.

The principle of relativity is an interesting hypothesis and

* BULLETIN, 2d ser., volume 14 (1908), pp. 230-237.

has probably taken a grip upon pure mathematicians to a considerable extent since it was mathematically formulated by Poincaré and Minkowski. It would be particularly interesting to know *just* what this principle is. Many a person seems to have a general idea as to what it is, and the general ideas seem in a general way to be very much the same; but it is doubtful if these various persons agree in the details of their ideas on the subject. For instance, if we understand correctly the point of view of Poincaré, it is an essential element of the principle of relativity that the transformations of Lorentz form a group; whereas we find Abraham stating that Cohn's theory also satisfies the principle of relativity, and Cohn's transformations do not form a group. From Lorentz's point of view of motion relative to an ether, the principle of relativity appears as a physical theorem; for some more recent writers it appears to be a metaphysical principle or at least a psychological theorem. The whole matter needs an exhaustive analysis. In his closing remarks Abraham seems to suggest that a different procedure be employed according as electrons or ponderable bodies are considered. This might avoid some difficulties at present but is not finally satisfactory from a scientific point of view.

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CORRECTION.

IN Dr. W. B. Carver's paper on "Degenerate pencils of quadrics" in the BULLETIN for July, 1909, the first sentence of the third paragraph on page 486 should read: Proper configurations exist for types 1, 2, and 4, and do not exist for types 3 and 5.