

THE THEORY OF ELECTRICITY.

Theorie der Elektrizität. Von M. ABRAHAM. Erster Band: *Einführung in die Maxwellsche Theorie der Elektrizität.* Von A. FÖPPL. Zweite, vollständig umgearbeitete Auflage. Von M. ABRAHAM. Leipzig, B. G. Teubner, 1904. xviii + 443 pp.

BEFORE this, we have had occasion to praise Föppl's lectures on technical mechanics.* His treatise on electricity is no less deserving. When this first appeared in 1894 it was, at all events for Germany, a new departure. Vector analysis was consistently employed throughout, and the point of view of Maxwell, which was so long in winning its proper recognition on the continent, was unequivocally and wholly adopted, even for elementary instruction. It must be a cause of gratification to Föppl to find a new edition called for in less than a decade; and to us it should be a matter for rejoicing that the new edition is not merely an improvement on the old, but an extension of it so as to form in two volumes a really modern treatise on electricity and magnetism from the Maxwell-J. J. Thomson point of view.

The theory of electrons and the atomic nature of electricity have recently become so firmly established as a highly valuable, if not yet indispensable, interpretation of nature, that a connected treatise beginning with the equations of Maxwell and leading through the motion of charged bodies to the consideration of atomic electricity and electrical mass is justified and necessary. Undoubtedly the present work will contribute to the popularization and ultimate adoption of the points of view for which it stands. Abraham, well known for his researches along just these lines, is peculiarly fitted to undertake this revision and enlargement of Föppl's treatise. The task has not been small. It has been ably executed.

The first section, containing the theory of vectors and vector fields, has been so amplified as to give the reader a summary exposition of those theorems in dynamics and hydrodynamics which form the basis of present views of electrical action. Surfaces of discontinuity, divergence, curl, and their relation to the theory of double layers (*Doppelschichten*, *couches doubles*) have their due attention. It is pointed out that the divergence and curl of a vector function \mathbf{V} are given by the formulas

* Reviewed in this BULLETIN, vol. 9, pages 25-35.