RÖNTGEN RAYS: MEMOIRS BY RÖNTGEN, STOKES, AND J. J. THOMSON

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GEORGE F. BARKER

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HARPER'S SCIENTIFIC MEMOIRS

EDITED BY

J. S. AMES, PH.D.

PROFESSOR OF PHYSICS IN JOHNS HOPKINS UNIVERSITY

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TRANSLATED AND EDITED BY

GEORGE F. BARKER, LL.D.
PROFESSOR OF PHYSICS IN THE UNIVERSITY OF PENNSYLVANIA

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PREFACE

THE new kind of radiation known as X-rays, or Röntgen rays, from the name of their discoverer, were first observed and studied by Professor W. C. Röntgen, of the University of Würzburg, in 1895, and the announcement of their discovery was made in a paper which appeared that year, and which is reprinted in this volume. As was noticed later these radiations had been previously detected and some of their properties noted by other observers, notably Professor Lenard; but it is to Röntgen that we owe the first systematic study of the methods of production and of the remarkable properties of these rays. Nearly all the general properties, both positive and negative, were investigated by Röntgen and carefully stated. These results are contained in the first three pages of this volume.

The most important experiments, however, and those which have led to the most important conclusions, were made by Professor J. J. Thomson, of Cambridge. They proved the fact that a dielectric traversed by these radiations became a conductor, or, in other words, was ionized. This discovery in the hands of Professor Thomson and his students has led to a series of most interesting and important researches, all bearing upon the intimate connection between matter and electricity.

Many hypotheses have been advanced to account for the peculiar properties of the X-rays. Röntgen himself at first was favorably inclined to the idea that they were waves due to longitudinal vibrations in the ether, but later he was convinced that they were essentially identical with light waves—that is,

with transverse waves in the ether. There were grave obstacles, from many stand-points, to either of these theories, and the first suggestion which seemed to offer a satisfactory explanation of all the properties of the rays came when, instead of waves, the idea of pulses in the ether was introduced. This idea in its simplicity is that the cathode rays being negatively charged and travelling with great velocity, give rise to intensely sudden disturbances in the ether when their motions are stopped by reaching a solid obstacle. These disturbances are of the nature of irregular pulses, and their properties are quite different from those of regular trains of waves.

This idea of accounting for Röntgen rays by the theory of pulses occurred almost simultaneously to Sir George Gabriel Stokes, to Professor J. J. Thomson, and to Professor Lehmann, of Karlsruhe. Stokes's paper, in which he explains his theory, is reproduced in full in this volume, as are also the essential portions of Professor Thomson's article.

GENERAL CONTENTS