radioactive substances do not emit secondary radiations to an abnormal extent. It is clear that there is a sharp line of distinction between the emission of an electron from an atom as a primary β ray, and the emergence of an electron from an atom as a secondary β ray. On our hypothesis the origin of the distinction is simply that in the former case the electron was part of the atom which ejected it; in the latter case, it was no part of the atom: it came in with the exciting ray. All the experimental evidence accords with this view. We come very close to the complete realization of an anticipation made twelve months ago (Trans. Roy. Soc. of S.A., May 7, 1907, pp. 84, 85): "All secondary radiation, other than the δ rays, seems to be in general a rough reflexion or scattering of the primary. . . . The only cases in which a secondary radiation appears, that is neither δ radiation nor reflected primary rays, are those in which β rays are produced at the impact of X- or γ rays, and in which X-rays are produced by cathode rays. . . . It may well be that further research will bring these cases into better agreement with the rest." On the neutral-pair hypothesis the exceptions mentioned here practically disappear. There remains a broad generalization, which, with all the faults natural to its kind, seems to us to be applicable to every case of which we have knowledge, and to be an important principle of the theory of secondary radiation.

LXXIX. *On the Principle of Relativity.* *A Reply to* Mr. E. Cunningham. *By* A. H. Bucherer*.

NOTWITHSTANDING my objections Mr. Cunningham, in the September number of this Magazine, still asserts that my principle of relativity leads to the same forces as the Lorentz-Einstein principle. *Mr. Cunningham seems not to have noticed that the forces on moving electrons are quite different.* Take the concrete case realized in experiments, and let Becquerel rays traverse a uniform magnetic field. The force on the electron, according to my principle, is

$$\frac{\epsilon H u \sin\alpha}{1-\frac{u^2}{v^2}\cos^2\alpha},$$

whereas according to Lorentz the force is

$$\epsilon H u \sin\alpha.$$

* Communicated by the Author.

Referring to my first paper on the subject in this Magazine, I had from the first recognized that the question, which of the various theories represented the law of nature, was one for experiment to decide. I have completed the experiments foreshadowed*, and in contradiction to Kaufmann have verified the substantial accuracy of the Lorentz formula for the electromagnetic mass, and therefore also of the Lorentz-Einstein principle of relativity, since the only serious objection to its complete acceptance has been removed.

Bonn University, Oct. 5, 1908.

LXXX. *On a Method of Showing Fluorescent Absorption directly if it exists. By* R. W. Wood, *Professor of Experimental Physics, Johns Hopkins University*†.

THE question as to whether the fluorescence of an absorbing medium modifies in any way its absorption appears to be still unsettled. Burke's experiments with uranium glass‡ appeared to show that a block of the glass, when excited to fluorescence by a transverse beam of light, absorbed the fluorescent light of a second block of the same glass more strongly than when unilluminated. More recent work by Nichols and Merritt§ showed the same effect in the case of solutions of fluorescein, and apparently confirmed the discovery of Burke. They made use of the spectrophotometer, measuring the intensity of the light of the fluorescing solution alone (F), the intensity of a source of light seen through this solution when not stimulated to fluorescence (T), and the intensity of the fluorescence plus that of the source when seen through the fluorescing solution (C). It is obvious that if the absorption is not modified by the fluorescence, we shall have $F+T=C$. They found, however, that in practically every case C was less than F+T. Similar results were obtained by Miss Wick‖, with resorufin, working in the same laboratory. Camichel¶ has, however, been unable to find any trace whatever of the effect, using similar methods.

* Phil. Mag. ser. 6, vol. xiii. p. 419 (April 1907).
† Communicated by the Author.
‡ Phil. Trans. cxci. p. 87 (1898).
§ Phys. Rev. xviii. p. 447 (1904).
‖ Phys. Rev. xxiv. p. 407 (1907).
¶ *Compt. Rend.* cxl. p. 139 (1904).