

On the Interaction of Elementary Particles. II.

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§1. Introduction and Summary.

In the first part of this paper,<sup>1)</sup> one of the present authors introduced a new field, which was responsible both for the short range force between the neutron and the proton and for the  $\beta$ -disintegration. This field turned out to be accompanied by quanta, <sup>each</sup> with the elementary charge either  $+e$  or  $-e$ , the mass about  $1/10$  of that of the proton and  $0$  or integer spin, obeying Bose statistics. It was shown further that such quanta, if they ever existed, could not be emitted by ordinary nuclear reactions, but might be present in the cosmic ray. There had been no evidence in favour of the last point, until recent researches of Anderson and Neddermeyer,<sup>2)</sup> Street and Stevenson,<sup>3)</sup> and Nishina, Takeuchi and Ichimiya<sup>4)</sup> indicated the existence in the cosmic ray of particles, which <sup>could</sup> ~~can~~ be identified neither with the electrons nor with the protons, as long as we accept <sup>ed</sup> the present theory of energy dissipation of high speed particles. Thus it seems <sup>likely that they are the</sup> ~~to be reasonable to identify these~~ particles with heavy quanta above considered.<sup>5)</sup> Similar conclusions were

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- 1) Yukawa, Proc. Phys.-Math. Soc. Japan 17, 48, 1935. ~~Here~~ Hereafter, this paper will be referred to as I.
  - 2) Anderson and Neddermeyer, Phys. Rev. 50, 273, 1936; 51, 884, 1937.
  - 3) Street and Stevenson, *ibid.* 51, 1005, 1937.
  - 4) According to the preliminary result of Nishina and others, the mass of the new particle is about  $1/10$  the protonic mass in fair agreement with the theoretical expectation.
  - 5) Yukawa, Proc. Phys.-Math. Soc. Japan 19, 712, 1937.