The Electron-Photon Cascade Shower in Lead Absorber

S.Dake

Department of Physics, Kobe University, Kobe,

K.Mizutani

Department of Physics, Saitama University, Urawa,

I.Ohta

Faculty of Education, Utsunomiya University, Utsunomiya,

M.Sakata and Y.Yamamoto

Faculty of Science, Konan University, Kobe,

and

T.Yuda

Faculty of Technology, Kanagawa University, Yokohama.

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The Purpose of the Experiment

The shower experiments so far performed with accelerator have been
mainly carried out to calibrate the efficiency of various detectors
with ionization chambers, scintillation probes, X-ray films and thermo-
luminescent dosimetry, so that these are limited to measure the average
behavior of shower development. But the purpose of our experiment is
to study the lateral and longitudinal development on each shower and
its fluctuation, measuring the shower electrons in nuclear emulsion
plates at various depth.

The main objectives of this experiment are

1) to study the lateral and longitudinal developments of shower
   particles in lead absorber with nuclear emulsion plates, and to
   compare with three-dimensional cascade theory,

2) to study the fluctuation of shower development at various depth,

3) to compare with the shower behavior in several GeV regions,

4) to measure the effects of shower development in inhomogeneous
   media.

Conditions required in This Experiment

1) Beam; parallel and mono-energetic electron beam.

2) Energy; two points at the maximum energy and about 100 GeV.

3) Amounts of irradiation; 5 - 10 particles/cm^2 on the detector.

4) Sield material; lead blocks (0.5 m^3 in total blocks) enough to
   shield the detector.

Duration of the Testing and Data-Taking

About two hours in our rough estimation.

Detector

The detector is constituted of nuclear emulsion plates and lead
plates which are piled up in the form of a stack. The schematic view
of the detector is shown in the figure. The geometrical size of the
detector is about 10 cm x 10 cm x 10 cm and the total thickness of lead
absorber is 16 radiation length.

SCHEMATIC VIEW OF THE DETECTOR

10 cm

10 cm

10 cm

Electron
Beam

Nuclear Emulsion Plate

Lead Plate (0.5 radiation length)