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Search for New Particles in Emulsion Chamber

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The Purpose of the Experiment

The specially designed emulsion chamber with producing layers has the very high spacial resolution compared with other particle detectors. The proposal of our experiment is to expose the emulsion chamber to the FNAL 400 GeV/c proton beam to investigate the multi-particle production processes. The main purpose of our experiment is to search for the new hadronic particles with mean lives in the range 10^{-11} to 10^{-14} seconds through their decay mechanisms among the multi-particle processes. The momenta of the charged particles are measured by multiple coulomb scattering in lead plates. Leptons are identified also in lead plates through the electro-magnetic processes.

The main objectives of this experiment are

- 1) to search for the new hadronic particles through their decay mechanisms and to estimate the cross section of them,
- 2) to investigate the angular correlation and also the N_{γ} - N_{ch} correlation of the produced particles in multi-particle processes,
- 3) to estimate the scattering constant of lead plates in this chamber by measuring the multiple coulomb scattering of the incident particles.

Conditions required in this Experiment

- 1) Beam; parallel and mono-energetic proton beam.
- 2) Energy; proton beam about 300 and 400 GeV.
- 3) Amounts of irradiation; $\ast 10^3$ and 10^4 particles/cm² on the detector.
- 4) Shield materials; lead blocks enough to shield the detector.

Duration of the Testing and Data-Taking

About two hours in our rough estimation.

Detector

The detector consists of two parts; upper and lower chamber. The upper chamber is constituted of nuclear emulsion plates which are piled up in the form of a stack. The lower chamber is constituted of nuclear emulsion plates and lead plates which are piled up alternatively. The schematic view of the detector is shown in the figure. The geometrical size of the detector is about 10cm \times 10cm \times 12cm and the total thickness of lead absorber is 12 radiation length. About four chambers are scheduled to be exposed.

SCHEMATIC VIEW OF THE DETECTOR

