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Interaction of 50-100 GeV Muons with Emulsion Nuclei

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Recently we have reported the direct-electron-pair production from the Coulomb field of an emulsion nucleus by 200 GeV protons[1] and 150 GeV muons[2] from the Fermi Laboratory and 15.8 GeV/c muons[3] from the Brookhaven National Laboratory, in order to test the predictions of the theories based on quantum electrodynamics at small distances. From most of the present theories[4-7], the predictions for electron production cross section depends on the ratio $\gamma(=E/m)$ and not on E and m separately or on the type of the incoming particle. Our recent results indicates that mass of the incoming particle is perhaps playing an important role. In order to check this point we would like to have two or three more muon beam exposures between 50-100 GeV at FNAL. These experiments will help us to settle the mass dependence question very clearly.

Exposure Details

For each beam we would like to expose a small stack of 15 pellicles of G-5. Ilford emulsions of dimensions 10 cm x 15 cm x 600 micron to a flux density of 5×10^4 particles/cm^2 side in such a way that the beam is parallel to the plane of the emulsion (along its 15 cm length). The pellicles shall be scanned along the tracks.

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