

DIMUON PRODUCTION BY PIONS AND PROTONS IN IRON
AND A SEARCH FOR THE PRODUCTION IN HYDROGEN OF
NEW PARTICLES WHICH DECAY INTO MUONS*†

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ABSTRACT

Dimuon production cross sections have been measured with a 200 GeV π^- beam and a 240 GeV proton (p) beam. The dimuon mass spectra produced by π and p have essentially the same shape. The dimuon transverse momentum behavior is essentially the same for vector mesons produced by π or by p. For ($\rho+\omega$) or ψ production the x (Feynman) behavior is approximately independent of the mass of the dimuon produced. The dimuon π production cross section is approximately 6 times greater than that of the p for $x > .5$.

Using a missing mass (M_m) technique, the same pion and proton beams were used to search for the production in hydrogen of new particles which decay with muon emission. Model dependent upper limits (50 to 7000 nanobarns) for the production of such objects with $2.5 < M_m < 7$. GeV are given (for charmed meson pair production M_m is the mass of the $D\bar{D}$ system).

INTRODUCTION

This talk is a report on the results from two experiments for which the data were collected simultaneously in the M2 beam line of the Meson Laboratory at Fermi National Laboratory. Data were taken with a negative pion beam at a momentum of 200 GeV and a proton beam at a momentum of 240 GeV on the following reactions:

$$\pi^- + \text{Fe} \rightarrow \mu^+ + \mu^- + \text{anything} \quad (1)$$

$$p + \text{Fe} \rightarrow \mu^+ + \mu^- + \text{anything} \quad (2)$$

$$\pi^- + p \rightarrow p_{\text{recoil}} + Y \rightarrow \mu + \text{anything} \quad (3)$$

$$p + p \rightarrow p_{\text{recoil}} + Y \rightarrow \mu + \text{anything} \quad (4)$$

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