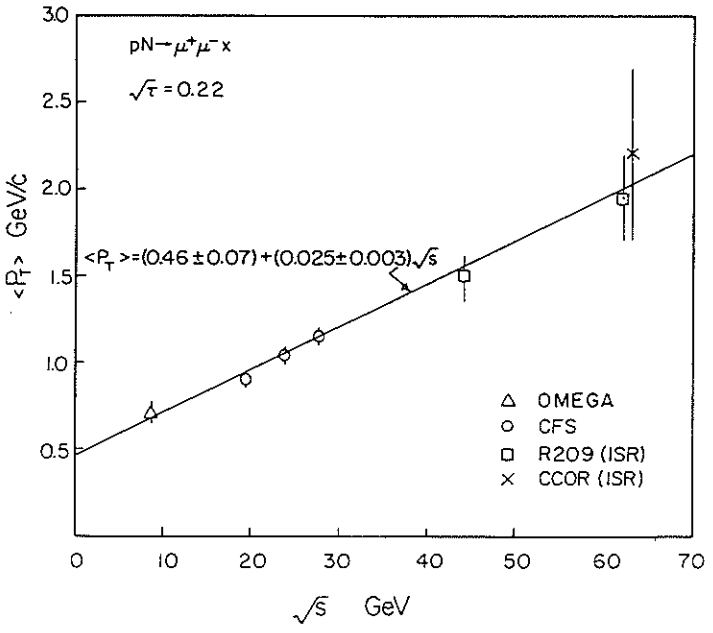

ig. 20. $\langle p_T \rangle$ vs. s for pN data[13,20,23] for $\sqrt{\tau}$=0.22. The curve shows our linear fit (see table 3).

Status of Experiment 615 at Fermilab : Production of Muon Pairs in the Forward Direction

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Experiment E615 is designed to study high x muon pair production in pion interactions. The major goals include a high statistics analysis of the muon pair angular distributions in θ and ϕ at high x, a scaling comparison with incident pion momenta of 75 and 250 GeV/c, and a comparison of muon pair production with incident π^+ and π^- beams to ensure that the Drell-Yan process is the dominant source of muon pairs.

Figure 1 shows the layout of the experiment, which is located in the Fermilab Proton West area. Incident pions with momenta of 75 or 250 GeV/c enter from the left and interact in a 20cm W target. Upstream of the target are the A and B scintillators which veto events with halo muons in the beam. Downstream of the target is the Mass Selection Magnet which is made from ZGS ring magnets and has an aperture of 1.30 × 0.65 m^2. The magnet, filled with Be, BeO, and C, has a 2.7 GeV/c momentum kick and is designed to eliminate hadrons from the incident

pion interaction and to enable the mass processor to function. The mass processor uses hodoscope information and will be implemented in future runs to trigger on only muon pairs with mass $\gtrsim$ 2.5 GeV/c^2.

Following the Selection Magnet are 9 planes of MWPC's, the analysis magnet ROSIE, 12 planes of drift chambers, and the C and D scintillators. The magnet ROSIE has a 0.8 GeV/c momentum kick and an aperture of 1.8 × 0.9 m^2. Located farthest downstream are the E and F scintillators with Fe blocks in front to filter any remaining hadrons. For our preliminary run the trigger was simply a 2 track pattern in the C, D, E, and F scintillators.

E615 has just recently come into operation; the major data taking will begin next year. The detector installation began on April 1, 1982 and was completed on May 20, 1982. This allowed a few weeks of data collection before the Fermilab shutdown on June 14. Approximately 17 million events were written on tape during this preliminary test run with a pion intensity of about 10^8 π^-/burst of 250 GeV/c for 2 × 10^{12} protons on target. The main objective of this first run is to check with a few times more events than experiment E444 the observation that the muon pair angular distribution changes from a $(1 + \cos^2\theta)$ form at low x toward a $\sin^2\theta$ form at high x. Figure 2 displays a "typical" event from Run 169 where the pion intensity was more than 10^8 π^-/burst. Although events were not always this clean, the Selection Magnet was very effective in preventing hadron punch-through.

The raw mass distribution from 1.18 × 10^5 triggers is shown in Figure 3 after a χ^2 cut has been imposed requiring that the two muons reconstruct to the target. This represents 0.6% of the present data sample. The J/ψ has a FWHM of ~ 450 MeV/c^2 which corresponds to a 6% mass resolution. A 3% mass resolution is expected at 9 GeV/c^2. The mass resolution is very sensitive to the target-absorber configuration, and we hope to improve the resolution for the next run.

There are about 10^3 J/ψ's and 29 events above 4 GeV/c^2 in Figure 3. Therefore, we expect ~ 1.5 × 10^5 J/ψ's and ~ 4 × 10^3 events above 4 GeV/c^2 from the present data sample. Furthermore, we expect ~ 5 times the number of events at high x as experiment E444.

The raw x_F, P_t, cosθ, and ϕ distributions of J/ψ events are shown in Figures 4-7. These distributions are uncorrected for acceptance and show indirectly the acceptance of the apparatus. The acceptance rises with increasing x_F, resulting in an $\langle x_F \rangle$ of ~ 0.40, but decreases slowly with p_T, where the $\langle p_T \rangle$ is ~ 1.0 GeV/c. There is acceptance over the full range of θ and ϕ.

Experiment E615 is ready to continue data taking as soon as beam returns next year. With better mass resolution and a trigger processor to reduce the number of low mass events, we expect to obtain 20 times as much data at 250 GeV/c as with this first, test run. Also, there will be data runs at 75 GeV/c with incident π^- and π^+ beams. The apparatus will be capable of handling a π intensity of 10^9/sec which should correspond to more protons than the total proton intensity of the Fermilab "Tevatron Era".

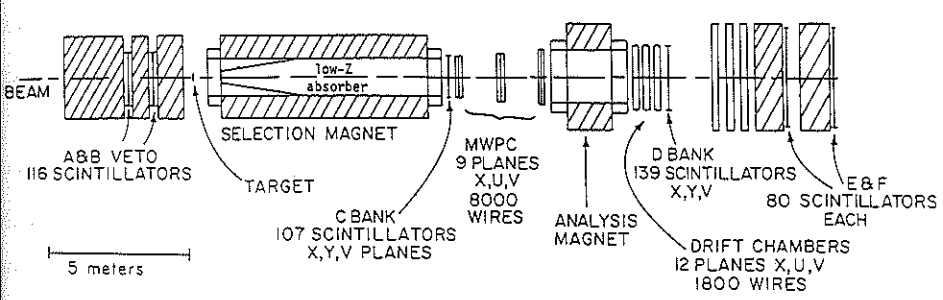

Fig. 1

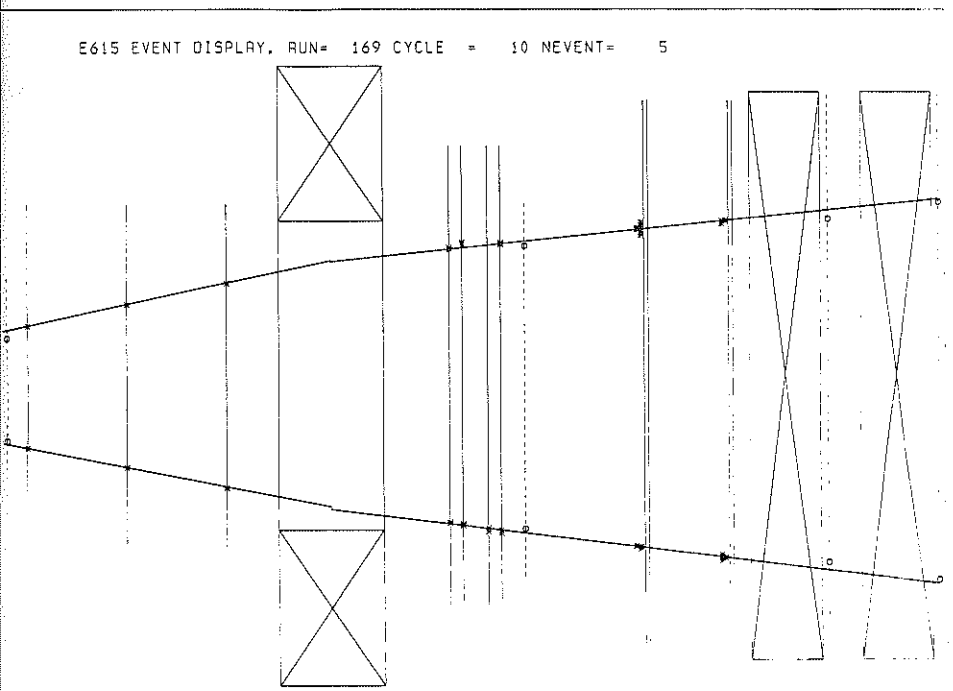

Fig. 2

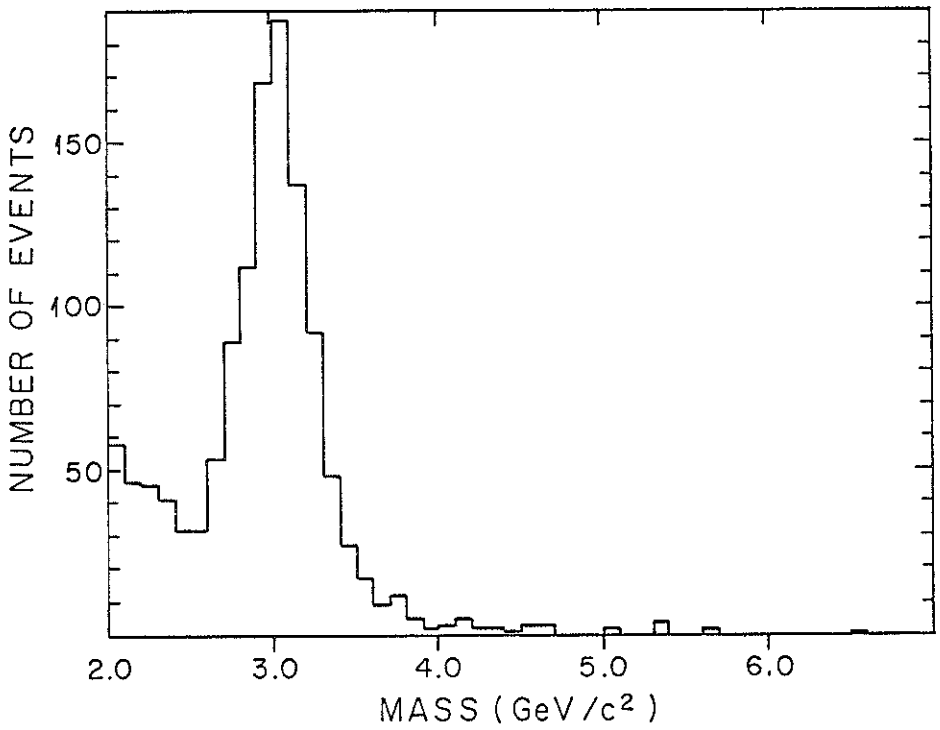

Fig. 3

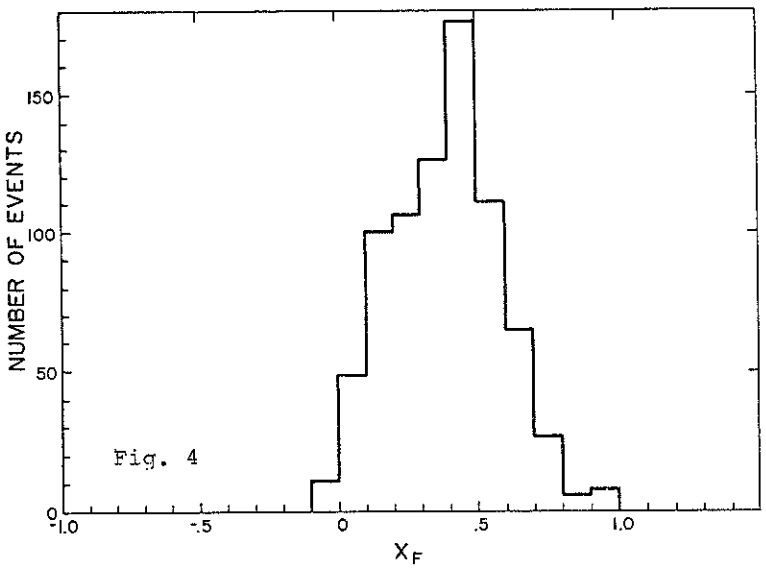

Fig. 4

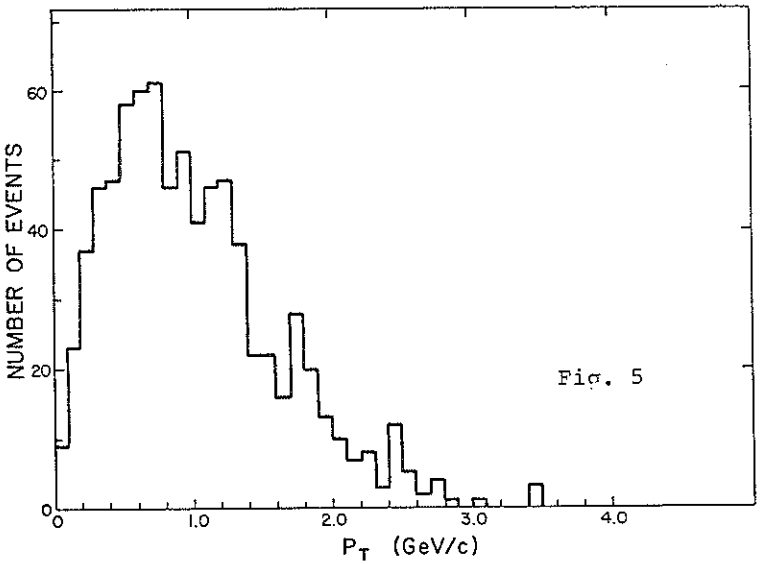

Fig. 5

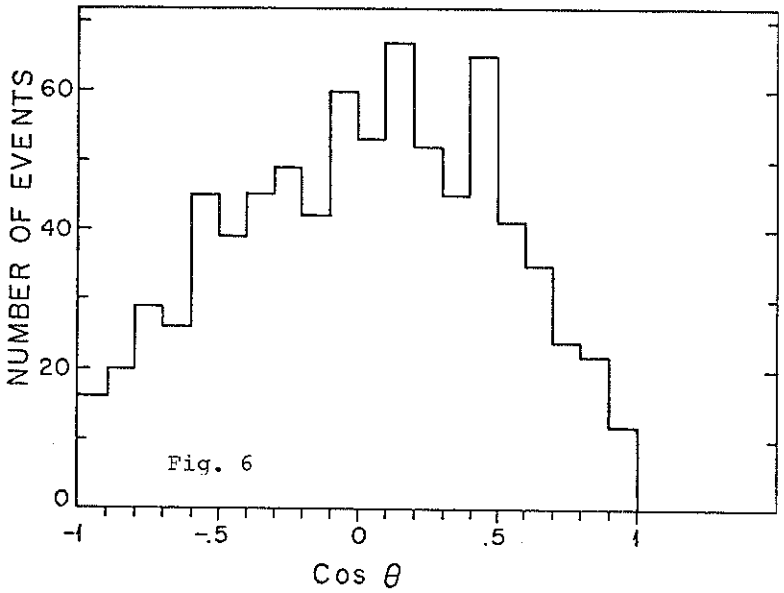

Fig. 6

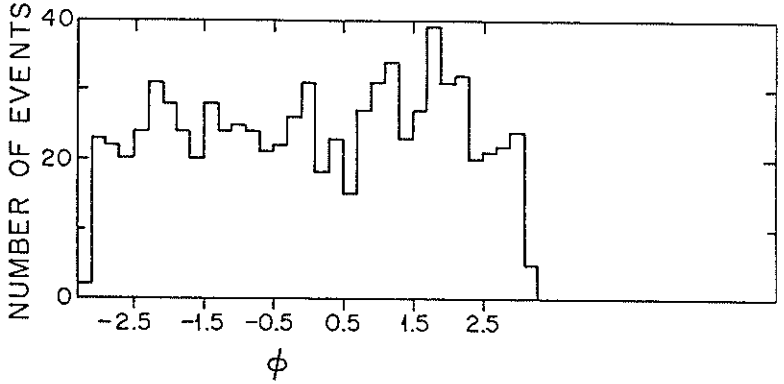

Fig. 7