PRELIMINARY RESULTS ON CHARGED PARTICLE PRODUCTION AT HIGH TRANSVERSE MOMENTA IN p-p COLLISIONS AT 90° AT THE CERN-ISR (P. 423)

L. Caroll

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The preliminary data presented here were obtained with a spectrometer at 90° to the proton beams at the CERN-ISR.

The experimental arrangement is shown in Fig. 1. Particle momenta were measured using a bending magnet and magnetostrictive spark chambers. Two threshold gas Cerenkov counters were used to separate pions, kaons and protons or anti-protons. A range of laboratory momenta from 1.6 to 5.2 GeV/c was covered with five different combinations of gas pressures and magnetic fields.

The trigger was a coincidence between six planes of scintillation counters with the additional restriction that only certain combinations of vertical elements of hodoscopes 3 and 4 were allowed, to reduce the number of lower momentum triggers. Any systematic bias introduced by the geometry was reduced by frequent reversal of the magnet polarity during data taking.

The cross-sections were determined with the help of a Monte Carlo program simulating events in the apparatus. At this stage of the analysis, we do not wish to quote absolute cross-sections.

The charged particle composition for this range of $P_T$ is shown in Fig. 2 for $\sqrt{s} = 44.6$ GeV. For comparison, results of our measurements at low $P_T$ for $\sqrt{s} = 30.6$ GeV are included (Ref. [2]). It can be seen that there is a rapid change in particle composition up to about 1 GeV/c. Above this momentum, the distributions are flat, except perhaps for the highest $P_T$ bin where the statistics are poor.

![Fig. 1.- Layout of the spectrometer.](image)

![Fig. 2.- Charged particle composition for high transverse momentum particles for $\theta_{lab} = 89°$ at $\sqrt{s} = 44.6$ GeV. The values of $P_T < 0.5$ GeV/c are at $\sqrt{s} = 30.6$ GeV. (Ref.[2]).](image)
At present the ratio of positive to negative pions is poorly determined but it remains about 1.1 to 1.2 except perhaps at the highest values of $p_T$. It is interesting to compare this behaviour with that observed at lower $p_T$. There, the ratio is observed to rise steadily from $1.02 \pm 0.02$ at 0.25 GeV/c to $1.17 \pm 0.03$ at 1 GeV/c (Ref. [2]).

In Fig. 3, the invariant cross-section for pion production at $\sqrt{s} = 44.6$ GeV is compared with our results obtained at $\sqrt{s} = 23.4$ and 63.0 GeV. Although we are not quoting absolute cross-sections, we believe we understand the $S$-dependence of our measurements to $\pm 10\%$. Within the small region of overlap, there is evidence for an $S$-dependence in the cross-section which varies from $1.6 \pm 0.3$ at $p_T = 1.48$ GeV/c to $2.5 \pm 0.6$ at $p_T = 2.28$ GeV/c between the extreme energies. This $S$-dependence, although significant, is much less pronounced than the factor of ten reported by the CERN-Columbia-Rockefeller collaboration (Ref. [3]) for neutral pions.

Fig. 3.- $S$-dependence of pions with high transverse momentum.

REFERENCES

[3] BÜSSER (F.W.) et al., Observation of $\pi^0$ Mesons with Large Transverse Momentum in High Energy Proton-proton collisions (Submitted to Physics Letters).