CERN/TC/30 61-9
23.5.1961

HIGH ENERGY BEAMS FOR THE 80 cm HBC

The first section of the "d 3" beam, shown in figure 1, was modified by the addition of a bending magnet to allow operation up to 16 GeV/c. Other elements were slightly displaced to allow compatibility with other beams. Counters were placed in the beam and measurements taken during 1 shift (6 hours).

The momentum spectrum for positive and negative particles with the quadrupoles unenergised, the optimisation of the quadrupoles at 3.7 GeV/c and the image shape at 3.7 and 7.0 GeV/c were found.

Due to the fringing field of the PS there is a difference of 12 mr between the emission angles of 6 and 16 GeV/c negative particles passing through the same point in the first collimator. The quadrupoles and first collimator were placed on the 6 GeV/c beam line. This represents a loss of about 10 o/o of intensity at 16 GeV/c due to misalignment of the first collimator for this momentum. Furtheron at 16 GeV/c there is no focus caused by the fringing field of the PS, as it is at 7 GeV/c. Therefore it can be expected, that the intensity at 16 GeV/c is very small.

Figure 2 shows the momentum spectrum for negative particles at a beam energy of 19 GeV/c. It can be seen that there is a background of about 2 particles/pulse/cm^2/GeV/c, that means there are no particles above 14 GeV/c. With the machine at 25 GeV, the spectrum shown in figure 3 was obtained. The intensity at 16 GeV/c is here above background and sufficiently high for bubble chamber experiments. Unfortunately only 15 minutes were available for this measurement. Figure 4 shows the spectrum for positive particles. The intensity is higher, because there are many protons. The channel optimised for 6 GeV/c is far from being optimum for 16 GeV/c. In spite of this there are probably enough particles at higher energies for bubble chamber experiments.

The enhancement obtained by optimum quadrupoles was a factor 6.3 at 3.7 GeV/c. Figures 5, 6 and 7 show the image shape for 3.7 GeV/c (vertical) and for 7 GeV/c (vertical and horizontal).

H. Burmeister

W.A. Cooper

PS/2551/sg