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SOME MORE OBSERVED PROPERTIES OF THE LOW ENERGY SEPARATED BEAM

I. INTRODUCTION

In a previous report[1] (referred to here as I), we described some observed properties of the low energy separated beam[2,3,4] from the AGS C station. In this report we give some further information which may be of interest to other users of the beam. The data were taken as a by-product of measurements of high accuracy total cross sections of $K^{\pm}$ and $\bar{p}$ on hydrogen and deuterium. Data taking conditions were similar to those described in I, where more details are given.

II. FLUX MEASUREMENTS

These were taken at various times in the period March 1972 - May 1973. During that time there were changes in the external proton beam to the C target, and in the means of measuring the incident proton fluxes. Because of this, we estimate that uncertainties in the particle fluxes are $\sim \pm 25\%$.

In Fig. 1, we give the number of particles at our counters (~ 580" from the production target) for 10^{12} protons incident on a 4.1" copper target; other beam parameters are shown on the figure. The data of Fig. 1 of I is included in this figure.

III. EFFECT OF THE VERTICAL JAWS

A pair of adjustable tapered vertical heavimet jaws were added just upstream of the first dipole magnet when early studies showed a contamination in the beam due to particles (mainly pions) from the production target scattering from the magnet pole faces and producing "ghost" images at the mass slit. The effect was particularly troublesome when the required particles were antiprotons.

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By adjusting the jaw separation, the pole faces could be shielded from the target. In Fig. 2, we show the effect of the jaw opening on a beam of 750 MeV/c antiprotons, and the accomanying pions (here pions are defined as any particles in the beam reaching the detectors which are not antiprotons). It can be seen that the $\pi/\bar{p}$ ratio drops as the jaws are closed, while the antiproton flux is approximately constant until about 7.5 volts D.V.M. reading, when the collimator begins to cut into the beam acceptance. (The change in $\bar{p}$ flux between 2v and 6v in Fig. 2 is probably due to rate effects in the detection equipment when this data was taken). Typical operation for antiprotons was at 7.0 volts; the collimator was left open when using other particles.

IV. BEAM PURITY

In Fig. 3. we show the ratio of pions (defined above) to K^+, K^- and $\bar{p}$ as a function of momentum; data from I is also included. The data taking conditions are shown on the figure. At low momenta, the ratios rise due to the rapid fall off of flux shown in Fig. 1; at high momenta the separation at the mass slit between pions and the wanted particle is becoming small. However, at high momenta the ratio can be improved from that shown by closing down the mass slit from the .2" or .25" used when obtaining the data of Fig. 3.

REFERENCES

1. A.S. Carroll, T.F. Kycia, K.K. Li, D.N. Michael, P.M. Mockett, D.C. Rahm, and R. Rubinstein. BNL Accelerator Dept. EP&S Division Technical Note No. 54 (1972). We wish to correct here an error on page 3, Section VII. The jaw positions given are for $\frac{\Delta p}{p}$ of $\pm$ 2%, not the stated $\pm$ 1%.

2. J.D. Fox, BNL Accelerator Dept. EP&S Division Technical Note No. 7 (1967).

3. J.D. Fox, BNL Accelerator Dept. EP&S Division Technical Note No. 20 (1968).

4. M. Zeller, L. Rosenson and R.E. Lanou, BNL AGS Summer Study - BNL 16000, p. 193 (1970).

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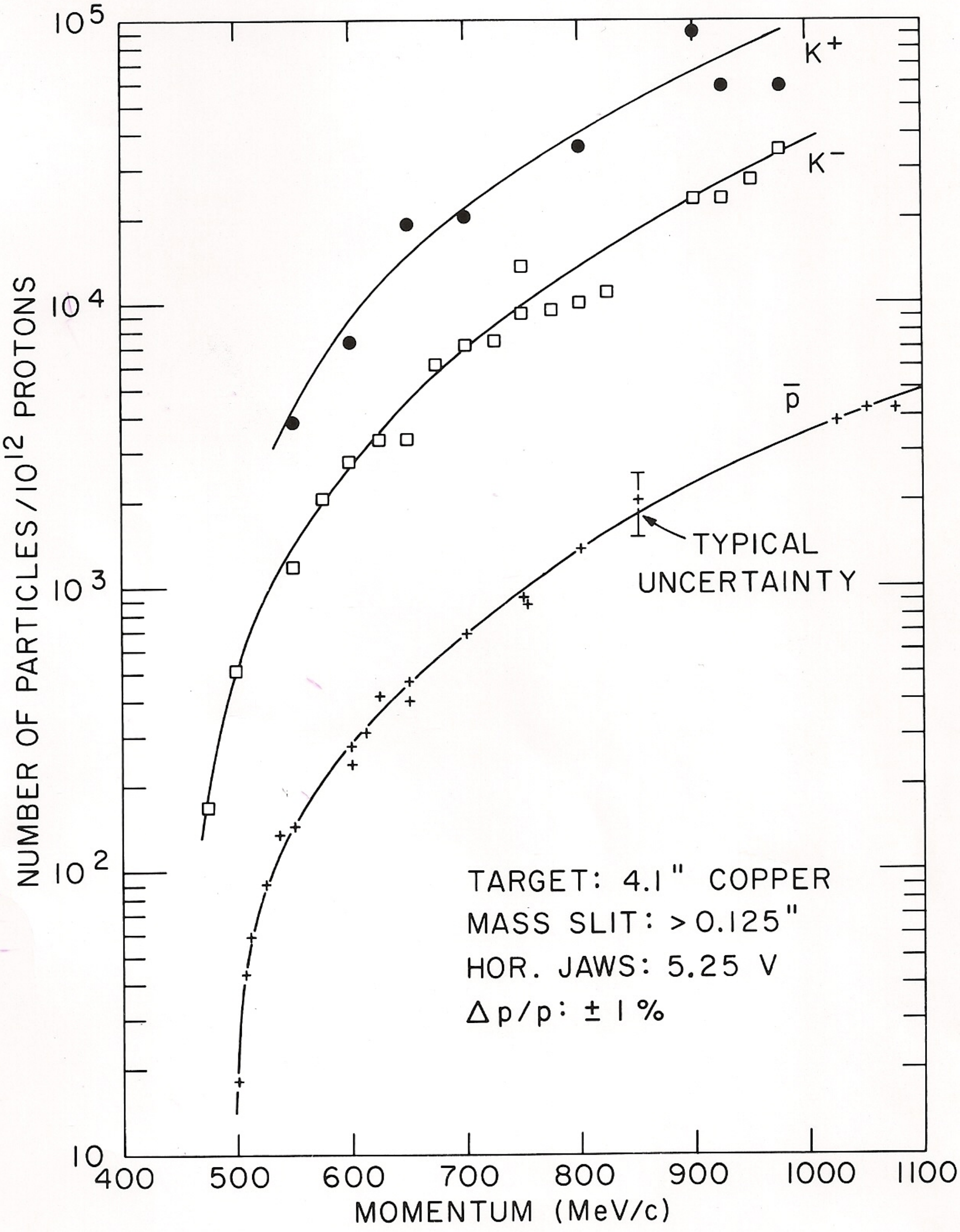


10^5
10^4
10^3
10^2
10
NUMBER OF PARTICLES/10^12 PROTONS
K+
K−
p̄
TYPICAL
UNCERTAINTY
TARGET: 4.1" COPPER
MASS SLIT: >0.125"
HOR. JAWS: 5.25 V
Δp/p: ± 1 %
400
500
600
700
800
900
1000
1100
MOMENTUM (MeV/c)

Fig. 1

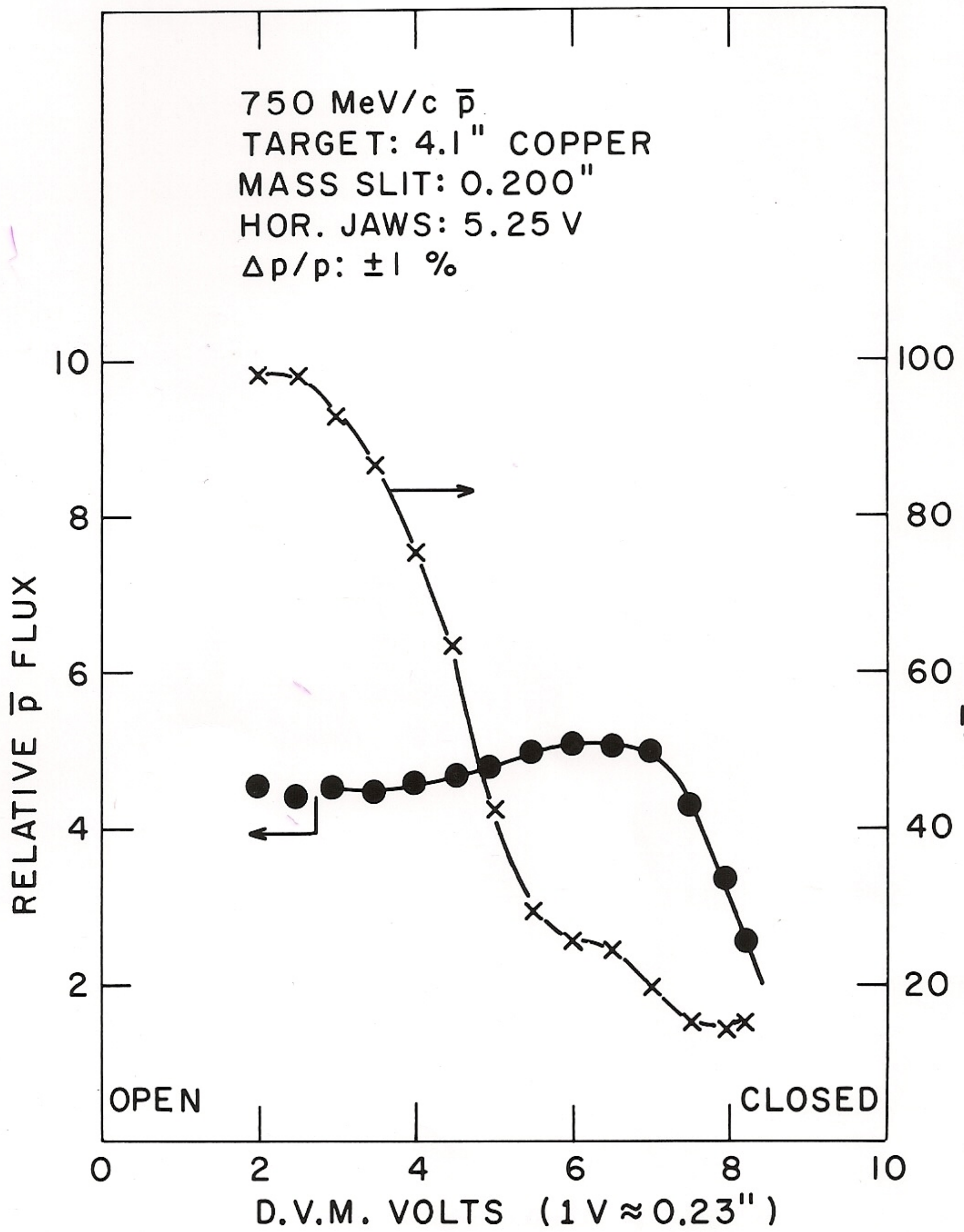
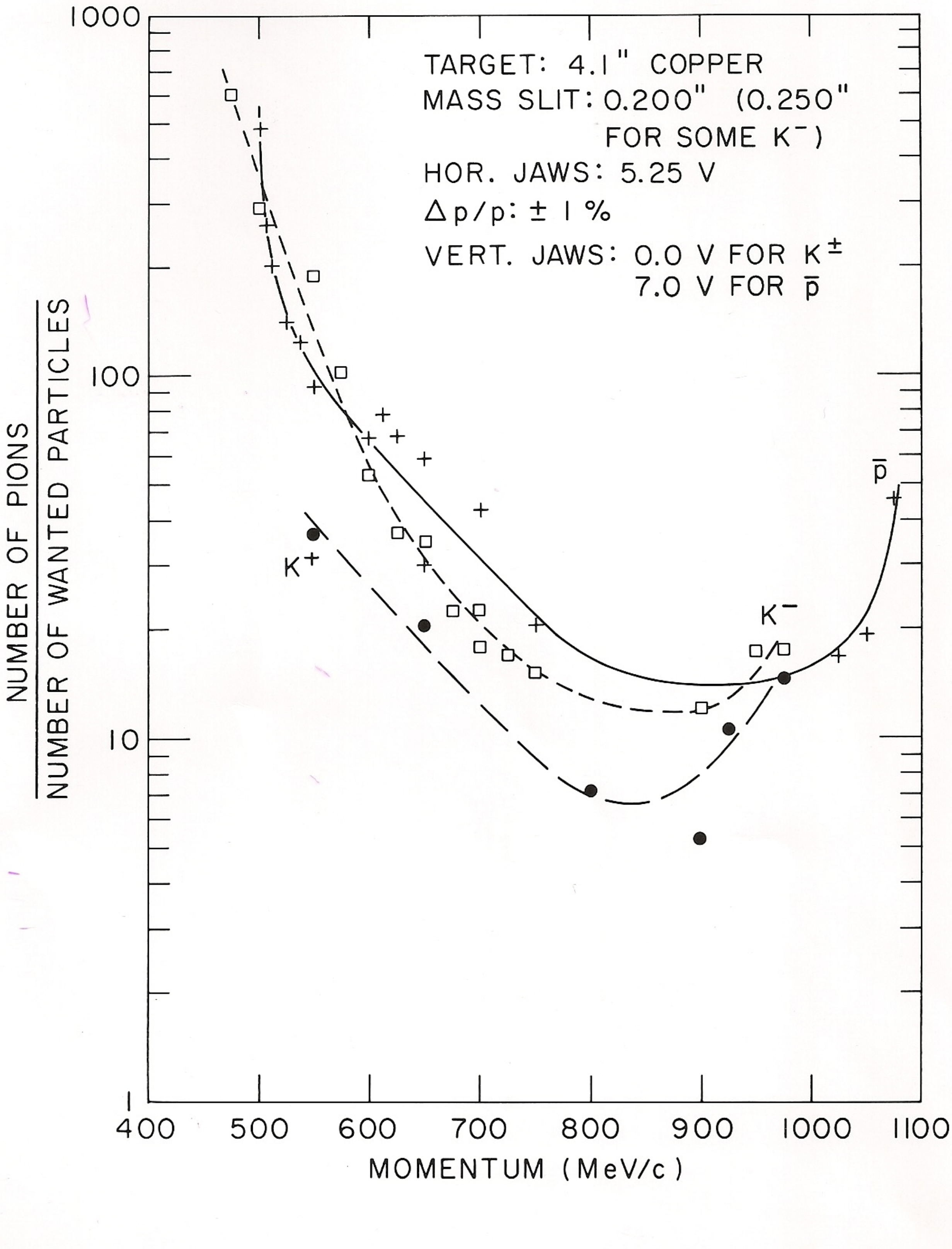

750 MeV/c $\bar{p}$
TARGET: 4.1" COPPER
MASS SLIT: 0.200"
HOR. JAWS: 5.25 V
Δp/p: ±1 %
RELATIVE $\bar{p}$ FLUX
$\pi/\bar{p}$
OPEN
CLOSED
D.V.M. VOLTS (1 V ≈ 0.23")

Fig. 2



TARGET: 4.1" COPPER
MASS SLIT: 0.200" (0.250" FOR SOME K⁻)
HOR. JAWS: 5.25 V
Δp/p: ± 1 %
VERT. JAWS: 0.0 V FOR K± 7.0 V FOR p̄
NUMBER OF PIONS / NUMBER OF WANTED PARTICLES
1000
100
10
1
400
500
600
700
800
900
1000
1100
MOMENTUM (MeV/c)
K+
K−
p̄

Fig. 3