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5 GeV/c spill into B line for Exp. 703

V. Agoritsas

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Collider Accelerator Department

Brookhaven National Laboratory

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Date 1/18/77 Time 0800-1600 Experimenters Agoritsas, Blumberg, Carroll, Feltman, Gill, Glenn, Lee, Raka, Soukas, Witkover

Subject 5 GeV/c spill into B line for Experiment 703

OBSERVATIONS AND CONCLUSION

Objectives

5 GeV/c slow spill of $\geq 5 \times 10^8$ protons/second.

Technique

Diffractive proton scattering from 1 mm thick F5 Al_2O_3 flag into SEB channel.

AGS Condition

1 second flat top, 1.6 sec cycle, flat top starts at 160 msec, SEB sextupoles off. H20 septum retracted, extraction magnets and SEB supplies at $\sim$ 0.175 of normal value.

Results

The extracted intensity at C10 as measured by polyethylene and aluminum foils was 6×10^{10} protons/pulse for a circulating beam intensity of 1.2×10^{12} protons, giving an extraction efficiency of 5%. The beam spot on the flag at C12 was estimated to be $\sim$ 1/4" vertically by $\sim$ 1" horizontally. The extraction efficiency was raised from an initial 1.3% by changing the AGS horizontal tune and be inserting and exciting the F5 septum magnet. These two procedures each gave about equal contributions. It is believed that further tuning might yield another factor of two. The C10 SEC whose gain had been increased by a factor of $\sim$ 100 indicated an extracted flux of 57% of that of the foils.

The beam was transported to the C207 flag by observing a short (50 msec) spill on flags. There was no estimate of transport efficiency made, but there was a visible spot on the C207 flag. The SEB transport magnets maintained good regulation at the 5 GeV/c settings.

The spill structure observed on the F10 scintillator showed less than 50% modulation for an $\sim$ 250 msec spill even though the extraction system was operated with an open loop $\dot{B}$ program and the ring quads and bump were not filtered.

Recommendations for Experimental Run

1. A small ($\sim$ 1 mm diameter) scattering target instead of the F5 flag should be used. A light element target would seem to be adequate.

2. The bump at the point of the scattering target should be under servo control similar to G10 targeting.

3. Adjustments should be made to the filters on the AGS quadrupole and bump power supplies to remove some ripple at these low excitations.

4. The gain of some of the TV cameras on the SEB flags should be increased during this mode of running as was done at C204.

5. A fixed aperture beam attenuator for intensity control will probably be required.

6. In order to minimize the beam losses in the AGS and maximize the duty cycle of the experiment, a 10 second flat top should be tested during a maintenance period.

Conclusion

With relatively modest improvements to the AGS, this method of extracting will provide more than adequate flux, and a sufficiently smooth spill to meet the requirements of Experiment 703.