

## 5 GeV/c Slow Spill for Expt. 703

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Subject 5 GeV/c Slow Spill for Experiment #703

### OBSERVATIONS AND CONCLUSION

#### Objectives

To achieve a 5 GeV/c slow spill of  $\sim 5 \times 10^8$  protons/second through B line SEB transport and B1 secondary beam to Experiment 703.

#### Technique

Small angle proton scattering from internal targets.

#### AGS Conditions

1.6 second cycle, 1.0 second flat top, SEB sextupoles off. H-20 septum retracted. F-5 and F-10 extraction magnets and SEB beam transport of 5 GeV/c values. C12 SEC calibration 1 count/ $10^9$  protons and B target SEC 1 count/ $10^8$  protons. Circulating beam intensity  $\sim 2.5 \times 10^{12}$ .

#### Results

Using the F-5 flag we extracted  $\sim 4 \times 10^{10}$  protons ( $\sim 2\%$  extraction) into the SEB channel. The boron carbide target at F-7 was also tried but the extraction efficiency was down by a factor of 2 or 3, and there was not noticeable improvement in image quality at the C-10 flag.

When we attempted to extend the flat top beyond 1.0 seconds, it was found that a timing multivibrator did not allow the flat top to extend beyond 1.3 seconds.

With all the quads in the SEB transport off except Q6, Q7-8, and Q9,  $\sim 1 \times 10^9$  (2%) of the extracted beam was transported from C-10 flag to the B target as calculated. The time taken to tune the beam from the AGS to the B target was longer than in the previous study of June 23 and pointed out the need for more sensitive flags for the 5 GeV/c running.

With some tuning  $\sim 50\%$  of the beam at the B target was transported to the 703 experiment as measured on an ion chamber, and monitor telescopes. Most of the beam loss was at a 1.5" diameter circular collimator just upstream of the liquid hydrogen target because the beam was found to be low with respect to the normal B1 transport by  $\sim .75"$ . The beam losses on the collimator caused radiation levels of  $\sim 20$  mr/hour in the experimental trailer.

The beam spot upstream of the collimator as measured by a Polaroid film was 2" wide by 1" high. Further tuning of the SEB and B1 line will be required. The beam momentum as determined from the B1 line dipoles was 5% higher than the 5.0 GeV/c given by the AGS gauss clock.

Obtaining a sufficiently smooth spill from the AGS is the remaining major difficulty. For short periods of time, spills of  $\sim 600$  m sec were achieved, but this spill was not stable and had  $\sim 100\%$  modulation at 60 cycles and at other multiples of 60 cycles. Accidental rates between the two spectrometers of Experiment 703 were  $\sim 50$  times higher than compared to running with similar beam intensities during normal SEB running. Subsequent to the studies it was found that a capacitor had been put across the servo input, which severely limited its high frequency response. Also some 60 cycle noise was found on the output of the spill counter.

#### Improvements Required Before Next Study Period

1. Measure gain of bump servo as function of frequency.
2. Provide more sensitive flag and/or SWIC at B target so that beam size and position can be determined.
3. Provide better shielding near collimators in B line.
4. Provide  $\geq 2$  second flat top.

#### Conclusion

The extraction and beam transport from the AGS to Experiment 703 now provides sufficient intensity and a nearly good enough beam spot. Further work is required