AGS STUDIES REPORT NUMBER 88

Date 6/23/77 Time 0800-1600 Experimenters Carroll, Glenn, Soukas, Witkover

Subject 5 GeV/c low intensity, slow spill for Experiment 703.

OBSERVATIONS AND CONCLUSION

Objectives

5 GeV/c slow spill of $\sim 10^9$ protons/second through B line SEB transport to Experiment 703 apparatus in B1 secondary beam.

Technique

Diffractive proton scattering from boron carbide target at F-7.

AGS Conditions

One second flat top, 1.6 second cycle, SEB sextupoles off. H20 septum retracted. Extraction magnets and SEB supplies at 5 GeV/c values. C12 SEC gain at 5 times normal and SEC gain at B target 10x normal. Circulating beam intensity 2.5×10^{12}.

Results

Using a relatively fast spill ($\sim$ 50 msec) to produce visible signals on the flags, the beam was extracted and transported to the B target. With the SEB quads on, there was $\sim$ 20% transport efficiency between the C12 SEC and B target. Turning the SEB quads off reduced the efficiency to $\sim$ 2%. The beam spot as estimated from the SWIC at B was 0.1" vertically x 0.4" horizontally (FWHM). Initially, it was larger due to the presence of flags in the beam. With the quads off, the beam intensity was $\sim 5 \times 10^8$ protons/pulse.

The beam was brought out to the B1 experimental cave for about one hour. The beam was large horizontally 2-3" and $\sim$ 1" high. Estimating intensities by a counter in the beam and [illegible]es from a carbon target into the spectrometer arms, it was found that there were $\sim 10^7$ protons/pulse of which 1.5×10^6 struck the carbon target. There was no beam tuning, but a tape was written to study backgrounds. Health Physics found the radiation levels to be very low inside and outside the experimental caves. The radiation safety interlocks appeared to function satisfactorily.

Most of the scattered out beam came from circulating protons striking the F-5 septum, not the F-7 target as planned. Subsequent to the run, it was found that the F-7 target was not correctly positioned.

With the bump power supply in open loop, it was possible to achieve spill lengths of up to 700 msec. However, a combination of the low level of the SEC signal and some ripple on the output of the bump power supplies prevented satisfactory operation with the servo loop closed. Equipment settings are in the SEB log.

Recommendations for Next Study Period

1. Reposition F-7 target.
2. Have scintillation counter downstream of C12 to provide cleaner signal for spill servo.
3. Have integrating card to provide larger signal from B target SWIC.
4. Provide instrumentation at B1 intermediate focus and better intensity monitoring at B1 final focus.
5. Possibly reverse polarities of Q7-8 and Q9 to produce smaller horizontal image at B target.

Conclusions

It was relatively easy to reestablish a 5 GeV/c spill. Beam transport to Experiment 703 was achieved. Further work is required to obtain a satisfactory beam spot and to have a long (> 2 sec) smooth spill.