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Extract 1.5 GeV/c FEB to U-186 Beam Stop at maximum AGS Intensity

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AGS STUDIES REPORT 1B NUMBER 89

Date July 1 '77 Time 1300-2200 Experimenters Blumberg, Cahill, Egelman, Elliott, LoSecco, Naase, Soukas, Wanderer, Witkover

Subject Extract 1.5 GeV/c FEB to U-186 Beam Stop at Maximum AGS Intensity. Measure Emittance at U-167.

OBSERVATIONS AND CONCLUSION

AGS Conditions: $T_{extract}$ = 107 ms, E10 bump = 20 A, H10 bump = 30 A, E10 septum current = 600 A, H10 septum current = 1000 A, C15 and E15 kickers at 1 kA peak and half-sinusoid pulse of 60 μsec. The E13 straight section diameter was increased prior to this run from 5-3/4 in. i.d. to 7 in. i.d. by removal of the 6S24 E13 high field sextupole magnet.

Results: We detuned the AGS to ~ 5×10^{12} ppp at 100 ms CBM. We were not able to extract more than ~ 5% of this beam. The reason for this negative result is not presently understood.

Procedure: The E10 magnet was positioned at ≈ 1.6 in. from the beam code axis using an injection 3/2 λ bump of 2 A and an ejection λ/2 bump at E10 of 20 A which were established in prior studies. The H10 λ/2 bump was set at 30 A after lengthy modifications to the power supply (removed about half of the capacitors). We observed a beam spot at the H10 flag resulting from the E10 kick but were unable to detect external beam. We observed that the extracted beam as measured by the U15 current transformer increased from zero where the E10 bump was turned off. We then reversed the polarity of the E10 extraction bump and confirmed the polarity error by observing beam motion onthe E10 flag. With the E10 bump reversed we observed a clear rectangular beam spot ~ ½ in. vert. × ½ in. horiz. on the H10 flag with ~ 1/8 in. separation from the circulating beam. We then varied the H10 septum position and H10 ejector power supply but could not increase ejected beam beyond ~ 3×10^{11} ppp at U15. The timing between the 60 μsec half-sinusoid fast kicker waveform and the 200 μsec E10 septum waveform was checked and appeared correctly timed on the 422 oscilloscope. A scan of residual radioactivity from E10 to H10 after the rim indicated that we were not hitting the new E13 straight section. However, the scan did not indicate where we were losing the 5×10^{12} ppp.

Recommendations: Before next test the H10 bump supplies should be checked out at 30 A and controllable from MCR. Also, the positions of the E10 and H10 septa and their flags should be calibrated vs. datacon readback. The timing of the E10 septum current waveform should be checked with respect to C15-E15 pulse.