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1.5 GeV/c MTX FEB

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DISCLAIMER

AGS STUDIES REPORT NUMBER 96

Date 9/12-9/13/77 Time 1700-0530 Experimenters Egelman, Gill, LoSecco, Soukas, Sulak, Weng, (Danby), Huffman

Subject 1.5 GeV/c MTX FEB

OBSERVATIONS AND CONCLUSION

Objective: Transport the beam through 8^{o} without loss, and attempt to get as much as possible to the target area.

AGS Conditions: $T_{extract}$ = 133 ms, E10 bump = 22 A, $E16_{bump}$ = 15 A, $H10_{bump}$ = 30 A, E10 SM = 450 A, H10 EJ = 900 A, C15 and E15 kickers at 1400 A peak and half-sinusoidal pulse of 60 μsec.

Modifications: (A) Two new quads, UQ2A and UQ7A, were installed.

(B) Bigger flag at U165.

(C) Two vertical dipoles F20 and I10 were available for vertical shifting of the beam at E10 and H10.

(D) Detailed calibration of a spare 4Q26.5 suggested that 17 gauss/A for UQ3 should be used instead of 18 G/A. This improved the fitting to the August 16th emittance data and gave:

		ϵ (cm-mrad)	α	β (cm/mrad)	γ (mrad/cm)
Measurement (90% contour)	H13-H	1.13	-2.99	1.50	6.61
	H13-V	0.889	1.08	0.662	3.27
Calculation (95% contour)	H13-H	0.726	-2.55	3.25	2.31
	H13-V	1.063	0.987	0.37	5.3

(E) The window at U170 was removed.

U-Line Conditions: The updated measured emittances were used to find the best transport through the U-line and the quads were set accordingly by using new calibration data from (D) above.

Results: 1) The J-19 target was turned on to scrape more than 20% of the beam. The circulating beam intensity before extraction was approximately 4.3×10^{12} ppp and that at U15 current transformer was 3×10^{12} ppp.

2) After proper steering of UD1-3 we got clean transport to the beam plug at U186 at 1942 (see attached sheet no. 1).

3) We opened the U186 beam plug at 2030 and tried to align the beam by flags U165 and U273. After the alignment was done and the flags removed, we observed an almost perfect transport through 8^{o}. Optimization through the 8^{o} such that no loss was recorded by the radiation monitors, was achieved by 2300 (see attached sheet no. 2).

4) We observed heavy losses around Q9-Q10 and Q11. Proper setting of the 8^{o} correction sextupole and UQ5 helped us to eliminate most of these losses. Optimization was achieved by first steering the beam and tuning downstream quads within 10% of initial setting. The intensity recorded by U772 CT was 2.5×10^{12} ppp (see attached sheet no. 3).

5) Pictures at all the flags were taken one by one at 0500 and they were in good agreement with the calculations.

6) Vertical kicks at F20 and I10 were used to optimize the extraction efficiency. Only 2% variation was observed. The trigger times of the C15 and E15 kickers were varied to control the spill; and 3 to 5 turn extraction could be obtained.

7) The J-19 target was removed to observe the effect on extraction and transport. In general, without the J-19 scraping, we got 10% more at U15 but could only transport 5% more to the target. This was consistent with the calculation.

8) Some of the highlights of this study:

Ring intensity	4.3×10^{12} ppp,
U15 CT	3.0×10^{12} ppp, extraction eff. 70%
U772 CT	2.5×10^{12} ppp, transport eff. 85%
Fill factor	$\sim$ 80%, spill 10 $\sim$ 15 μsec.

Recommendations:

1) The resolution of 8^{o} dipole power supply should be better by a factor of ten.

2) UQ3 and UQ11 p.s. should be stabilized.

3) Remove the existing target, and install a flag ten meters downstream.

4) Replace existing flags at U618, 667 and 772, with larger 4" X 4" ones.

5) Remeasure the emittance at U167; and generate a transport with less than 50% fill factor (we probably need 3 more quads downstream of 8^{o}).

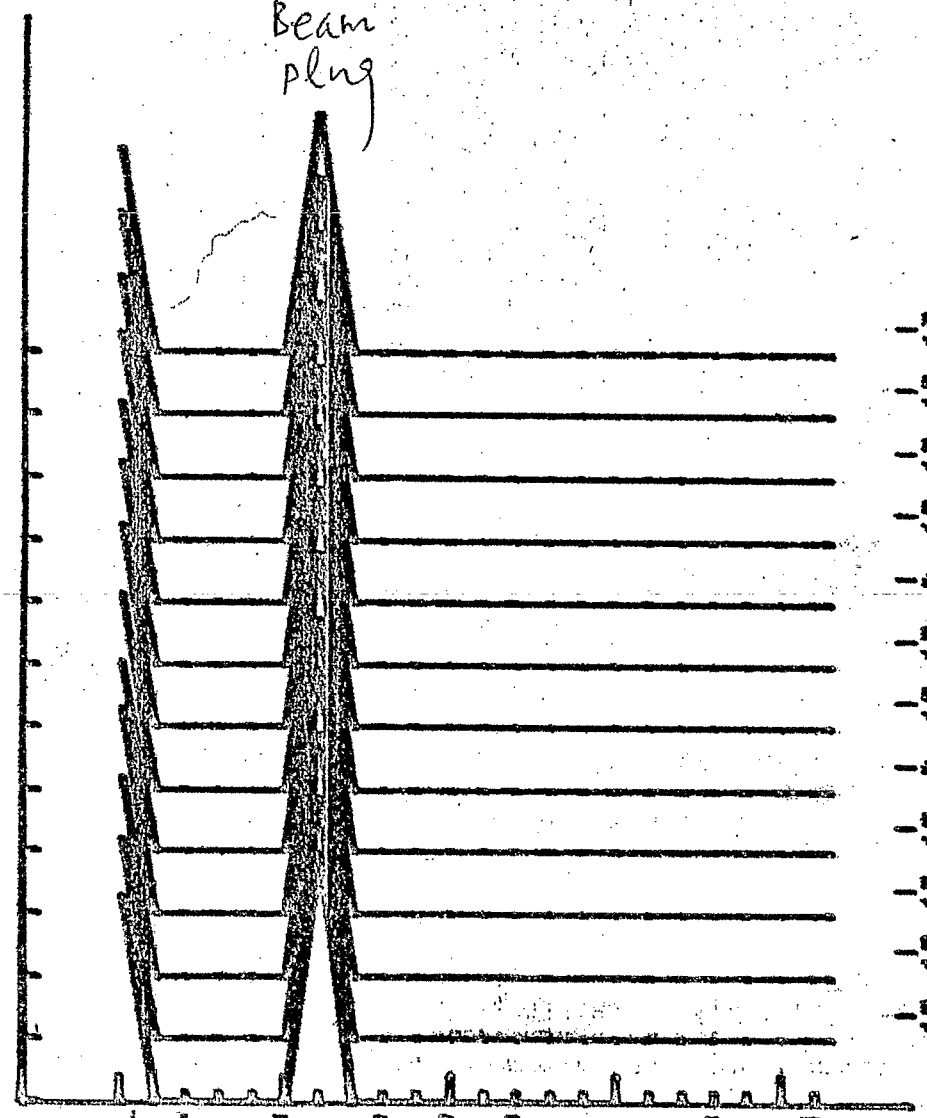
6) Studies of the extraction system are needed to determine sensitivity, stability and other effects of the extraction and in-ring equipment.

20:02

12-SEP-77

READING TIME: 136 MSEC. AMPL. GAIN SETTING: 7

(1)



C121	C135	C123	C124	C428
-504	-468	-8	-3	-6
-500	-464	-5	-3	-6
-510	-475	-7	-3	-6
-504	-471	-6	-3	-6
-497	-461	-6	-3	-6
-511	-476	-8	-3	-6
-516	-481	-9	-3	-6
-498	-465	-5	-3	-6
-505	-470	-5	-3	-6
-526	-488	-10	-3	-2
-504	-466	-8	-3	-7
-516	-479	-7	-3	-4

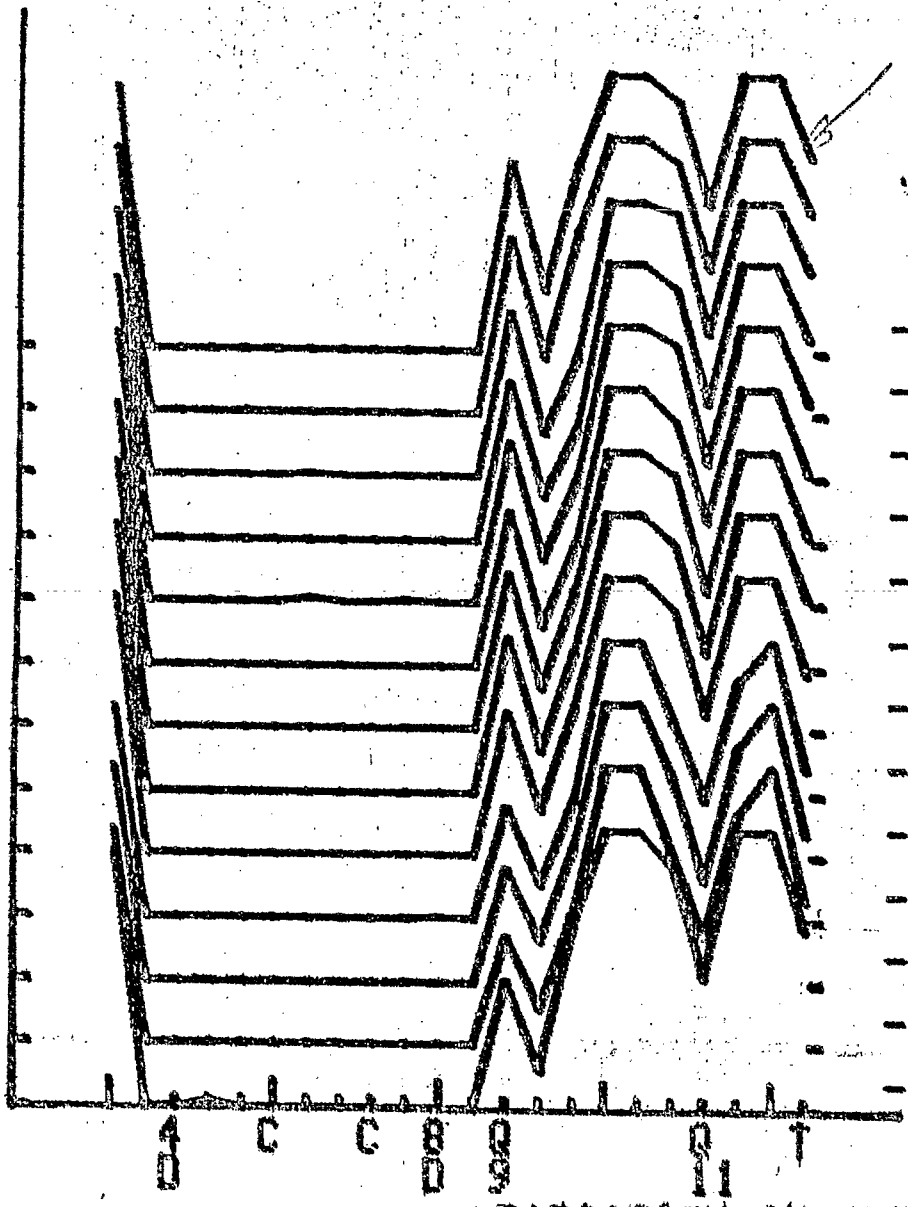
Set by sextupole,

23:28

12-SEP-77

READING TIME: 136 MSEC. AMPL. GAIN SETTING: 7

(2)



RADIATION IN FEB-LINE

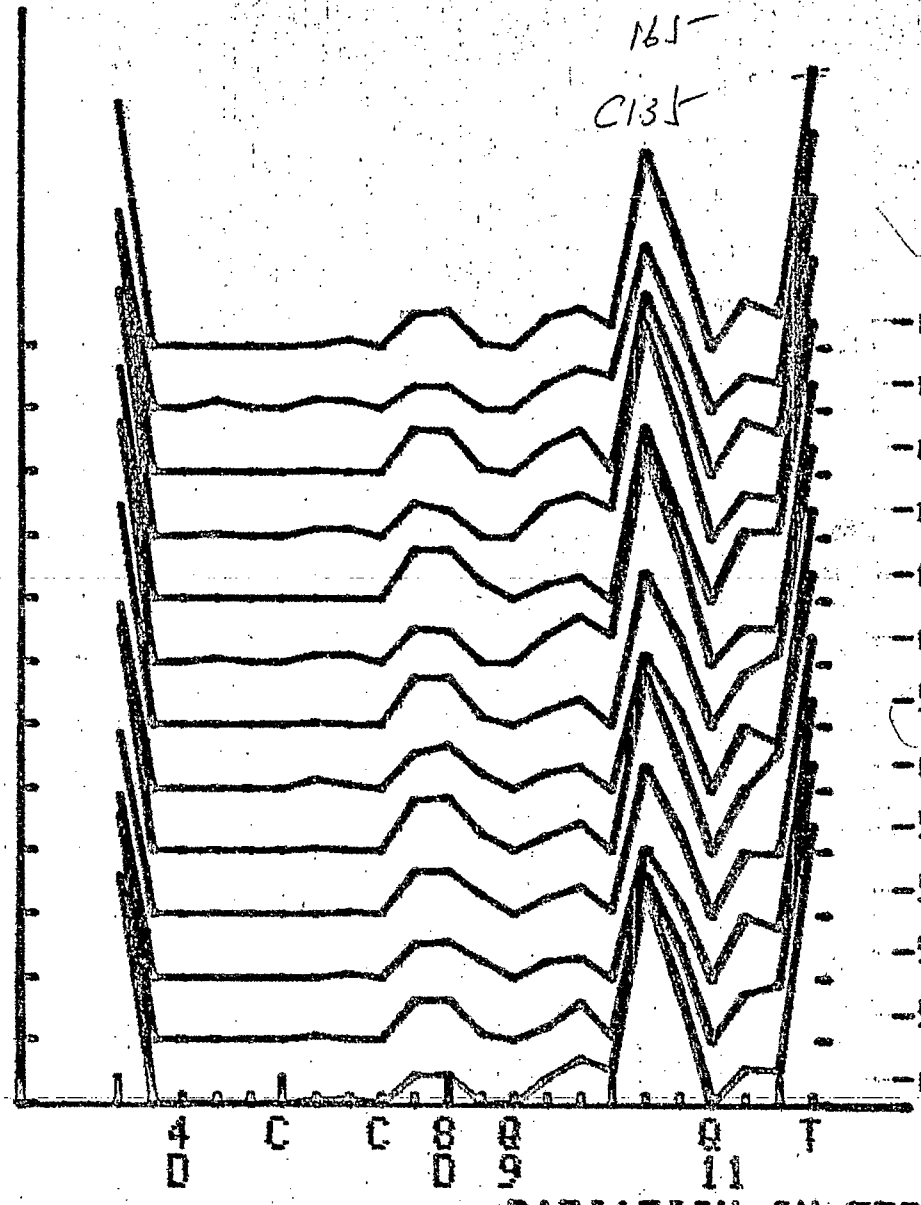
C121	C135	C123	C124	C420
-607	-563	-596	-574	-182
-616	-569	-604	-584	-184
-611	-567	-598	-577	-184
-596	-553	-585	-559	-176
-618	-570	-605	-580	-180
-616	-565	-607	-583	-177
-603	-558	-593	-572	-168
-604	-558	-595	-572	-168
-611	-566	-606	-588	-172
-591	-547	-586	-568	-162
-596	-556	-593	-573	-163
-606	-563	-602	-578	-164
-599	-556	-597	-573	-156

04:26

13-SEP-77

READING TIME: 136 MSEC. AMPL. GAIN SETTING: 7

(3)



C121	C123	C124	C420	C422
-628	-623	-608	-525	-526
-623	-607	-596	-514	-521
-608	-594	-585	-507	-519
-635	-625	-614	-529	-528
-612	-603	-581	-501	-513
-622	-604	-594	-511	-522
-574	-563	-551	-476	-499
-607	-598	-580	-498	-521
-599	-590	-572	-490	-505
-586	-578	-561	-476	-460
-589	-582	-568	-485	-503
-596	-585	-572	-497	-515
-611	-598	-591	-506	-520