PS/PA-EP/jyh

PS/PA-EP Note 91-11
April, 10^{th}

LEAR MD REPORT

To : See attached distribution list
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subject : Results from the 5,6 & 7-04-91 MD

The MD was the continuation of the developments on 62 MeV/c momentum beam, for which the previous results were reported in the PS/PA-EP Note 91-08.

1 Machine parameters

The best results have been obtained with a machine tuning of Qh = 2.324, Qv = 2.740 on the extraction flat top. The optimal electrostatic septum position was found to be 35 mm.

The extraction RF noise has been applied on the 22nd harmonic of the revolution frequency, as compared to the 44th harmonic during the previous MD. This change aims at preventing the betatron side band to be excited by the noise, thus decreasing the loss rate in the low frequency part of the momentum distribution. We used a "slope spill form factor" of 0.4.

Unfortunately, software problems have prevented us from measuring the beam lifetime and to make a comparison between the situations with and without stochastic cooling.

Several attempts have been made to improve the deceleration from 105 MeV/c to 61.2 MeV/c, but with little success. However, there is some evidence that a fine tuning of the DWH22 current could have an influence.

2 Monitors in the transfer lines

The specialists have first consumed some spills, before we took data, to make sure their electronics were optimally adjusted.

2.1 Comparison between E5 scintillator and MPS108

They do supply the same counting rate, provided the flux is below $\approx 17 \times 10^3$ c/s, which corresponds to the present limitation on the associated electronics of the PSPM (K. Kuroda statement). A modification is proposed by the latter to extend the range to 10^5 by next week for the P118T run. A new VME card is presently studied to allow 10^6 c/s.

2.2 Comparison between MPS108 and MPS109

The same counting rate is obtained on the two monitors. This test was made with a low intensity spill (6×10^3 c/s). Hence, no loss has been observed down to the final straight section of the S3 line using the beam optics which will be used for PS189 physics.

2.3 Transmission

The highest intensity could only be measured on the E5 scintillator and reached a maximum of 2×10^5 c/s. The integrated beam over 20 min gave 5×10^7 at the end of the E5 line for a circulating

beam of $\approx 4 \times 10^8$ protons, which puts the transmission at around 12.5%.

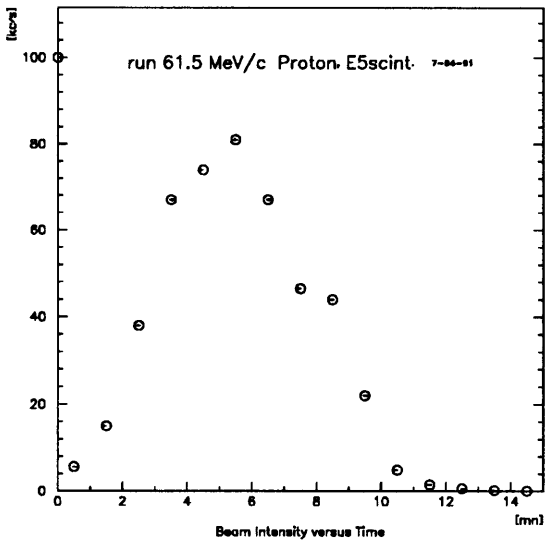

Figure 1: spill shape seen on E5 scintillator

3 Hiccups

3.1 Instability

In Position: spurious jumps of 0.5 mm & 10 mm respectively in H & V planes during the spill have been observed on the MPS108 & 109.
In intensity: jumps of factors 1.2 to 5 in counting rate in the transfer lines occurs systematically in synchronism with the AA production cycle. This phenomenon stands with or without beam in the PS.

3.2 Failures

On Friday night, the 2 kickers failed and could only be repaired by Saturday morning.

On Saturday evening, the electrostatic septum (SEH11) was mechanically stuck scraping the beam, while its reading let us believe it was out of the beam. It took some time to diagnose the cause of the short lifetime of the beam and next, to get it repaired.

3.3 Deterioration

This high intensity remained stable from spill to spill and lasted from 01h00 till 05h00 on Sunday morning. The situation deteriorated along the day and the MD ended at 24h00 with only 1.2×10^5 protons per spill in E5 line (400 times less than in the morning). M. Chanel suspects that this poor transmission may be correlated with PS202 being setting up and baking out the NEG pump.

4 Conclusion

The transmission of 12.5% obtained during this MD is a factor 10 better than the one of the previous MD. The shortening of the beam life time correlated with PS202 setting up is to be confirmed. The spill intensity and shape are good enough for steering and tuning the transfer lines. Since, these very low momentum beams are to be used in short extraction mode for physics, a much higher transmission may be expected.

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