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Operation at Full B

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DISCLAIMER

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AGS STUDIES REPORT

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Reported by J.W. Glenn

Subject Operation at Full B

OBSERVATIONS AND CONCLUSION

Introduction

The Siemens power supply for the AGS main magnet was operated at full output. The potential for increasing the repetition rate was monitored. Beam was accelerated without a reduction in intensity.

Power Supply Setup

The Siemens set excitation was adjusted to provide the maximum allowed 7500 volt generator output. For "Save-a-Watt" pulsing, the output voltage was 2200 volts on the magnet at injection time, up from about 1600 volts. The injection peaker also moved 11 ms earlier to 38.5 ms. (This change was a bit smaller than scaling and a 5 ms turn on delay would imply.) The pulse length was then extended to achieve full current. The generator voltage, as read on the control station meter, appeared to rise a bit, so excitation was dropped 5% to stay within the 7500 volt limit. Full current was achieved by 741 ms, 121 ms earlier than normal B, and the dwell time increased by 200 ms. The set was then pulsed for half an hour and pictures taken. (Figures 1 and 2 are composites of early and late voltage and current waveform pictures.) The large ringing at the end of the high B cycle (Figure 2) was adjusted out on June 9, 1983 for acceleration tests.

Acceleration

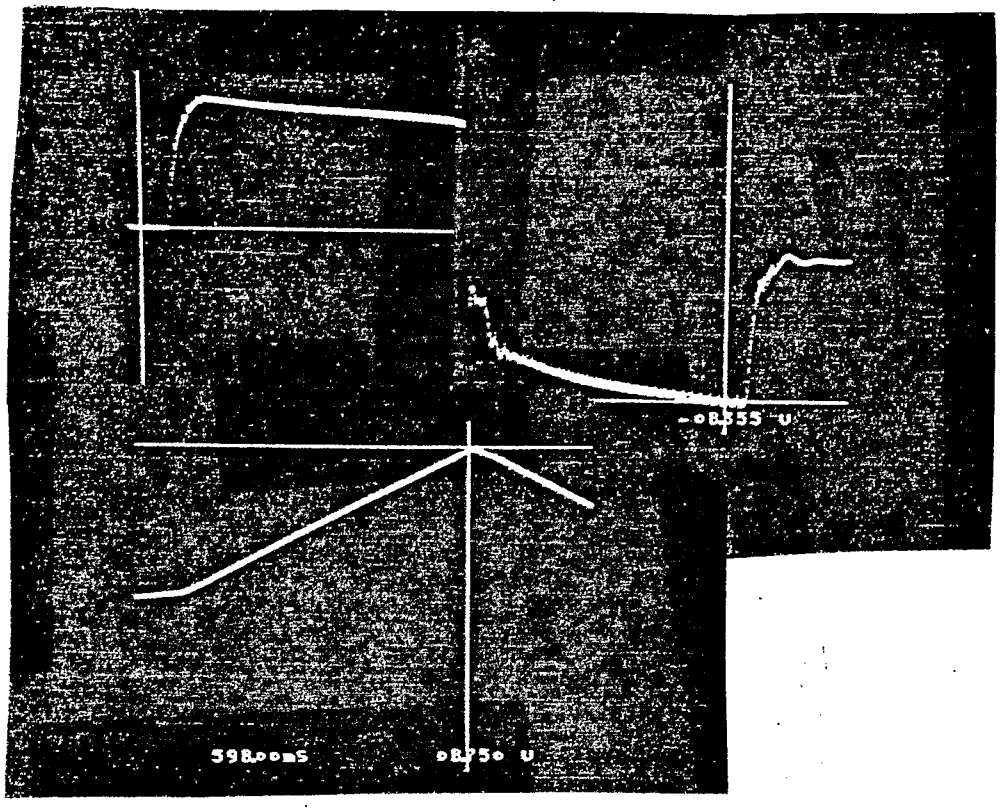
The setup on June 8 was repeated on June 9 and beam was injected and accelerated. After some tuning, injected intensity was 18 TP, captured at 3 ms - 12 TP and accelerated to 100 ms - 9.5 TP. Bunching was normal (Figure 3). The IPM showed a slightly smaller beam size for the high $\dot{B}$ case, but when the time is normalized to $\dot{B}$, and thus to momentum, the beam is slightly larger after the 75 ms transition out of the "front porch" (Figures 4 and 5) The beam was accelerated to approximately 27 GeV/c. The rf system tracked the higher B

without losses before transition. There was an erratic loss at transition time, but schedule pressure did not allow sufficient time to investigate it and/or tune it away.

Conclusions

1. This change did not significantly affect the amount of beam captured.

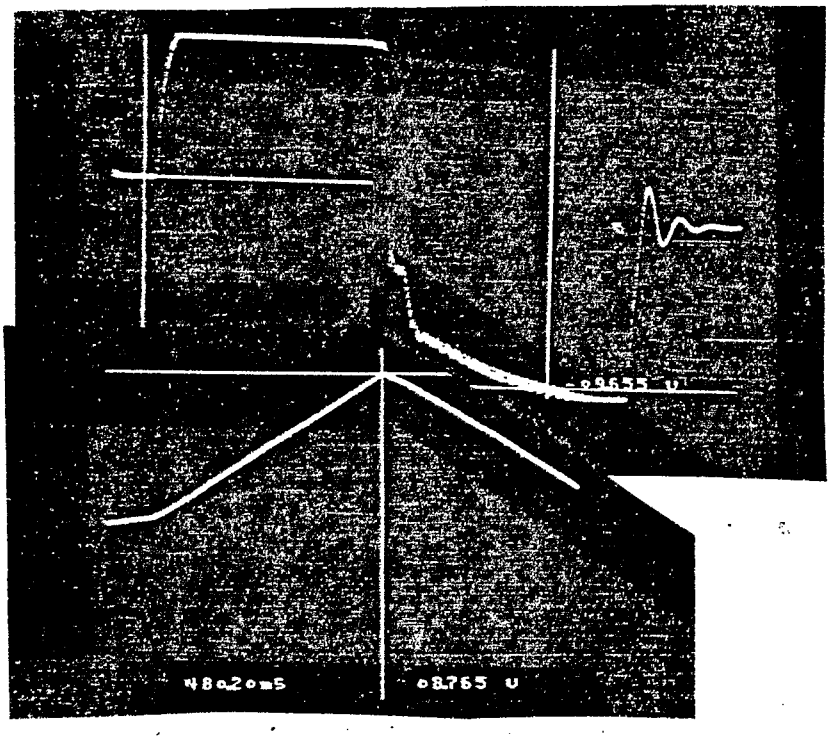
2. With this rate of rise, it would be possible to run the FEB program at a 1.2 second repetition period.



Magnet Voltage

Current

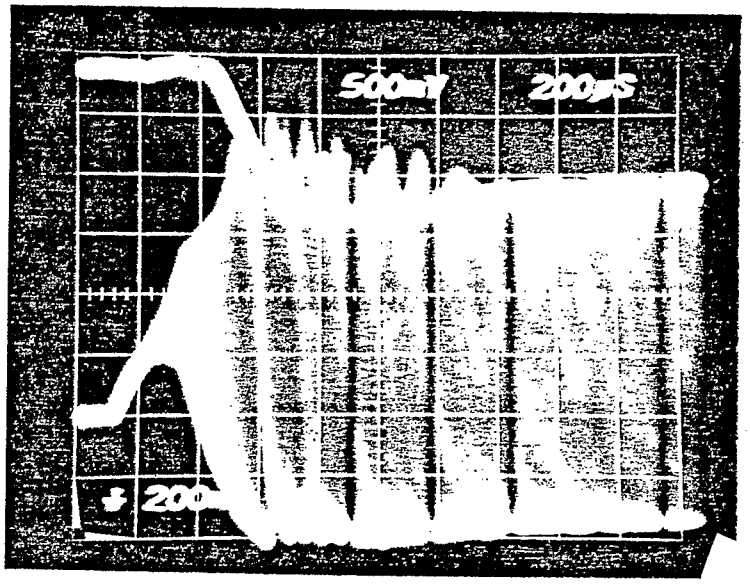
Fig 1 Normal $\bar{B}$



Magnet Voltage

Current

Fig 2 High $\bar{B}$



F20 Fast Beam Current Transformer

Fig 3 Beam Bunching

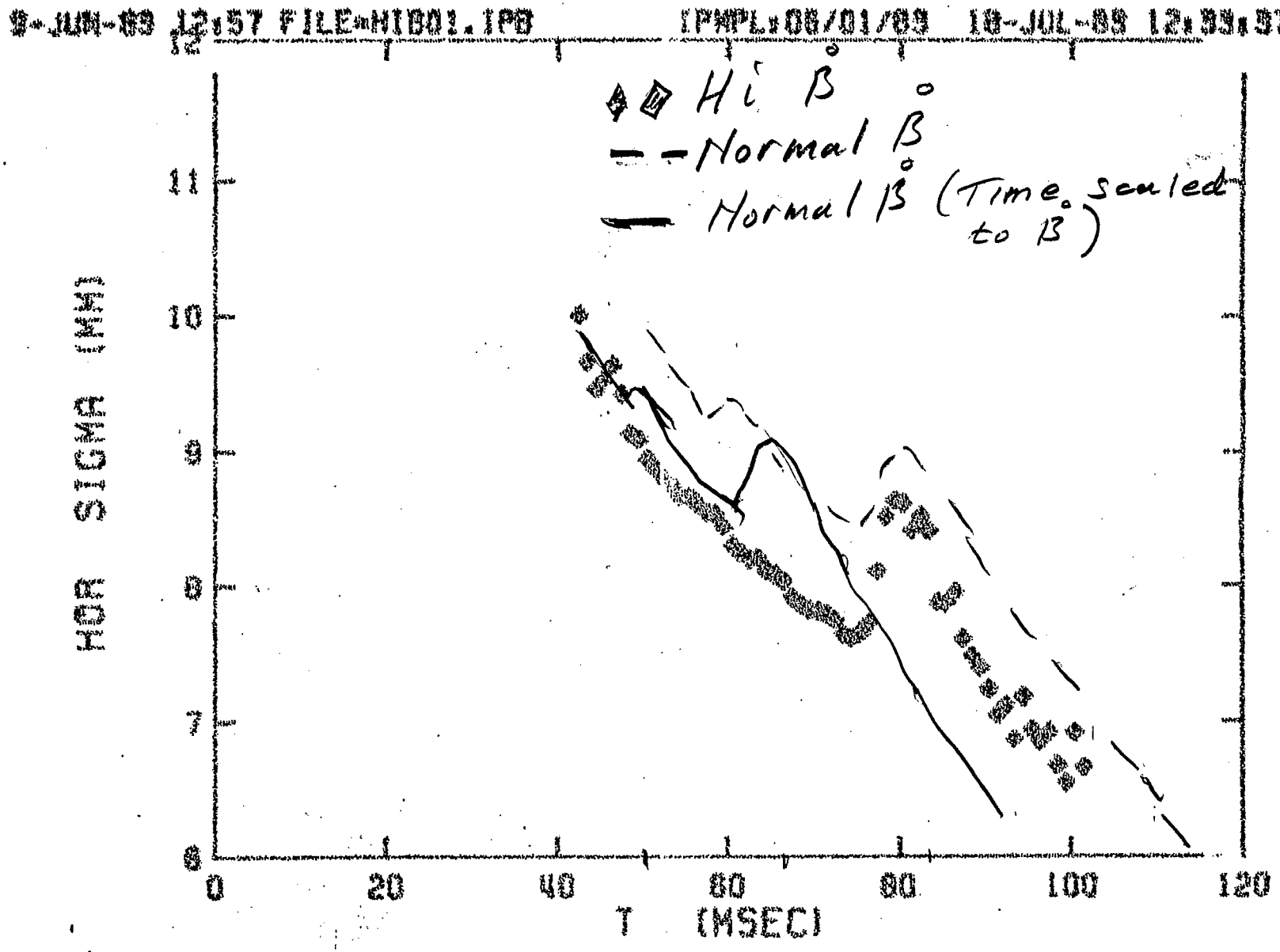


Fig 4. Horizontal Beam Size

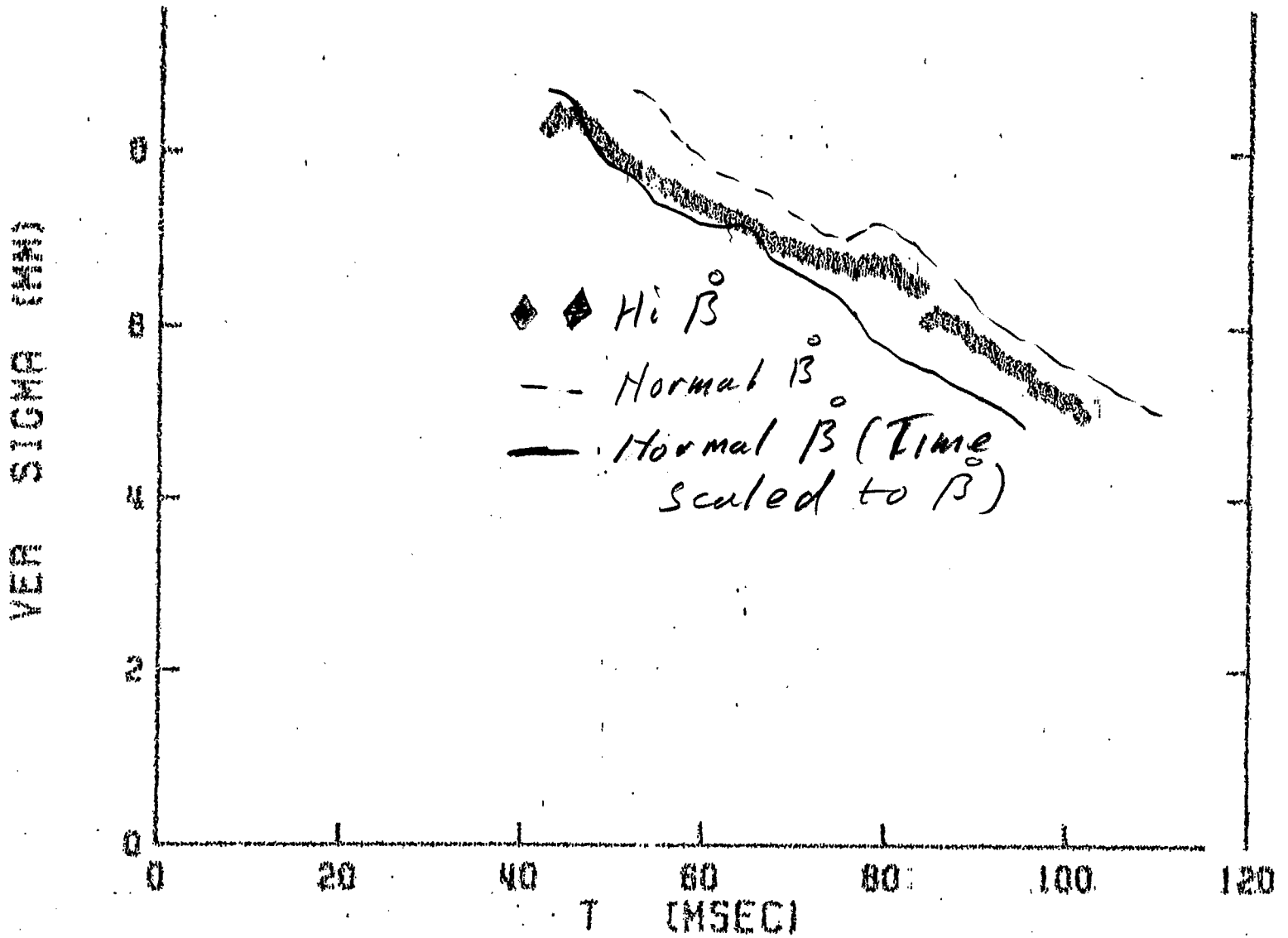


Fig. 6 Vertical Beam Size