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Vertical Injection Matching Studies

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Subject Vertical injection matching studies

OBSERVATIONS AND CONCLUSION

Objectives: To measure the vertical injection conditions by observing the coherent oscillations due to misalignment present with a spiraling beam. Also, if possible to observe the effect of rotating the vertical emittance ellipse on beam size.

Procedure: In order to obtain a clean vertical difference the linac pulse length was reduced to less than one full turn. Then power supplies NP447 and NP456 were varied in an attempt to reduce the observed oscillations. Next, the linac pulse width was increased to give five turns and $\approx 4 \times 10^{12}$ injected protons (with the nominal NP447 and NP456 values) and an attempt was made to measure the vertical beam size.

Results: For the fractional turn injection the peak-to-peak amplitude of oscillations was $\approx$ 1.4 cm at commands of 0,-211 on the two vertical steering dipoles 447 and 456. At -60, -90 on these two elements the amplitude was reduced to $\approx$ 8 mm peak-to-peak but it was not possible to reduce it any further. The reason for this is not known. (Horizontal tune $\approx$ 8 2/3 and vertical $\approx$ 8.88.) With these settings, however, the five turn beam was $\approx$ 20-25% less than the 4×10^{12} mentioned above. Again, this result is not understood.

An attempt was made to measure the spiraling beam vertical height using J-19 targets. A very rough value of 1.7" was obtained for the 4×10^{12} beam but time ran out at this point.

Problems: The NP447 power supply had to be replaced as it was not functioning properly. Also there was considerable difficulty with the computer control of the J-19 target position.