

Vertical Injection Matching Studies

E. Raka

August 1977

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No.EY-76-C-02-0016 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Date 8/31/77 Time 0001-0400 Experimenters E. Raka, J-L LeMaire, E. Gill

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 ≈ 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 ≈ 8 mm peak-to-peak but it was not possible to reduce it any further. The reason for this is not known. (Horizontal tune $\approx 8 \frac{2}{3}$ and vertical ≈ 8.88 .) With these settings, however, the five turn beam was ≈ 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.