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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 beam size on the spiraling beam for different vertical matching conditions.

Procedure: We use the J19 vertical target to remove 10% of the beam intensity as usually done. All the AGS and linac parameters are identical to what they were before starting studies, but the linac pulse is shorter -- linac current was $\simeq$ 67 mA.

Results:

1) We measured a vertical beam size, on a 5-turn injected spiraling beam of 1.58". This gives a normalized vertical emittance of 12.6 π mm·mrad.

2) Using the destructive measurement device, we get for the same 90% beam conditions, a normalized emittance of 7.4 π. Thus, there is a dilution factor of 1.6 during injection process. So the beam undergoes either vertical coherent oscillation or closed orbit distortion, or vertical mismatching, or all of them.

3) Because the steering conditions in HEBT IV were quite satisfactory, we concentrated on vertical matching. Making use of the matching code HOPI, we were able to change the vertical emittance parameters without affecting the horizontal ones. We ended up with a beam intensity increased by 5%, but the vertical size measurement could not tell any smaller size within the accuracy of the method.

When we went back to full intensity, it was lower than before studies for unknown reasons. We decided to set the new quad settings and were able to achieve 5% more in the injected intensity than before starting studies.