BNL-104019-2014-TECH

AGS.SN141;BNL-104019-2014-IR

Search for Intensity Limits on AGS Spiraling Beam

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April 1983

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U.S. Department of Energy

USDOE Office of Science (SC)

DISCLAIMER

Number 141

AGS STUDIES REPORT

Date April 20, 1983 Time 0500

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Reported by L. Ahrens

Subject Search for Intensity Limits on AGS Spiraling Beam

OBSERVATIONS AND CONCLUSION

The purpose of this study was to inject increasing quantities of H^- beam into the AGS up to limitations of the linac while observing the resulting circulating beam intensity as a function of time. In particular, we were searching for intensity-dependent (space charge) loss patterns.

The number of protons obtained from HEBT was increased from 1 x 10^{13} to 4 x 10^{13} by increasing the linac pulse width from 120 to 420 microseconds. Photos were taken of the resulting L20 current transformer pulses, and a record kept of the scalar reading of AGS circulating beam current. Figure 1 gives AGS intensity vs HEBT intensity. Figure 2 is a tracing of photos of the L20 wave forms for the various currents.

From the figures: 1) the fraction of injected current which initially survived, remained constant within errors over this range of intensity, 2) higher intensity resulted in earlier spiraling beam loss until the intensity was reduced to low levels.

This was a one-hour study, which precluded significant parameter vartiation due to time limitations. The rf system was off--B^+ off, cavities mistuned to supress self-bunching of the beam. Essentially, the full pulse width available from the source was used (420 microseconds). The reported linac current was 18-19 mA.

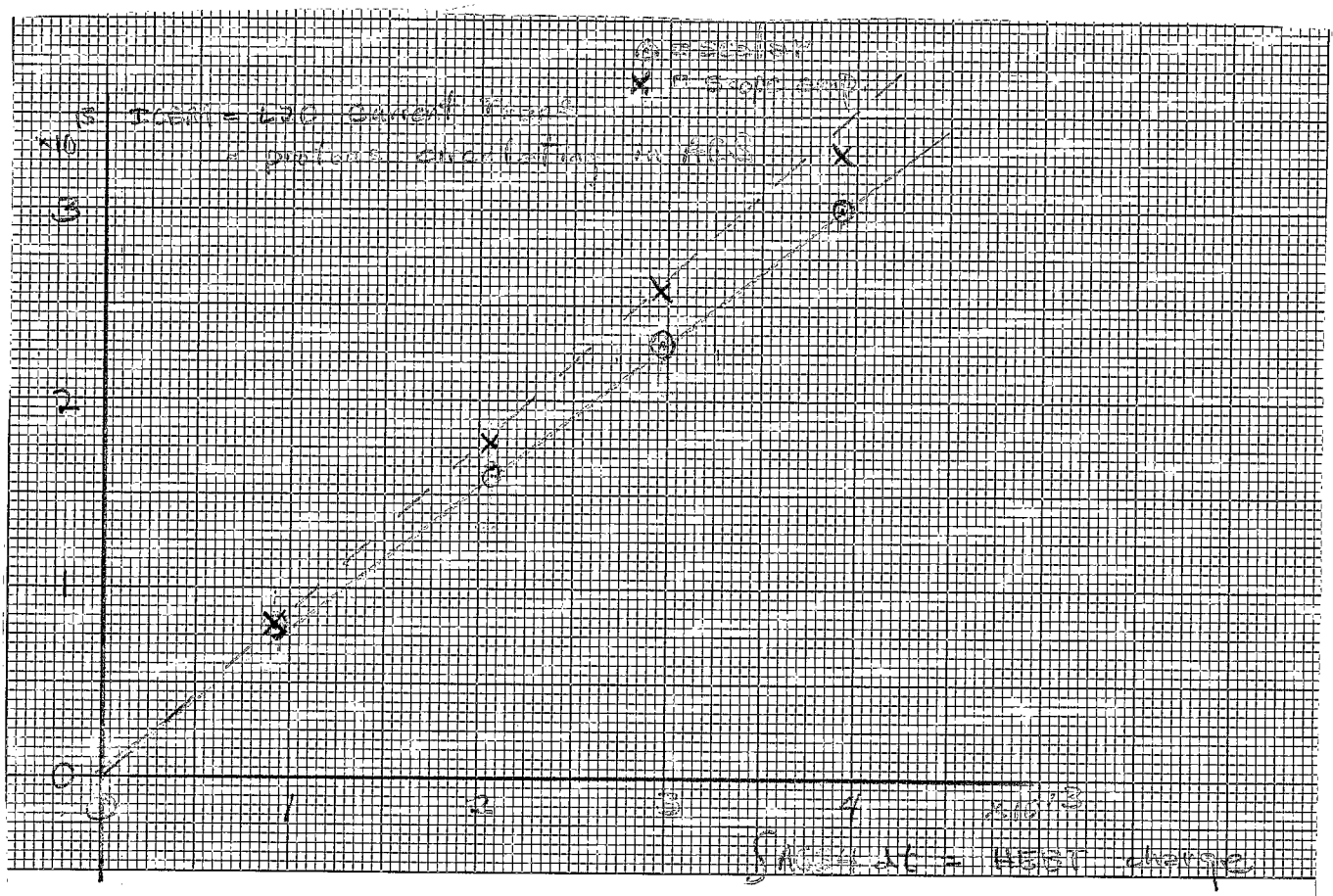

Fig 1

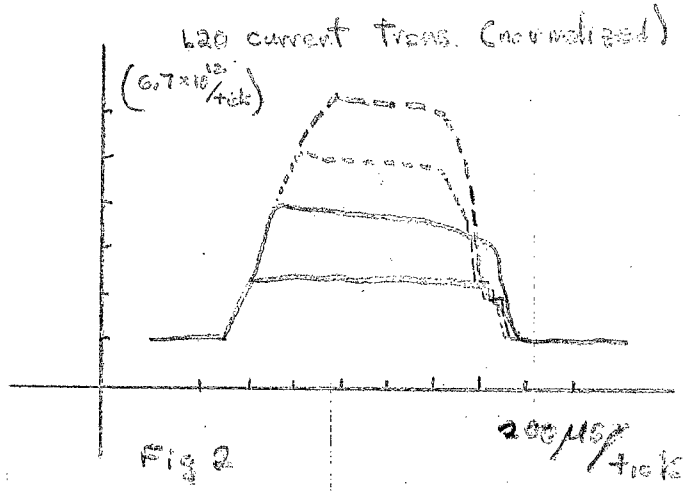

Fig 2