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Optimization of Stacking Efficiency

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No. 5

Blumberg

Injection Studies — April 10, 1973 — 11:00 pm - 5:00 am

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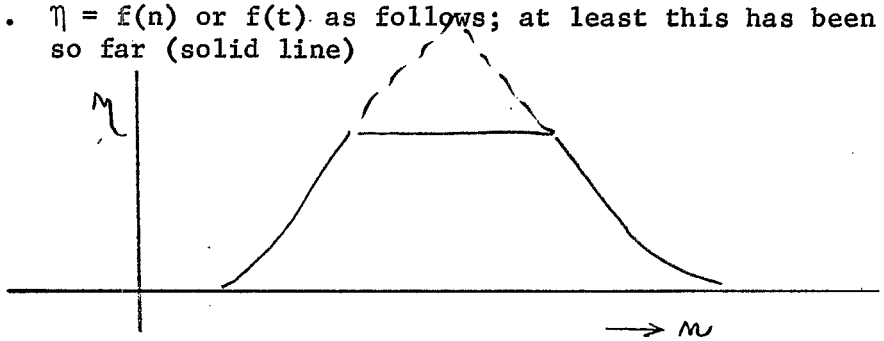
Objective: Further optimization of stacking efficiency (horizontal only) variation of β_H, for various injection bump collapse rates.

Procedure:

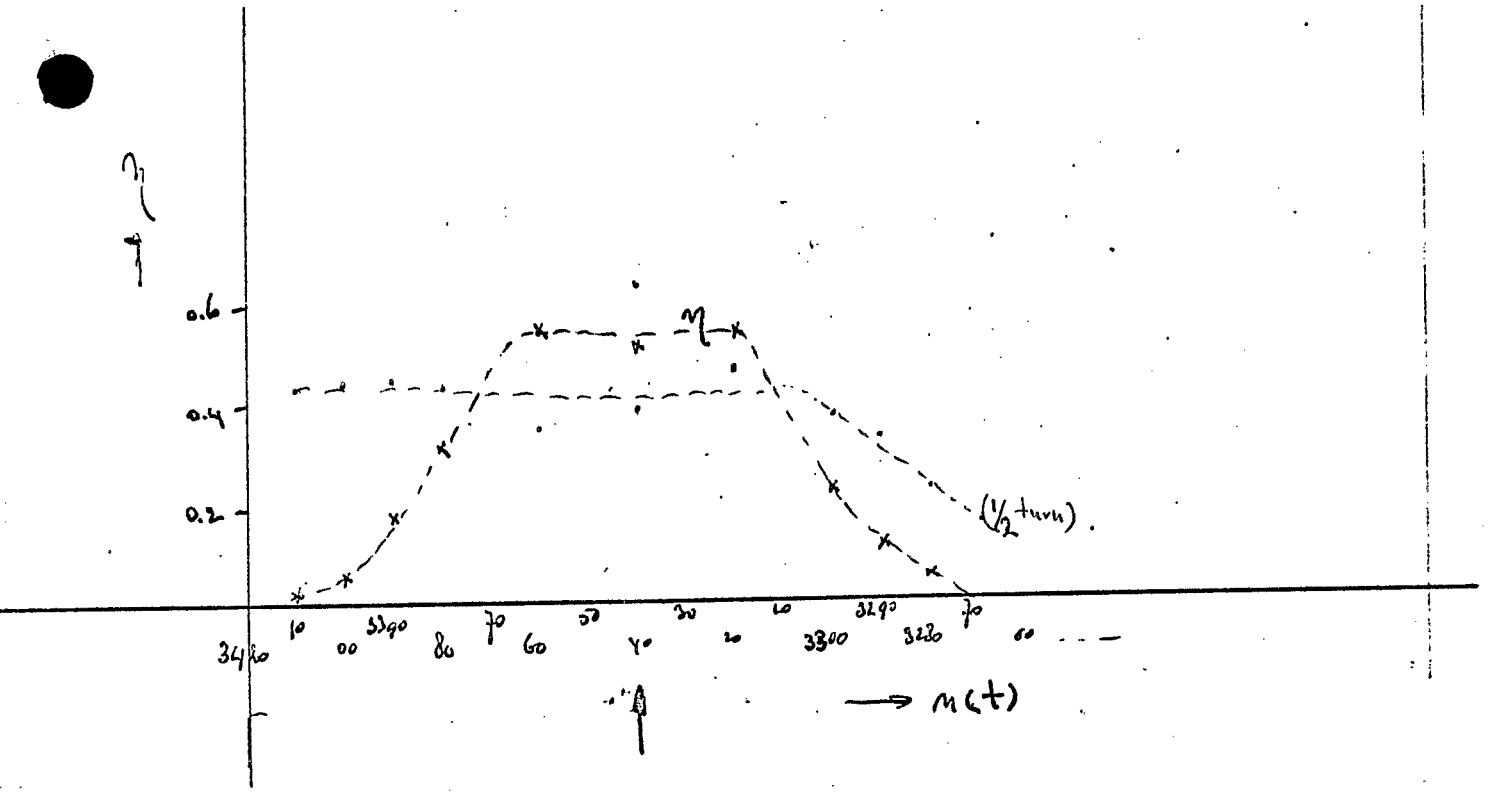
1. Take emittance, execute on-line match to desired β_H value, $\alpha_H = 0$, vertical "match".
2. Use short pulse, after adjustment ν values to $\nu_H = 8.75$, $8.5 \neq \nu_V \neq 9$. Take "survival" amplitude. Ratio of late value to first (½ turn) is η.
3. $\eta = f(n)$ or $f(t)$ as follows; at least this has been found so far (solid line)



4. Set n for "center" of acceptance range. Reduce β_H, maintain other match parameters. Expected result is that η should increase, until total $\eta = f(n)$ behavior nearly triangular (dashed addition).
5. If this is achieved, try further optimization by changing ν_H by small amounts.
6. Switch back to full pulse length, check total stacking behavior.
7. Repeat procedure for a 2 larger values of injection bump collapse time.

Results:

1. Emittance system (which was transferred just previously from the linac injection area) did not produce data. Efforts were made for a few hours to correct this. This was abandoned by 0200. Decided to use $\alpha_H = 2.8$, $\beta_H = 23.0$ m; $\alpha_V = 0.8$, $\beta_V = 9.8$ m emittance parameters obtained 2 weeks earlier.
2. Single turn stacking efficiency data were taken. See page 2.



3. Subsequently, attempts to use the matching program, in order to vary β_H only, failed because of lengthy computer problems. Abandoned attempts to use the computer by 0330.0/cl.

4. Decided to take stacking data for various injection bump collapse rates (see 7 above). Switching of the A bump frequency could be done remotely via datacon, but failed for the B bump. Finally did this locally in the A10 House. Attempts to increase the linac pulse length to 200 μsec failed. Gave up any further attempts towards significant data taking by 0430.0/cl.