P1 Line Matching

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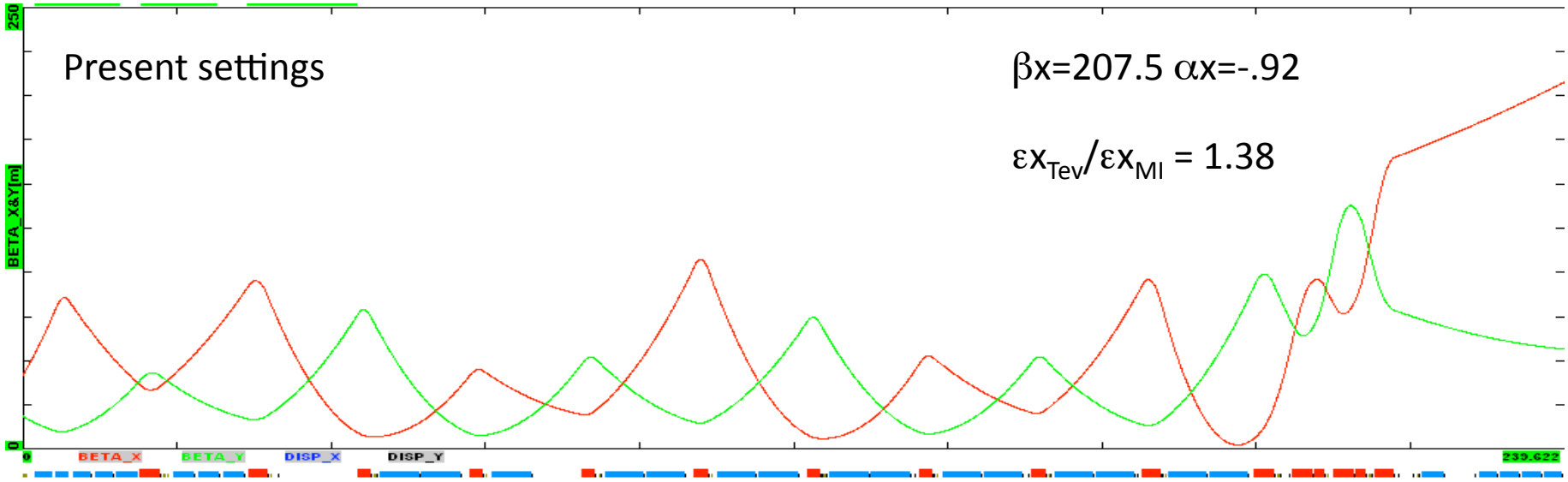
Motivation

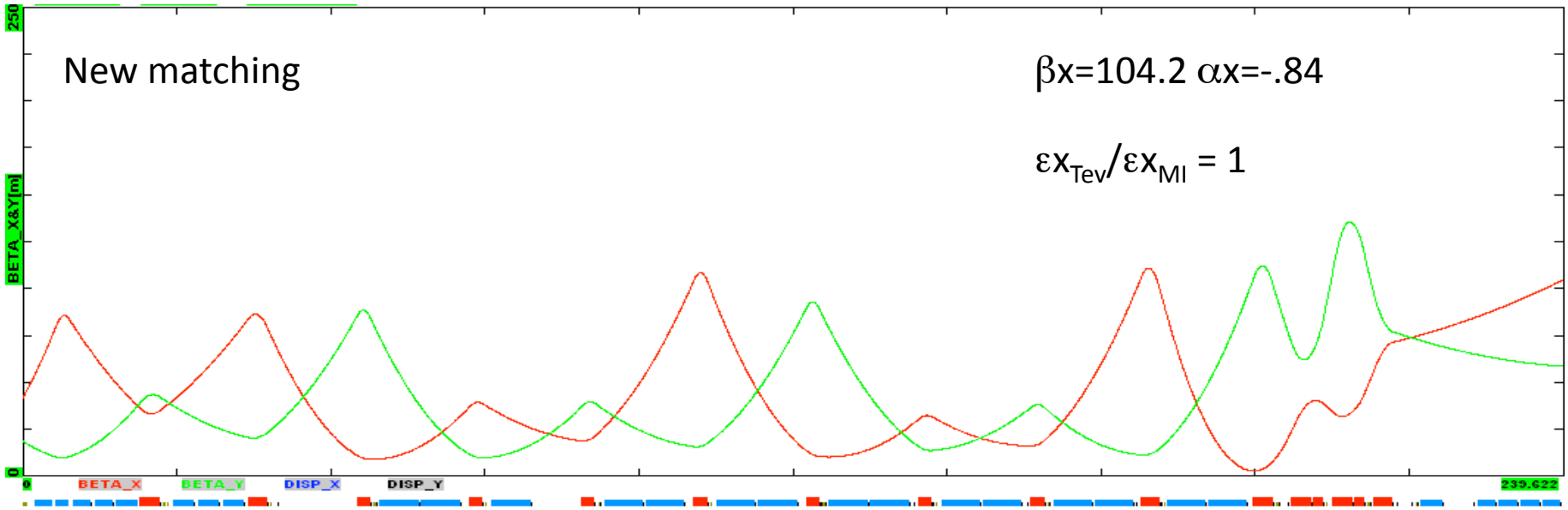
From M.-J. Yang's presentation On Aug. 7:

There may be a large horizontal β mismatch MI/P1/Tev
Although not consistent with TBT lattice measurement

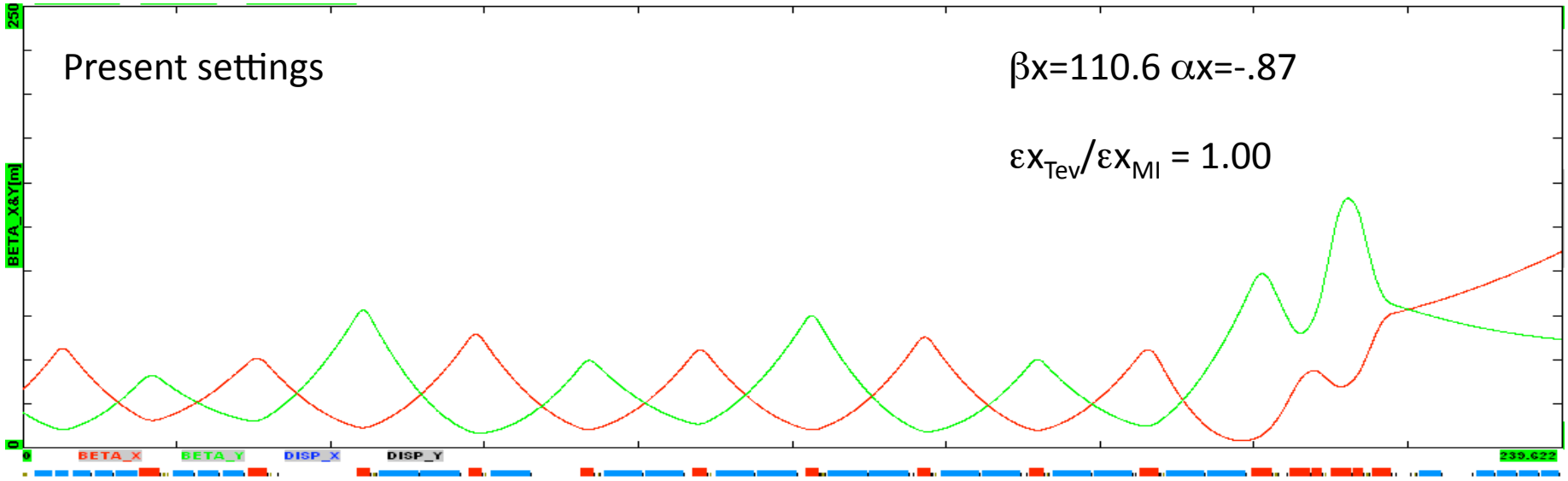
Re-taking the complete data would be lengthy. Matching P1 based on available MI and Tev lattice data is quick and could provide additional information.

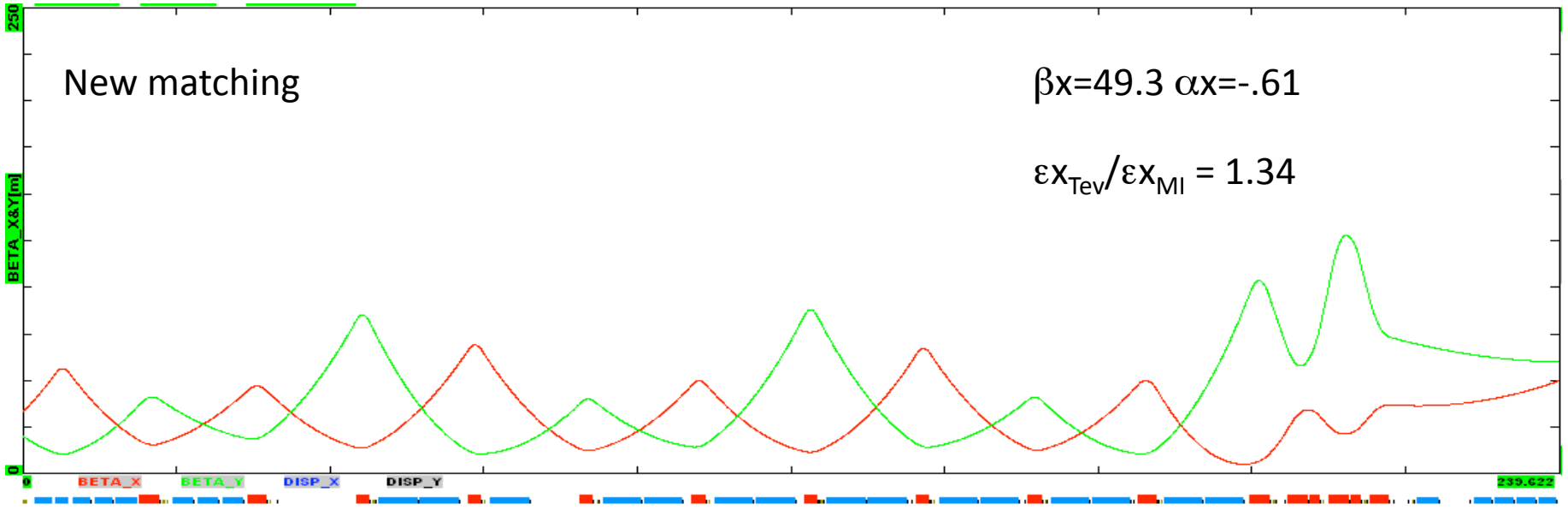
Matching with MJY initial parameters





Matching with Design initial parameters





Large horiz. emittance change expected in any case

- We should either observe a 20-30% improvement if MJY's measurement represents MI
- Or similar emittance increase if MI is close to design.

Study results

- 9/25: Had issues with closure, P1 matching solution had an error (introduced vertical mismatch).

  No effect on FW

setting	E11 V σ	E11 H σ	E17 σ
present	1.2	1.6	2.7
new	1.3	1.7	2.6

- 9/30: Refined matching, no problems with closure.

  No effect on FW

setting	E11 V σ	E11 H σ	E17 σ
present	1.19	1.65	2.64
new	1.18	1.64	2.63

Used coalesced beam in both cases. Both solutions do not change dispersion.

Summary

- After shutdown we do not see larger emittances in the Tev. Is the matching fine? May be, but:
- We do not understand the response of FW beam sizes to changes of P1 line matching.
  - A factor of 2 change in β-function should be visible
  - The changes were implemented in small increments, and FW reported the same values for all fractional P1 line quad settings
  - FW seem to respond to mis-steering
- We would like to try the new P1 matching in a store.
- Complete MI-P1-Tev measurement will be helpful, especially if we can get TBT IPM data. We should also repeat the round-trip measurements.

Backup

9/25 matching solution