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12/20/04

12/20/04 Injector Rematch Test

The following plots show comparison between baseline PZT signature and one of the solutions tested on 12/20/04.

A total of 3 solutions corresponding to varying degrees of trade-off between PZT and beam spot were tried, as well as variations thereof mainly due to uncertainty about the Chicane-NL junction. The plots below correspond to a variation of the 2nd solution. A more promising 3rd solution based on "DC PZT" taken on 12/19/04, which showed offline behavior superior to the 2nd solution, was unfortunately not fully tested due to Injector energy lock not responding fast enough, leading to steering confusion until time ran out. It should be tried in the next chance available.

With the solution shown below, close to 80 μA CW beam was transported to Hall C dump with no tweaking in the main accelerator. The data was taken at 71 μA CW.

The 1A & 2A SLM pictures for this solution are shown below.

The goals we have set out for this phase of the program, namely,

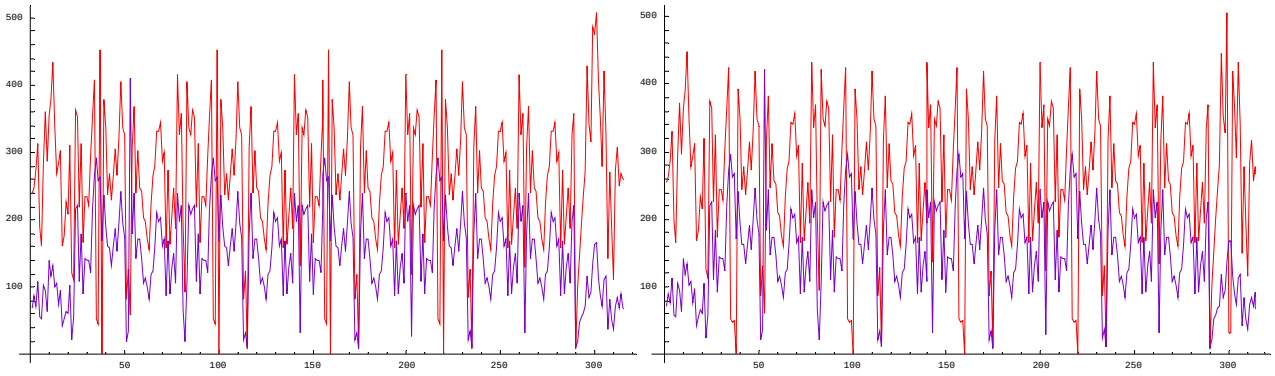
- clear all roadblocks identified during the first half of this year, and
- demonstrate scaled back version of PZT & beam spot control (XY & YX components, the most offensive ones),

has thus been achieved with the current test. The XX & YY components also seem to be damped appreciably, indicating improved transport overall. In this sense we have exceeded the goal somewhat unexpectedly.

For all plots, red represents the base line PZT signature and blue represents a variation of the second solution (relaxing matching of PZT to accommodate beam spot after 60 MeV)

Wire Sums at all STP (Injector + Hall C) and linac SEE BPM's

The baseline case was run at 80 μA, as opposed to 71μA for the test case. No BLM/BCM trips stopped delivery of the latter. The difference is apparently purely due to the current difference.



In the following pages all 4 30 hz PZT components are shown in 3 graphs:

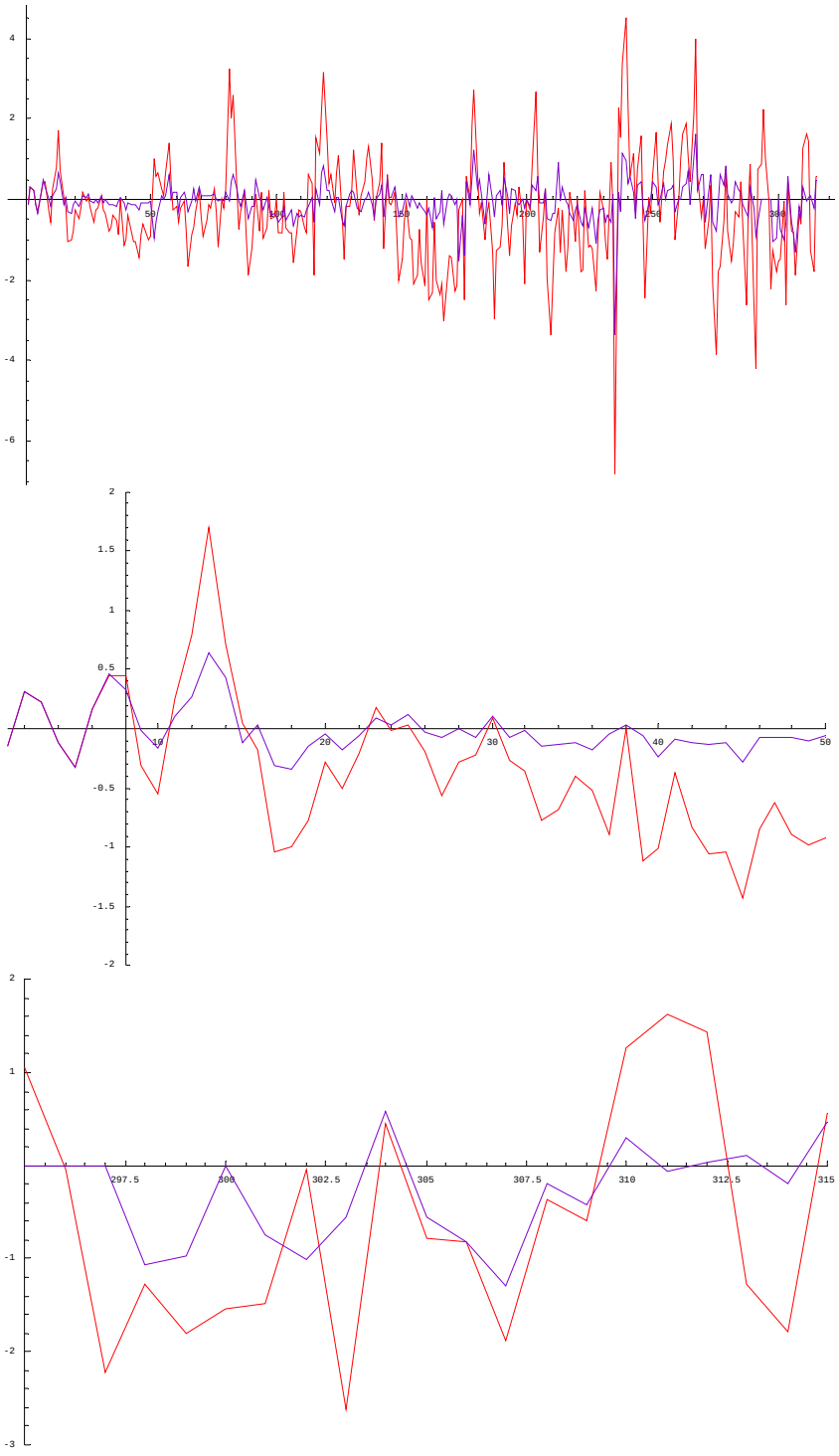
- All STP (Injector & Hall C) and linac SEE BPM's
- Subset of first 60 (from IPM0I02 to IPM2L07)
- Subset of last 20 (all in Hall C)

The first 2 pages correspond to the 2 most pronounced PZT components that we set out to correct. All amplitudes have been normalized by square roots of momentum.

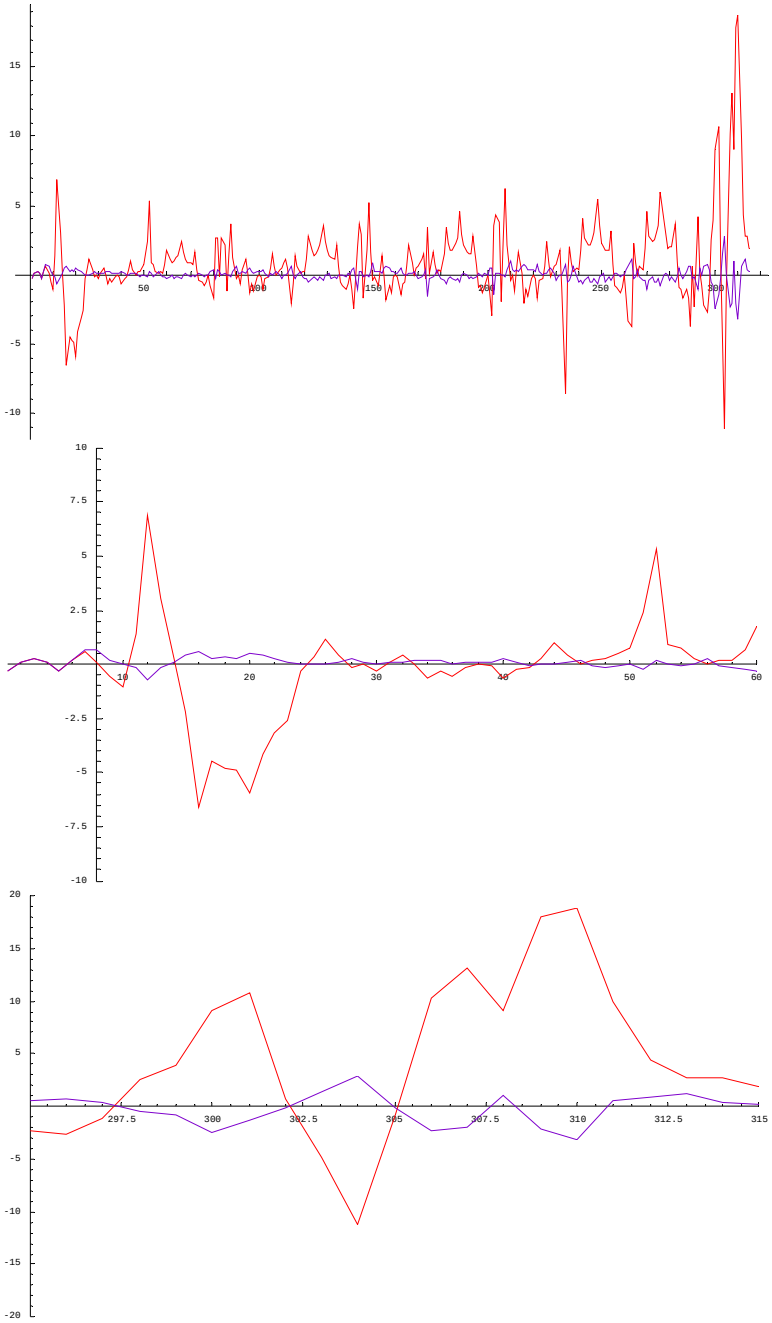
There is some apparent local optical mismatch inside Hall C, which we did not address. But given the much reduced PZT amplitudes coming in, this should not pose a problem if we want to.

A global matching inside the accelerator proper seems useful too in maintaining the damping achieved out of 60 MeV. This should be addressed soon as we know the current transport in the accelerator is not optimal.

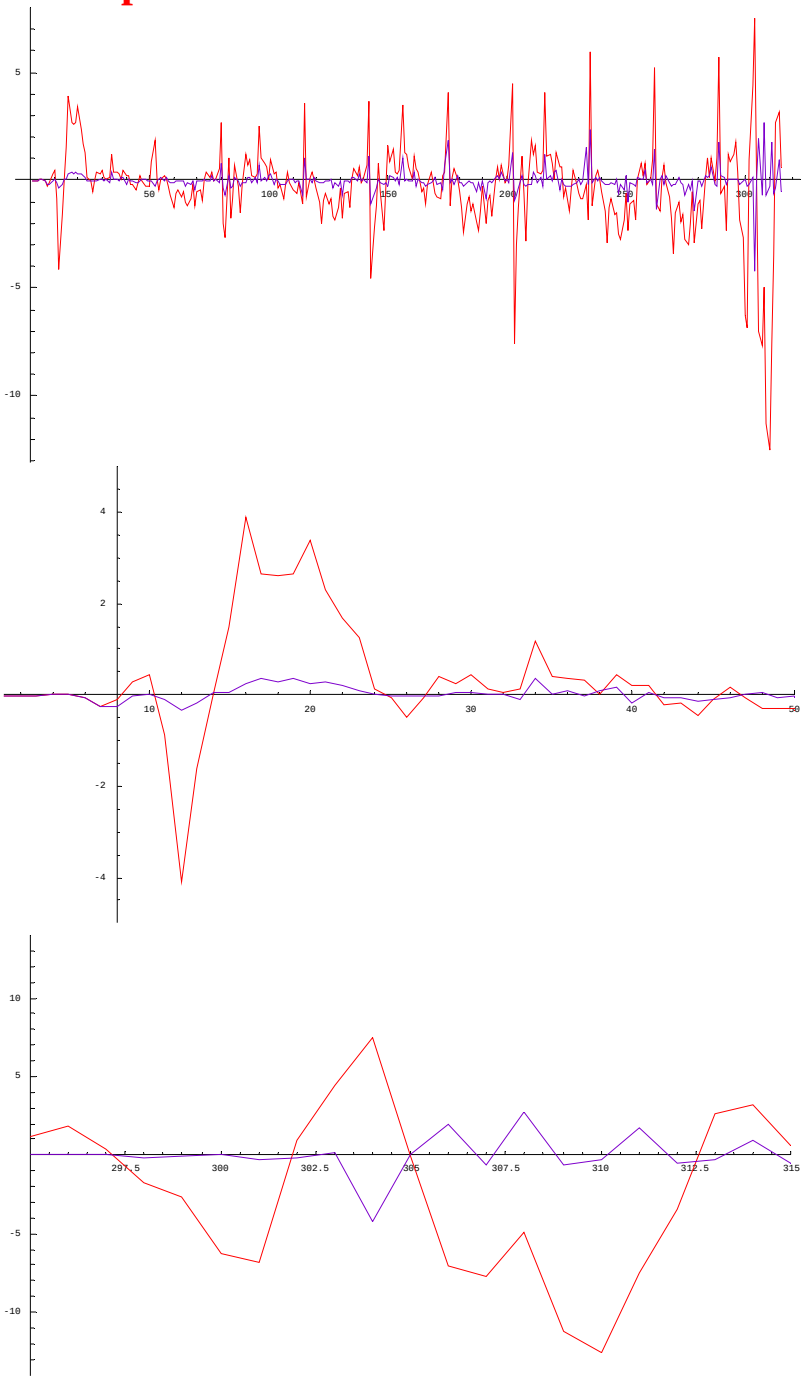
Y component of X PZT



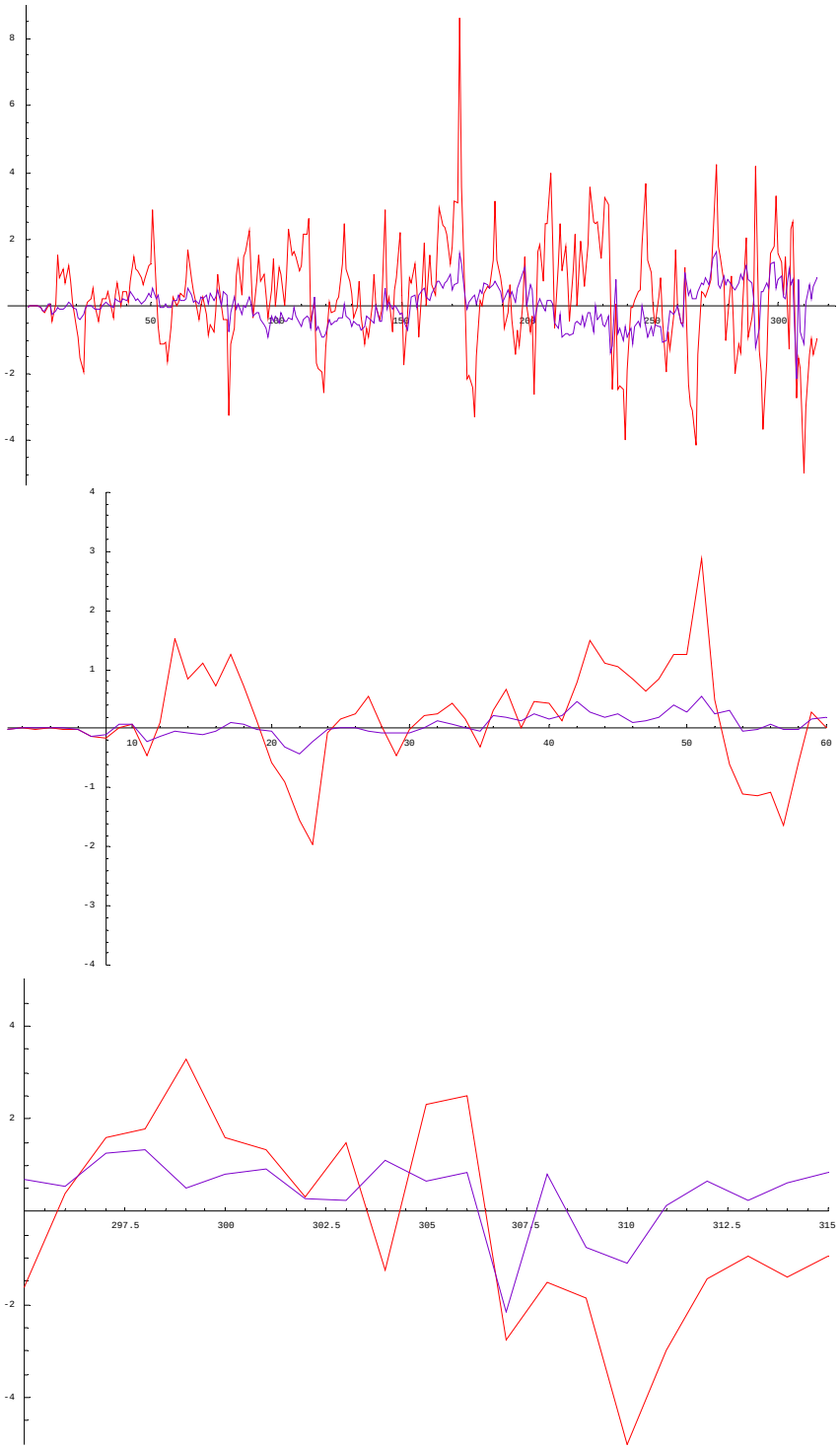
X component of Y PZT (the worst offender)



X component of X PZT

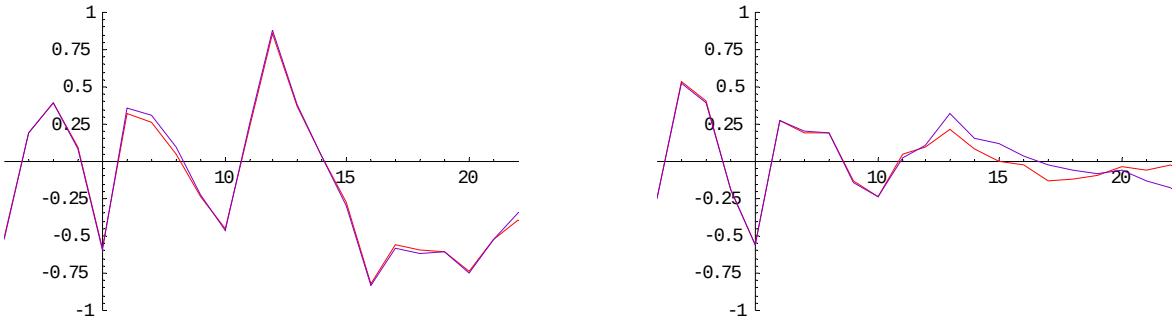


Y component of Y PZT



- About reproducibility of the Injector and PZT:

The YX & XY components are shown below for the first 23 BPM's (red: 12/20, blue: 12/19). They largely agree except in XY after IPM0L06 (12th). This is due to the fact that on 12/19 the skew quads 0L04 & 0L06 were left on while they were turned off on 12/20. This reproducibility explains the success of the current test (the solution was based on skew quads off).



- Unfortunately due to said energy lock induced steering confusion, an AllSave was not made of this solution in time. However a BURT special download file of all the quads implemented can be created. It would need to be followed by steering.

- The next agenda is definitely obtaining reliable measurements of the transport through capture+CU and Chicane-NL junction to pave way for final global fix of the Injector, now that we have decent confidence of measurability, correctability, and reproducibility.