Longitudinal Distribution Study

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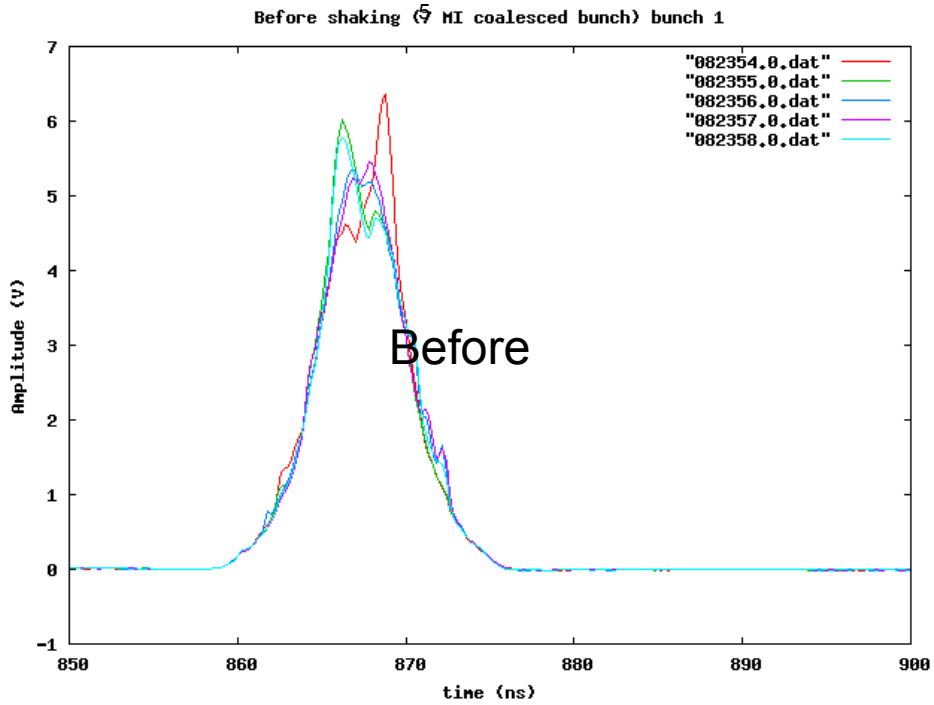
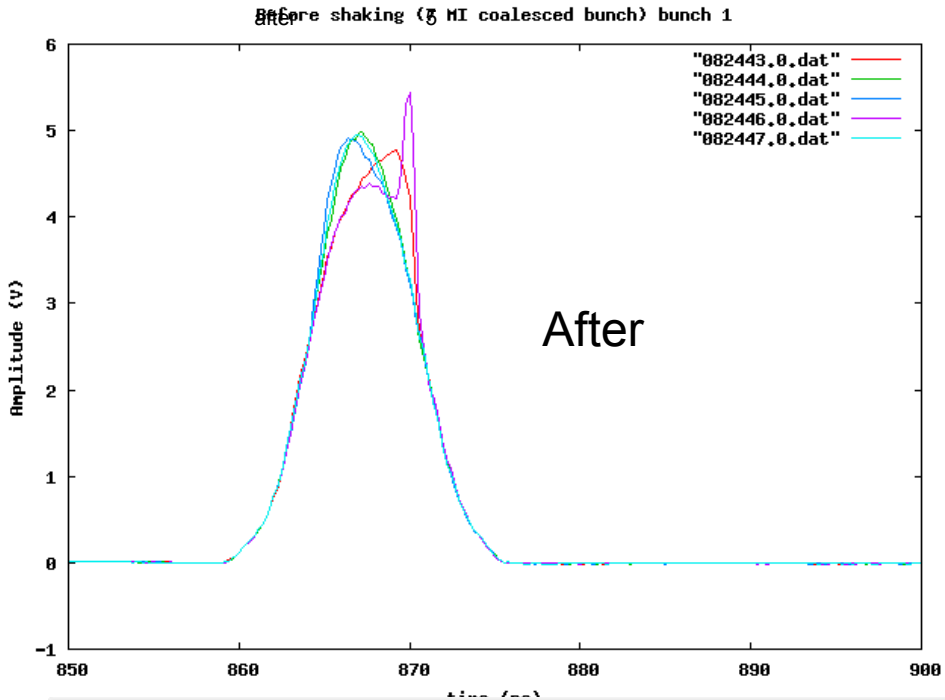
Goals

- See if beam loss can be reduced or eliminated with 5 bunch coalescing
  - Check beam redistribution does indeed stop tips from oscillating.
  - Minimize time of shaking to see if beam loss can be reduced.

Reminder

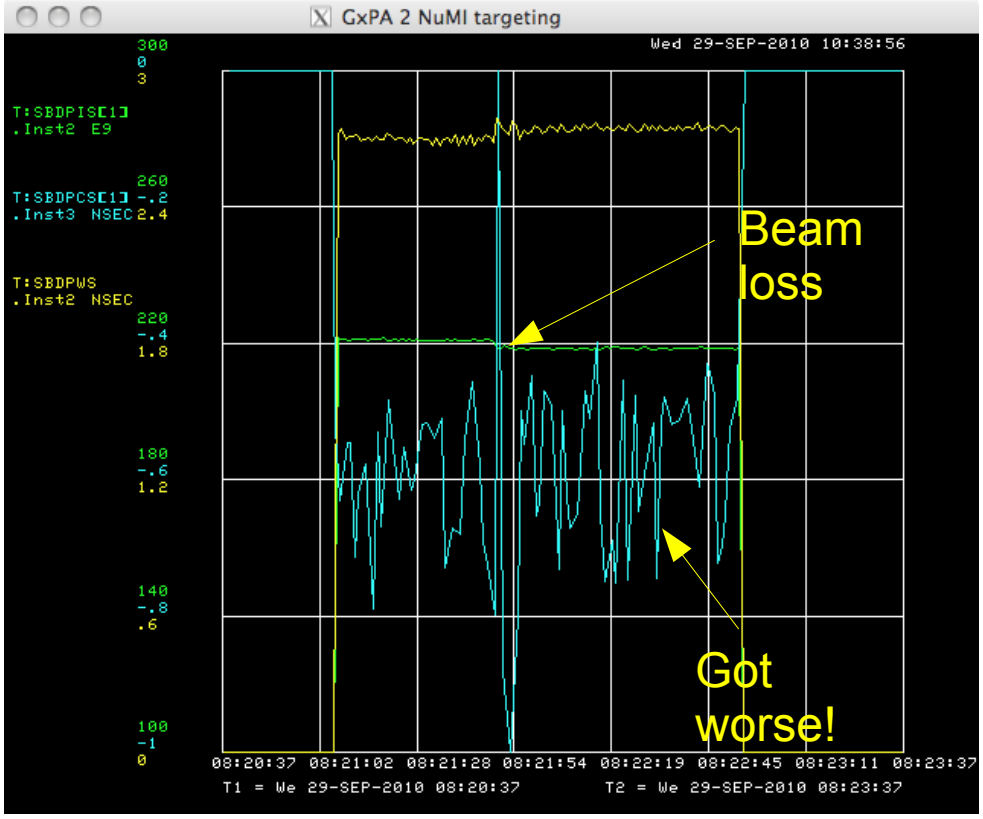
- Use chromaticity tracker's phase shaker to shake the beam longitudinally at synchrotron frequency.
- Use SBD to take data before and after the shaking.
  - Previous experiments did show that after shaking, anti-damping had little effect on the beam.

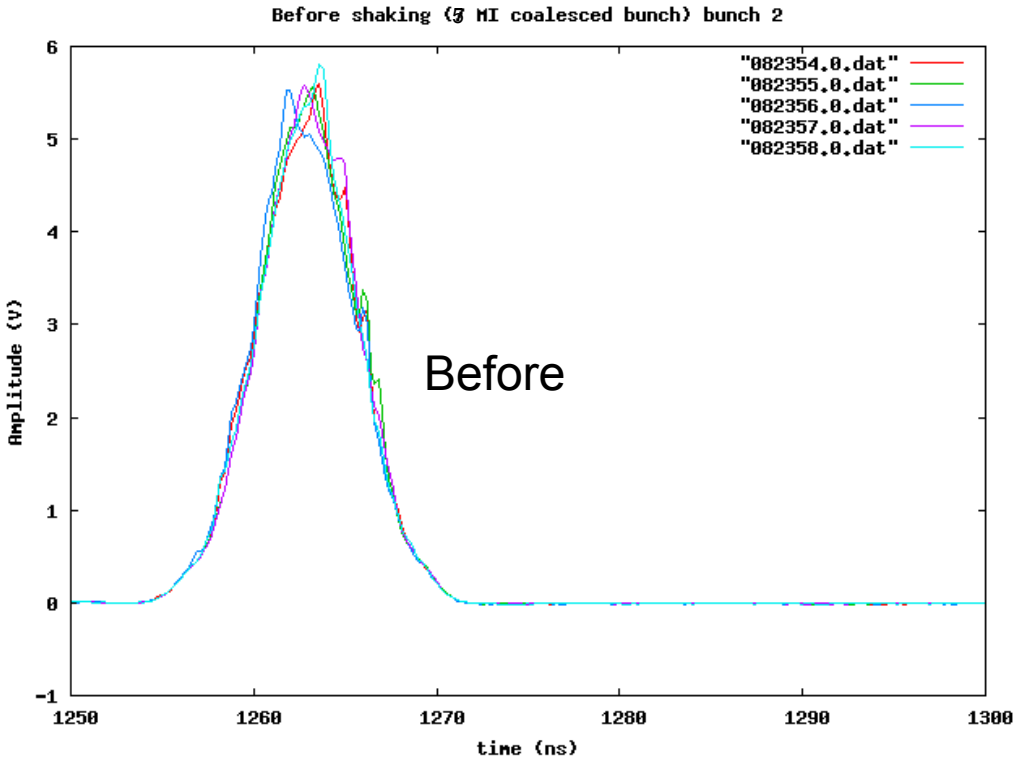


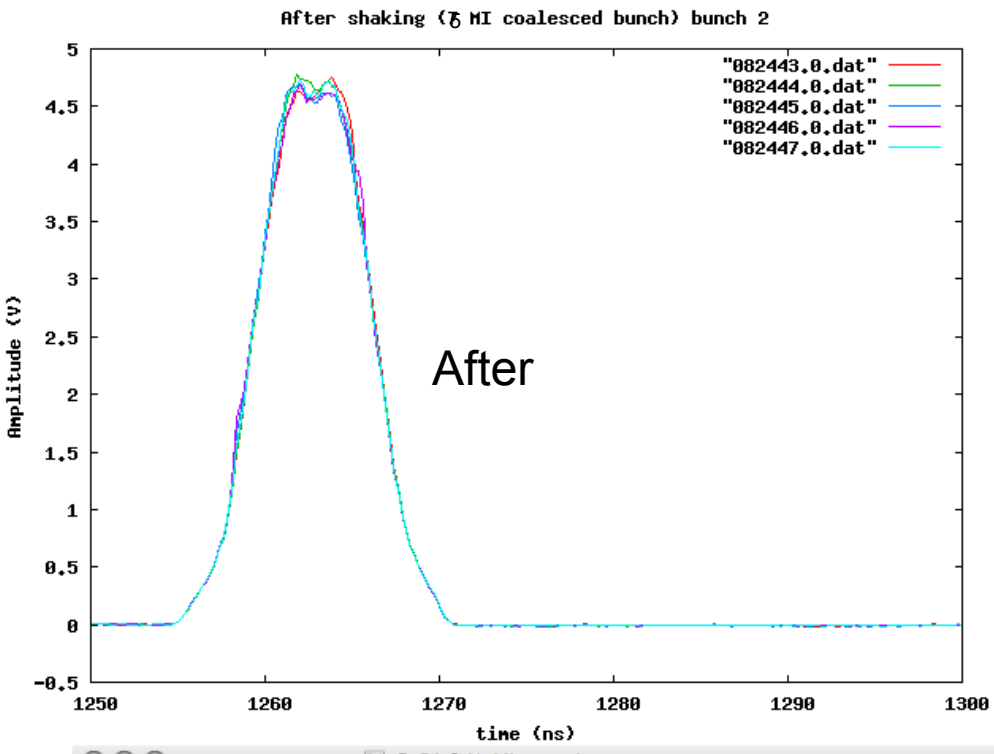


Shake is 3 deg for 7-8 second using 5 bunch coalesing.

Looks like oscillations did NOT stop after shaking!

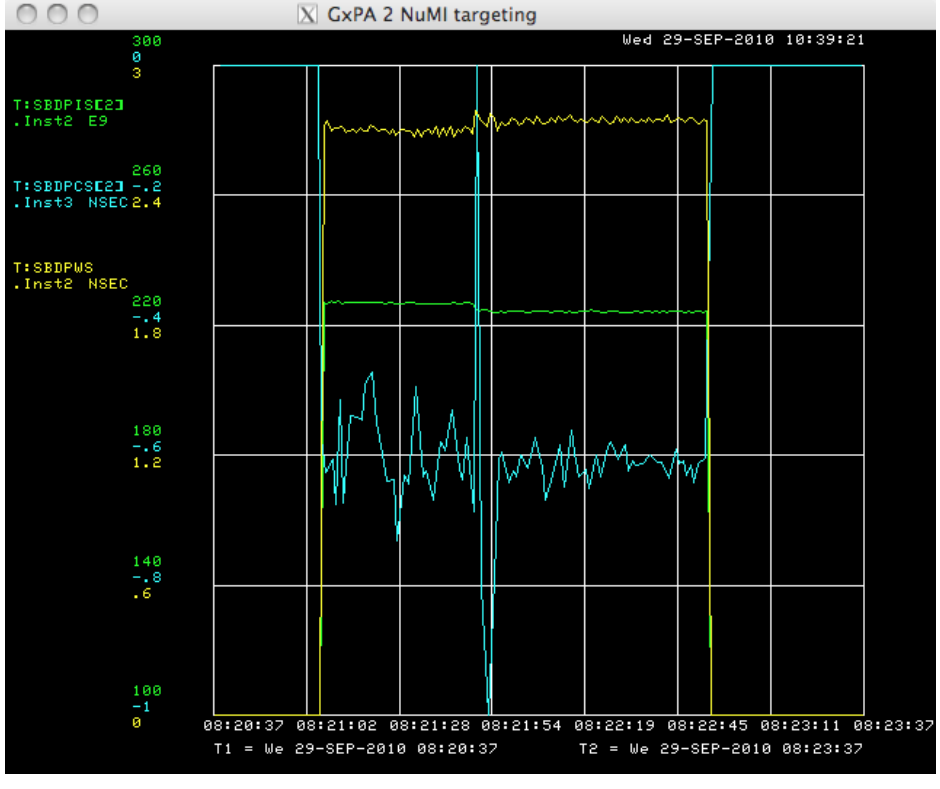




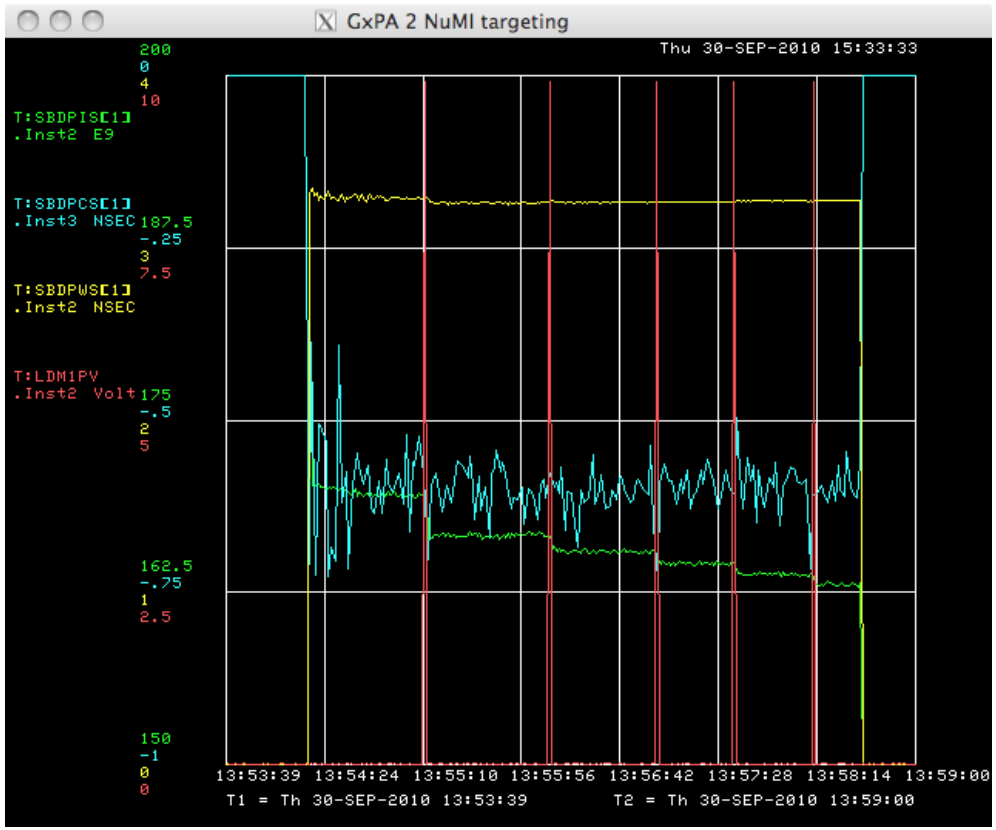


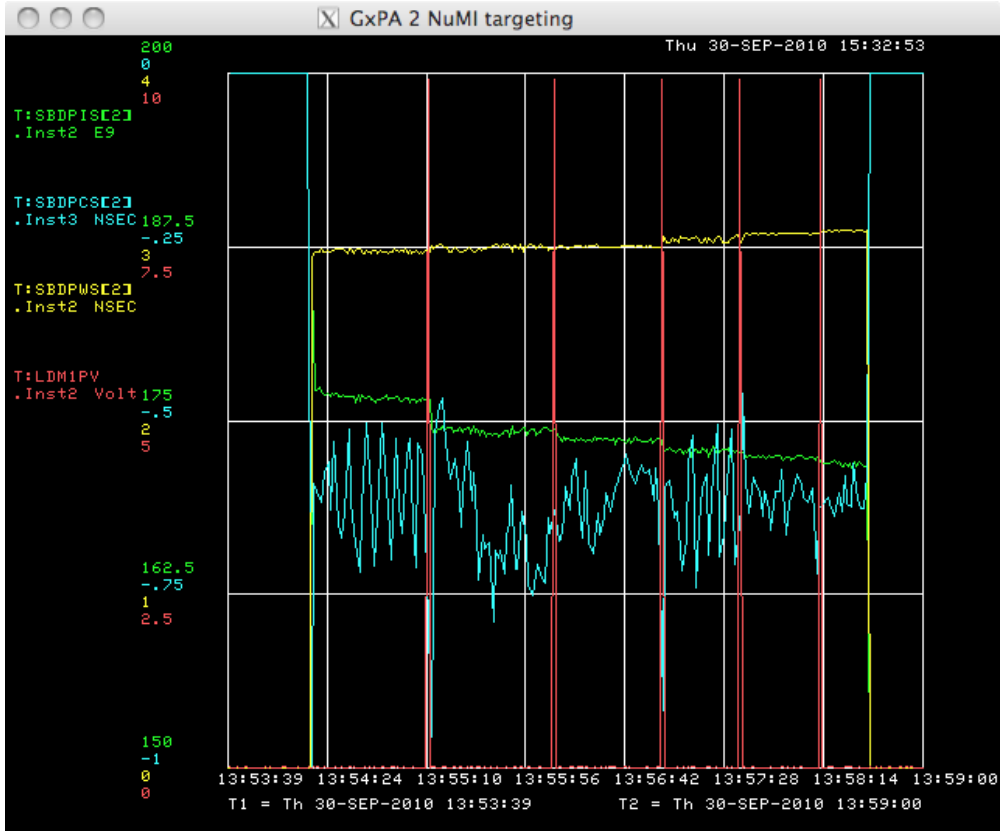
And yet for bunch 2, the oscillations stopped and adopted the classic divot type distribution.

Unfortunately, even with 5 bunch coalescing there is still beam loss ~1%.

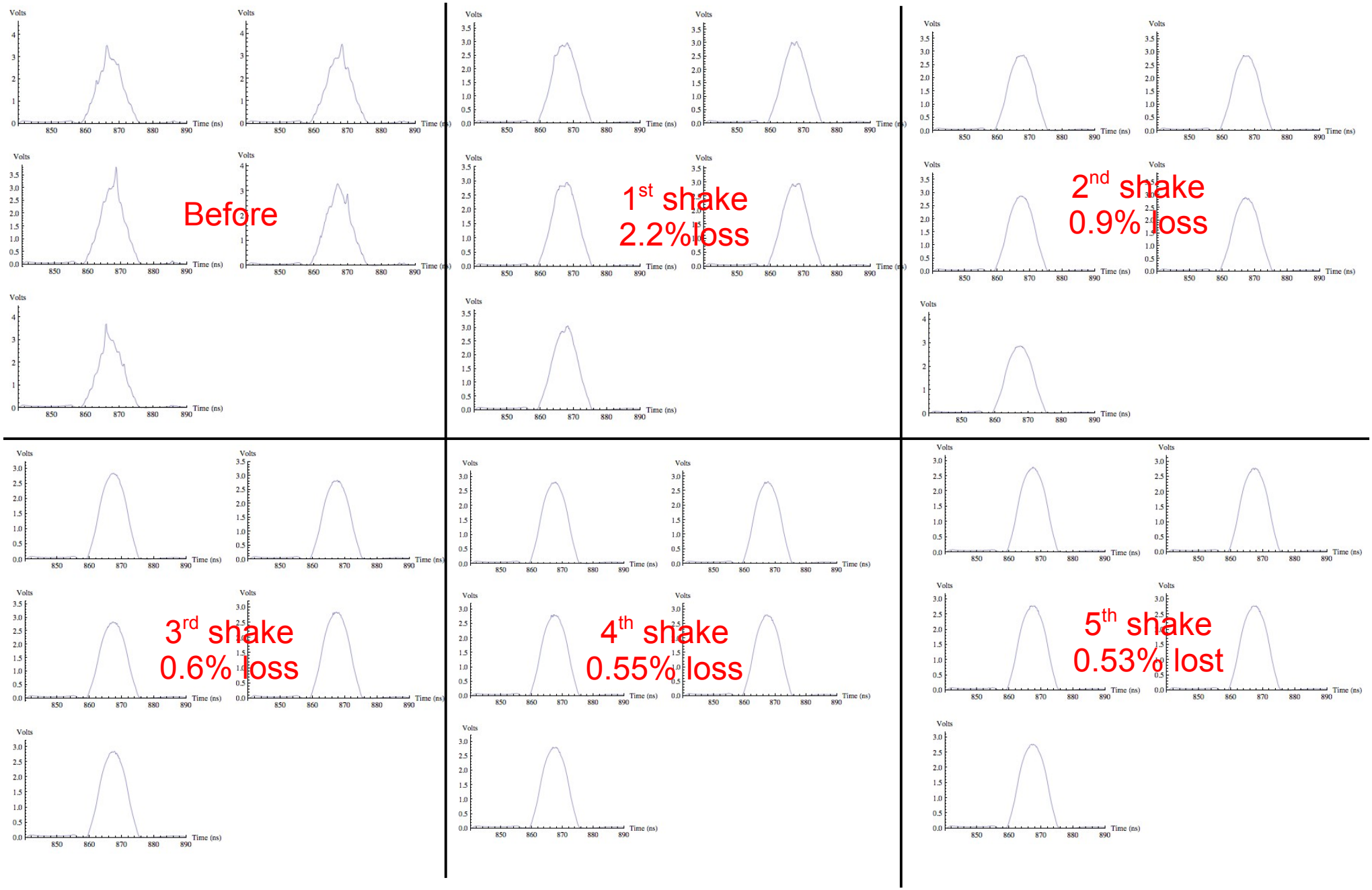


So shake for 1s intervals

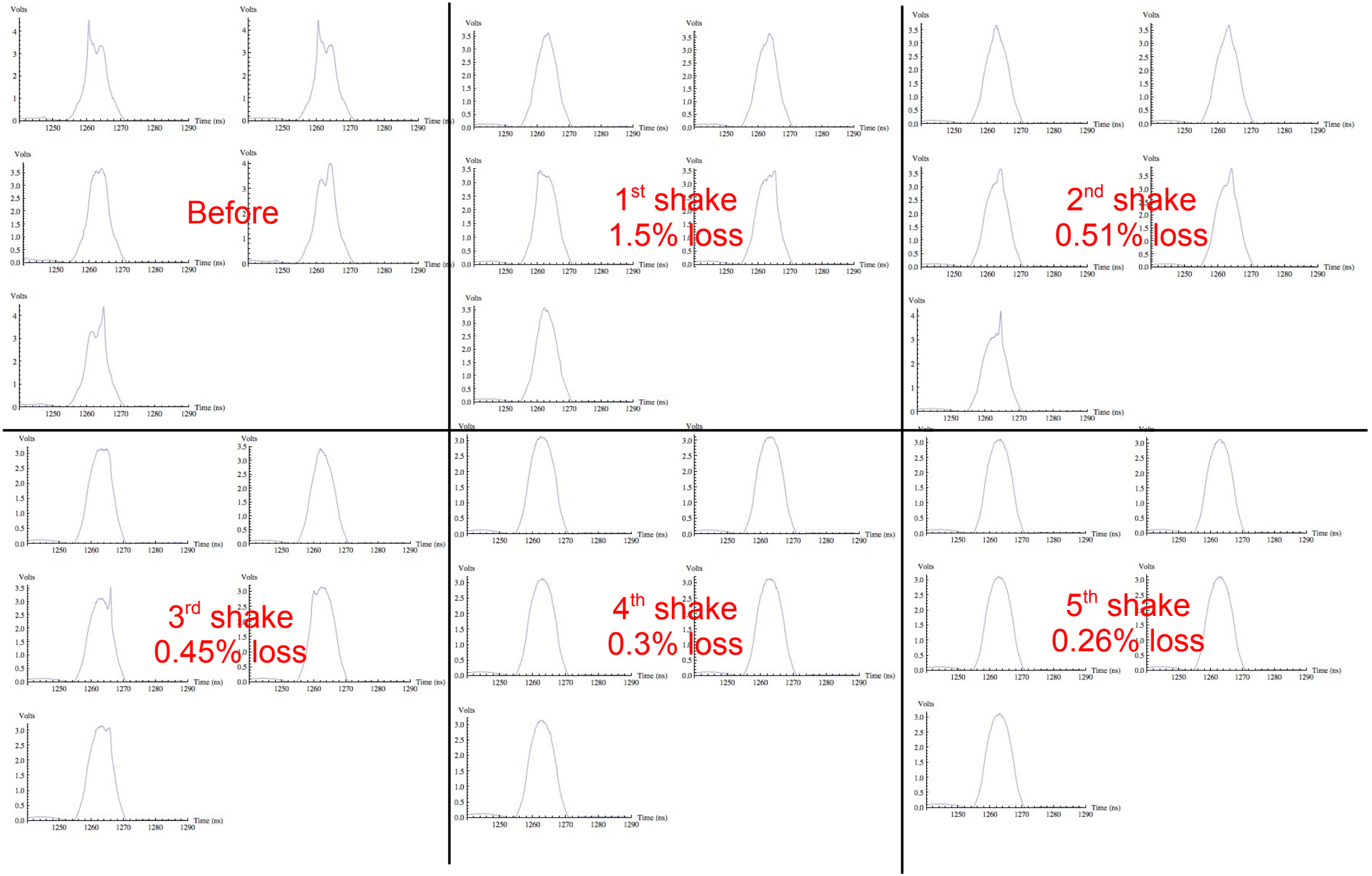




I still see losses!

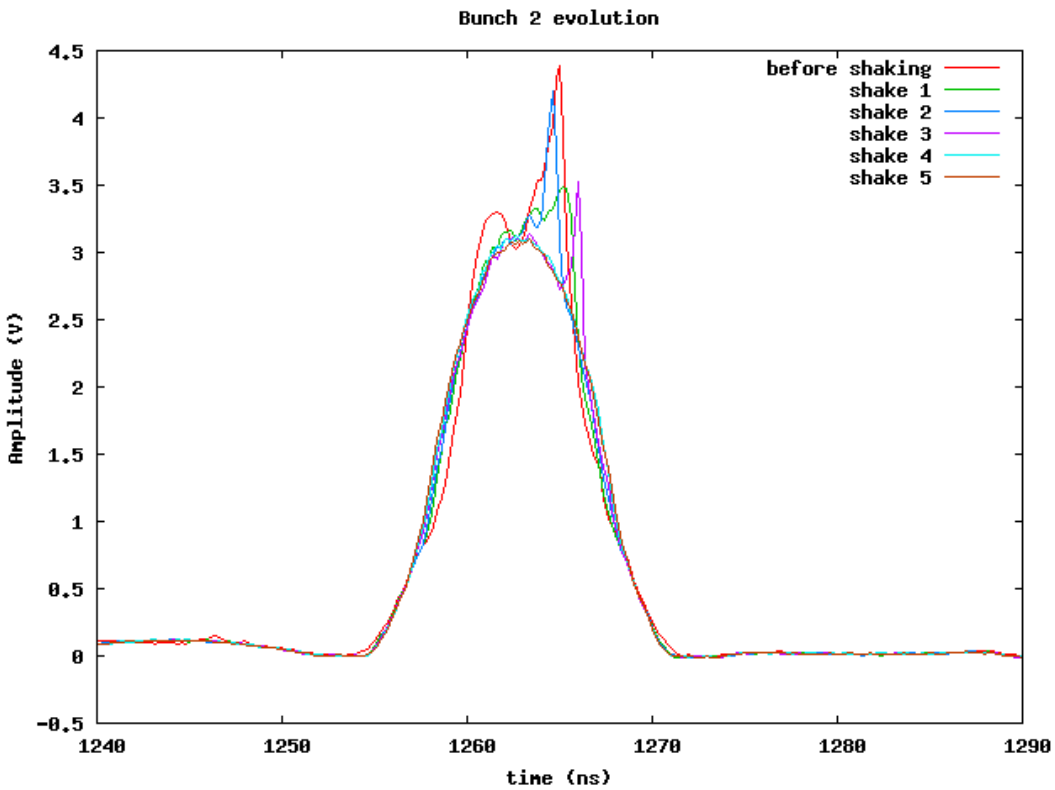


There is always beam loss and the divot structure can be shaken away.



Divot never developed and the clump may have moved

Moving clump?



Unfortunately, mountain range scope does not have bw to see the moving clump.

Conclusion

- Shaking does change the distribution
  - However, it is not guaranteed to stop the shaking.
    - Perhaps too little shaking?
  - There is always beam loss
    - Even 5 bunch coalescing beam is still near the edge of the bucket.
- Theory says that (total charge/bunch length)^5 is the parameter which determines the strength of Landau damping. Need to look at pbars, which should be shaking violently at 150GeV.