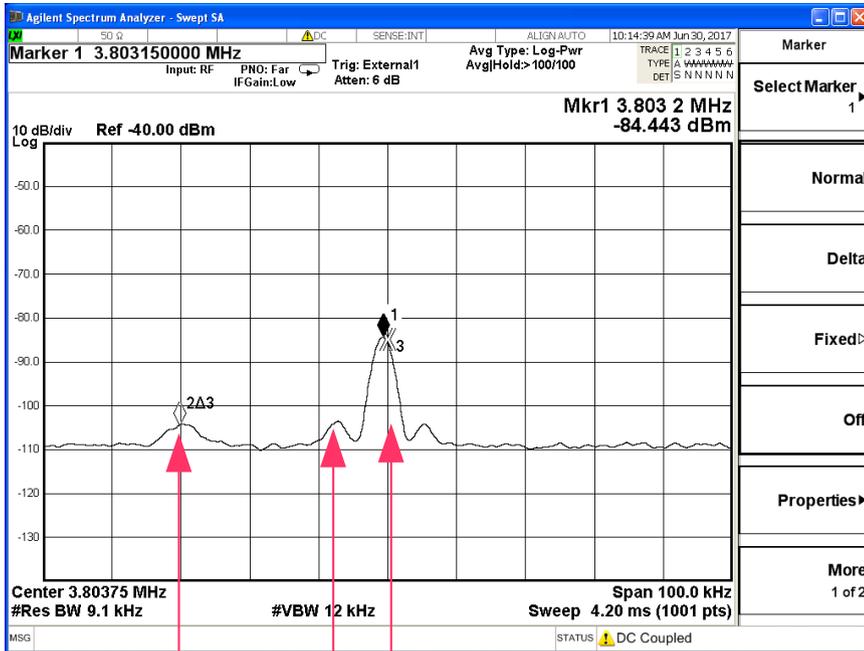


Noise and harmonic $3Q_x=20$ measurements

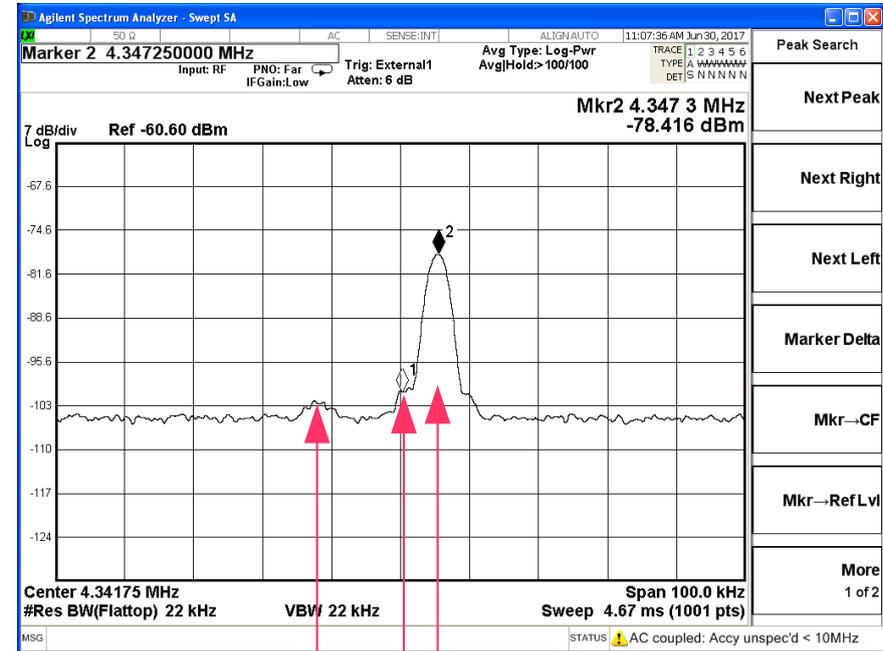
C.Y. Tan, C. Bhat & K. Seiya
12 Jul 2017

Noise



3.77 MHz

7.7 kHz



4.33 MHz

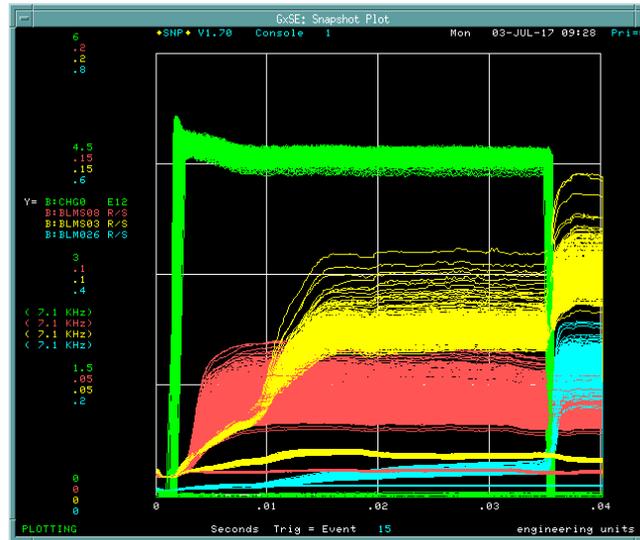
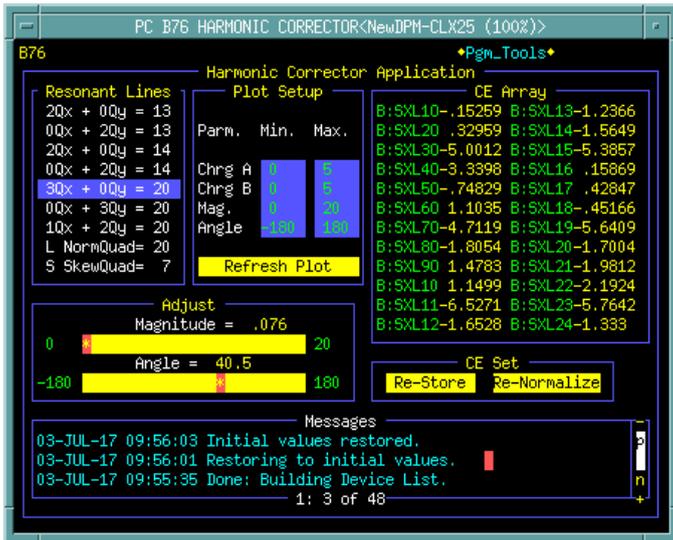
4.5 kHz

Data taken using damper pickups in difference mode.

\$1D (\$15 not taking beam) used to trigger, 4.3 to 4.6 ms sweep. So that the FT is at the start of injection.

Odd ball bumps not associated with revolution harmonics may be “noise”.

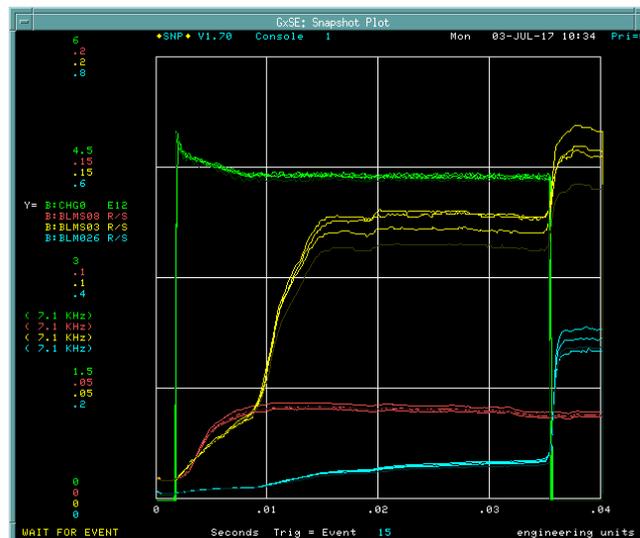
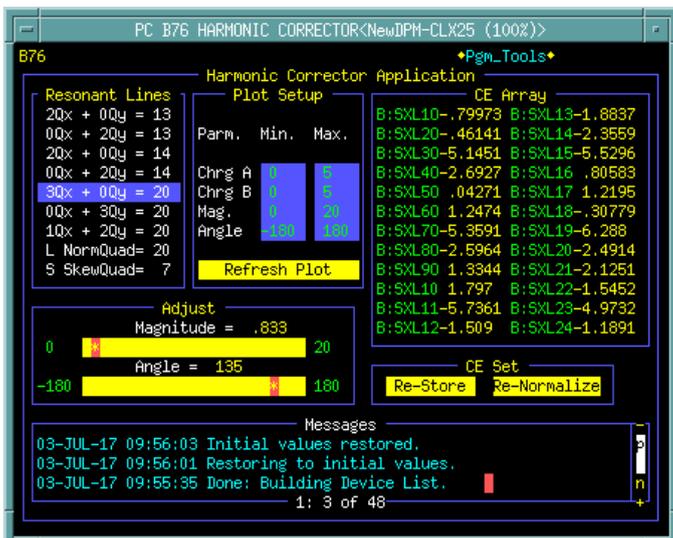
Behaviour of beam as function of $3Q_x=20$ harmonic sextupoles



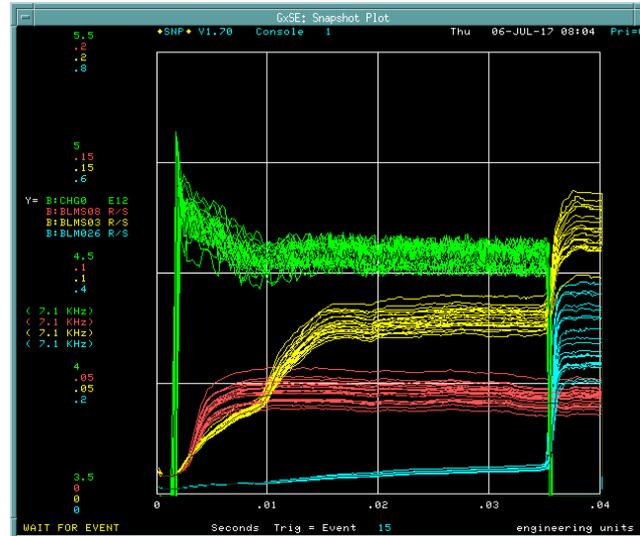
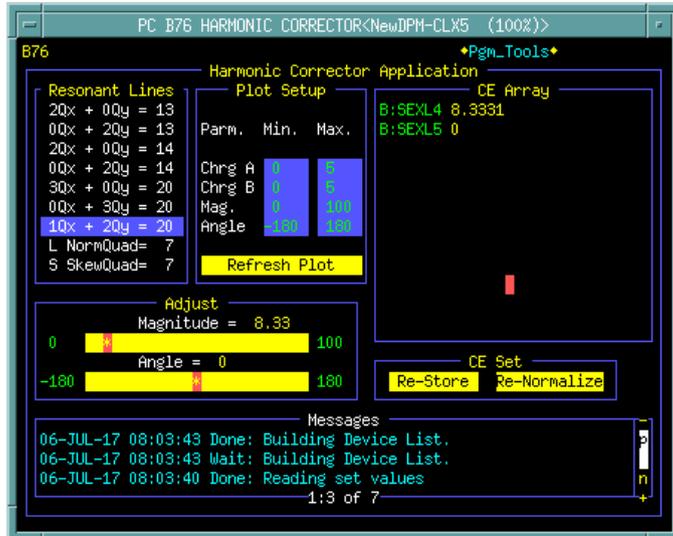
We took a 3 sets of data for different $3Q_x=20$ harmonic sextupole settings. Only 2 shown here.

$Q_x+2Q_y=20$ harmonic sextupole settings have no effect on the losses.

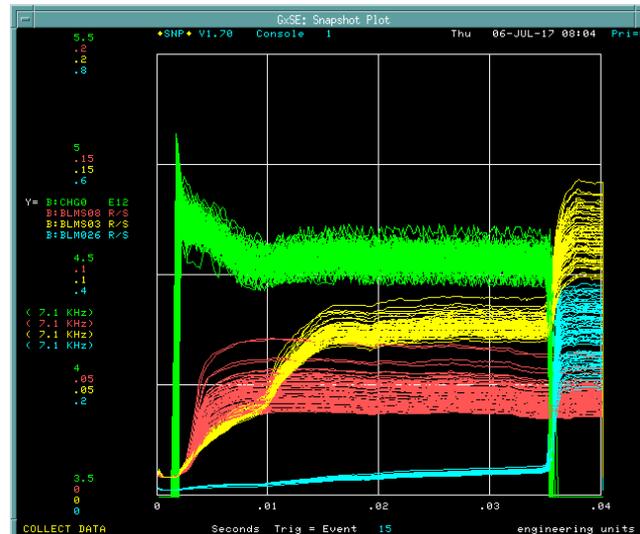
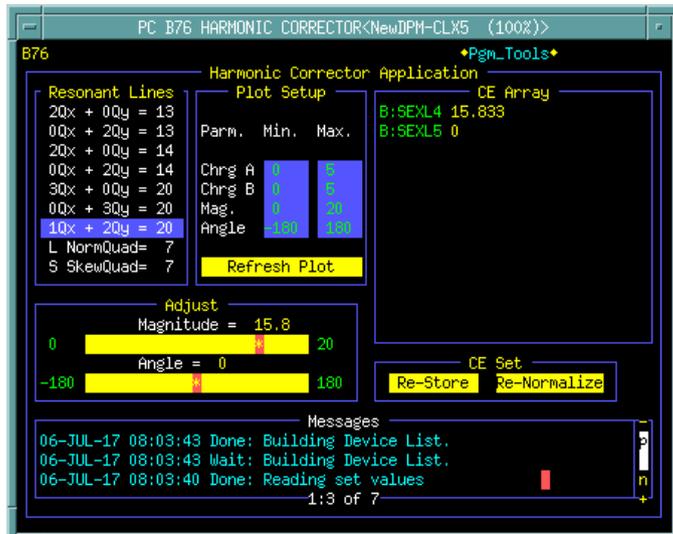
Magnet settings on that day used for HEP have also been saved.



Behaviour of beam as function of $Q_x+2Q_y=20$ harmonic sexupoles

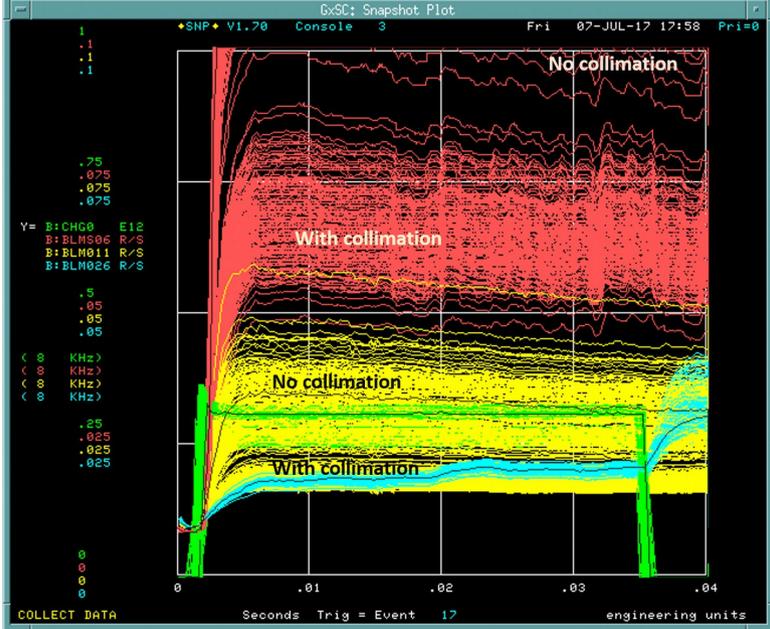
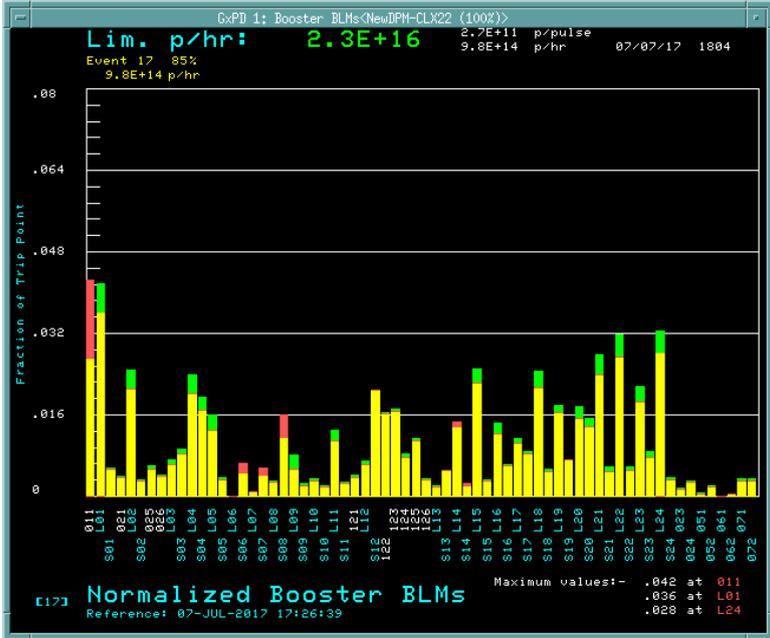


As found HEP



No obvious change in losses.
Also did it with 90 deg angle saved in logbook

Transverse laser collimation at 750 keV (Pellico et al)



Laser collimation (vertical only) for 1 turn beam.
 Loss profile better (beam current is lower overall)
 No firm conclusion yet.

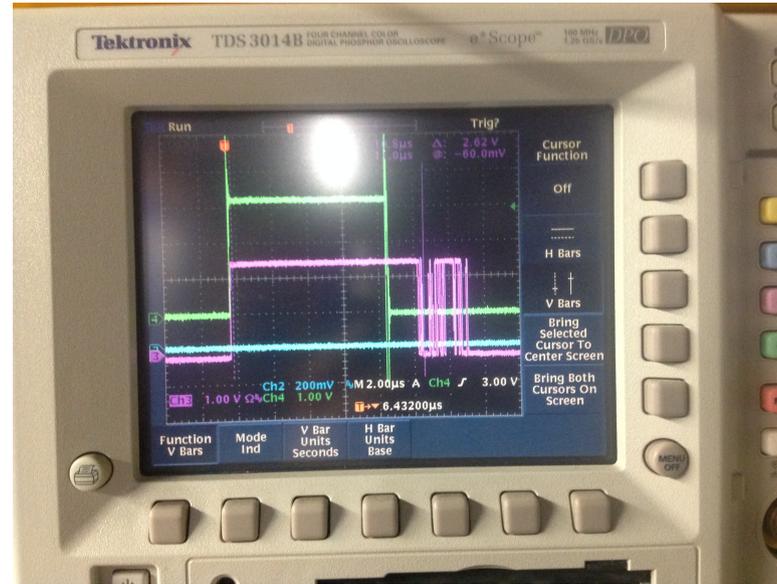
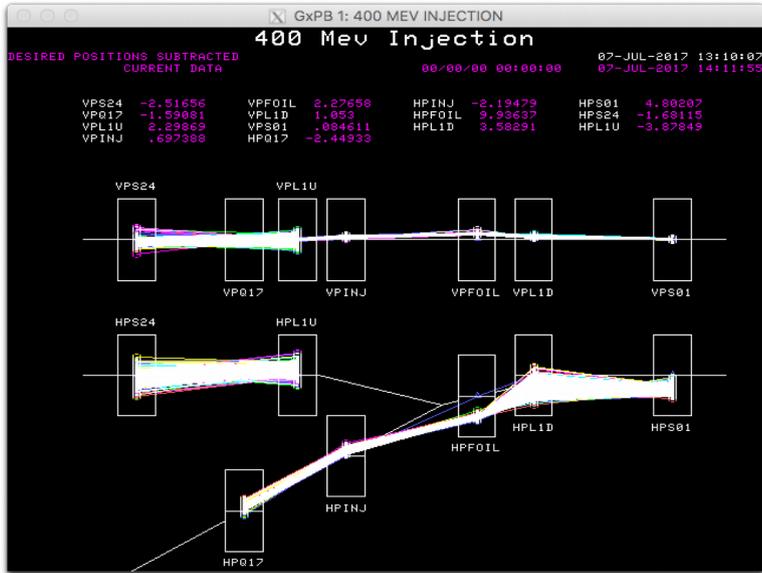
Summary of what we know

- Dog leg effect
 - Negligible
 - Pseudo flat lattice does not show improvement in lifetime.
 - Tune space is improved with pseudo-flat lattice.
 - Simulations in Synergia and MADX shows small effect from dog leg.
- Displacement of CPL03 (and CPL01)
 - Simulations in Synergia and MADX shows large effect (> dogleg) in losses
 - Source is $Q_x+2Q_y=20$ (MADX simulations, 30 Jun 2017)
 - Tune scans do not show such a resonance.
 - Changing $Q_x+2Q_y=20$ with sextupoles do not change loss profile.
 - $3Q_x=20$ changes losses.
 - TBT may show something ...
- Lowering chromaticity does nothing
 - Beam lifetime is not improved at injection with Ch and Cv lowered from $Ch=-20$, and $Cv=-30$ units (varies from 3 ms to 8 ms), to less than $|-5|$ units does nothing to lifetime.
 - Tuning did not help with lifetime with lowered chromaticity.

New ideas (Are we sure that it is dynamics?)

- Transverse noise.
 - Noise hunt on PS's during shutdown.
- Paraphased beam has larger momentum spread than momentum acceptance.
 - Compare different paraphasing curves in experiments with simulations to tease out any differences.
- Halo?
 - Collimation at 750 keV might help
- Check whether losses are transverse or longitudinal
 - New IPM with better resolution should help us to see tails.

200 MHz BPMs



Magenta is "beam" signal



HPL1D and VPL1D are not in B38 so no TBT. Shown here is B32.

Looks like "beam" spigot is s/h intensity signal.

Need to talk to expert to figure this out.