Drive Beam Status

and Issues

Drive beam quality
Dispersion tuning
Emittance
Combination issues

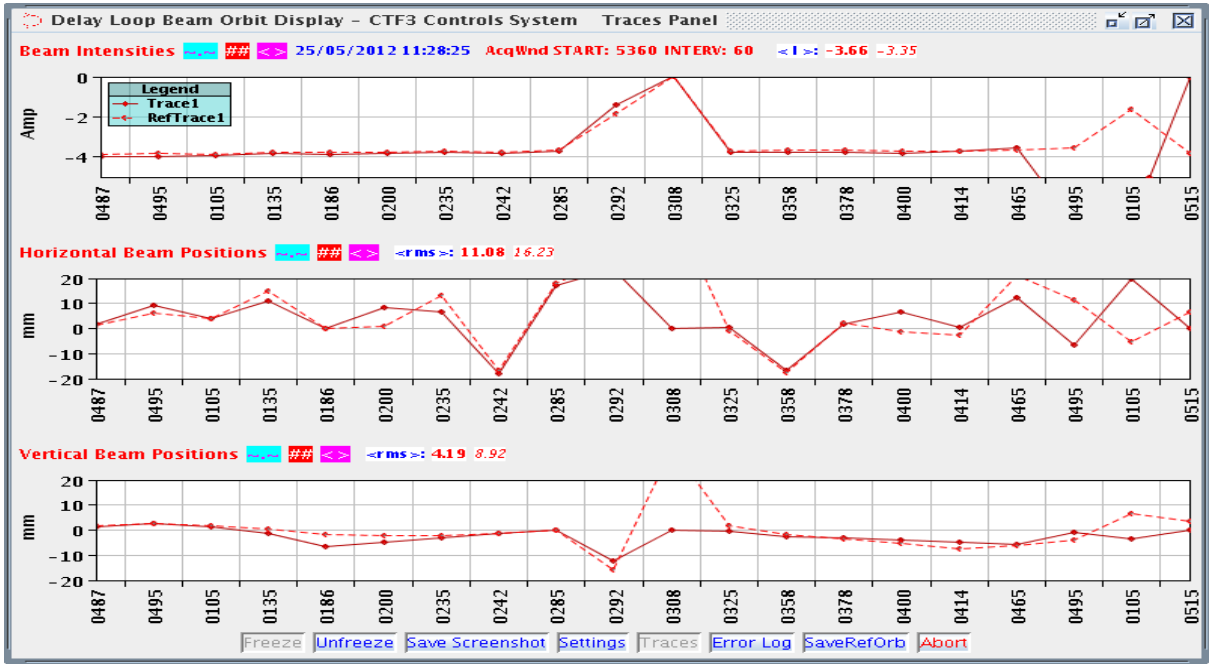
Piotr Skowroński
Ben Constance
Javier Barranco
…

February Summary:
Issues and spaces calling for improvements

- Switches
- Misalignment in the Delay Loop
- R56 of Frascati Chicane; Spurious dispersion from Frascati that appeared in Aug 2010
  - spent already a lot effort to find the source -> no effect
  - Found a work-around by tuning a quad inside
  - Might be related to the difficulty of setting op smaller R56
- Optics check and control in TL2 and TBTS
- Orbit
- Closure in DL and CR => Emittance
  - Need additional attenuation for the 2nd RF deflector
- Chromatic corrections (need good orbit)
- Tune measurement and control in CR
- For both, DL and CR, beam trajectory is steered down when passing through or passing by the septa

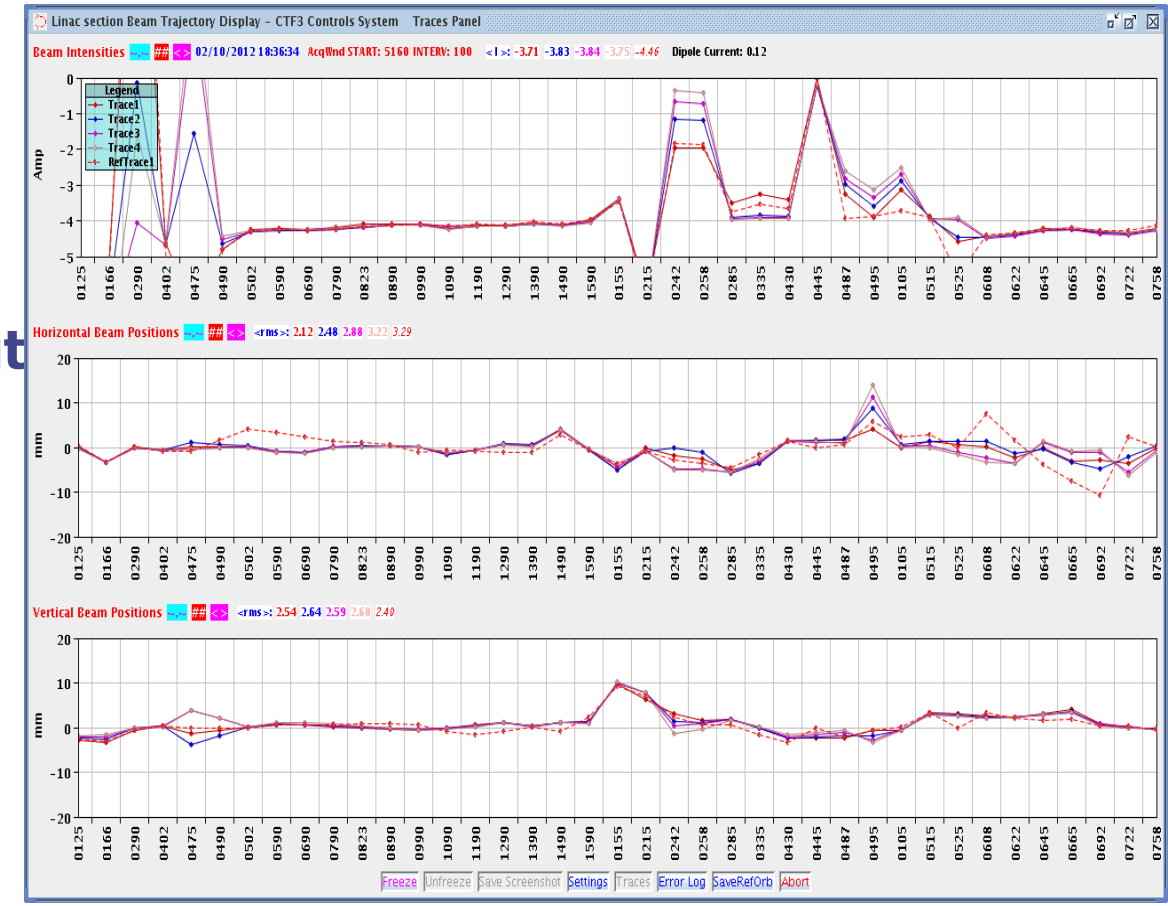
Delay Loop misalignment corrected

- Alignment of the quads helped indeed
  - Much easier setup this year
  - Much more space for beam drifts and jitters
- But still
  - The orbit exhibits the dip after the septum
  - The last vertical corrector before the ejection is at 12-14 A



Orbit: CL & CT

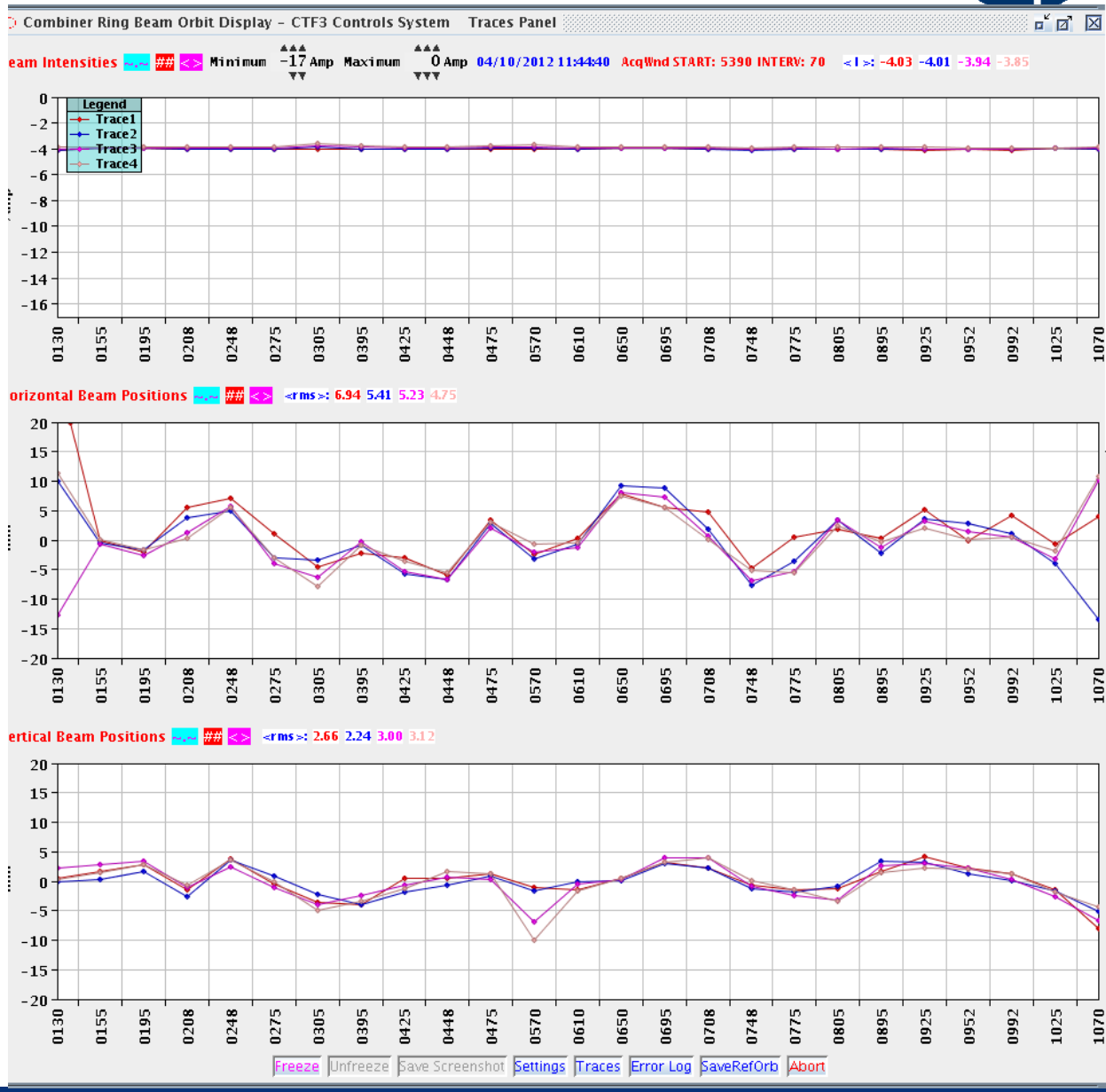
- Linac OK, issues start at its end
  - Girder 14: a small bump
  - CT.DHD0160: always at -1.6A or more
  - CT.BHB0510 is always almost 2x CT.BHB0490 to get good transmission in TL1
  - And than beginning of TL1
    - CT.DHF0612 2.80A
    - CT.DHF0632 2.60A
    - CT.DHF0648 1.00A
- Must make "a deap" before DL inj so the beam goes up through the septa and it is easier to "fish it out inside DL
  - It causes the wave in TL1
  - If not DL, the orbit can be made easily perfect in vertical



Orbit CR

- DH 200 @ -3.5
- DH 408 @ 4
- DH 948 @ -4.8
- DH 1025 @ -1.2
- DH 1055 @ -6.5

- Automatic would be appreciated but it is difficult with the misalignments
  - DFS ?



Orbit TL2

- We can get a straight orbit, no problem, but same correctors are always strong
  - DV 175 @ -3A
  - DH 855 @ 7A
  - DV 855 @ 2.4A

Optics overview

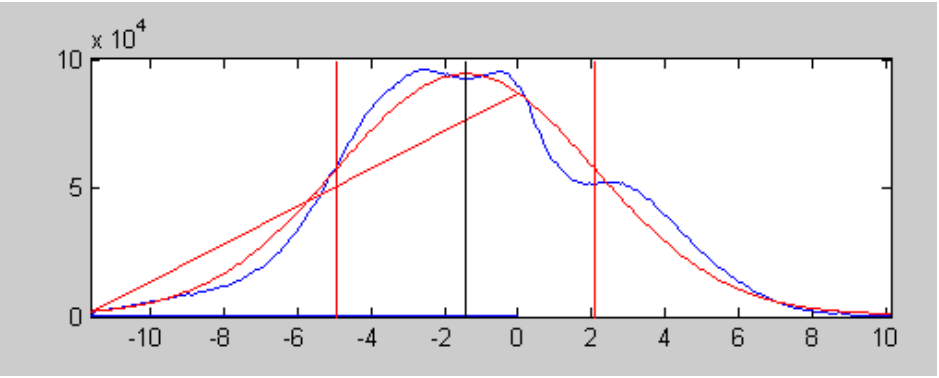
- **Linac** – well understood
- **Chicane** – measurements with natural R56 agree
- **CT** – we need to understand difference between the CT and CTS quad scan measurements. Important for DL injection
  - Should repeat over longer distance (to TL1 and/or DL)
  - Tricky due to BPI's issues
- **DL** – measured and model corrected
- **TL1** – understood from previous response measurements
  - Regular Response Matrix gave very good agreement
- **CR** – first half measured and agrees with model. We should measure the second half, and over multiple turns
  - Good agreement in hor. with regular multi-turn RM
  - Bend edge focusing was tweaked to get agreement in vert.
- **TL2** – Not yet studied…

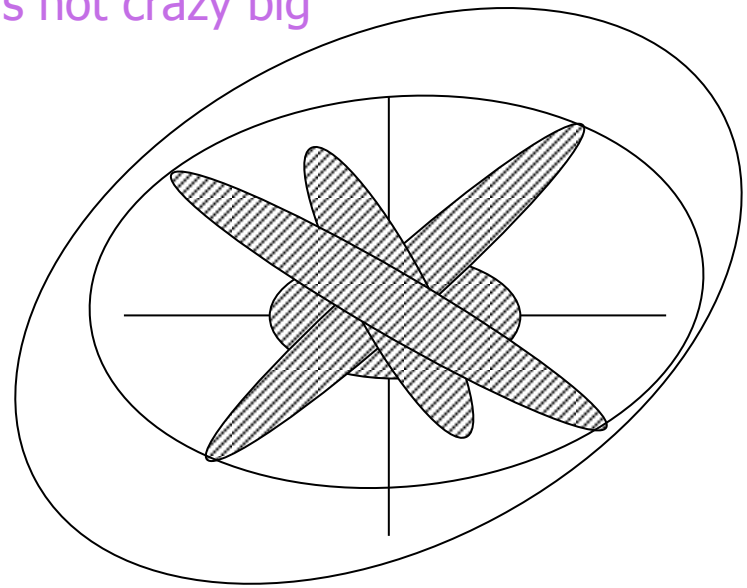
Optic Control in TL2 and TL2 prime

- We run an empirically setup TL2 since 3 years
  - Problems with quad scans at MTV 253
  - Initial problems with BPMs
    - Line was never measured properly
  - The dogleg was tweaked to get zero dispersion in CLEX
  - But we have no control of R56
  - The model we have shows not optimal patterns
- 2-3 Days needed to measure the line properly and verify the model
  - Start from model predicted, relaxed optics (no R56 constraint)
    - Get large acceptance
    - Can start from measured Twiss parameters at CC.253, but do not have to
  - Check and correct dispersion
    - To assure the large acceptance
  - Measure the optics with phase-space scans
    - Preferably starting from CR to measure the ejection dogleg
    - Also from girder 2 to get higher amplitudes
  - If any doubts found, set optics without suspected quads and re-measure
  - Plug in the nominal optics, set it up and re-measure

Transverse Matching

- Girder 10 OK
- Around DL: Not perfect, but not very bad
  - @CT.0435 never sure about quad scan validity
  - Need 1-2 days to fix it properly
- CR: Nothing done in this matter during this year
  - Neither during previous one
  - We circulate beam in thousands of turns
    - Only short pulse
    - Combined does not want to stay more than 5, but still
  - It gives indication that the beta beat is not crazy big
    - But combined emittance …
    - And in case of a bad closure





Transvers Matching
The issues

- At some locations we have trouble having reliable measurement. Consolidation needed.
  - Check software using MAD simulated profiles
  - Check carefully lines used for scans
    - Distances between quads and screen
  - Check screen calibrations
  - How can we be sure that we do not scrape between quad and screen?
    - We have no BPM in between
  - We observe very small beam sizes in the waist, below 0.3mm sigma
    - Pixel size is around 0.1mm
    - Small emittance and short distance to screen gives small beam sizes
    - Shall we try using quads further away from the screen? At least for cross-checks?

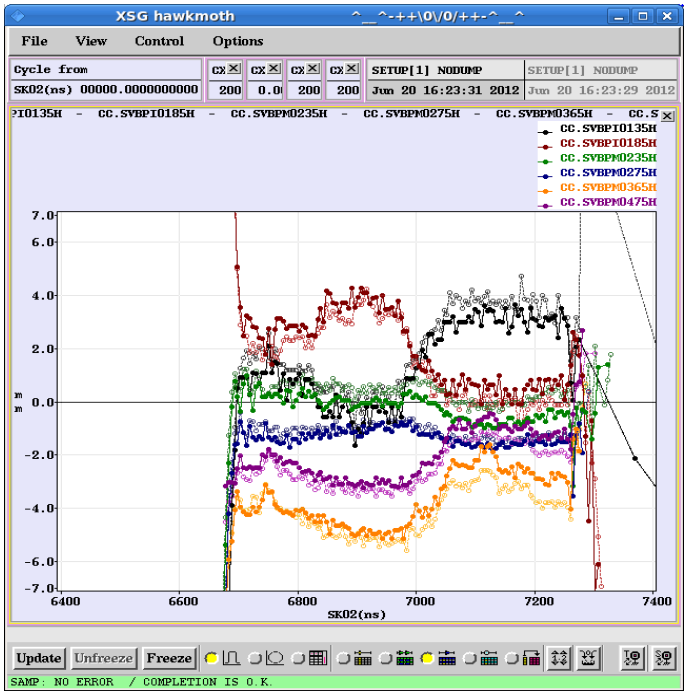
- Combiner Ring: Need 2 full good days to have chance to make it better
  - Measure Twiss in CRM, adjust CT/TL1
  - Measure Twiss for each turn separately
  - Back-track with the model, scale CR
  - Re-measure and see if it converges
  - If not, check the optics more carefully

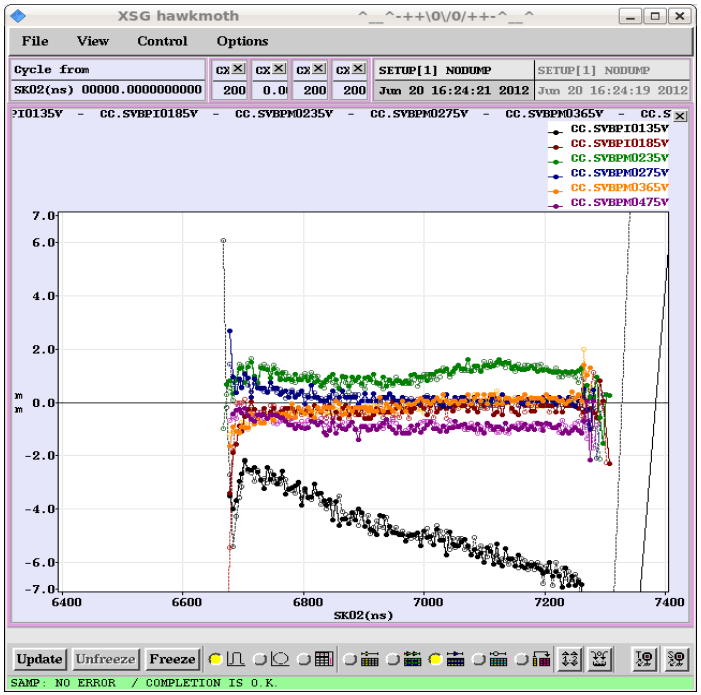
Chromatic corrections

- The optics checks and transverse matching in Combiner Ring would be much easier if we had optics with zero chromaticity
  - It prevents filamentation, so we could observe the transverse oscillations for enough turns to get
    - Tunes
    - Phase advances between pickups → Local optics errors, beta beat
    - Amplitudes → beta beat
- We have sextupoles, but we do not use them
  - Bad orbit prevents us using them
    - Huge feed-down leading quickly to complete beam loss
- Sextuples should also help with the emittance preservation
  - But might be tricky with their limited number (3 families in CR)

Dispersion

- The dispersion is well controlled
- Need to be careful with strong steerers which can spoil dispersion
- Controlled with 2 different measurement methods
  - Scaling all magnetic elements
  - Change of beam energy with MKS15
    - A variant: make a step in compressed amplitude and watch the step in BPM traces

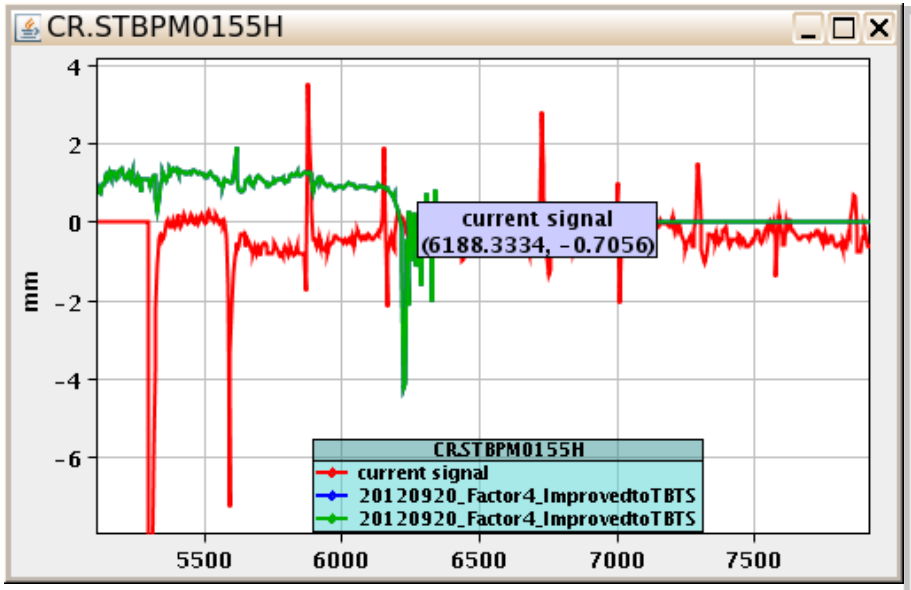


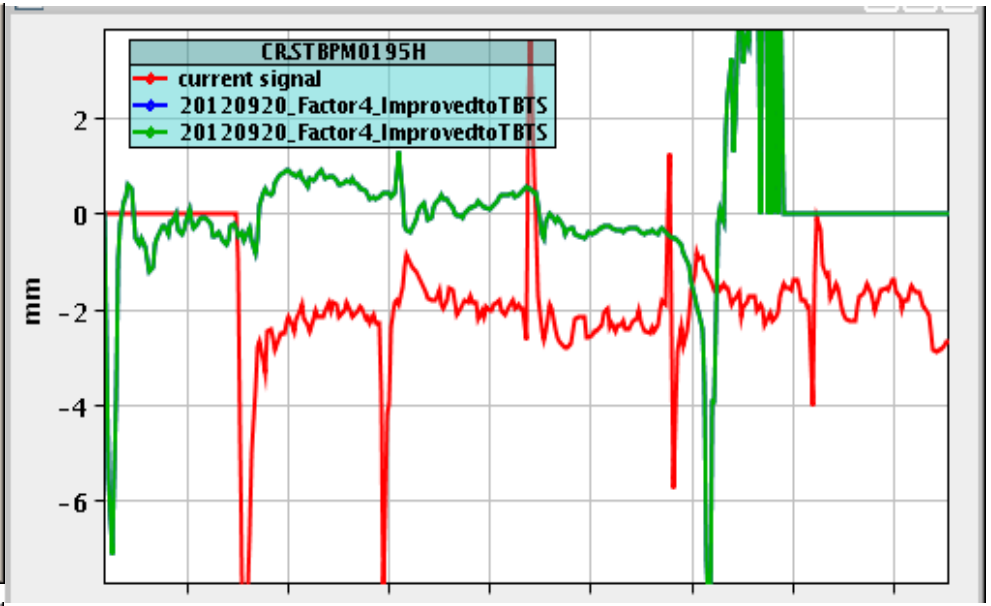


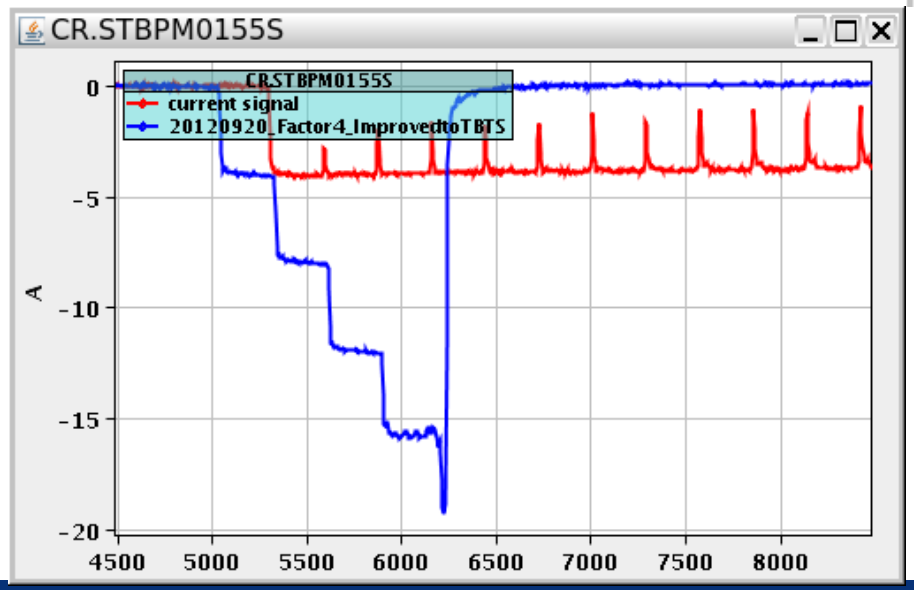
Emittance [mm mrad]

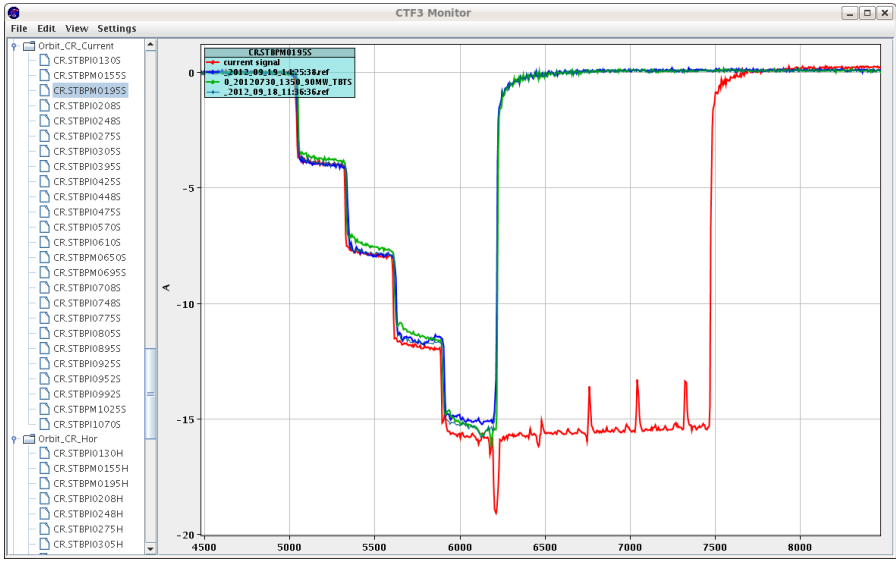
- Girder 10
  - Horizontal 40-> 60
  - Vertical 40 -> 60
- CT.0435
  - Horizontal 50-> 500
  - Vertical 40 -> 400
- CTS
  - Horizontal 60 -> 200
  - Vertical 70 -> 200
- CC.253
  - No reasonable data this year
- CC.957 factor 1
  - Horizontal 120 -> 300
  - Vertical 60 -> 70
- CC.957 factor 4
  - Horizontal 320 -> 350
  - Vertical 100 -> 200

CR recombination with new attenuator for the 2nd RF deflector



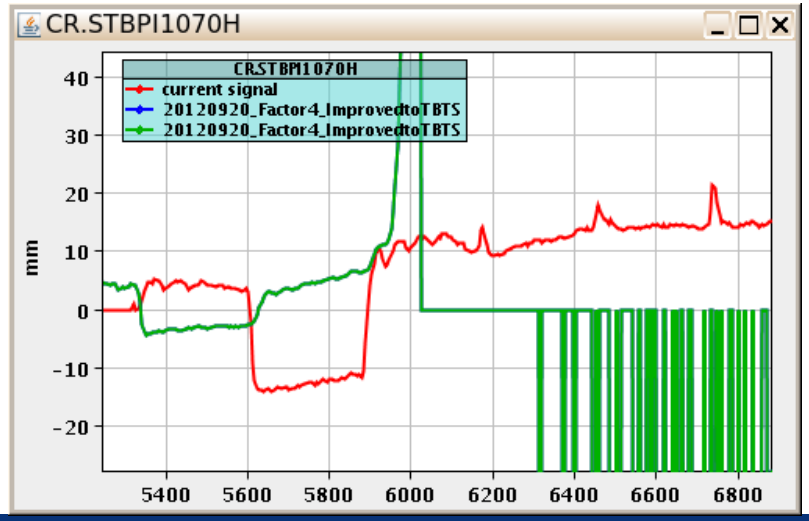


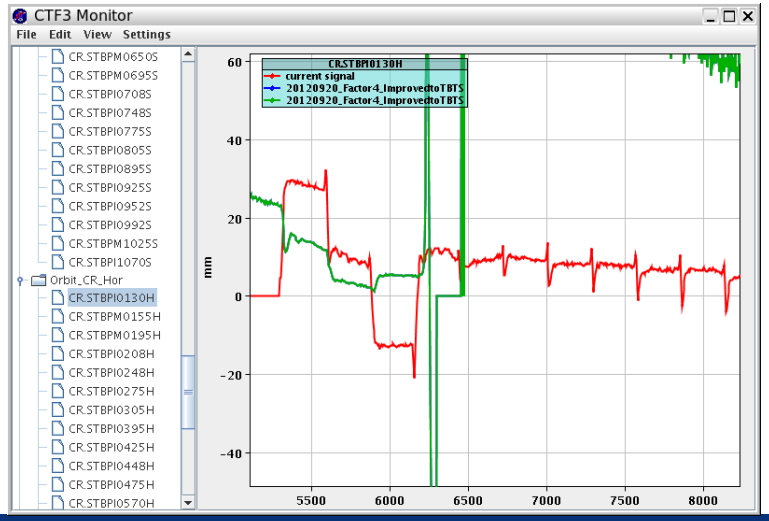




Recombination

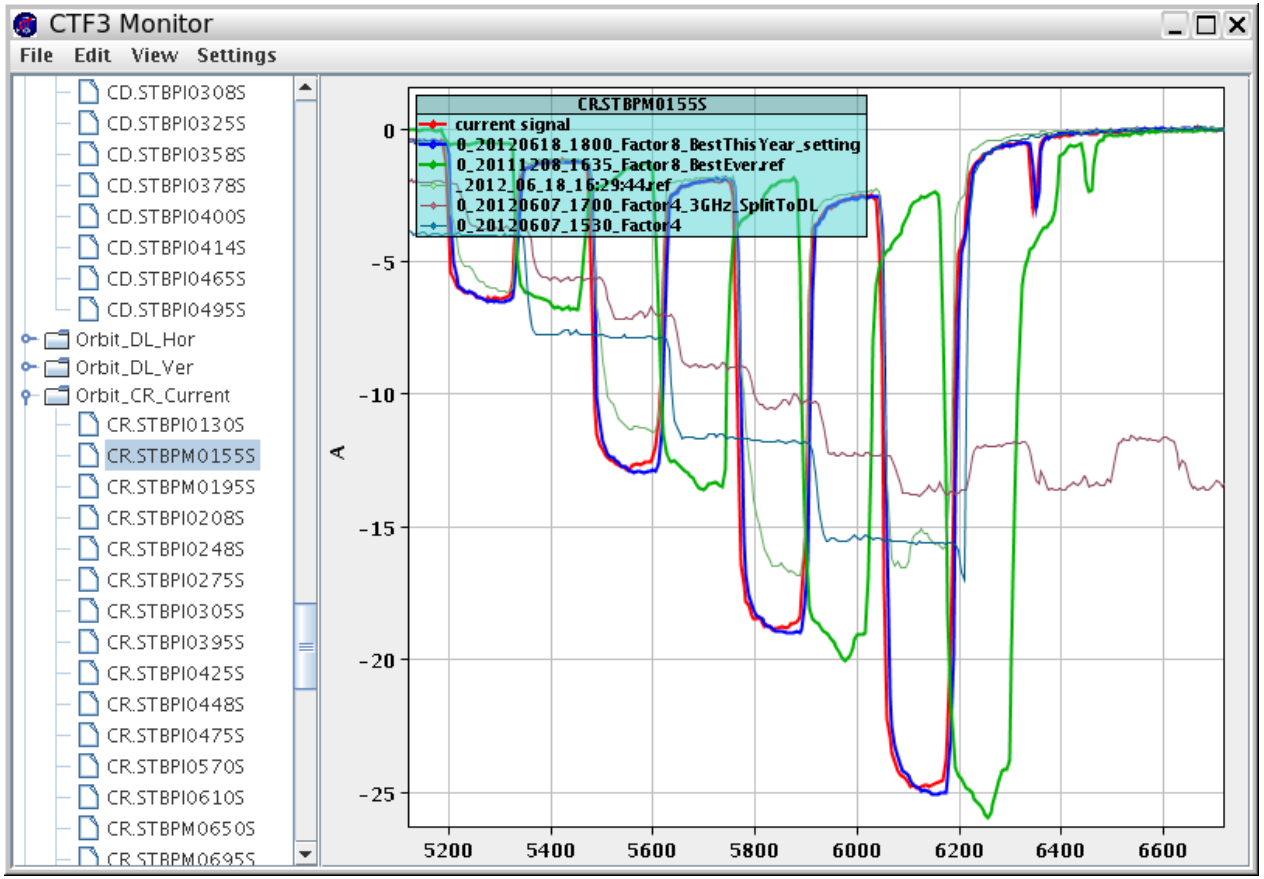
- Looks good, but
  - Need little bit more tuning to close the orbit properly on all BPMs around the machine
    - Some automation?
  - The bump is too low, should be 27mm, but it is not really important (I think)
  - The machine quickly (too quickly) drifts from the sweet point
    - Need more feed-back to lock it?





Factor 8

- The biggest issue is the orbit closure and its stability
  - Davide made the automatic tool for that
  - But it is still rather a development version
    - When can we have it in production?



Stability of Optics

- We can match different beam parameters at a time
- But the machine is drifting permanently
  - Different knobs are tweaked
    - Usually to circumvent the machine drifts or change of RF parameters due to hardware modifications (repairs)
    - In the most cases it drives the beam out of the set-point
      - Orbit, energy (and hence dispersion, transverse matching, bunch length)

- **Good quality production beam** → we must implement
  - **Rigorous procedures on changes of machine settings**
  - **Full set of feed-backs** keeping all different parameters fixed
    - RF pulse flatness
    - RF phase
    - Injector: Combined BPR + current level + loading on PEI03
    - Loadings
    - Beam energy on average, as well as flatness along the pulse

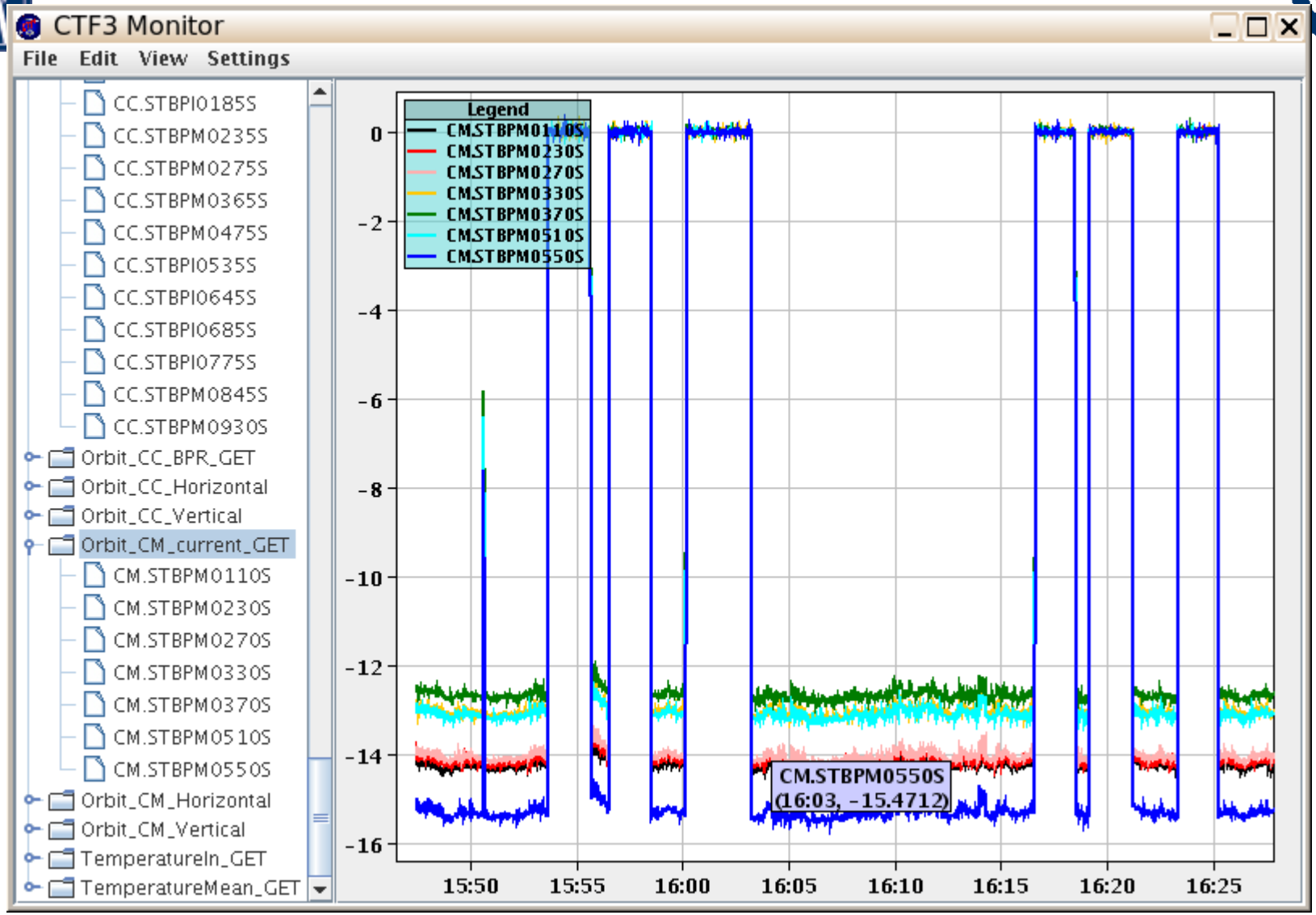
February Summary:
Issues and spaces calling for improvements

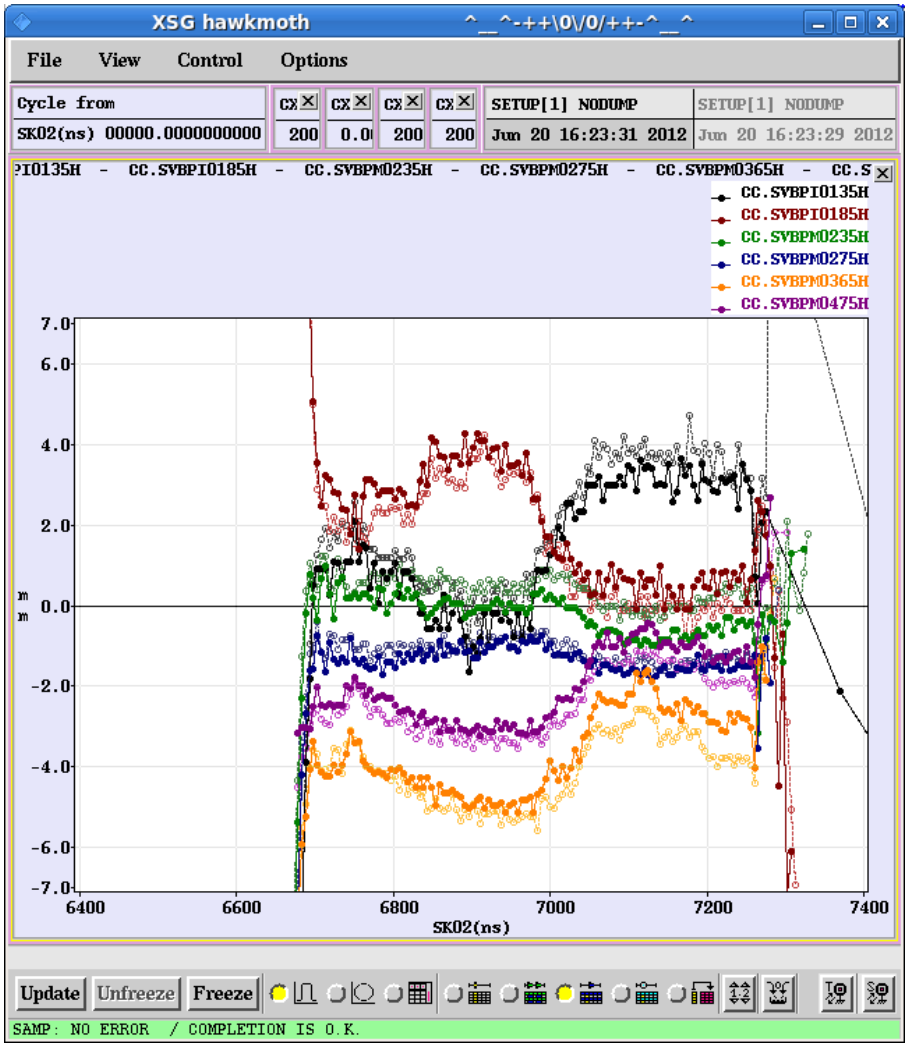
- Switches
- ~~Misalignment in the Delay Loop~~
- R56 of Frascati Chicane; Spurious dispersion from Frascati that appeared in Aug 2010
  - spent already a lot effort to find the source -> no effect
  - **Found a work-around by tuning a quad inside**
  - ~~Might be related to the difficulty of setting op smaller R56~~
- Optics check and control in TL2 and TBTS
- Orbit
- Closure in DL ~~and CR~~ => Emittance
  - ~~Need additional attenuation for the 2nd RF deflector~~
- Chromatic corrections (need good orbit)
- Tune measurement and control in CR
- For both, DL and CR, beam trajectory is steered down when passing through or passing by the septa

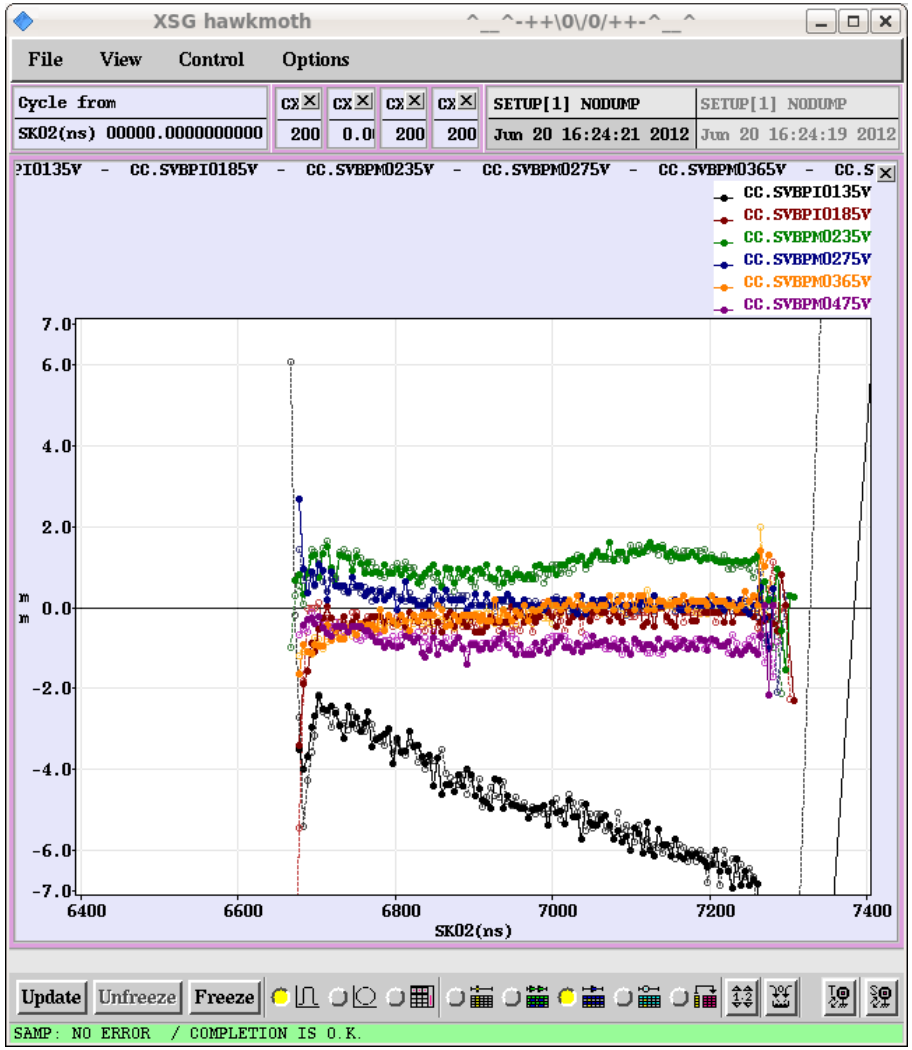
Outlook

- Only few points were removed from the issue list of the previous year
- I would add **Long Term Stability**
  - CTF3 is old enough – we start understanding the machine well
- We should make changes in the settings only for good reasons and **stick to them**
- Orbit and beam energy should be frozen
  - Now orbit changes every second day
- I think, next year when we restart the machine we should not
  - Setup injector from scratch
  - Re-match Linac (only to check)
  - Redo the steering
  - Redo orbit closure in CR and DL
  - Re-matching of CT and DL
- We should NOT redo the same procedures all over again every month

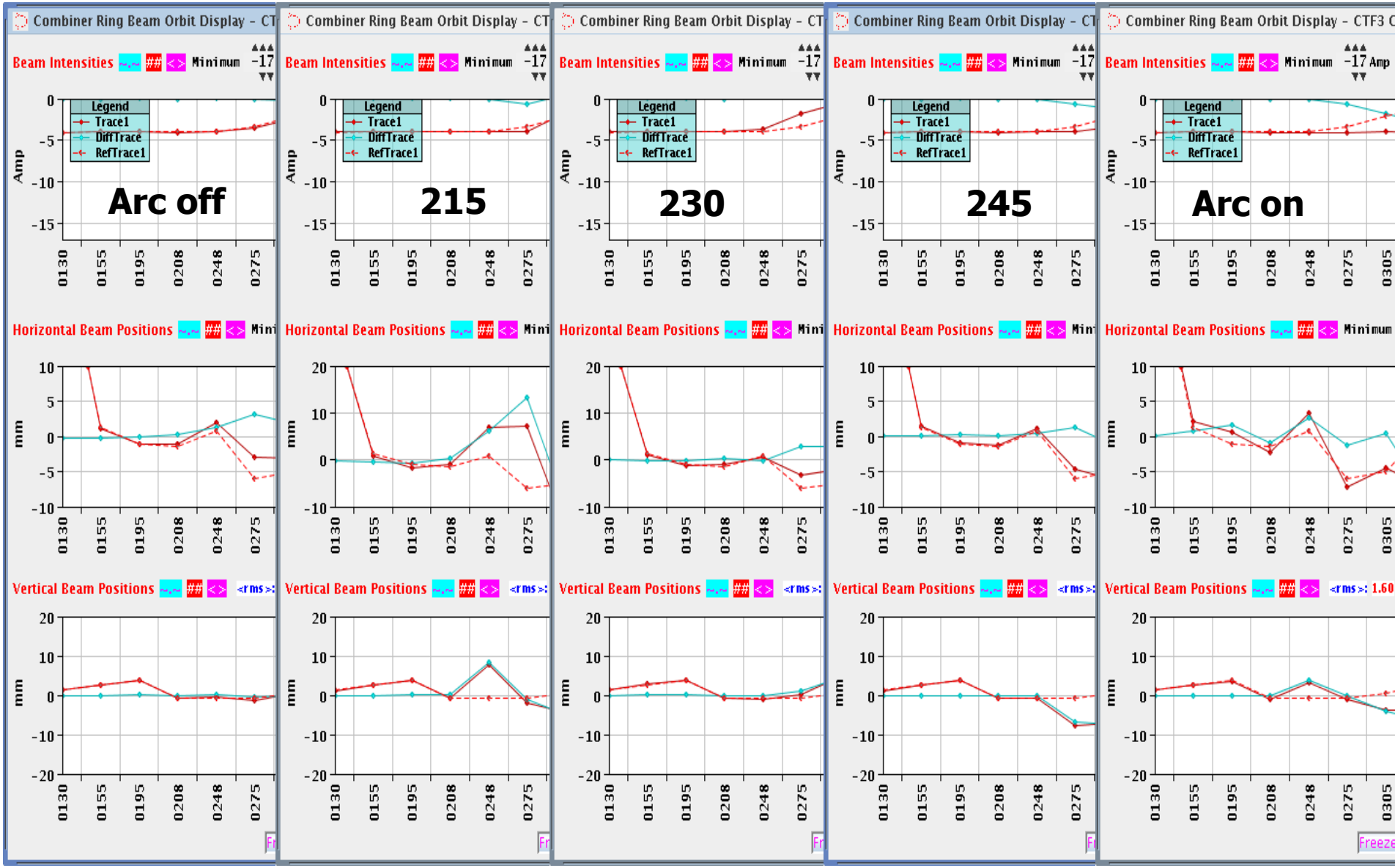
ADDITIONAL SLIDES


CTF3 Monitor
File Edit View Settings
CC.STBPI0185S
CC.STBPM0235S
CC.STBPM0275S
CC.STBPM0365S
CC.STBPM0475S
CC.STBPI0535S
CC.STBPI0645S
CC.STBPI0685S
CC.STBPI0775S
CC.STBPM0845S
CC.STBPM0930S
Orbit_CC_BPR_GET
Orbit_CC_Horizontal
Orbit_CC_Vertical
Orbit_CM_current_GET
CM.STBPM0110S
CM.STBPM0230S
CM.STBPM0270S
CM.STBPM0330S
CM.STBPM0370S
CM.STBPM0510S
CM.STBPM0550S
Orbit_CM_Horizontal
Orbit_CM_Vertical
TemperatureIn_GET
TemperatureMean_GET
Legend
CM.STBPM0110S
CM.STBPM0230S
CM.STBPM0270S
CM.STBPM0330S
CM.STBPM0370S
CM.STBPM0510S
CM.STBPM0550S
0
-2
-4
-6
-8
-10
-12
-14
-16
15:50
15:55
16:00
16:05
16:10
16:15
16:20
16:25
CM.STBPM0550S
(16:03, -15.4712)


XSG hawkmoth
File View Control Options
Cycle from
SK02(ns) 00000.0000000000
SETUP[1] NODUMP
Jun 20 16:23:31 2012
CC.SVBPI0135H
CC.SVBPI0185H
CC.SVBPM0235H
CC.SVBPM0275H
CC.SVBPM0365H
CC.SVBPM0475H
SK02(ns)
Update Unfreeze Freeze
SAMP: NO ERROR / COMPLETION IS O.K.


XSG hawkmoth
File View Control Options
Cycle from
SK02(ns) 00000.0000000000
SETUP[1] NODUMP
Jun 20 16:24:21 2012
CC.SVBPI0135V
CC.SVBPI0185V
CC.SVBPM0235V
CC.SVBPM0275V
CC.SVBPM0365V
CC.SVBPM0475V
SK02(ns)
Update Unfreeze Freeze
SAMP: NO ERROR / COMPLETION IS O.K.

Misalignment in CR



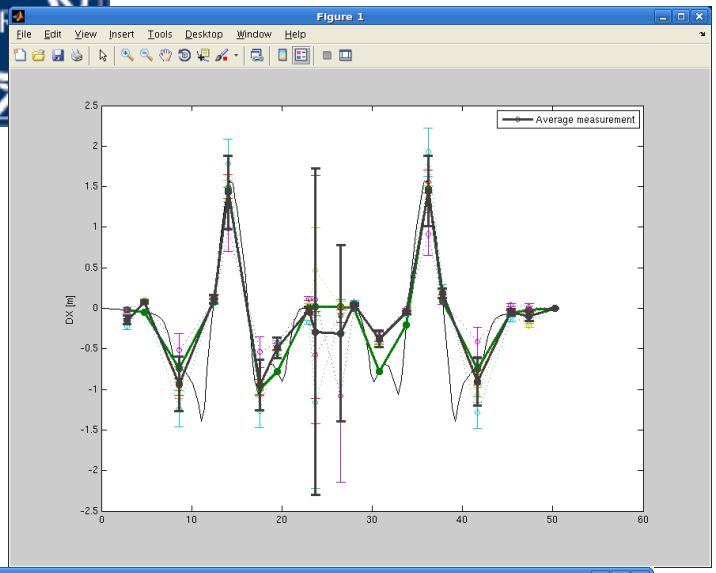
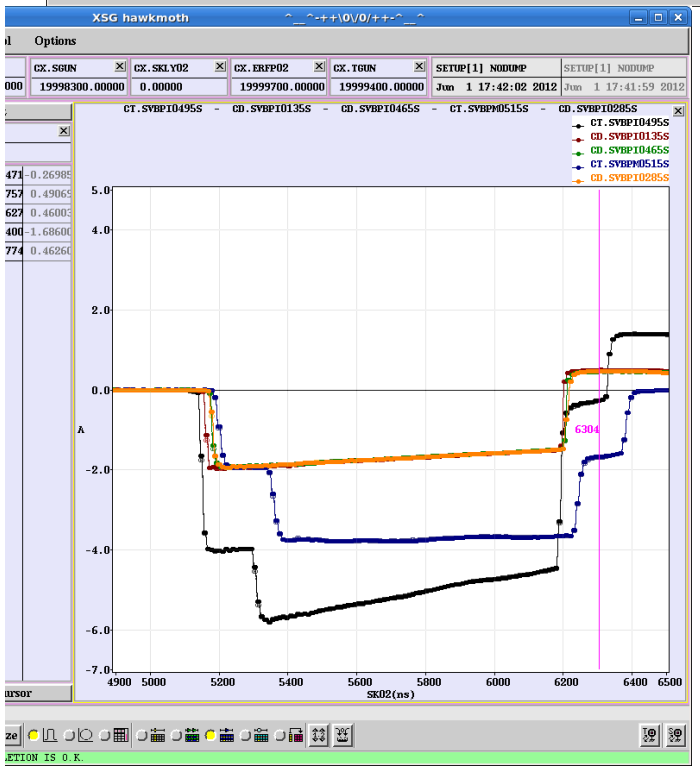
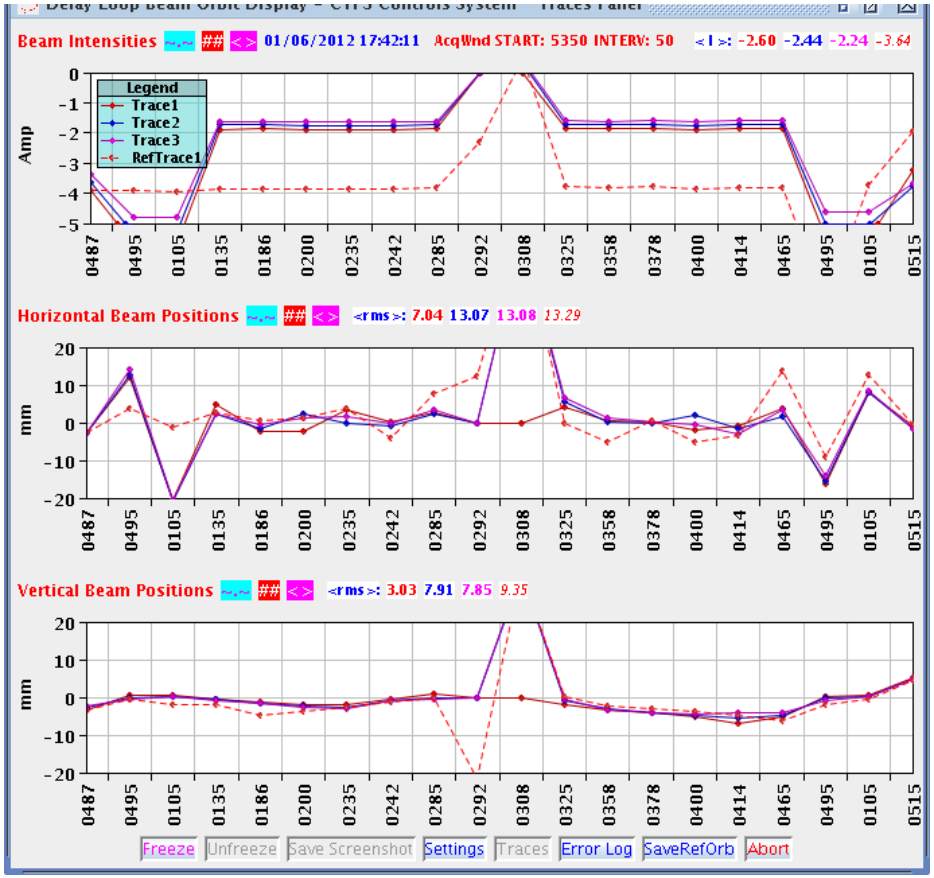
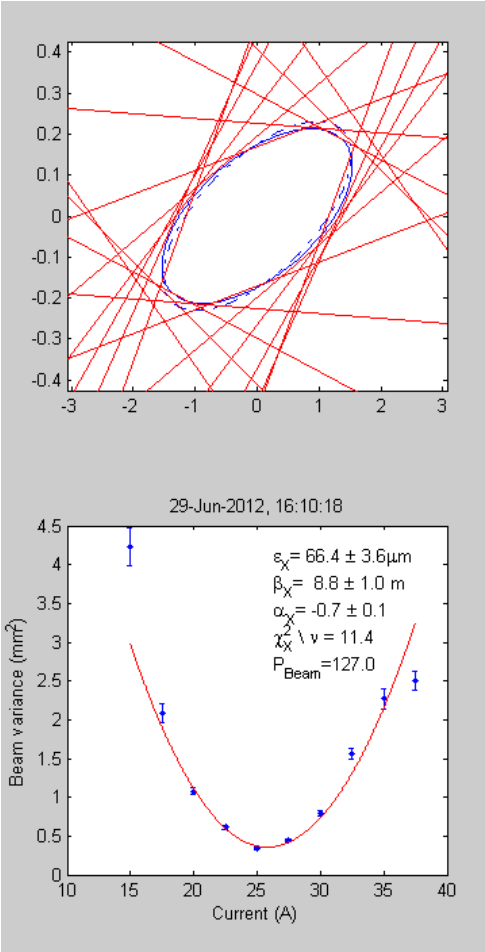


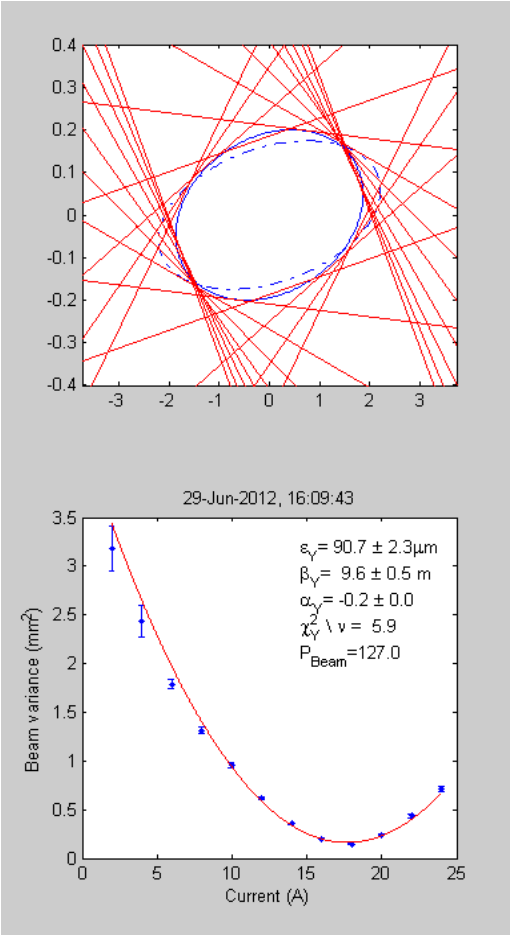
Figure 1
File Edit View Insert Tools Desktop Window Help
Average measurement
DX [m]


XSG hawkmoth
Options
CX.SGUN
CX.SKLY02
CX.ERFP02
CX.TGUN
SETUP[1] NODUMP
CT.SVBPI0495S - CD.SVBPI0135S - CD.SVBPI0465S - CT.SVBPM0515S - CD.SVBPI0285S
SK02(ns)

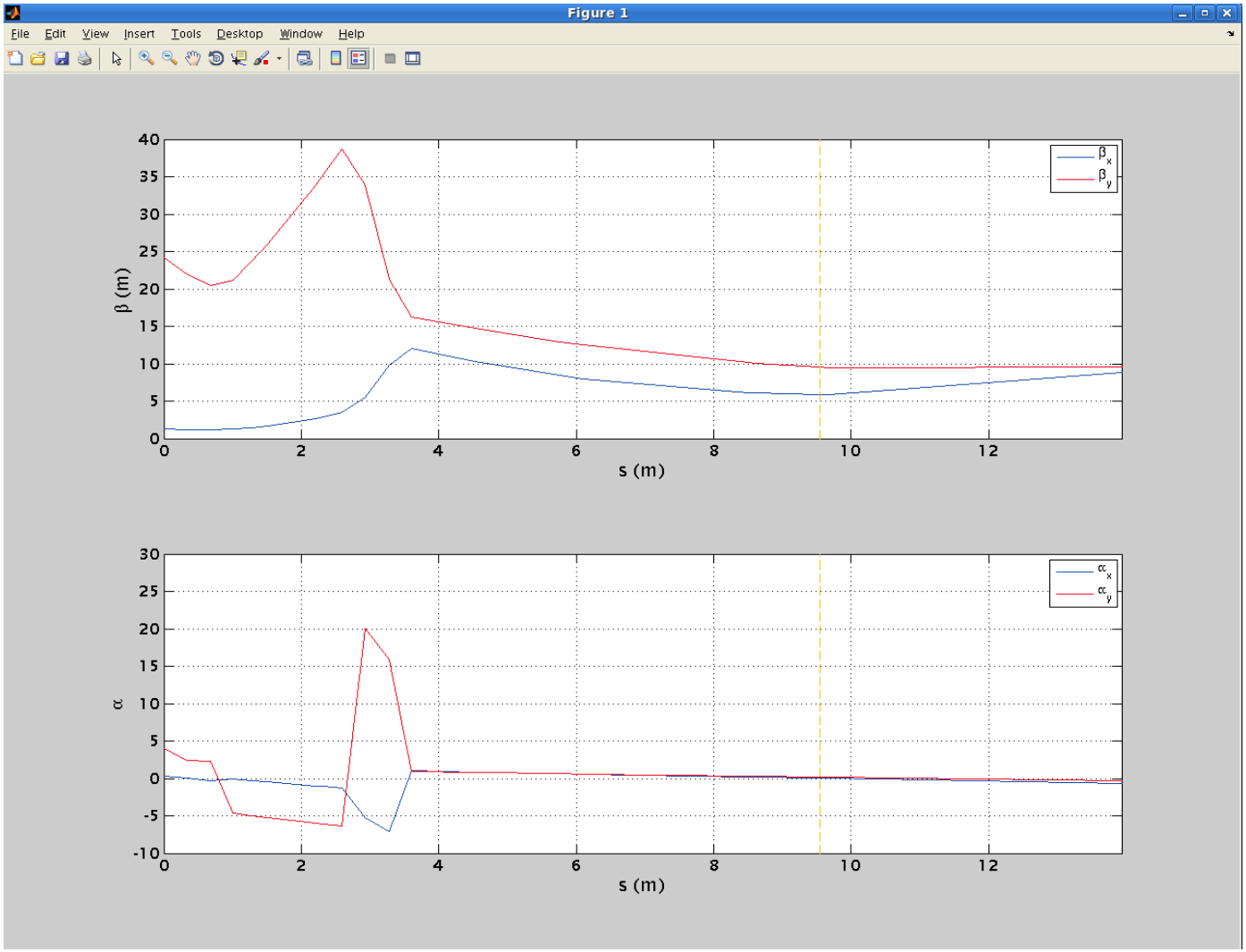

Beam Intensities
01/06/2012 17:42:11
AcqWnd START: 5350 INTERV: 50
Legend
Trace1
Trace2
Trace3
RefTrace1
Amp
Horizontal Beam Positions
Vertical Beam Positions
mm
Freeze
Unfreeze
Save Screenshot
Settings
Traces
Error Log
SaveRefOrb
Abort

CTS line scans
29/06/12 1.5 GHz bypassing w/ satellites killed

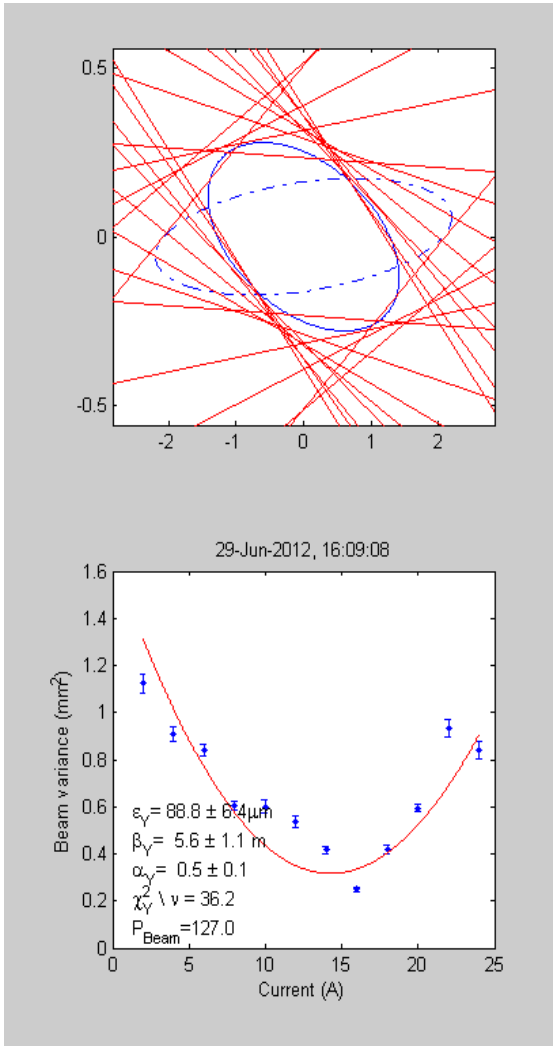




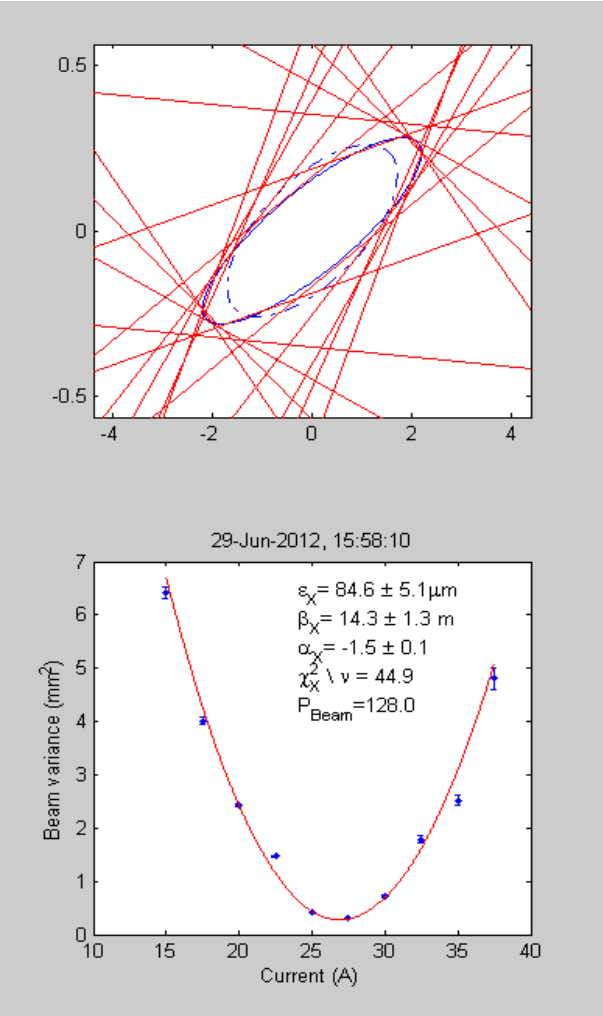
Backpropogated optics

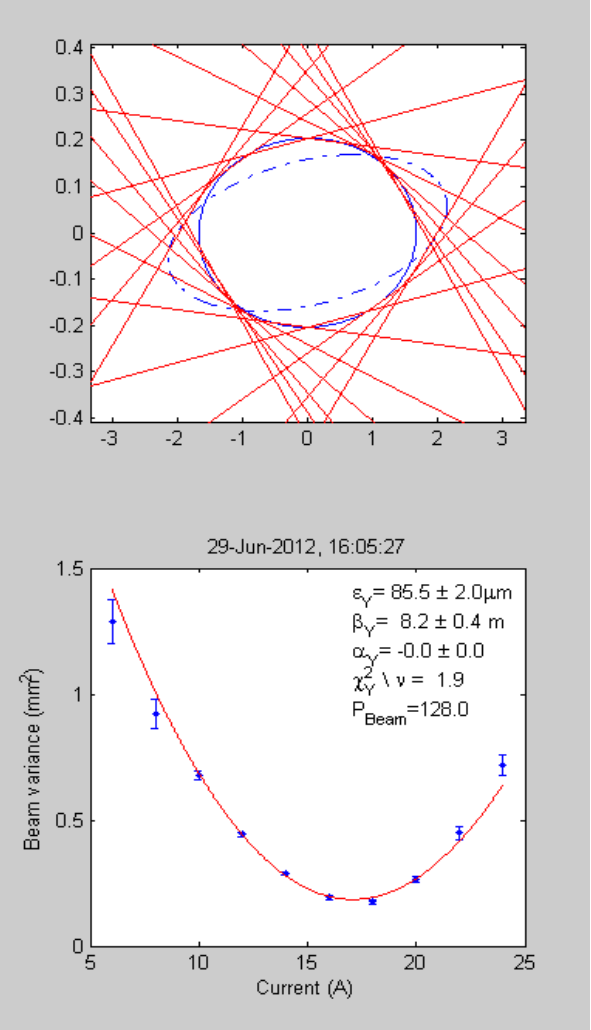


Delayed beam vertical only plus satellites, mismatched

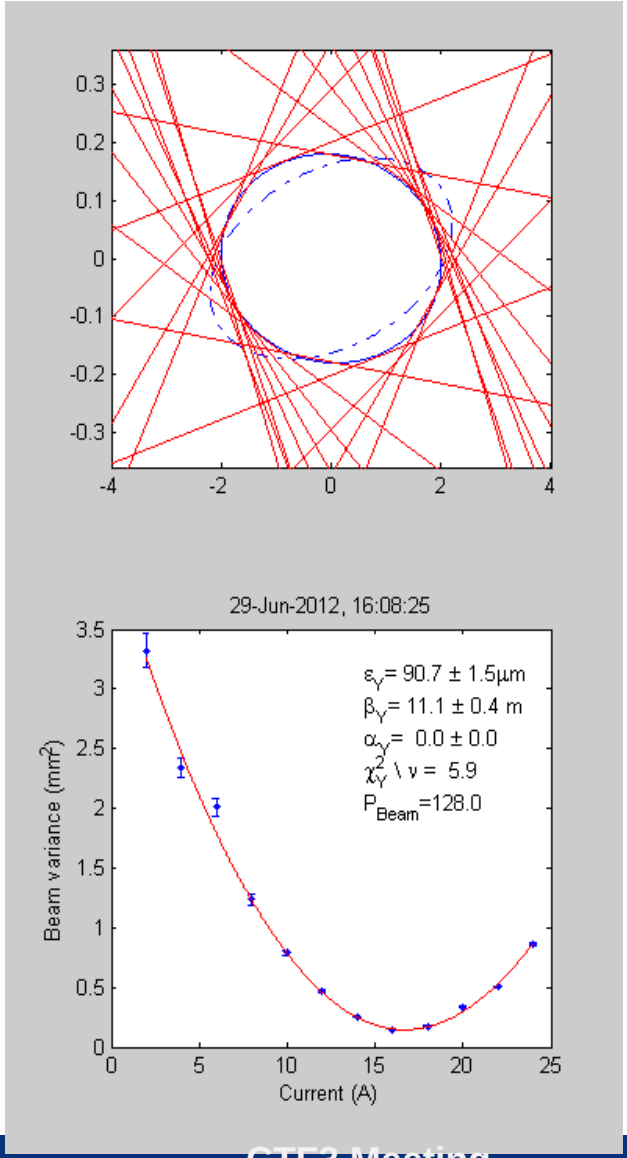


Rescaled CT line to 128 MeV, straight beam again

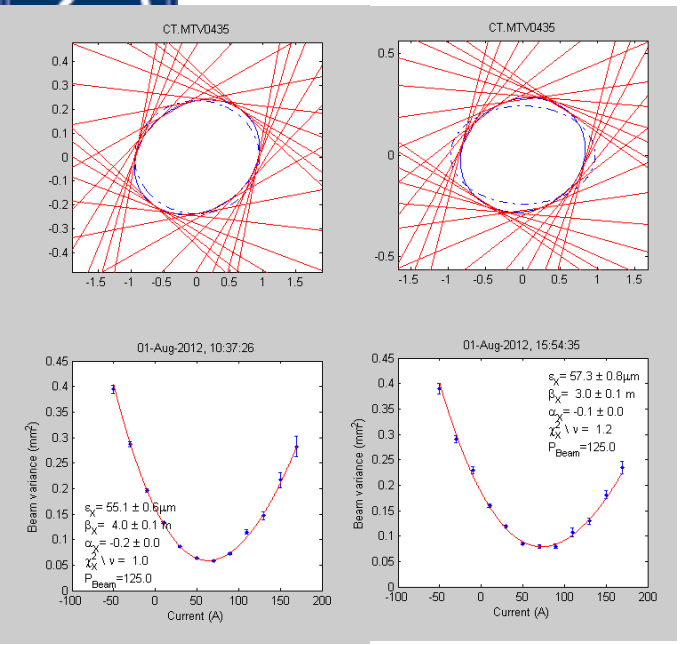


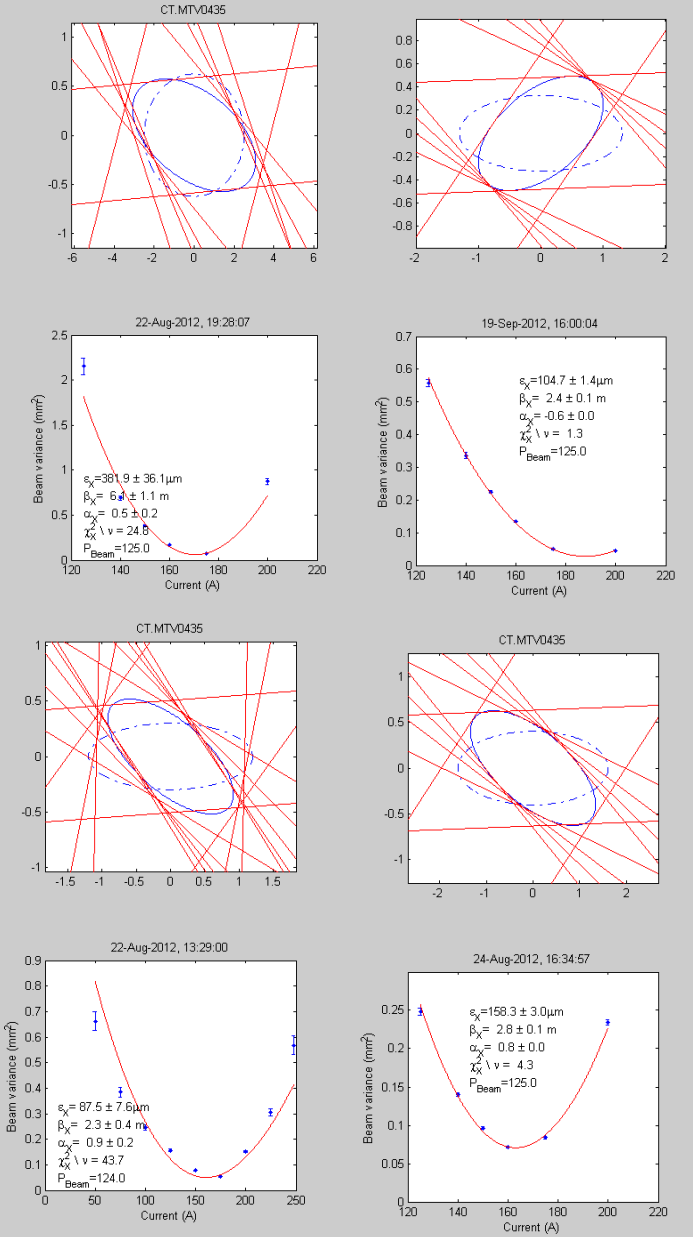


Delayed plus satellites

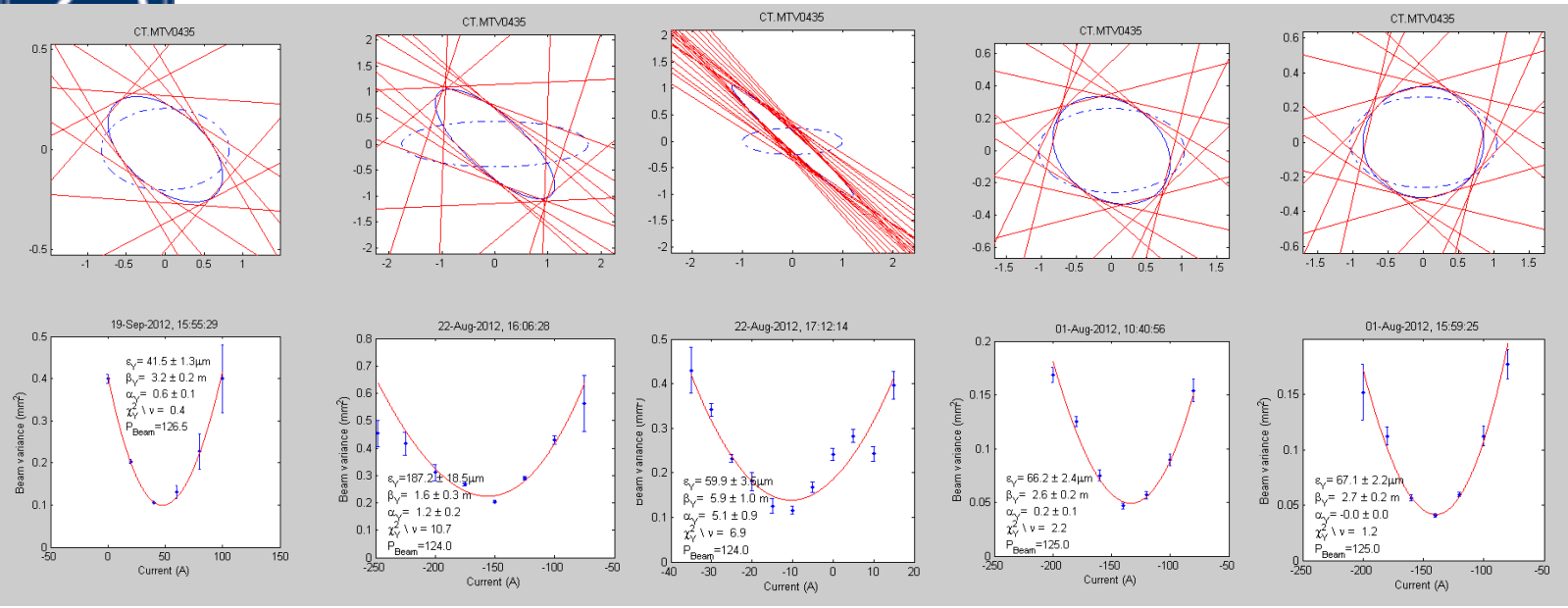


CT435 H

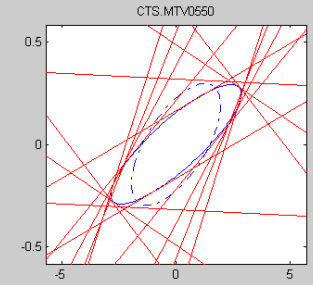

CT.MTV0435
CT.MTV0435
01-Aug-2012, 10:37:26
ε_X= 55.1 ± 0.6μm
β_X= 4.0 ± 0.1 m
α_X= -0.2 ± 0.0
$\chi^2_X \setminus \nu$ = 1.0
P_{Beam}=125.0
01-Aug-2012, 15:54:35
ε_X= 57.3 ± 0.8μm
β_X= 3.0 ± 0.1 m
α_X= -0.1 ± 0.0
$\chi^2_X \setminus \nu$ = 1.2
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

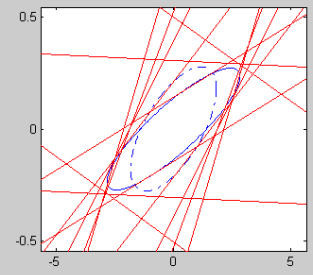

CT.MTV0435
CT.MTV0435
22-Aug-2012, 19:28:07
ε_X=381.9 ± 36.1μm
β_X= 6.4 ± 1.1 m
α_X= 0.5 ± 0.2
$\chi^2_X \setminus \nu$ = 24.8
P_{Beam}=125.0
19-Sep-2012, 16:00:04
ε_X=104.7 ± 1.4μm
β_X= 2.4 ± 0.1 m
α_X= -0.6 ± 0.0
$\chi^2_X \setminus \nu$ = 1.3
P_{Beam}=125.0
CT.MTV0435
CT.MTV0435
22-Aug-2012, 13:29:00
ε_X= 87.5 ± 7.6μm
β_X= 2.3 ± 0.4 m
α_X= 0.9 ± 0.2
$\chi^2_X \setminus \nu$ = 43.7
P_{Beam}=124.0
24-Aug-2012, 16:34:57
ε_X=158.3 ± 3.0μm
β_X= 2.8 ± 0.1 m
α_X= 0.8 ± 0.0
$\chi^2_X \setminus \nu$ = 4.3
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

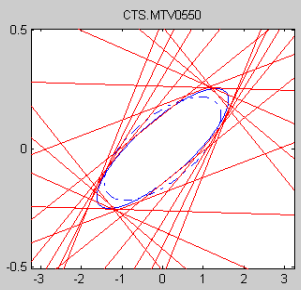
CT435 V

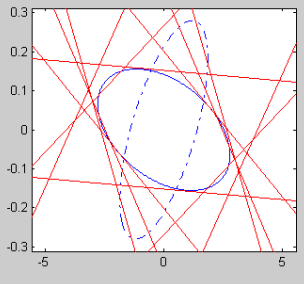

CT.MTV0435
CT.MTV0435
CT.MTV0435
CT.MTV0435
CT.MTV0435
19-Sep-2012, 15:55:29
εY= 41.5 ± 1.3μm
βY= 3.2 ± 0.2 m
αY= 0.6 ± 0.1
χ2Y \ ν = 0.4
PBeam=126.5
22-Aug-2012, 16:06:28
εY=187.2 ± 18.5μm
βY= 1.6 ± 0.3 m
αY= 1.2 ± 0.2
χ2Y \ ν = 10.7
PBeam=124.0
22-Aug-2012, 17:12:14
εY= 59.9 ± 3.5μm
βY= 5.9 ± 1.0 m
αY= 5.1 ± 0.9
χ2Y \ ν = 6.9
PBeam=124.0
01-Aug-2012, 10:40:56
εY= 66.2 ± 2.4μm
βY= 2.6 ± 0.2 m
αY= 0.2 ± 0.1
χ2Y \ ν = 2.2
PBeam=125.0
01-Aug-2012, 15:59:25
εY= 67.1 ± 2.2μm
βY= 2.7 ± 0.2 m
αY= -0.0 ± 0.0
χ2Y \ ν = 1.2
PBeam=125.0
Beam variance (mm2)
Current (A)

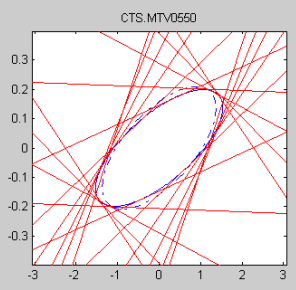
CTS H

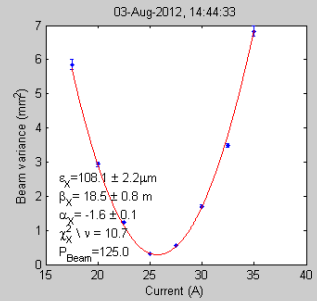

CTS.MTV0550

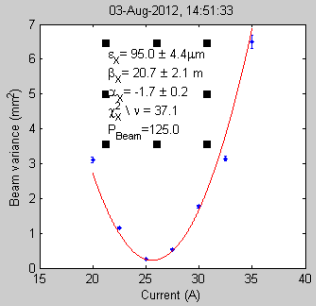


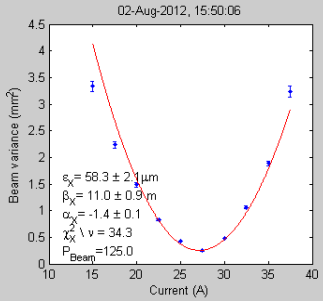

CTS.MTV0550

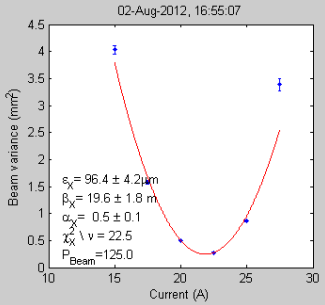


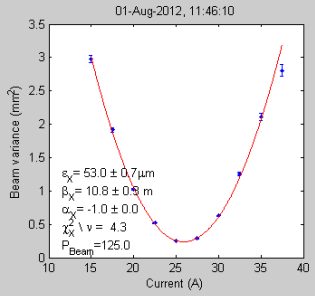

CTS.MTV0550

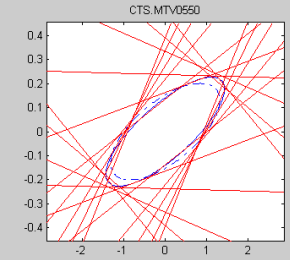

03-Aug-2012, 14:44:33
ε_x=108.1 ± 2.2µm
β_x= 18.5 ± 0.8 m
α_x= -1.6 ± 0.1
χ^2_x \ ν = 10.7
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

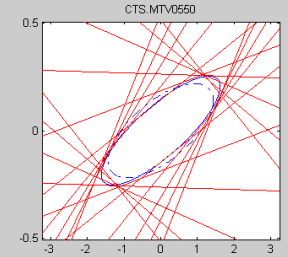

03-Aug-2012, 14:51:33
ε_x= 95.0 ± 4.4µm
β_x= 20.7 ± 2.1 m
α_x= -1.7 ± 0.2
χ^2_x \ ν = 37.1
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

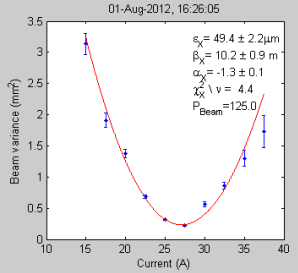

02-Aug-2012, 15:50:06
ε_x= 58.3 ± 2.1µm
β_x= 11.0 ± 0.9 m
α_x= -1.4 ± 0.1
χ^2_x \ ν = 34.3
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

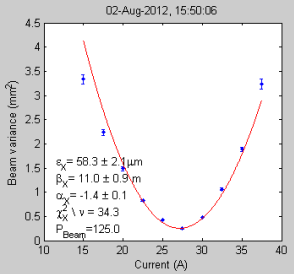

02-Aug-2012, 16:55:07
ε_x= 96.4 ± 4.2µm
β_x= 19.6 ± 1.8 m
α_x= 0.5 ± 0.1
χ^2_x \ ν = 22.5
P_{Beam}=125.0
Beam variance (mm²)
Current (A)


01-Aug-2012, 11:46:10
ε_x= 53.0 ± 0.7µm
β_x= 10.8 ± 0.5 m
α_x= -1.0 ± 0.0
χ^2_x \ ν = 4.3
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

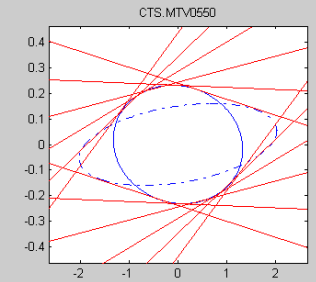

CTS.MTV0550

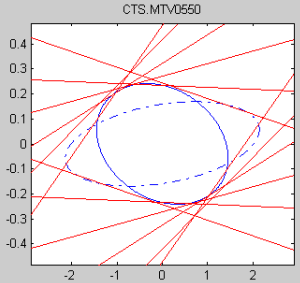

CTS.MTV0550

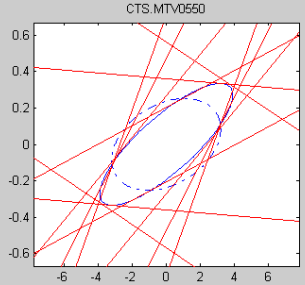

01-Aug-2012, 16:26:05
ε_x= 49.4 ± 2.2µm
β_x= 10.2 ± 0.9 m
α_x= -1.3 ± 0.1
χ^2_x \ ν = 4.4
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

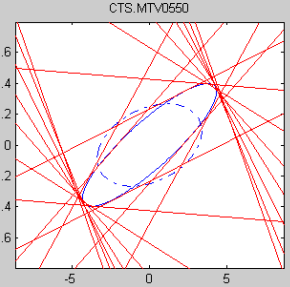

02-Aug-2012, 15:50:06
ε_x= 58.3 ± 2.1µm
β_x= 11.0 ± 0.9 m
α_x= -1.4 ± 0.1
χ^2_x \ ν = 34.3
P_{Beam}=125.0
Beam variance (mm²)
Current (A)

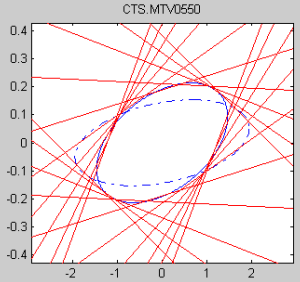
CTS V

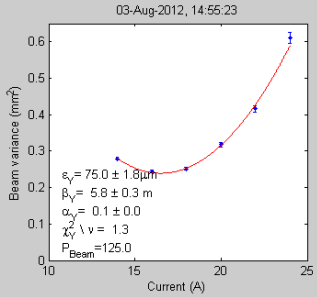

CTS.MTV0550

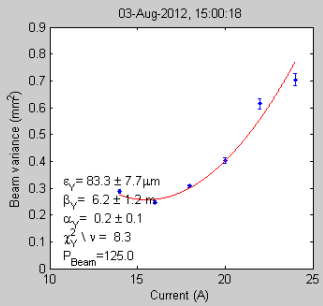

CTS.MTV0550

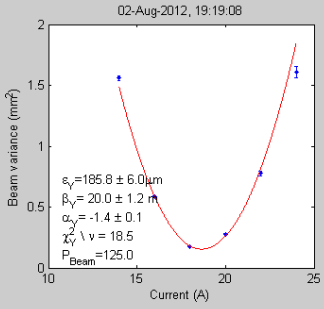

CTS.MTV0550

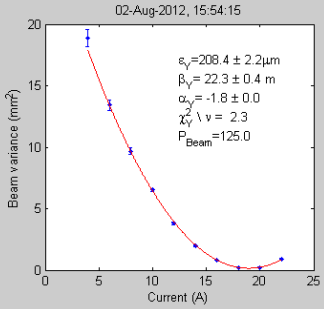

CTS.MTV0550

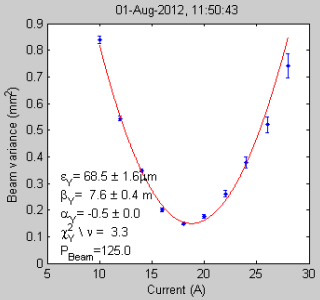

CTS.MTV0550

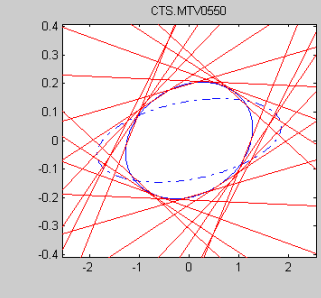

03-Aug-2012, 14:55:23
Beam variance (mm²)
Current (A)
εY= 75.0 ± 1.8μm
βY= 5.8 ± 0.3 m
αY= 0.1 ± 0.0
χ²Y \ ν = 1.3
PBeam=125.0

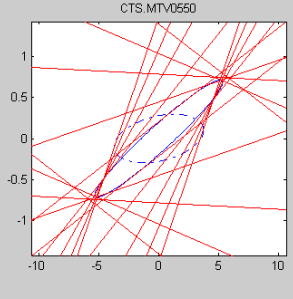

03-Aug-2012, 15:00:18
Beam variance (mm²)
Current (A)
εY= 83.3 ± 7.7μm
βY= 6.2 ± 1.2 m
αY= 0.2 ± 0.1
χ²Y \ ν = 8.3
PBeam=125.0

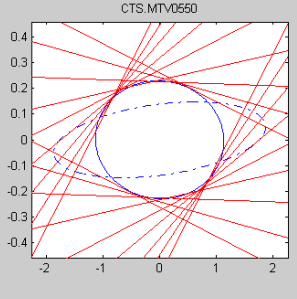

02-Aug-2012, 19:19:08
Beam variance (mm²)
Current (A)
εY=185.8 ± 6.0μm
βY= 20.0 ± 1.2 m
αY= -1.4 ± 0.1
χ²Y \ ν = 18.5
PBeam=125.0

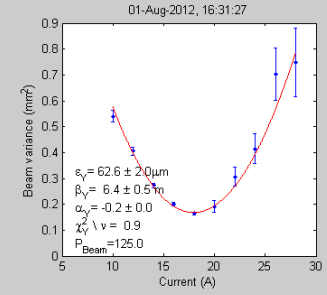

02-Aug-2012, 15:54:15
Beam variance (mm²)
Current (A)
εY=208.4 ± 2.2μm
βY= 22.3 ± 0.4 m
αY= -1.8 ± 0.0
χ²Y \ ν = 2.3
PBeam=125.0

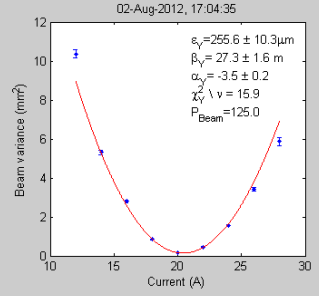

01-Aug-2012, 11:50:43
Beam variance (mm²)
Current (A)
εY= 68.5 ± 1.6μm
βY= 7.6 ± 0.4 m
αY= -0.5 ± 0.0
χ²Y \ ν = 3.3
PBeam=125.0

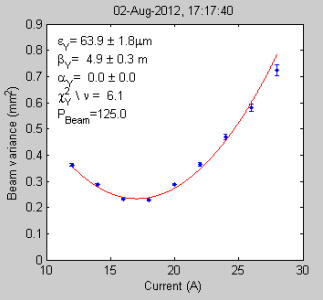

CTS.MTV0550


CTS.MTV0550

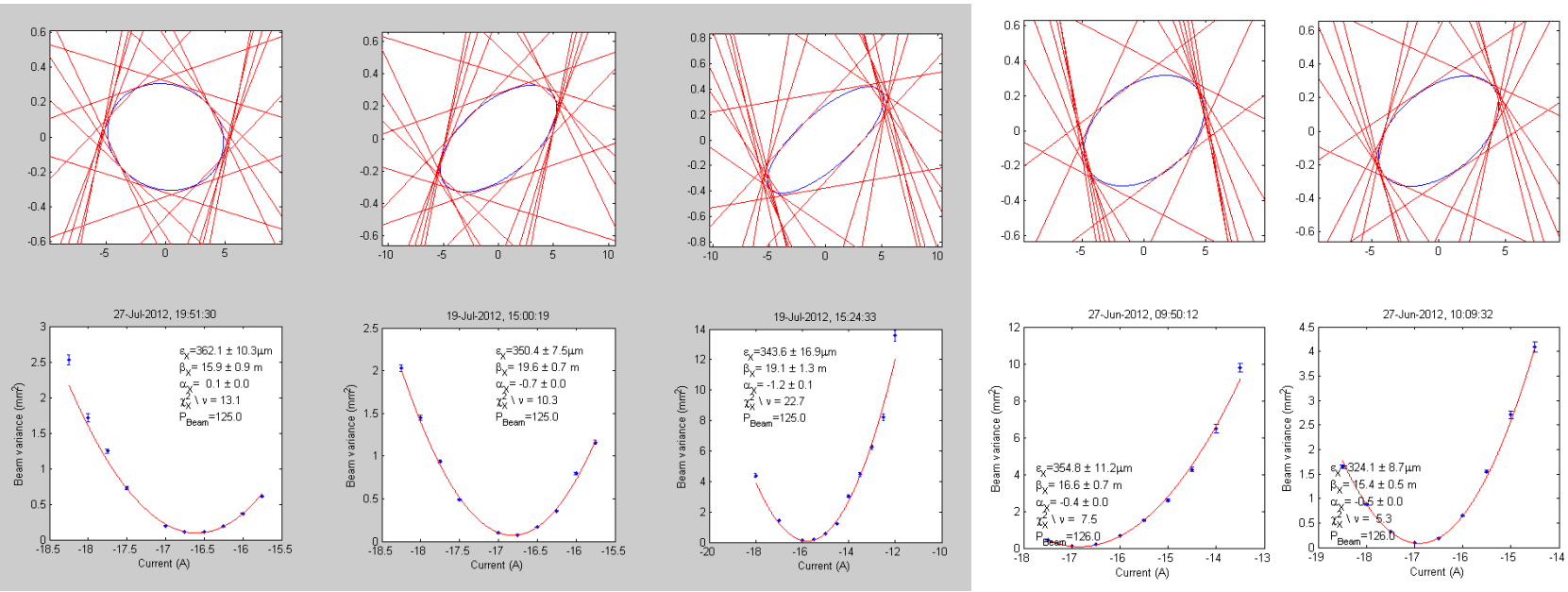

CTS.MTV0550


01-Aug-2012, 16:31:27
Beam variance (mm²)
Current (A)
εY= 62.6 ± 2.0μm
βY= 6.4 ± 0.5 m
αY= -0.2 ± 0.0
χ²Y \ ν = 0.9
PBeam=125.0

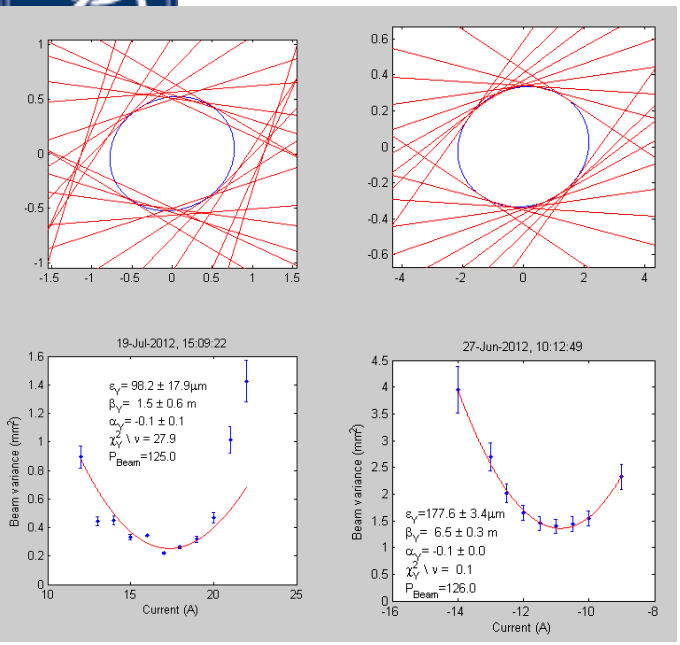

02-Aug-2012, 17:04:35
Beam variance (mm²)
Current (A)
εY=255.6 ± 10.3μm
βY= 27.3 ± 1.6 m
αY= -3.5 ± 0.2
χ²Y \ ν = 15.9
PBeam=125.0


02-Aug-2012, 17:17:40
Beam variance (mm²)
Current (A)
εY= 63.9 ± 1.8μm
βY= 4.9 ± 0.3 m
αY= 0.0 ± 0.0
χ²Y \ ν = 6.1
PBeam=125.0

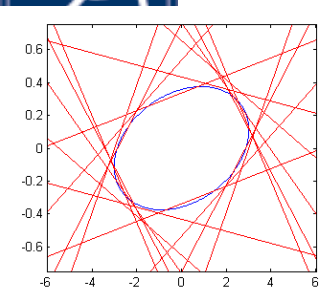
CLEX H (f4)

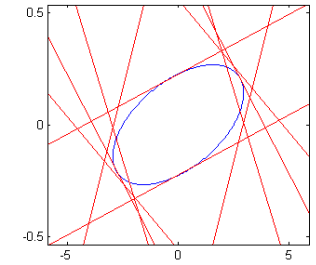

27-Jul-2012, 19:51:30
ε_X=362.1 ± 10.3μm
β_X= 15.9 ± 0.9 m
α_X= 0.1 ± 0.0
χ^2_X \ ν = 13.1
P_{Beam}=125.0
19-Jul-2012, 15:00:19
ε_X=350.4 ± 7.5μm
β_X= 19.6 ± 0.7 m
α_X= -0.7 ± 0.0
χ^2_X \ ν = 10.3
P_{Beam}=125.0
19-Jul-2012, 15:24:33
ε_X=343.6 ± 16.9μm
β_X= 19.1 ± 1.3 m
α_X= -1.2 ± 0.1
χ^2_X \ ν = 22.7
P_{Beam}=125.0
27-Jun-2012, 09:50:12
ε_X=354.8 ± 11.2μm
β_X= 16.6 ± 0.7 m
α_X= -0.4 ± 0.0
χ^2_X \ ν = 7.5
P_{Beam}=126.0
27-Jun-2012, 10:09:32
ε_X=324.1 ± 8.7μm
β_X= 15.4 ± 0.5 m
α_X= -0.5 ± 0.0
χ^2_X \ ν = 5.3
P_{Beam}=126.0
Beam variance (mm²)
Current (A)

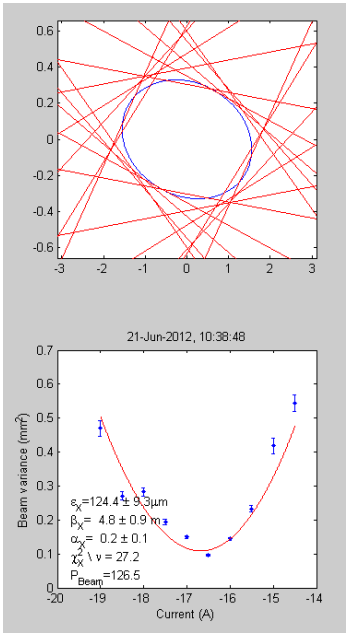
CLEX V f4

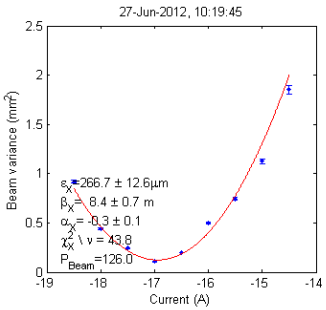

19-Jul-2012, 15:09:22
ε_y= 98.2 ± 17.9µm
β_y= 1.5 ± 0.6 m
α_y= -0.1 ± 0.1
χ^2_y \ ν = 27.9
P_{Beam}=125.0
Beam variance (mm²)
Current (A)
27-Jun-2012, 10:12:49
ε_y=177.6 ± 3.4µm
β_y= 6.5 ± 0.3 m
α_y= -0.1 ± 0.0
χ^2_y \ ν = 0.1
P_{Beam}=126.0
Beam variance (mm²)
Current (A)

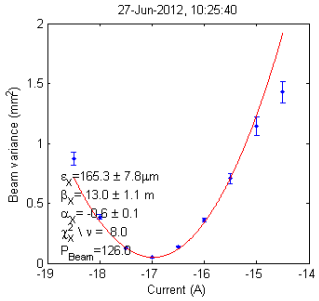
CLEX H f1





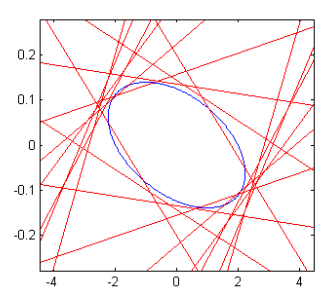


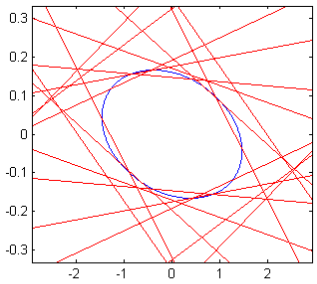

27-Jun-2012, 10:19:45
Beam variance (mm²)
Current (A)
εX =266.7 ± 12.6μm
βX = 8.4 ± 0.7 m
αX = -0.3 ± 0.1
χ²X \ ν = 43.8
PBeam =126.0

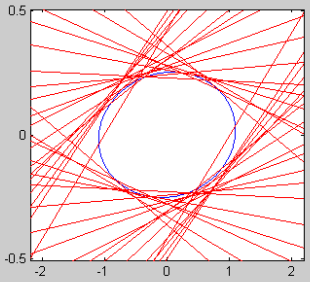

27-Jun-2012, 10:25:40
Beam variance (mm²)
Current (A)
εX =165.3 ± 7.8μm
βX = 13.0 ± 1.1 m
αX = -0.6 ± 0.1
χ²X \ ν = 8.0
PBeam =126.0

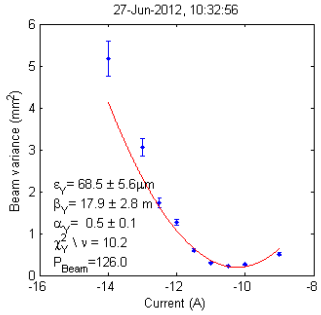
21-Jun-2012, 10:38:48
Beam variance (mm²)
Current (A)
εX =124.4 ± 9.3μm
βX = 4.8 ± 0.9 m
αX = 0.2 ± 0.1
χ²X \ ν = 27.2
PBeam =126.5

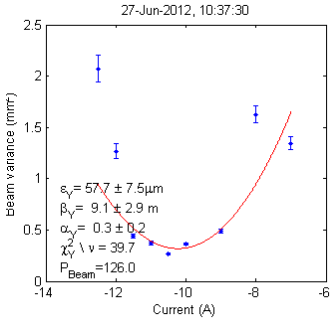
CLEX V f1

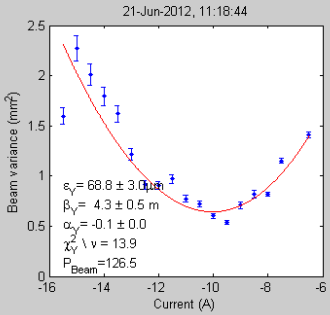







27-Jun-2012, 10:32:56
Beam variance (mm²)
Current (A)
εY= 68.5 ± 5.6µm
βY= 17.9 ± 2.8 m
αY= 0.5 ± 0.1
χ²Y \ ν = 10.2
PBeam=126.0


27-Jun-2012, 10:37:30
Beam variance (mm²)
Current (A)
εY= 57.7 ± 7.5µm
βY= 9.1 ± 2.9 m
αY= 0.3 ± 0.2
χ²Y \ ν = 39.7
PBeam=126.0


21-Jun-2012, 11:18:44
Beam variance (mm²)
Current (A)
εY= 68.8 ± 3.0µm
βY= 4.3 ± 0.5 m
αY= -0.1 ± 0.0
χ²Y \ ν = 13.9
PBeam=126.5

- **Chicane optics measurements**

Natural R56

12/06/2012

Chicane optics measurements

- Uses standard phase space painting technique
- Painted ellipse directly observed by turning off quads
- Ellipse at a given BPM reconstructed using the immediate downstream BPM (blue) and immediate upstream BPM (green)
- Comparing these gives a measure of accuracy of reconstruction (e.g BPI0487)
- Given this, the measurements agree quite well with the MAD-X predictions
- However, should repeat with different R56s with more, stronger quads

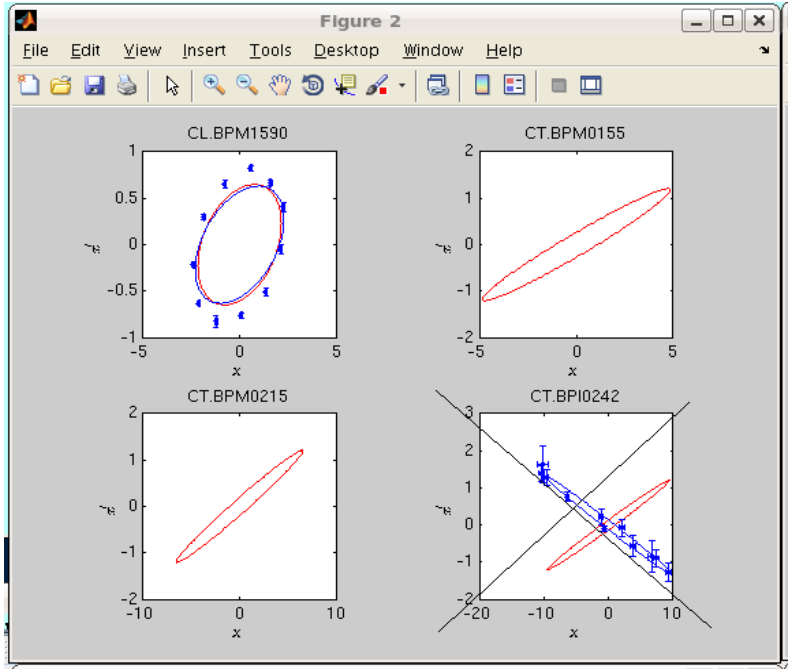


Figure 2
File Edit View Insert Tools Desktop Window Help
CL.BPM1590
CT.BPM0155
CT.BPM0215
CT.BPI0242
x
x'

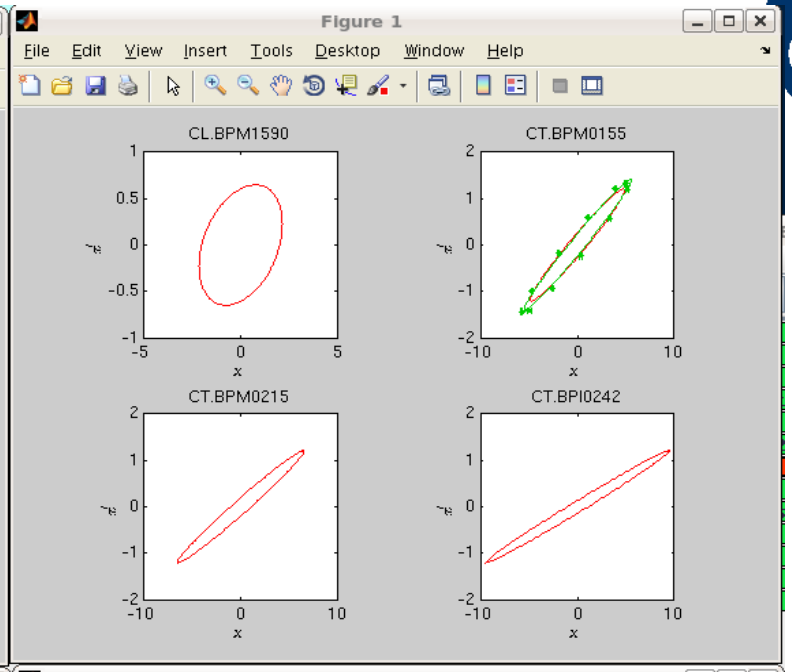


Figure 1
File Edit View Insert Tools Desktop Window Help
CL.BPM1590
CT.BPM0155
CT.BPM0215
CT.BPI0242
x
x'

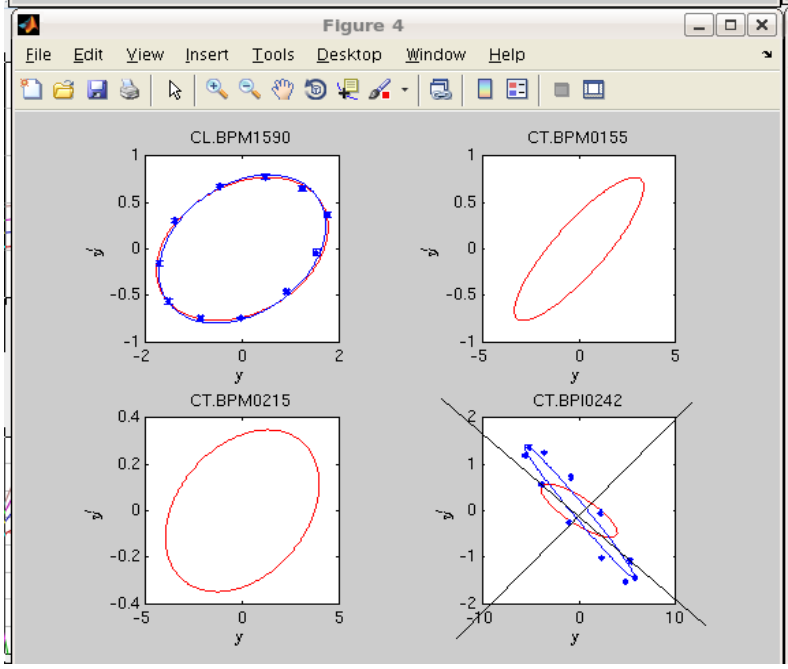


Figure 4
File Edit View Insert Tools Desktop Window Help
CL.BPM1590
CT.BPM0155
CT.BPM0215
CT.BPI0242
y
y'

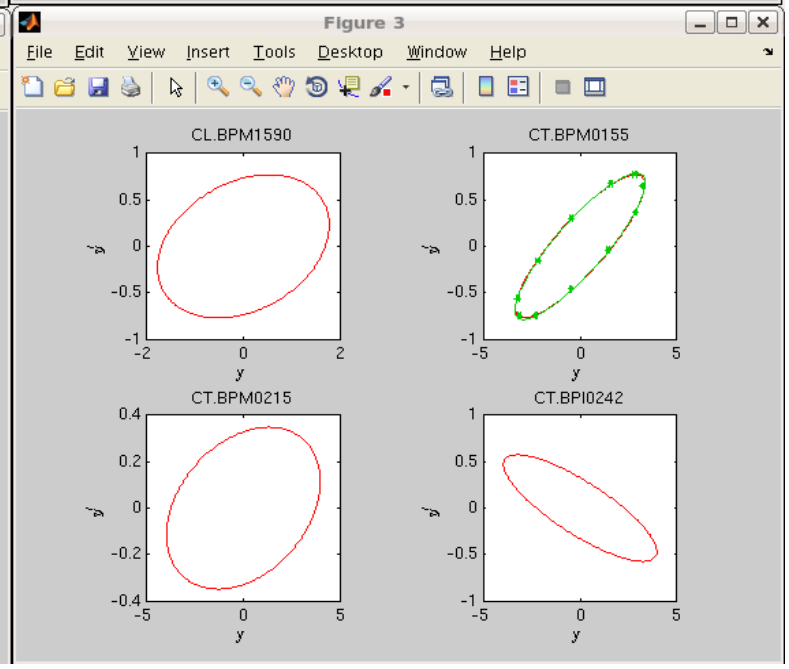


Figure 3
File Edit View Insert Tools Desktop Window Help
CL.BPM1590
CT.BPM0155
CT.BPM0215
CT.BPI0242
y
y'

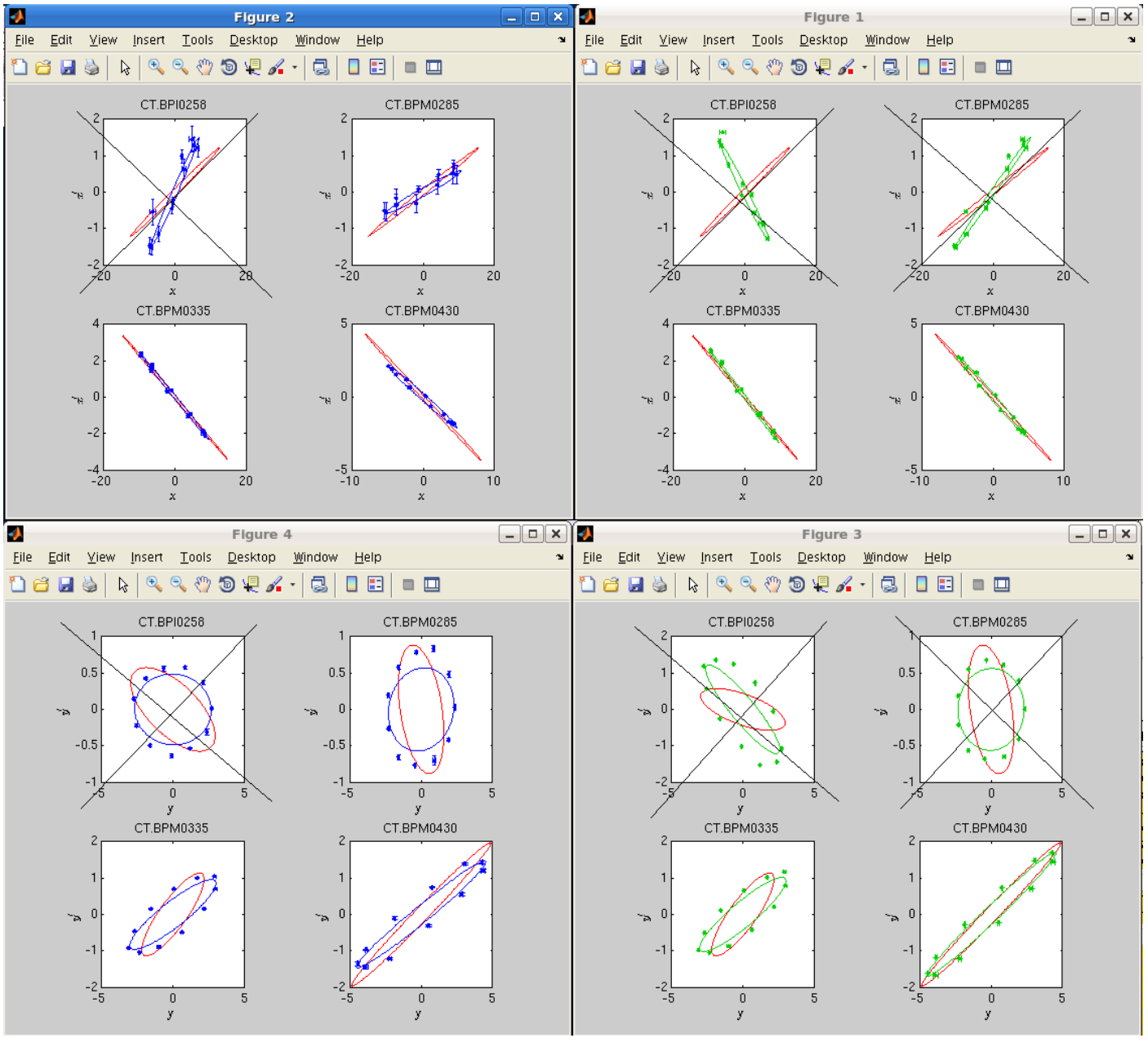


Figure 2
File Edit View Insert Tools Desktop Window Help
CT.BPI0258
CT.BPM0285
CT.BPM0335
CT.BPM0430
Figure 1
File Edit View Insert Tools Desktop Window Help
CT.BPI0258
CT.BPM0285
CT.BPM0335
CT.BPM0430
Figure 4
File Edit View Insert Tools Desktop Window Help
CT.BPI0258
CT.BPM0285
CT.BPM0335
CT.BPM0430
Figure 3
File Edit View Insert Tools Desktop Window Help
CT.BPI0258
CT.BPM0285
CT.BPM0335
CT.BPM0430

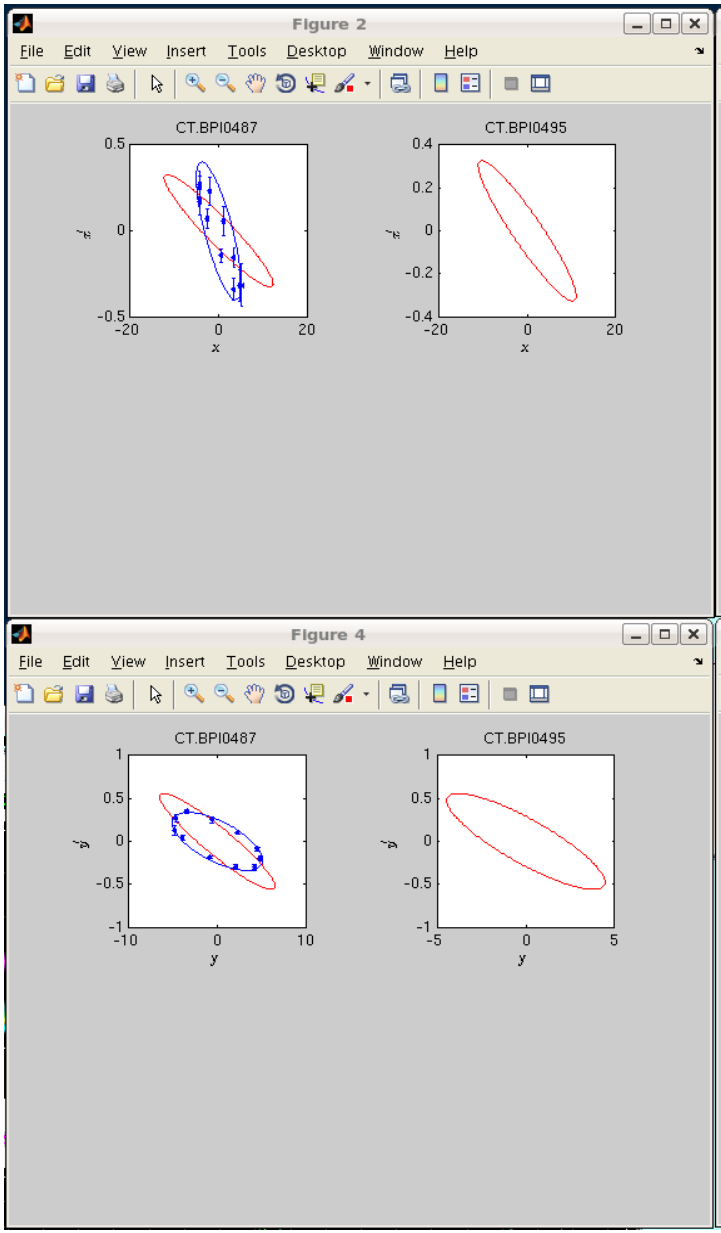


Figure 2
File Edit View Insert Tools Desktop Window Help
CT.BPI0487
CT.BPI0495
x
x'
Figure 1
File Edit View Insert Tools Desktop Window Help
CT.BPI0487
CT.BPI0495
x
x'
Figure 4
File Edit View Insert Tools Desktop Window Help
CT.BPI0487
CT.BPI0495
y
y'
Figure 3
File Edit View Insert Tools Desktop Window Help
CT.BPI0487
CT.BPI0495
y
y'