

MTE : Operations point of view: SPS

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BE-OP

Many thanks to the SPS operators and
S. Gilardoni

SPS operation with MTE

- Overview of the 2010 run with MTE
- Critical points to be keep an eye on.
- Requirements for operation of Fixed-Target/CNGS with MTE

CNGS extracted intensity per pulse during the month of May



CNGS only

CNGS + fixed target

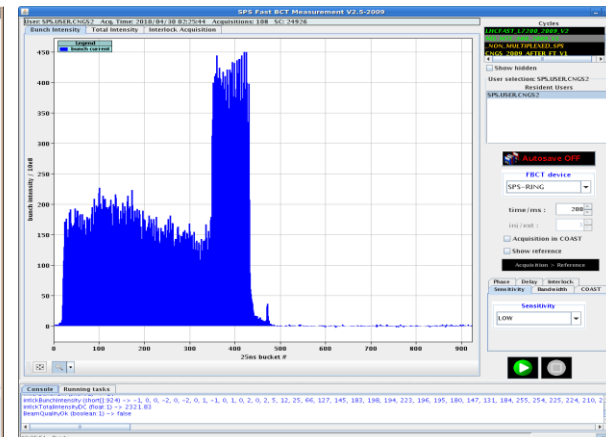
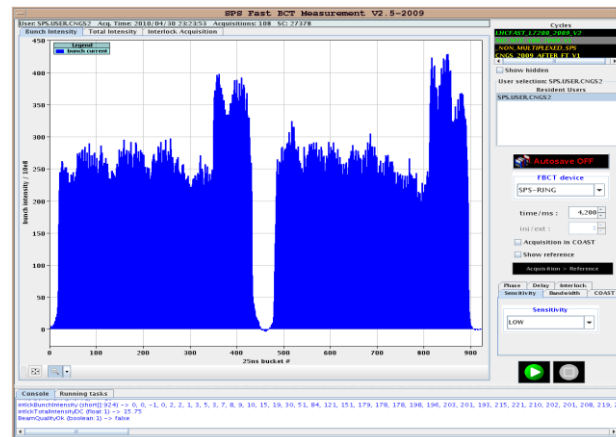
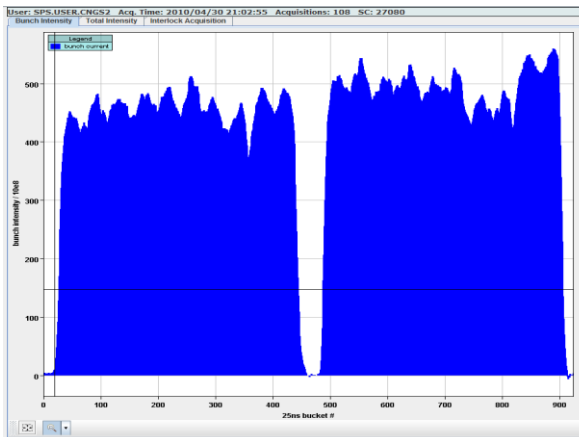
Back to CT

Best Achievements

CNGS Larger		User: CNGS2		01-May-2010 10:56:24	
Former teletext 111				Last update: 1 secs ago	
TT2	TT10	%LOSS	INJ	%LOSS	
2248	2167	3.6	2035	6.1	
2160	2082	3.6	1997	4.1	
	I/E10	%LOSS	%TRNS	TIME/ms	
INJECT	3985	5.1	95	1210	
END_FB	3950	2.0	98	1260	
20 GeV/c	3834	2.9	95	1470	
27 GeV/c	3782	1.4	94	1530	
50 GeV/c	3752	0.8	93	1740	
400 GeV/c	3743	0.3	93	4200	
SC: 28750		LOSS @ FB: 2.3%			

SPS LOGBOOK 3/5/2010 14:07

- CNGS cycle is now becoming REALLY unstable, batches are just getting worse and worse, CPS is having a look at it, but, nothing seems to have changed on their side (the situation is just worsening without a good reason...)



Overview

SPS Larger v0.1.14 - Apr. 2010

May 09 19:57:12 SPS - CNGS2, 01 CNGS2 - 01

Larger Marker edition

Select BCT

SPS.BCTDC.31832

GOOD

TT10 Top	TT10 Bottom	%Loss	Inj	%Loss
1,971.8	1,901.9	3.5	1,818.1	4.4%
1,920.6	1,855.6	3.4	1,623.4	12.5%

Marker	Energy	Time/ms	Intensity/E10	%Lost	%Trans	%Stored Trans	History
Total Inj.	14.0GeV/c	1210.0	3,441.4	8.4%	91.6%	--	Click
BEF_INJ2	14.0GeV/c	1180.0	1,771	2.6%	97.4%	--	Click
END_FB	14.0GeV/c	1260.0	3,350.4	2.6%	97.4%	--	Click
FR_PORCH	20.0GeV/c	1470.0	3,012.8	10.1%	87.5%	--	Click
TRANS	27.0GeV/c	1530.0	2,967.3	1.5%	86.2%	--	Click
RAMP	50.0GeV/c	1740.0	2,929.6	1.3%	85.1%	--	Click
START_FT	400.0GeV/c	4200.0	2,920.2	0.3%	84.9%	--	Click
BEF_BEAM_DUMP	400.0GeV/c	4280.0	0	--	--	--	Click

Start Stop Save to Ref. Clear Ref. Reset hist... Save to file

SPS Larger v0.1.14 - Apr. 2010

May 09 19:57:12 SPS - CNGS2, 01 CNGS2 - 04

Larger Marker edition

Select BCT

SPS.BCTDC.31832

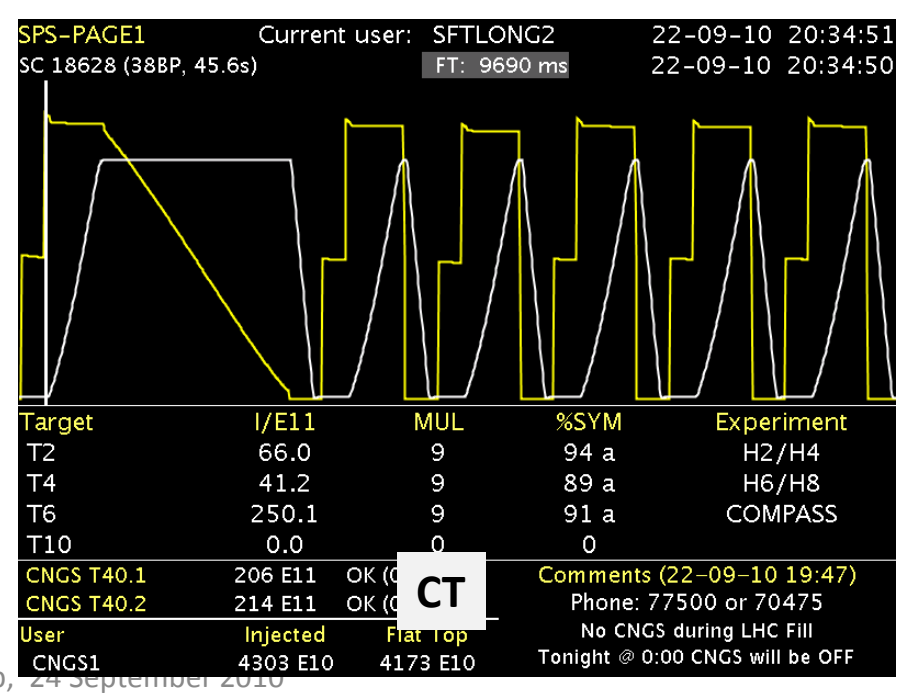
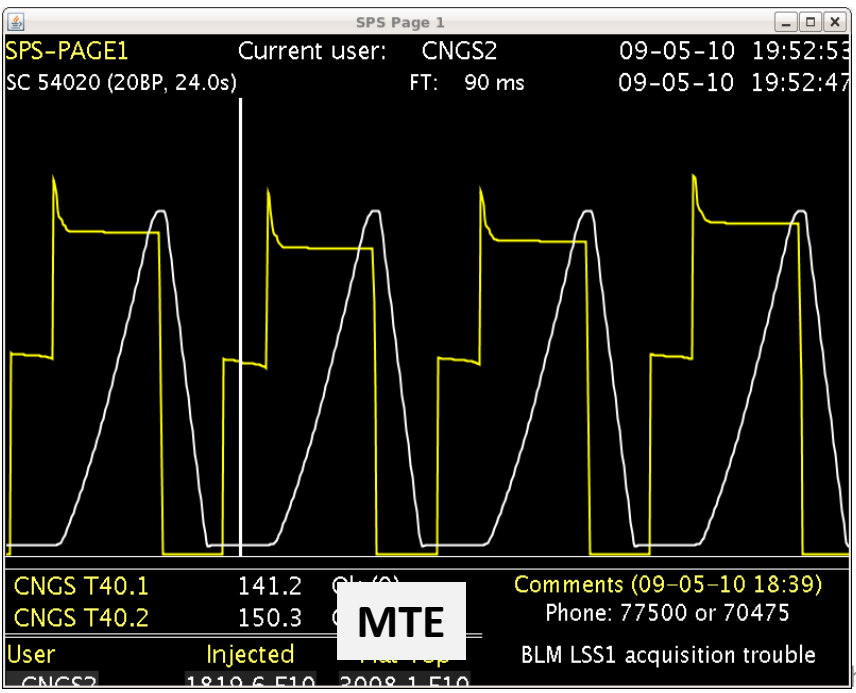
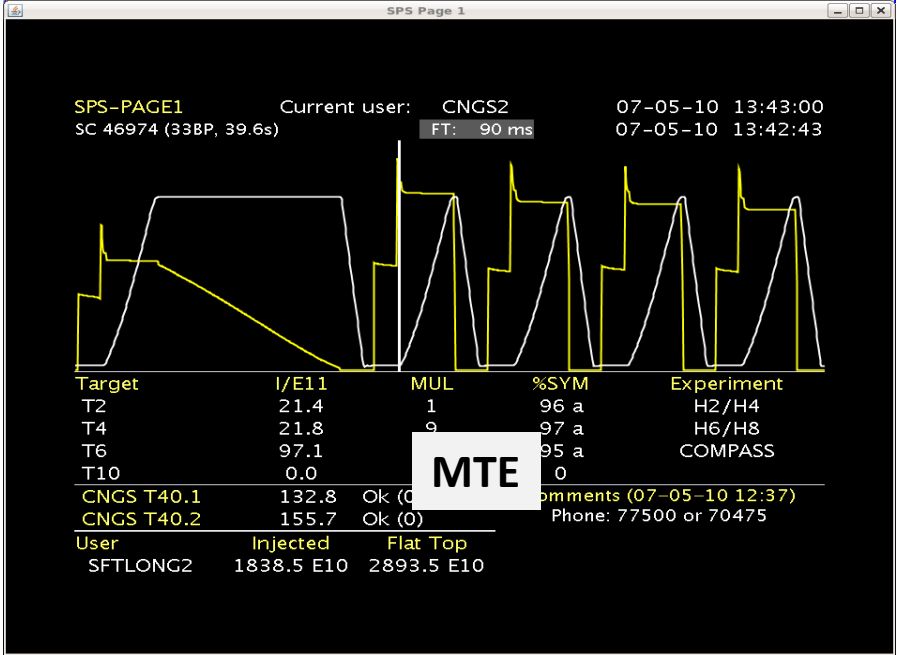
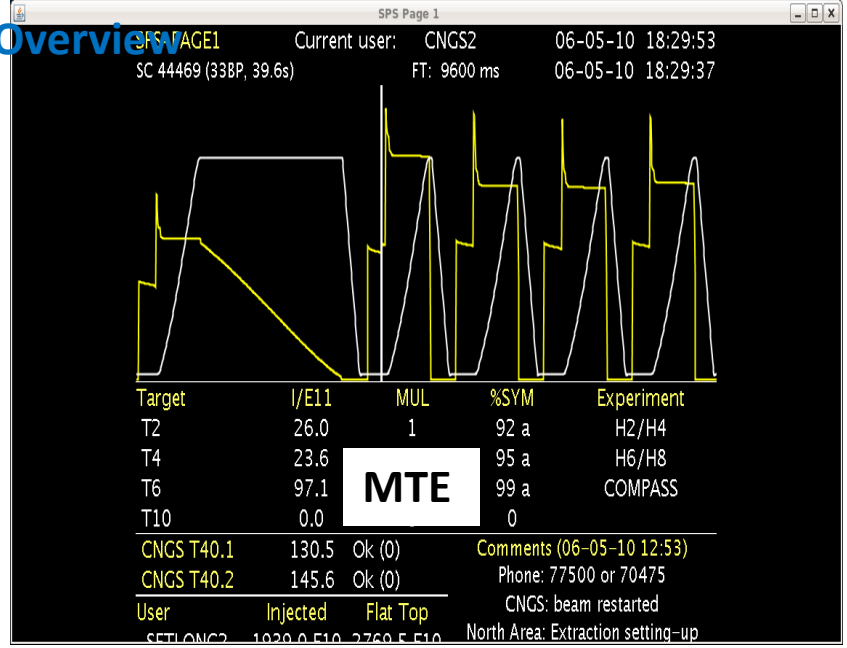
BAD

%Loss	Inj	%Loss
4	1,667.3	9.4%
4	1,463.2	19.4%

Intensity/E10	%Lost	%Trans	%Stored Trans	History
3,130.6	14.4%	85.6%	--	Click
1,402	15.9%	84.1%	--	Click
2,515.1	19.7%	80.3%	--	Click
2,273.4	9.6%	72.6%	--	Click
2,227.8	2%	71.2%	--	Click
2,188.6	1.8%	69.9%	--	Click
2,177.6	0.5%	69.6%	--	Click
0	--	--	--	Click

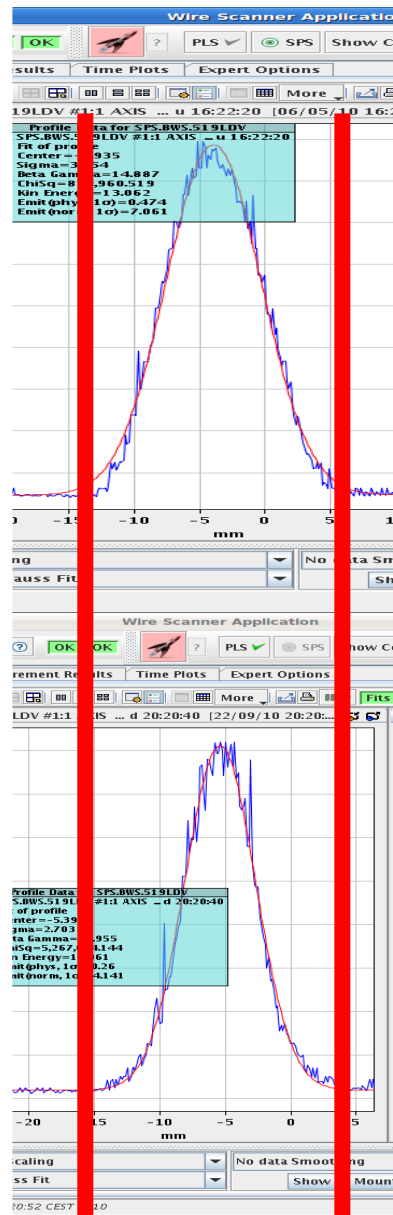
Save to Ref. Clear Ref. Reset hist... Save to file

Overview



Critical points

Vertical beam size

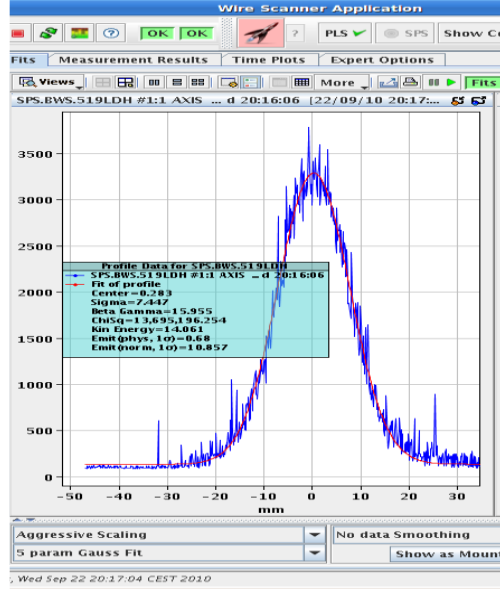


CNGS with MTE at 14GeV

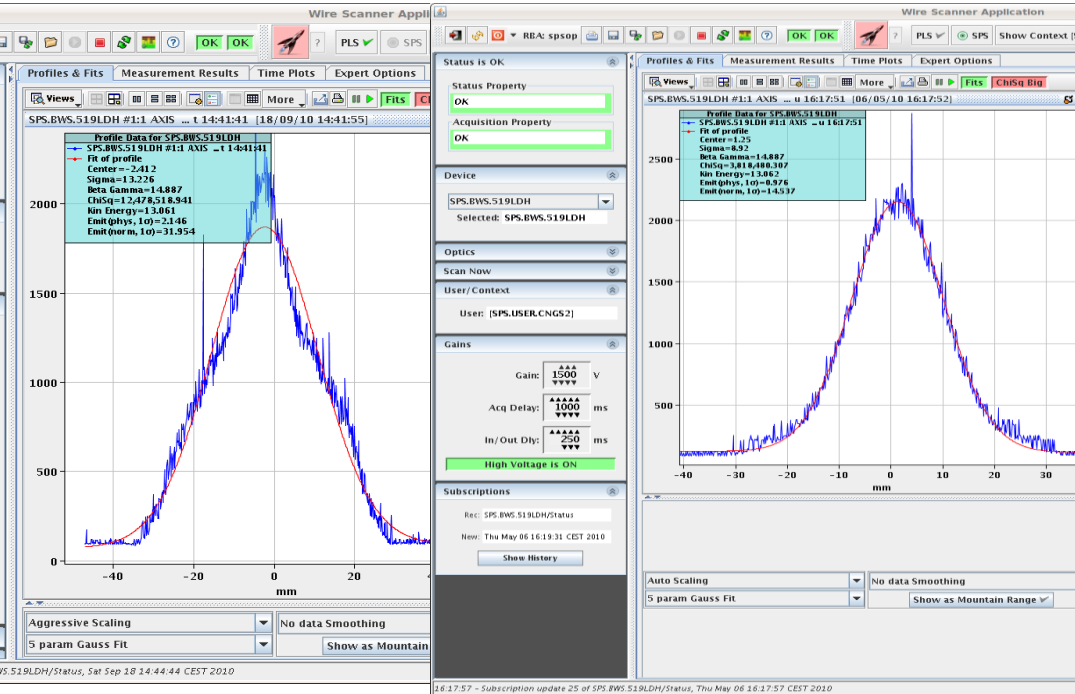
CNGS with CT at 14GeV

Critical points

Horizontal beam size



CNGS with CT at 14GeV



CNGS with MTE at 14 GeV

De-bunching + recapture in 200MHz is necessary

- H = 8, 60 kV CT case

	Intensity	%loss	%transmission
END FB	2343 +-176	2.21 +- 0.46	97.7 +- 0.6
20GeV/c	2057 +- 153	12.10 +- 3.79	85.9 +- 3.7
27GeV/c	1919 +- 134	6.65 +- 1.83	80.2 +- 3.1
50GeV/c	1795 +- 119	6.42 +- 1.35	75.0 +- 2.9
400GeV/c	1788 +- 118	0.39 +- 0.15	74.8 +- 3.0

- H=16, 60kV case

END FB	1185 +-103	3.32 +- 0.42	96.7 +- 0.6
20GeV/c	1151 +-109	2.92 +- 0.88	93.9 +- 1.3
27GeV/c	1088 +- 107	5.50 +- 0.48	88.7 +- 1.4
50GeV/c	1085 +- 109	0.30 +- 0.4	88.4 +- 1.7
400GeV/c	1085 +- 108	0.04 +- 0.08	88.4 +- 1.7

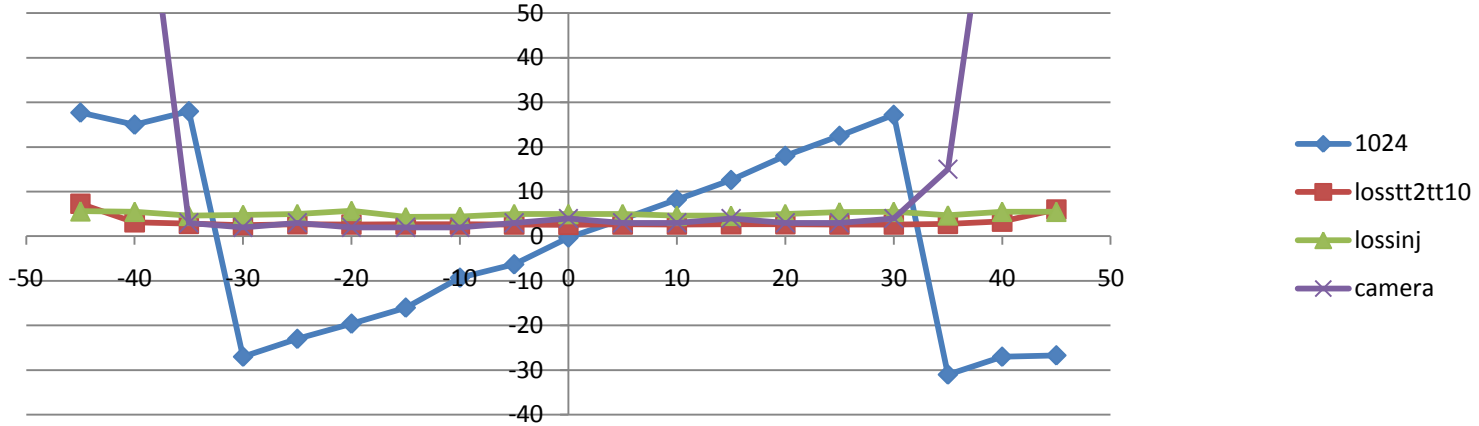
- Standard CT

END FB	2554+- 53	0.83 +- 0.11	99.0 +- 0.0
20GeV/c	2539 +- 52	0.56 +- 0.06	98.9 +- 0.3
27GeV/c	2527 +- 52	0.48 +- 0.07	98.0 +- 0.0
50GeV/c	2522 +- 52	0.17 +- 0.09	98.0 +- 0.0
400GeV/c	2519 +- 52	0.12 +- 0.06	98.0 +- 0.0

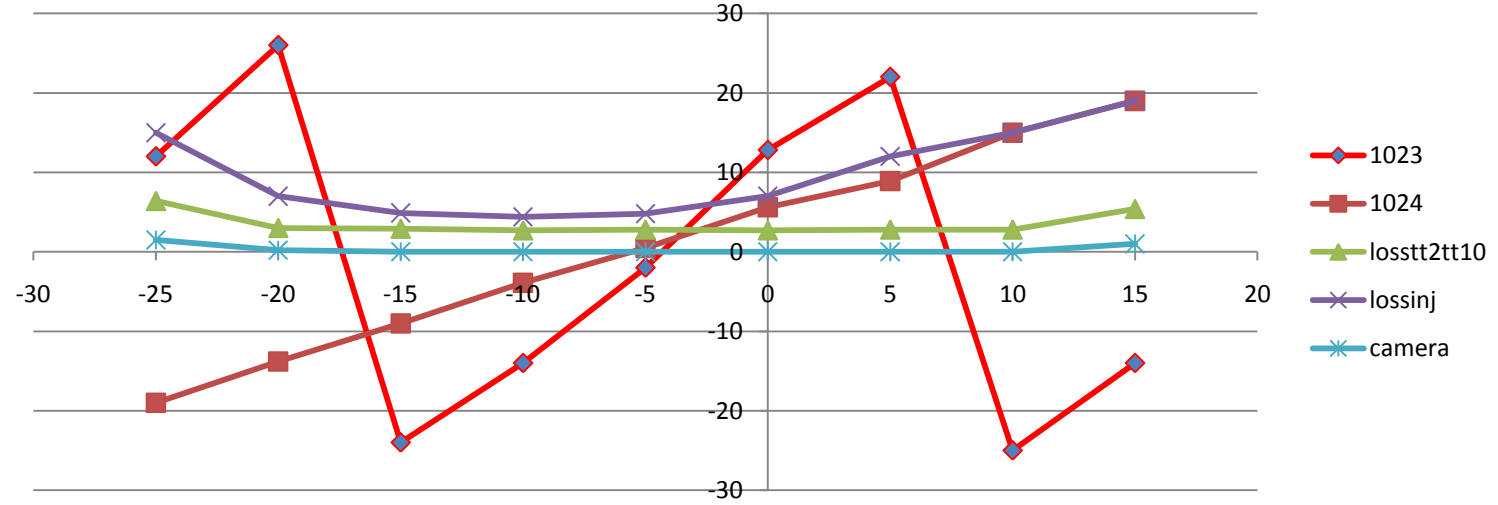
Thank you Thomas Bohl

Losses and PU in TT10 as function of bump amplitude

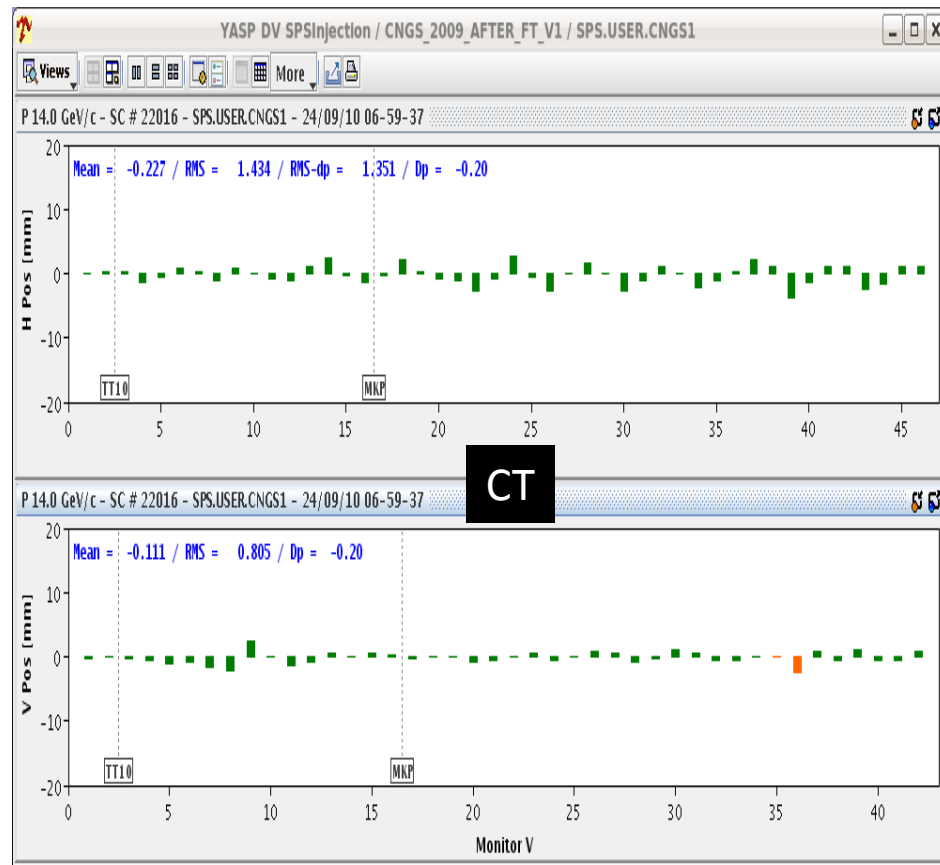
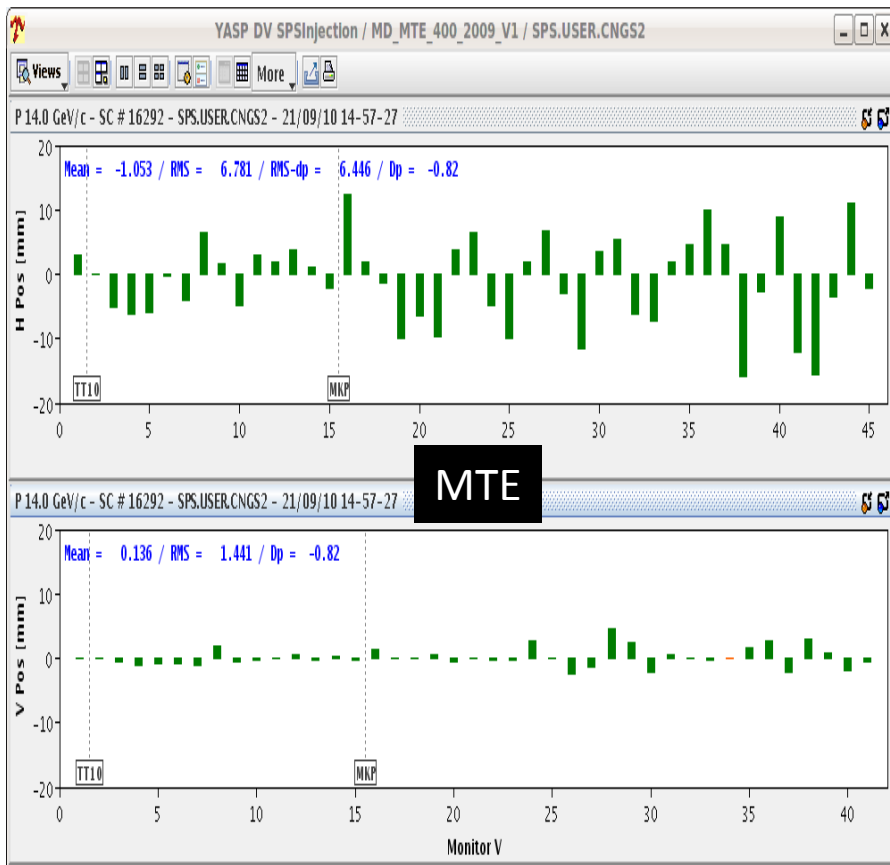
Horizontal scan



Vertical scan



Trajectory difference between two successive super cycles



Requirements for FT and CNGS

- For the moment we limit the intensity for the slow extraction to the north to $4 \cdot 10^{13}$ in order to avoid spark stress on the ZS. This will not change in the near future.
- CNGS is for the moment limited to $4.2 \cdot 10^{13}$, limits being losses in the PS and RF power in SPS.
- BUT:
 - Thanks to a constant effort of the RF group the amplifiers have become more reliable in 2010.
 - A new project to put more RF power per cavity length is on its way.
- SO:
 - An extraction with less losses in the PS will be very welcome in the future and 5 or $6 \cdot 10^{13}$, with a 6 second repetition rate will be very useful.

Conclusions

- The short 2010 run with MTE beam in the SPS showed some very encouraging results, but it also revealed a severe **stability problem** of spill and trajectories.
- The “peak” performance should become the “standard” performance.
- Any MTE development must take into account the SPS aperture and assure a good filling factor.
- SPS is preparing to accept higher intensities and MTE is one of the ways to get this without the PS beam loss whistle.