

Observations from the OP side

Bernard Vandorpe (Measurement)

Oliver Hans (Presentation)

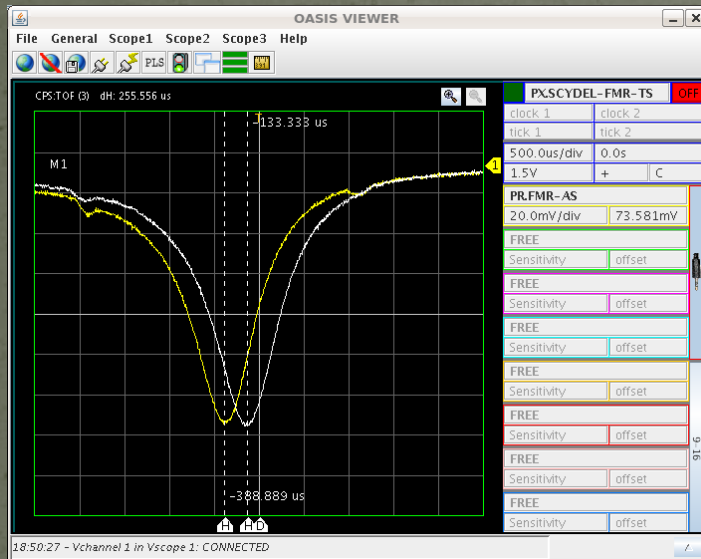
Many thanks to Bernard for the effort and explanations.



Please interrupt for questions!

B-train calibration

During the 2011 run, OP observed with the installed FMR, a field fluctuation.



OASIS FMR signal

The measurement shows a field fluctuation of 2 Gauss. Sampler BfC has only 0.4 Gauss fluctuation.

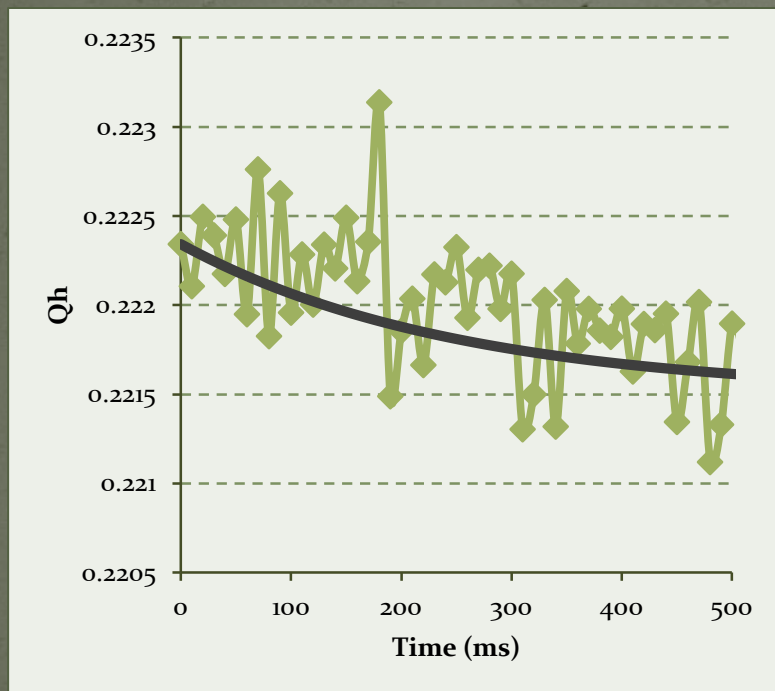
After some investigation the issue could be traced back to a calibration process taking place during the peaking strip signal.

The calibration window was shifted and OP sees this issue as solved.

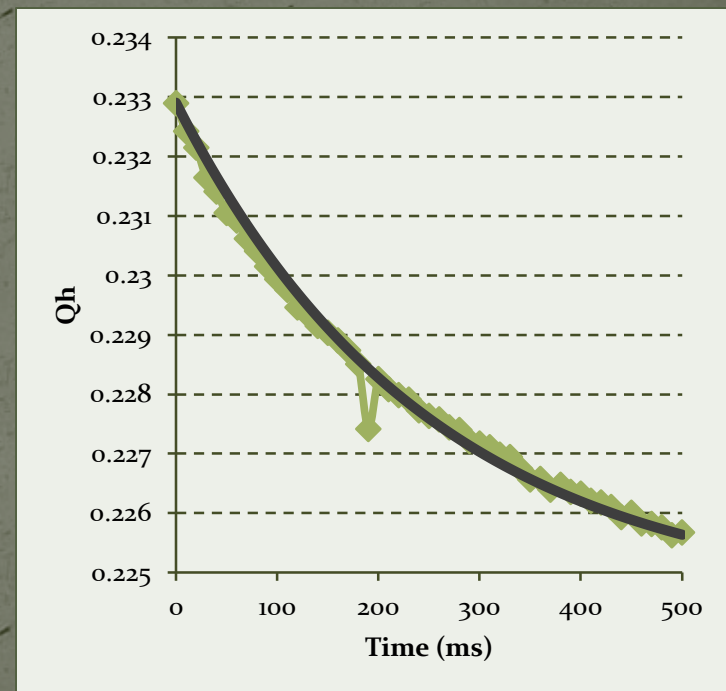
First observation

Tune stability on flat top

7000 Gauss flat top for 500ms
(14 GeV - 6666 Gauss)



12566 Gauss flat top for 500ms
(26 GeV)

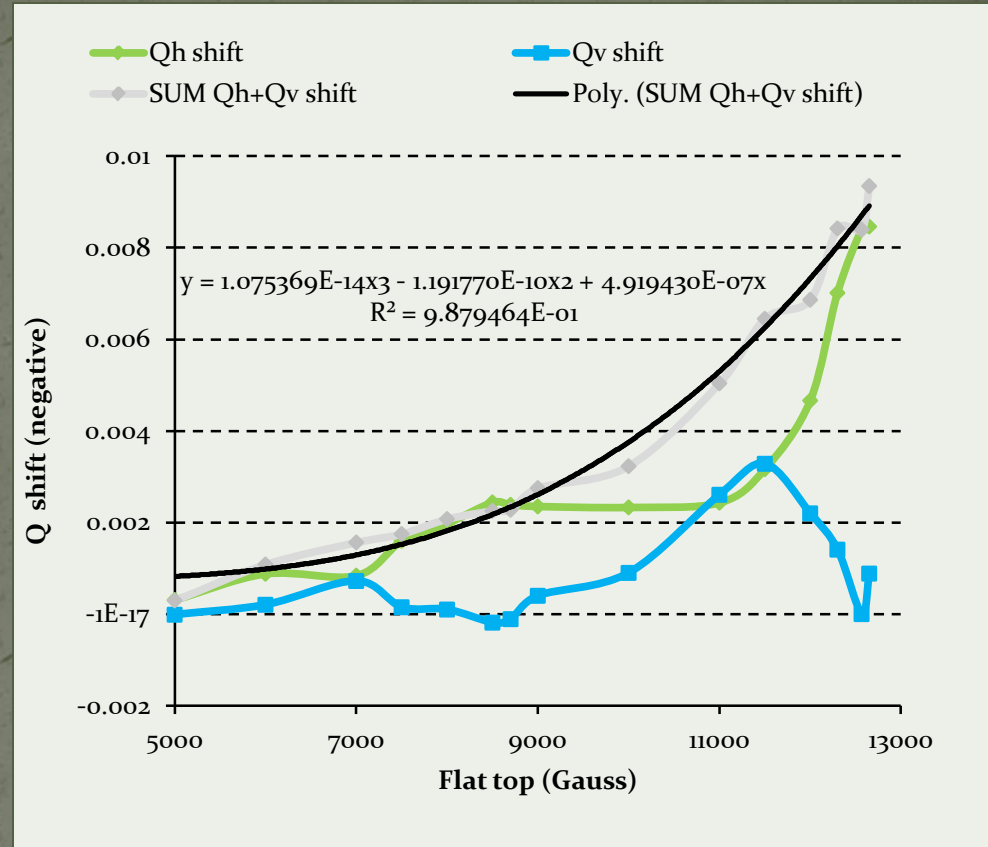


First observation

Tune stability on flat top

Bernard performed measurements on 14 different flat tops (Qh and Qv)

B-field (Gauss)	Qh start	dQh (10 ⁻³)	Qv start	dQv (10 ⁻³)
5000	0.226	0.31	0.303	-0.01
6000	0.223	0.88	0.306	0.20
7000	0.222	0.84	0.307	0.72
7500	0.220	1.6	0.312	0.15
8000	0.216	1.98	0.312	0.1
8500	0.215	2.44	0.313	-0.19
9000	0.216	2.39	0.313	-0.11
10000	0.218	2.35	0.312	0.40
11000	0.224	2.33	0.312	0.90
11500	0.225	2.43	0.327	2.61
12000	0.229	4.66	0.315	3.28
12300	0.234	7.01	0.291	2.20
12566	0.232	8.40	0.277	1.41
12650	0.224	8.46	0.267	0.00

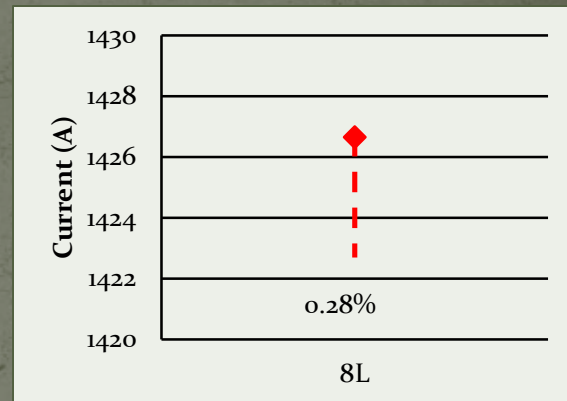
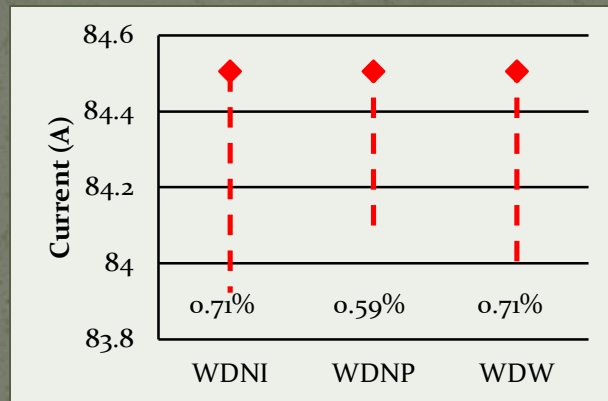
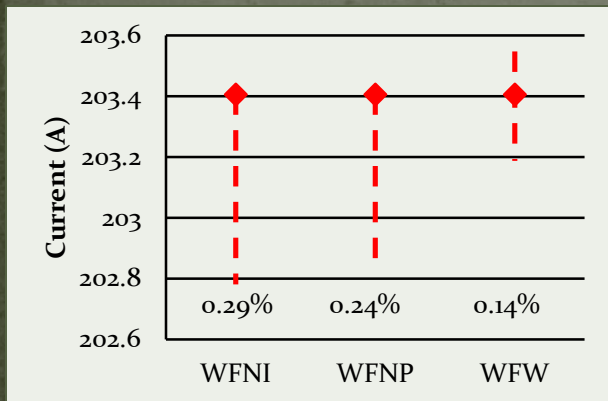
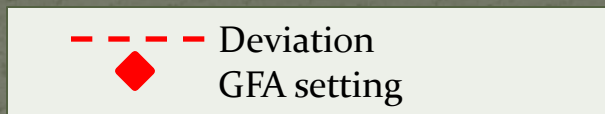


Observation:

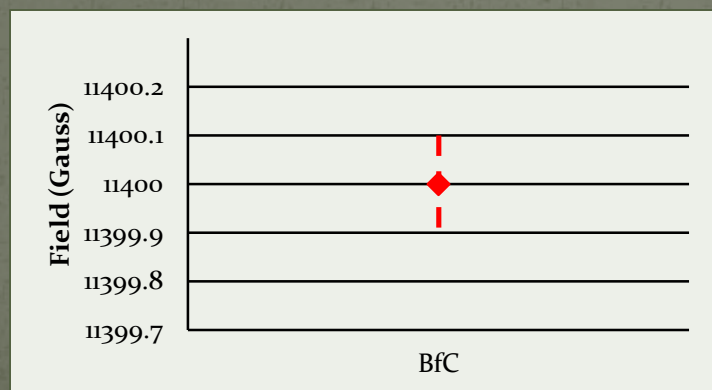
- Tune shift on flat top
- Higher flat top field -> higher dQh+v

Machine stability seen by Samplers

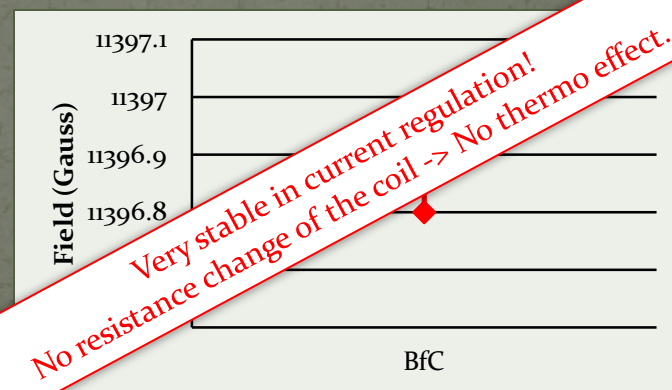
PFW measured on 26 GeV flat top over 3ooms, 5 cycles



MPS on 24 GeV flat top for 7ooms



Field regulated



Current regulated

*Very stable in current regulation!
No resistance change of the coil -> No thermo effect.*

Machine stability seen by Samplers

Matrix (B=12566 Gauss)	dI (A)	dQh	dQv
WFN	0.6	0.0009	-0.0004
WFW	0.3	0.0008	0.0005
WDN	0.6	-0.001	-0.0015
WDW	0.6	-0.0009	-0.0024
W8L	4	-0.0025	-0.0024

Tune shift calculated

Observed (B=12566 Gauss)	dQh	dQv
	0.0084	0.0014

Tune shift observed

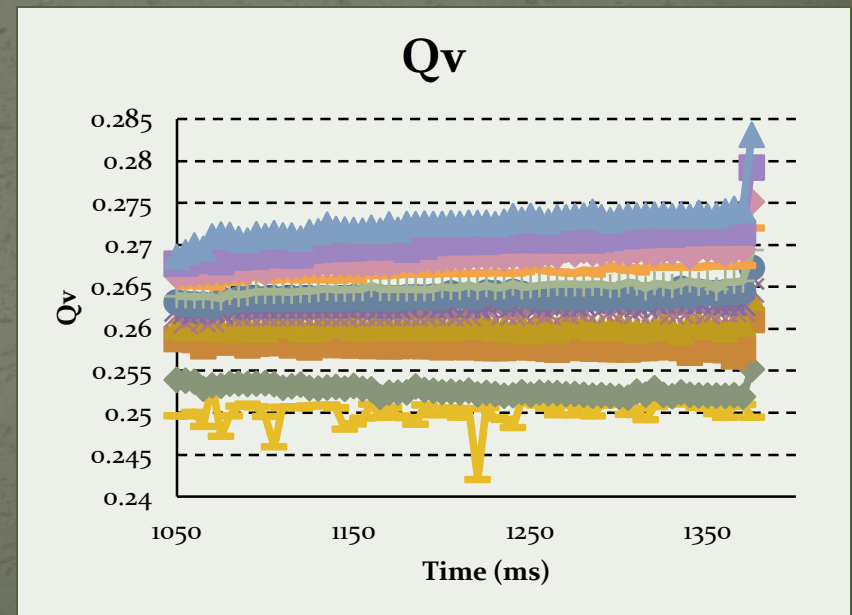
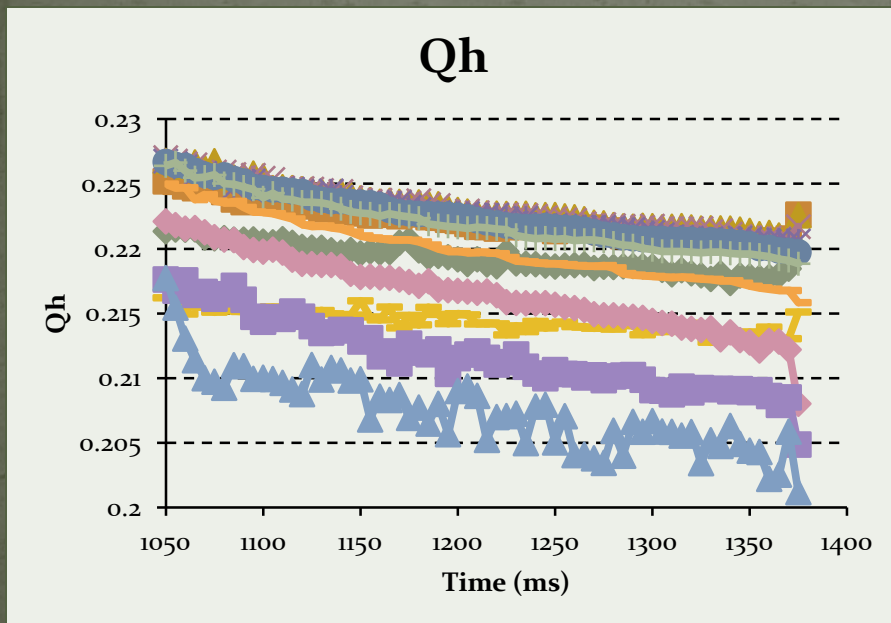
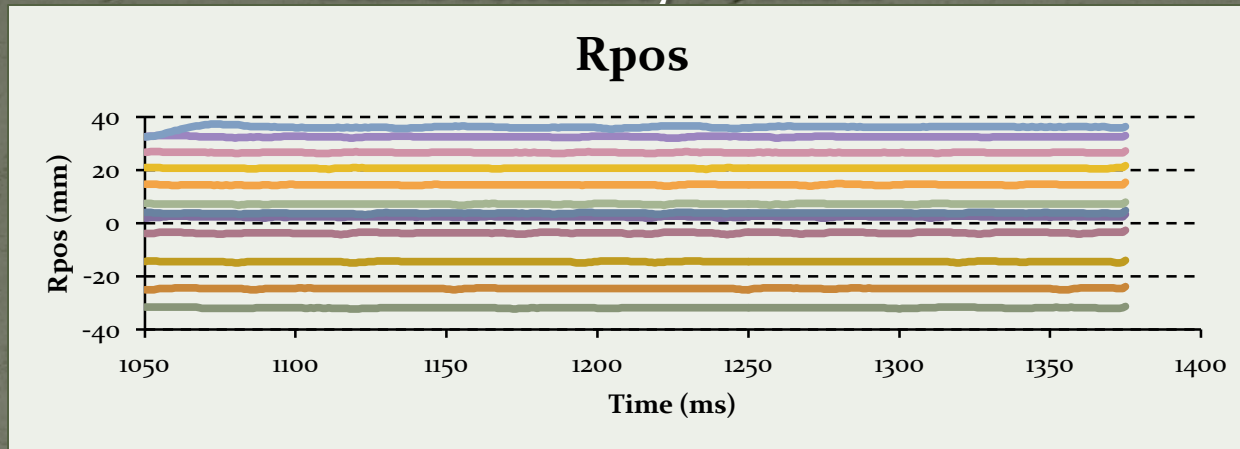
To be noted:

The PFW current has ripples,
whereas the tune shift has
clear 1st order function

Second observation

Tune stability vs MRP

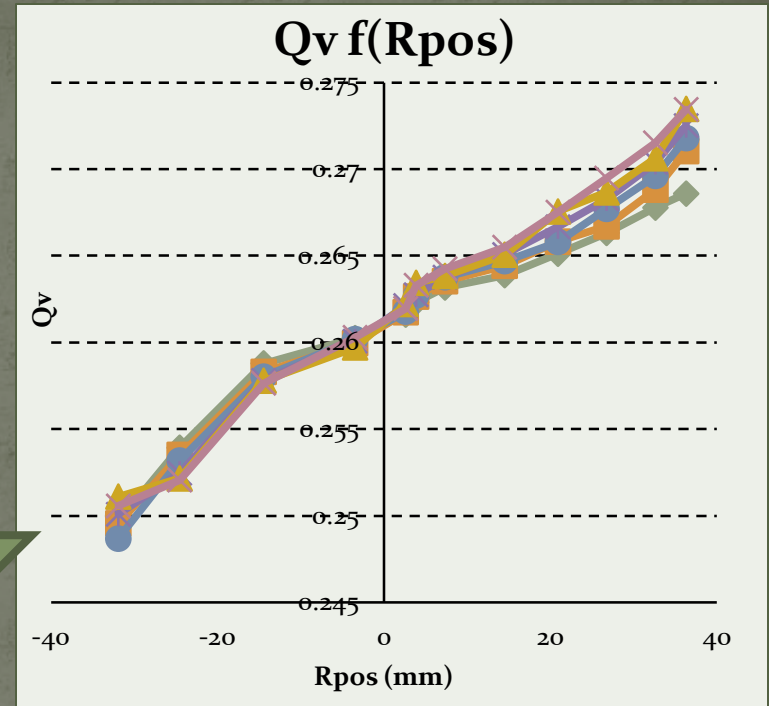
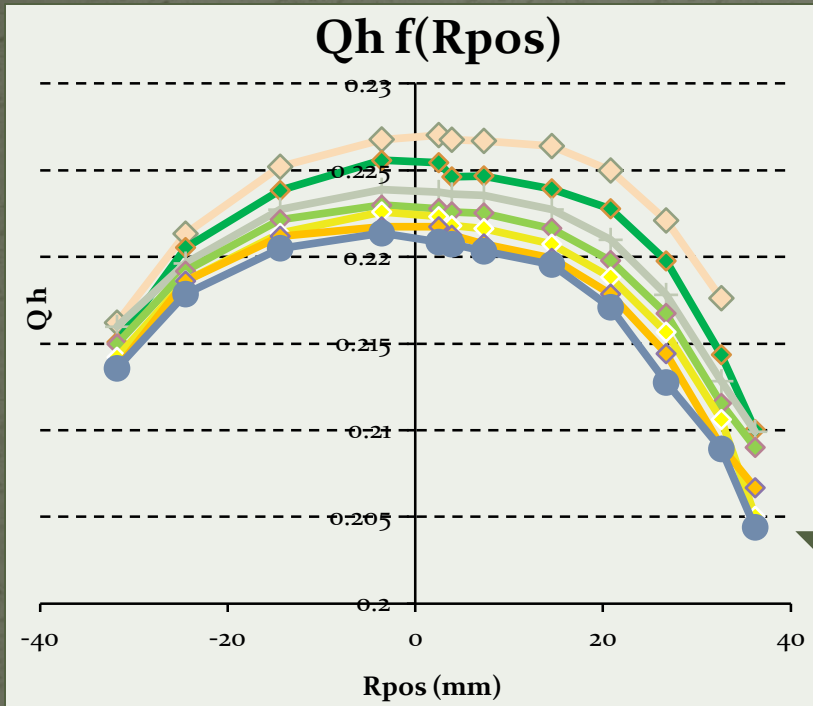
Measurements on
26 GeV flat top with
a length of 300ms



Second observation

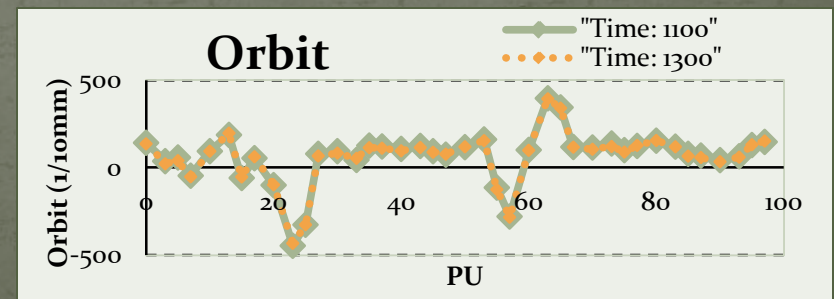
Tune stability vs MRP

Measurements on 26 GeV flat top with a length of 300ms



No orbit deformation observed
(orbit H and V measured at
 R_{pos} -20, 0, 30mm)

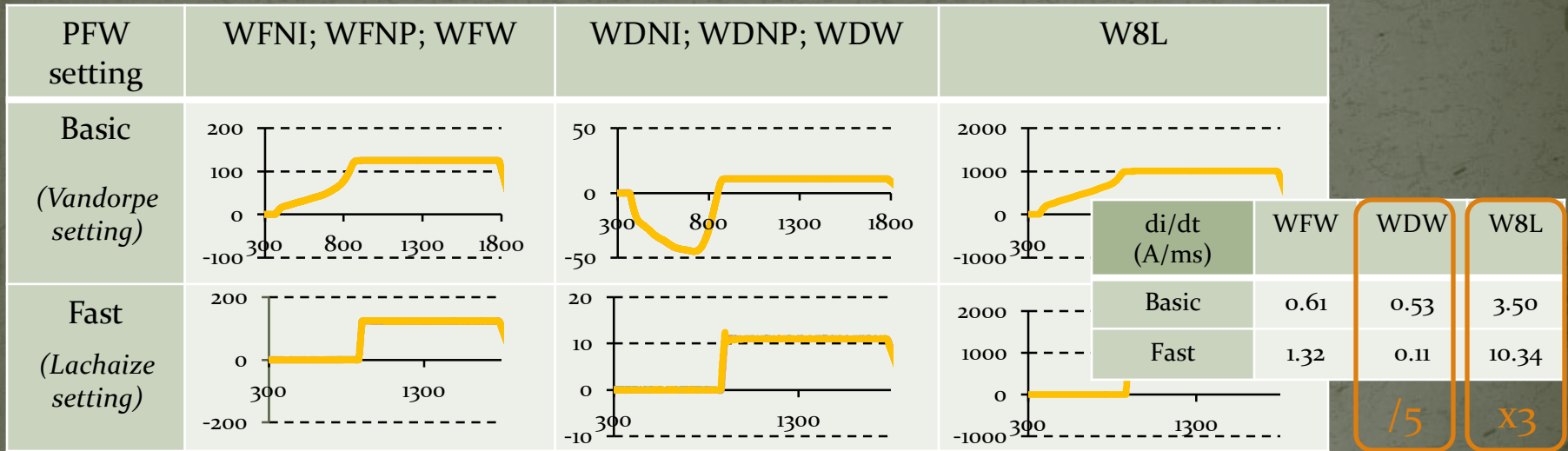
Example: Hor. Orbit for R_{pos} 0mm



Third observation

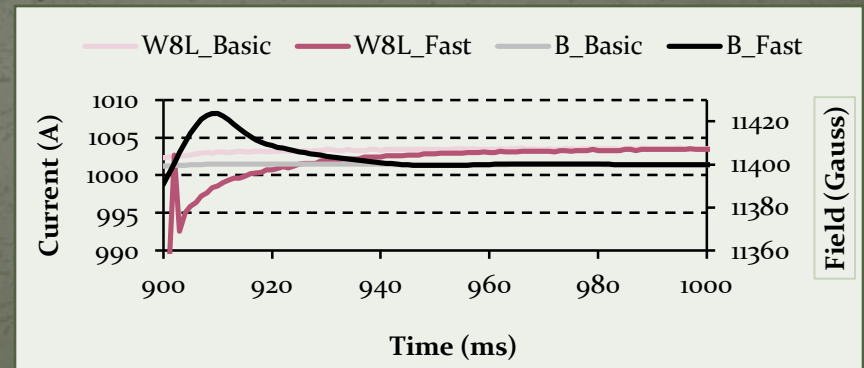
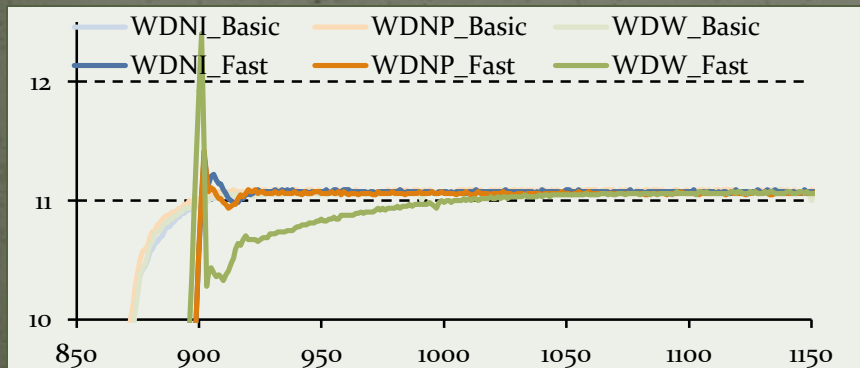
Measurements with a 24 GeV ION beam

Tune vs PFW dI/dt



With fast ramp PFW and B-field have important over shoot. Stabilized at C1000.

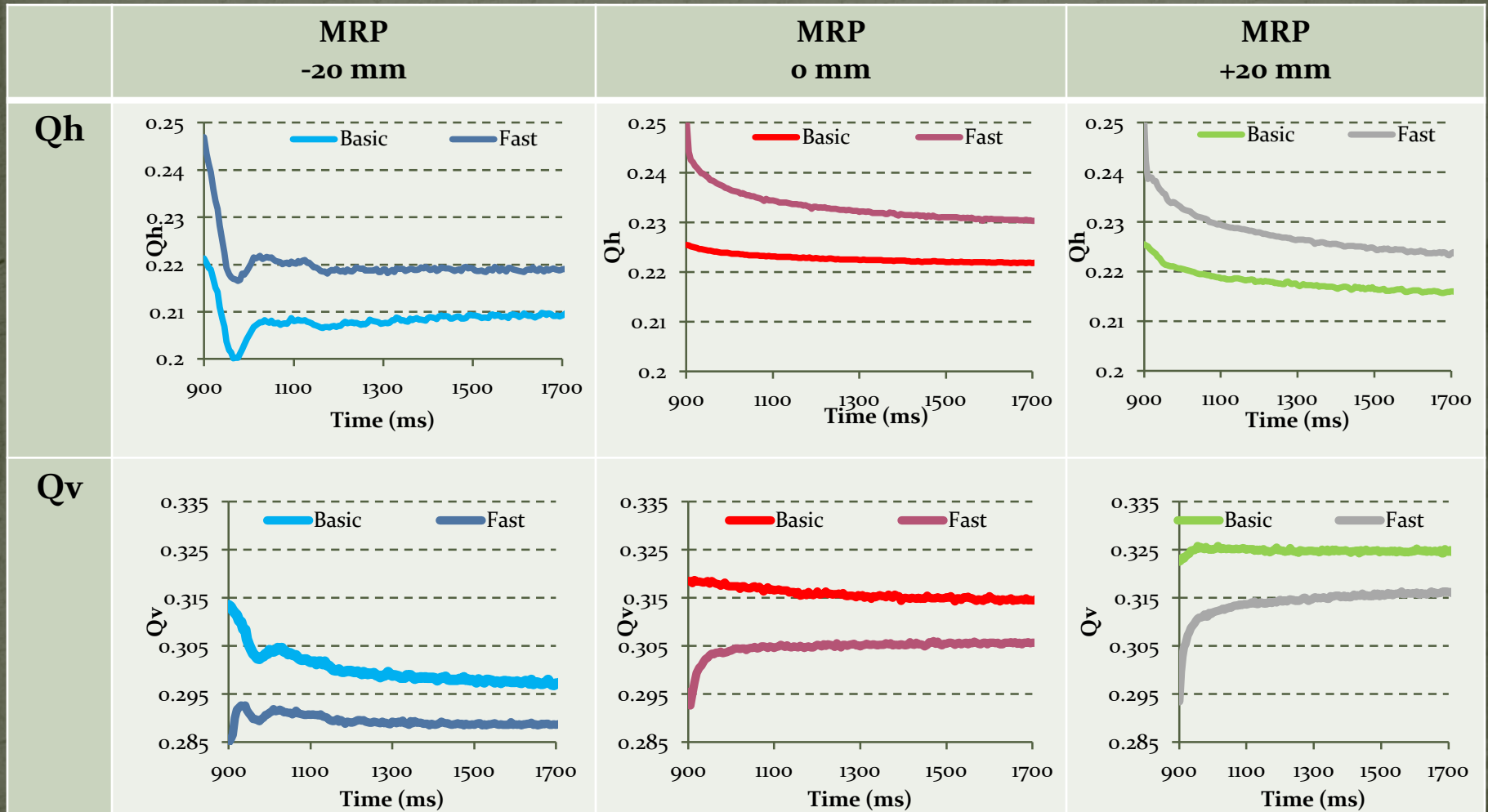
Measurement done between 1000 - 1700 ms



Third observation

Tune vs PFW dI/dt

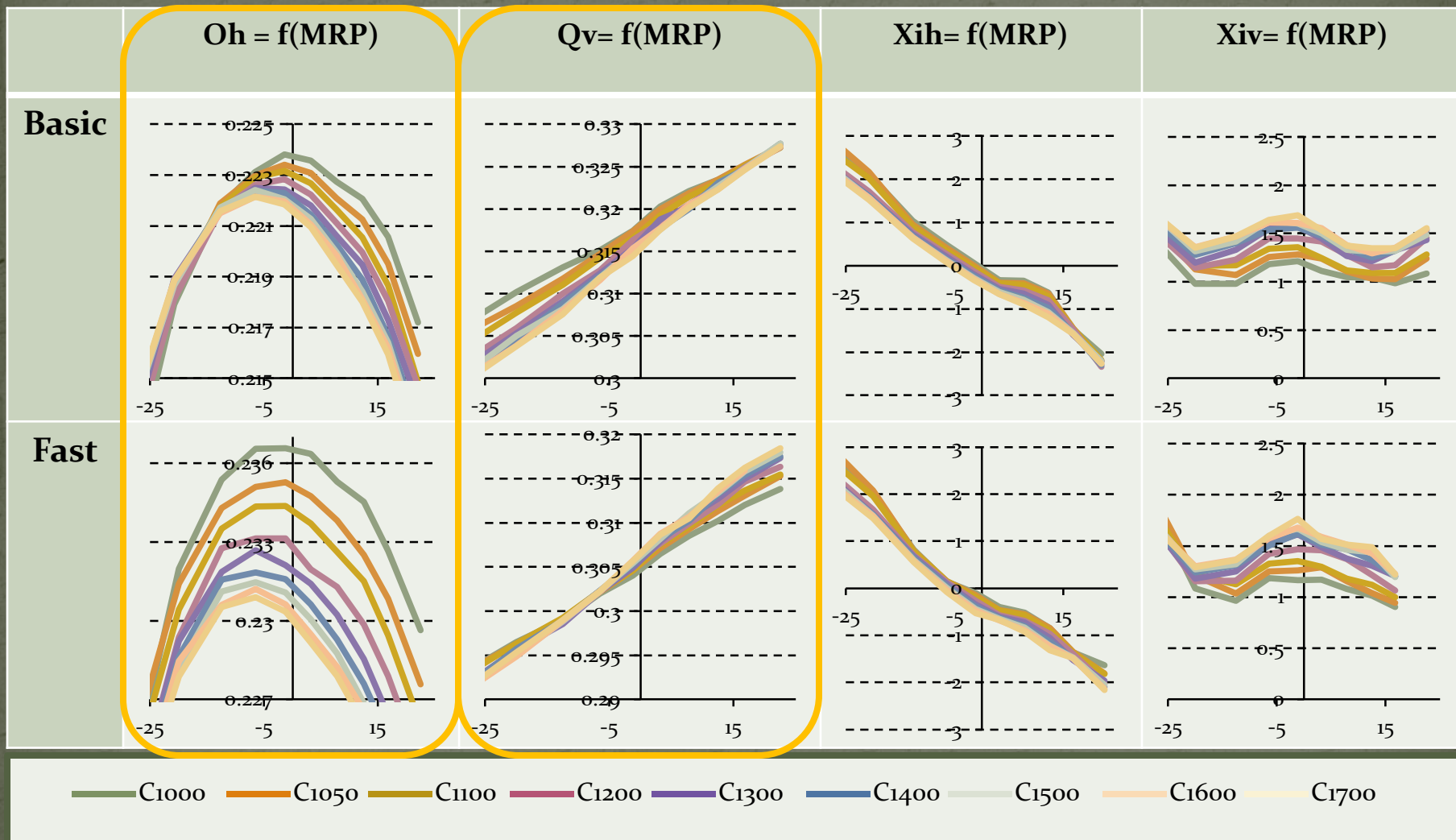
Measurements with a
24 GeV ION beam



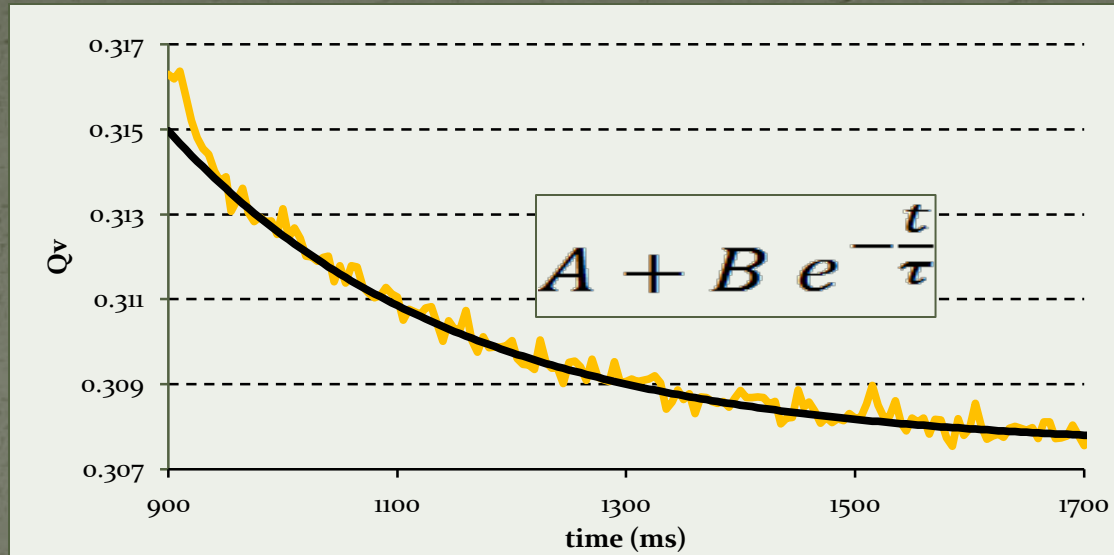
Third observation

Measurements with a
24 GeV ION beam

Tune vs PFW dI/dt



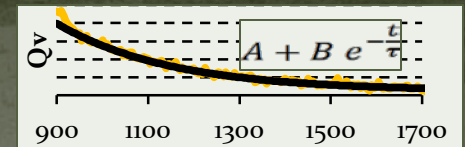
Analysis



Example:

- Vertical tune
- Basic PWF setting
- MRP-10 mm

Analysis



	A Asymptote	B coefficient	τ
Qh	<p>Graph showing A vs MRP (mm) for Qh. A Basic (green) and A Fast (orange) curves. A ranges from 0.19 to 0.24. MRP ranges from -50 to 50.</p>	<p>Graph showing B vs MRP (mm) for Qh. B Basic (green) and B Fast (orange) curves. B ranges from -0.02 to 0.02. MRP ranges from -50 to 50.</p>	<p>Graph showing τ vs MRP (mm) for Qh. τ Basic (green) and τ Fast (orange) curves. τ ranges from -200 to 600. MRP ranges from -50 to 50.</p>
Qv	<p>Graph showing A vs MRP (mm) for Qv. A Basic (green) and A Fast (orange) curves. A ranges from 0.27 to 0.33. MRP ranges from -60 to 40.</p>	<p>Graph showing B vs MRP (mm) for Qv. B Basic (green) and B Fast (orange) curves. B ranges from -0.008 to 0.012. MRP ranges from -50 to 50.</p>	<p>Graph showing τ vs MRP (mm) for Qv. τ Basic (green) and τ Fast (orange) curves. τ ranges from 0 to 400. MRP ranges from -50 to 50.</p>

Summary

Machine settings are stable (what OP can see via Sampler)
Tune is not stable

$$dQ = f \left\{ \begin{array}{l} \text{Time} \\ \text{Field} \\ dI/dt \text{ (PFW)} \\ \text{MRP} \end{array} \right.$$

Tune changes with a first order function of time.
With a coefficient depending on B-field, MRP and dI/dt (PFW).

Outlook

Measurement campaign

- 1st Find a setting to measure the influence of one single PFW (WFW, WDW
- 2nd More measurements with current regulation.

All data shown in this presentation, and many more, could be found at:
\\Cs-ccr-samba1\pcshare\user\vandorpe\public\QhOnFlatTop



The measurement campaign was not always straight forward.
But Bernard did a great job.

Discussion