

Coupling and Optics Measurement at Store

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APEX Session: Feb. 25, 2015 , p-p run

General

Beam Time: used 3 hours

Ramps : 2 , non-collisional pattern 12*12

What had been done:

- measured coupling angles at store / injection
- measured set tunes at store without collision
- measured tune shifts due to separation bumps at IR6/IR8
- ramp optics measurement
- store optics measurement with physics store condition
- local coupling measurement
- chromaticity measurement with physics store condition
- momentum aperture

Data analysis in progress:

Coupling Angle Measurement

- Current settings into machine from injection:
 - Blue: F2-->5.52rad, F13--> 0.75rad
 - Yellow: F2-->6.5rad, F13-->4.9rad
- What we found at store
 - Blue: F2-->5.7rad, F13--> 1.15rad
 - Yellow: F2-->6.5rad, F13-->7.2rad
- This measurement confirmed early predication
 - Different settings for injection and store
 - Yellow 2 decoupling families are much off $\text{Pi}/2$

Tunes without collision

- Measured tunes without collision:

→ Blue: (0.693, 0.690)

→ Yellow: (0.692, 0.6915)

Seems to us that two yellow tunes are too close

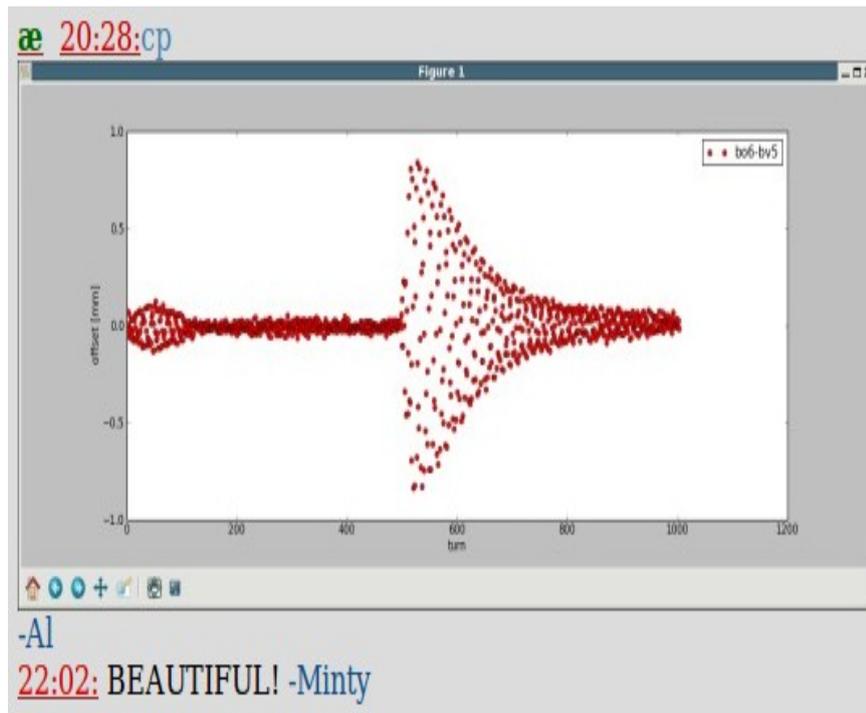
- Measured tune shifts due to separation bumps

for example: Blue ring

	0mm	1mm	2mm
Qx:	0.6941	0.6950	0.6967
Qy:	0.6891	0.6869	0.6840

Store Optics Measurement

- Both Al and Guillaume took data
- Fine data analysis on going
- Some examples

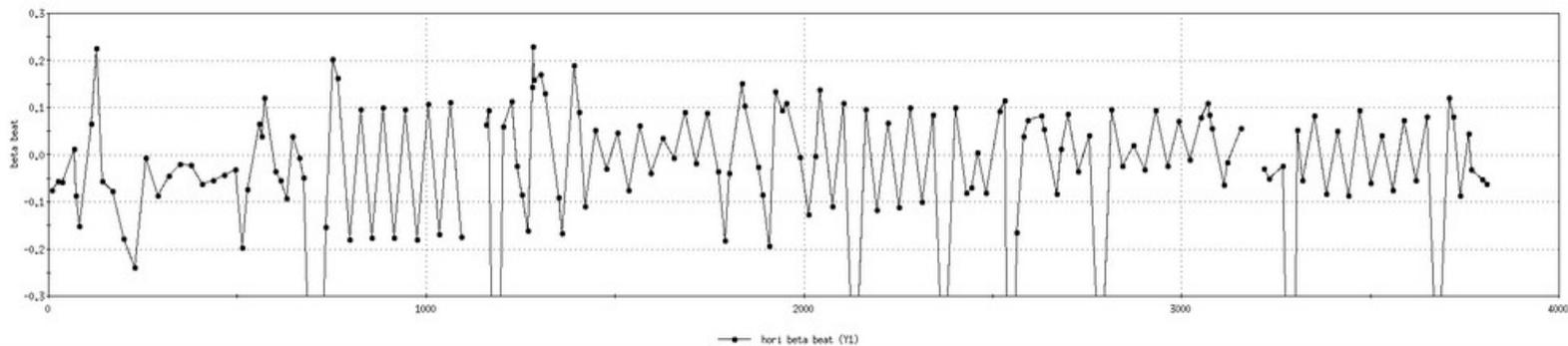


Places of interest around RHIC

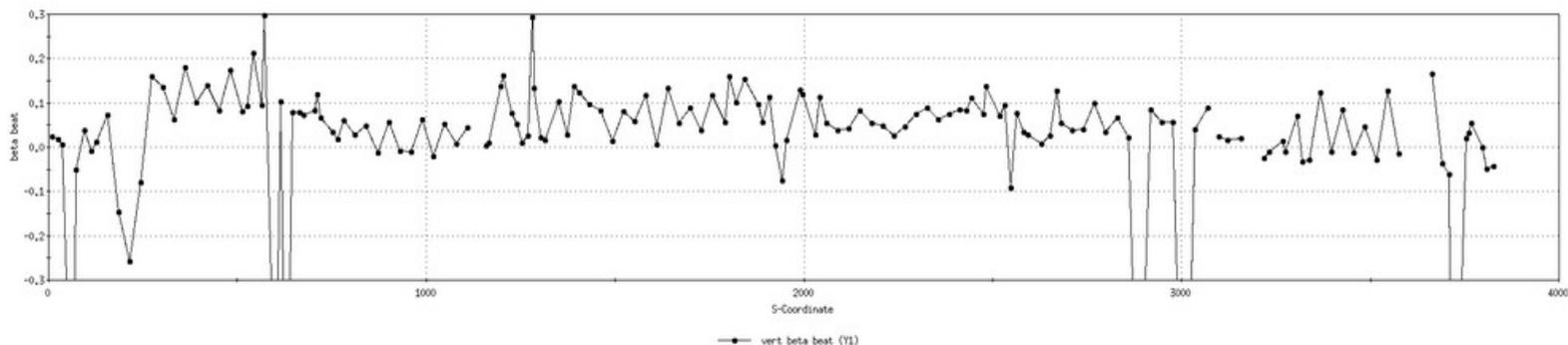
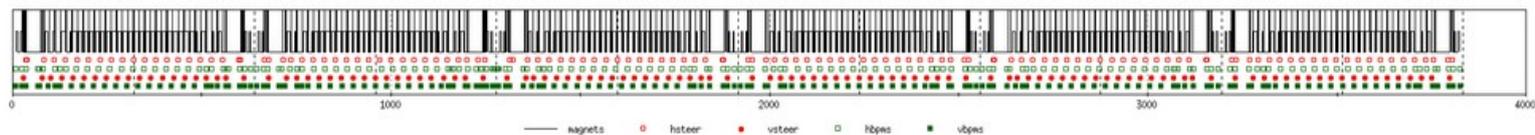
----- YELLOW -----

1=Element	2=SiteWideName	3=BetaX	4=BetaY
Hori. IPM	yi2-ipm3	127.47	25.5725
Vert. IPM	yo1-ipm3	19.0907	67.4085
COL0	yi7-c3	1081.89	154.082
COLH1	yi7-ch3.1	637.114	93.5713
COLV1	yi7-cv3	416.793	63.9315
COLH2	yi7-ch3.2	384.813	59.661
ELENS	g10-markx.6	15.463	14.0792
SC Hori. PU	yo12-cpuh3	47.7047	118.808
SC Vert. PU	yo12-cpuv3	20.4797	26.7348
SC Long. PU	yi2-cpul3.2	44.0246	20.0805
SC L. Kicker	yi11-kscl3.3	31.8998	65.2479
SC V. Kicker	yi3-kscv3	33.1959	98.0653
SC H. Kicker	yi3-ksch3.1	44.0137	51.1352

OK



Beam Co: Lattice: Yellow



Setup/Betatron Tunes

/\Qd	Rep	Up	Flat	Down	Tune	Qd
H:	-0.690	0.2285	1.0000	1.0000	0.6900	0.0000
V:	-0.680	0.0009	1.0000	1.0000	0.6800	0.0000

PS State

Horizontal Error On Off

Vertical On Off

Options

Trigger AC Dipole

Accumulate Avg

Horizontal Beta* at IPs

	IP2	IP4	IP6	IP8	IP10	IP12
H_b*	8.74	6.93	0.94	0.69	12.58	9.59
H_bIP	8.75	6.99	0.94	1.04	13.17	9.97
H_s*	0.29	-0.65	-0.04	-0.37	-2.72	-1.92
H_mu	220.401210	980.205788	180.520227	762.259871		

Vertical Beta* at IPs

	IP2	IP4	IP6	IP8	IP10	IP12
V_b*	9.37	3.07	0.85	0.80	12.35	10.11
V_bIP	9.38	8.39	1.08	0.83	17.43	10.19
V_s*	0.20	4.04	-0.44	0.17	7.92	0.88
V_mu	279.4	144.7	303.3	104.5	3.0	178.4

Places of Interest...

TBT fit parameters (0,0 = default)

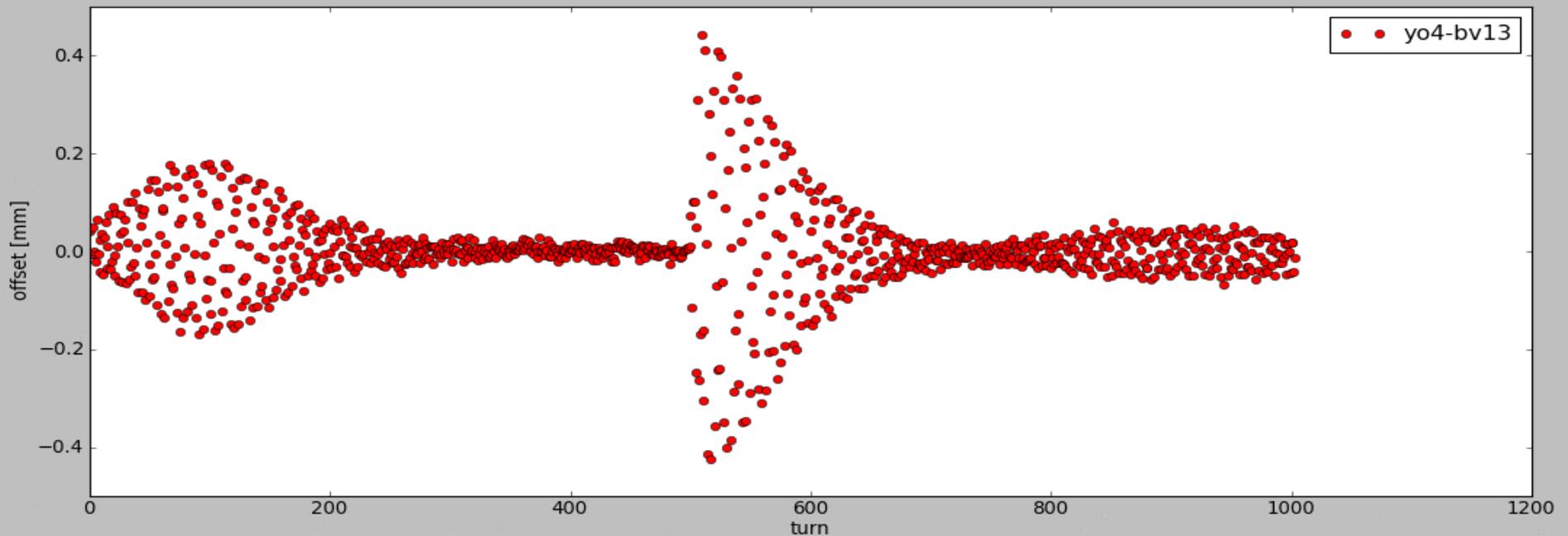
	a1	a2	a3
cosine	0.000000	0.000000	0.000000
exp*cosine	0.000000	0.000000	0.000000

Refit

Local Coupling measurement

- Local coupling at visible at BPMs: (beam kicked H & V separated by 500 turns)

Figure 1



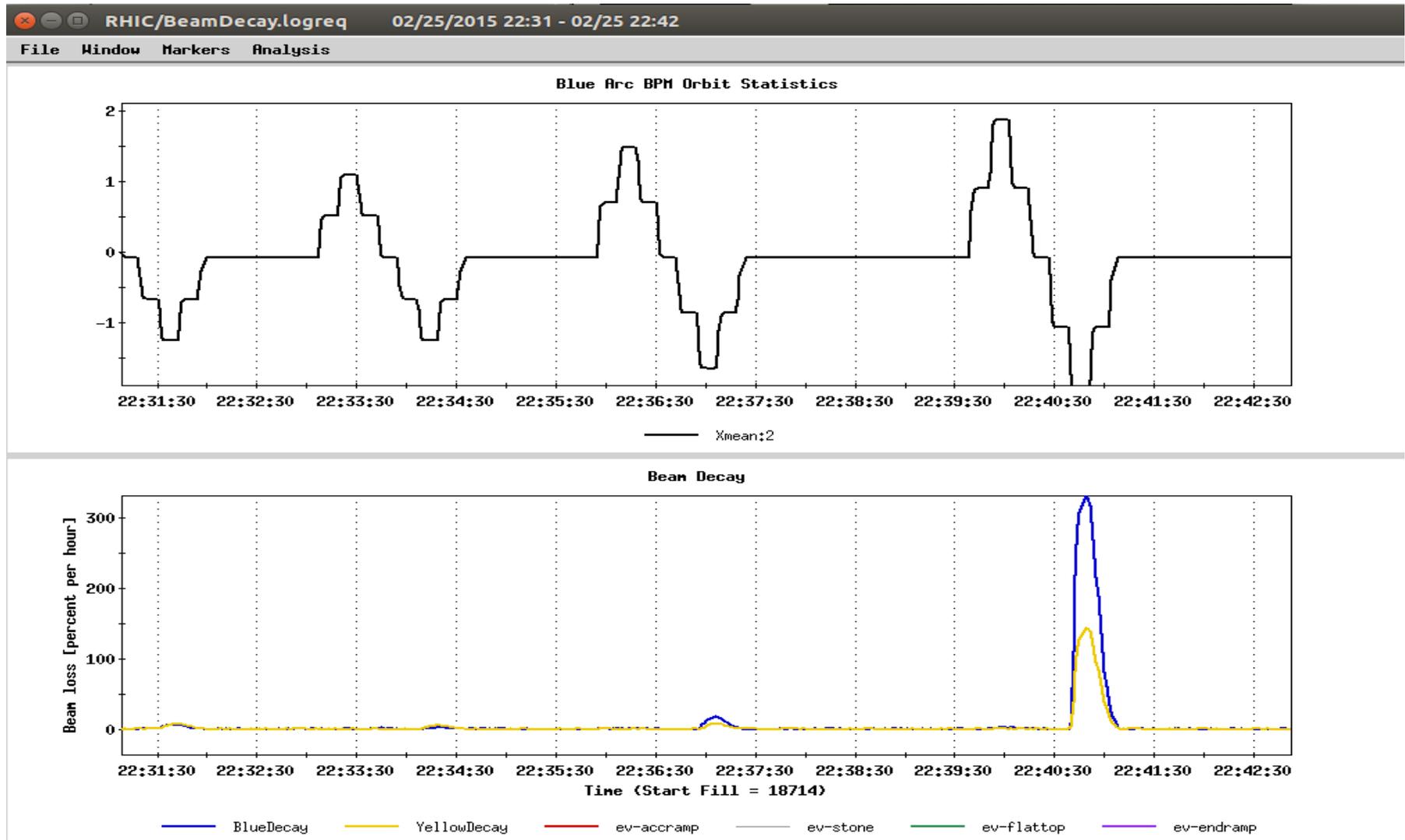
- One data set for local coupling measurement (kicked H & V direction same time)

[20:47:cp](#) /operations/app_store/RunData/currentRun/18713/RHIC/Orbit/TBT/Blue/tbt.Wed_Feb_25_20:42:36_2015.sdds

/operations/app_store/RunData/currentRun/18713/RHIC/Orbit/TBT/Yellow/tbt.Wed_Feb_25_20:42:41_2015.sdds

-Al

Momentum Aperture Measurement



Maximum shift: 1.25 mm, $(dp/p0)_{max} = 1.23e-3$.