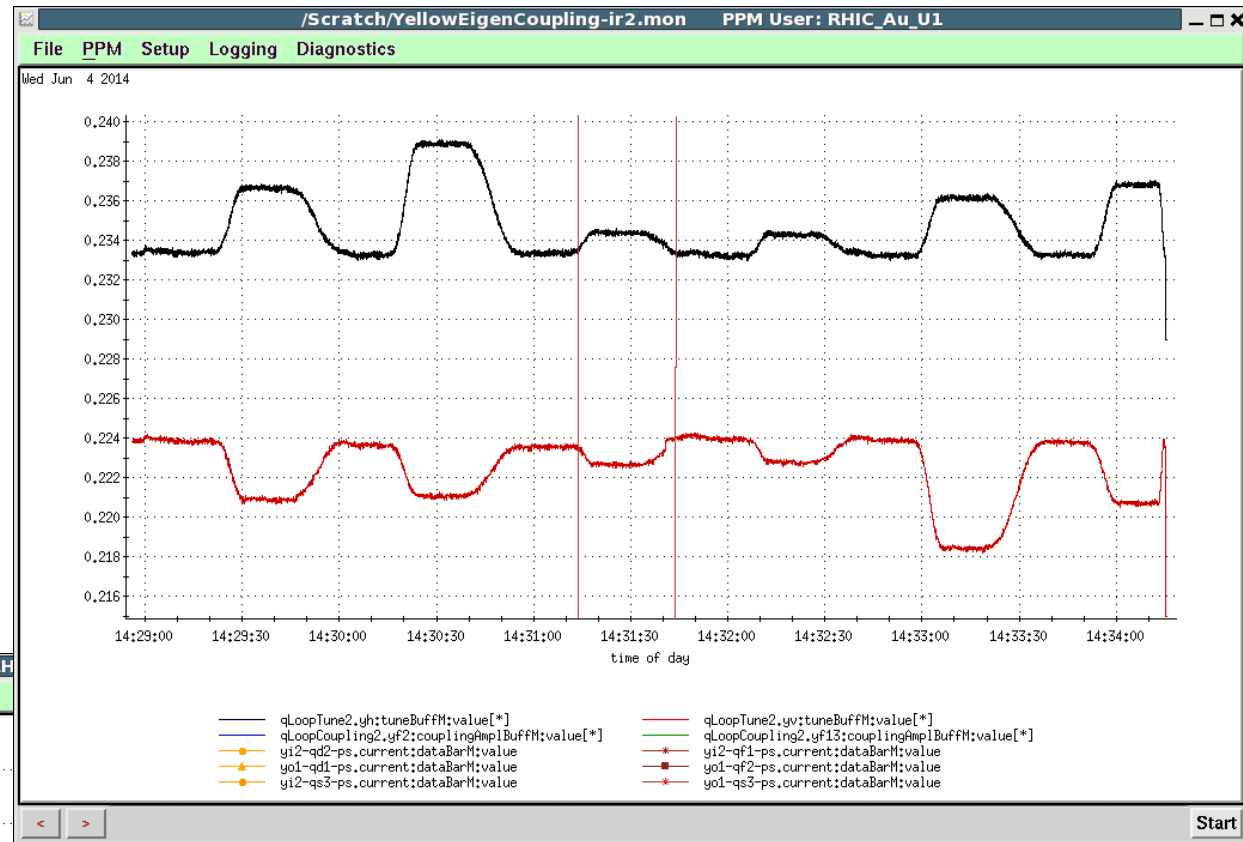


# Coupling Matrix Measurement

Steve Tepikian  
June 4, 2014

- Fixed the jumps in tunes
  - Used a slow factor of 10
  - Simplified quadrupole changes



Reduced the  $\sigma$  from the last run, but still large

Yellow-IP2-Au14-v0::injection-18389-2014-06-04-14-28-48.ctm -- Coupled Transfer Matrix

Summary Model Solver

IP2  $\downarrow$  Stone: Au14-v0::injection Fill#: 18389

Yellow  $\downarrow$  Time: 2014-06-04 14:28:48.390000 Bp: 81.1137653725

Measured Base Tunes

Type	Q <sub>1</sub>	Q <sub>2</sub>	$\Delta Q_{min}$
Value	0.233278	0.223780	0.000629

Measured Tweak Tunes

Quad	Device	$\Delta KL$	Type	Q <sub>1</sub>	Q <sub>2</sub>	$\Delta Q_{min}$
q1b	yo1-qd1	0.000500	Value	0.236553	0.220850	0.000704
q2b	yo1-qf2	0.000500	Value	0.238919	0.221185	0.000912
q3b	yo1-qs3	-0.000400	Value	0.234296	0.222878	0.006733
q3e	yi2-qs3	0.000400	Value	0.234346	0.222586	0.006513
q2e	yi2-qd2	0.000500	Value	0.236183	0.218329	0.000851
q1e	yi2-qf1	0.000500	Value	0.236826	0.220680	0.000880

Summary

Name	Value	$\pm\sigma$	Name	Value	$\pm\sigma$
$\alpha_1$	0.11437344	0.173	$\alpha_2$	-0.012415946	0.1393
$\beta_1$	8.9429517	0.8803	$\beta_2$	10.148056	1.13
$S_1^w$	1.0096289	1.491	$S_2^w$	-0.12597829	1.413
$\beta_1^w$	8.827477	0.9348	$\beta_2^w$	10.146491	1.13
a	0.0098065712	0.06629	b	0.50758409	1.154
c	-0.002423386	0.006989	d	0.015059294	0.06362

Open Save Measure Evaluate Edit Tunes Off Quit

- Reverting the changes using here2here leads to 519 PSs moved.
  - Try reverting only the quadrupole changed

RHIC/Ramp/Wfgman

Page PPM Device Data Tools Buffer Help

Primary Wfg Manager Current Use -> Blue and Yellow

wfgman.rhic	Confirm State:	Test	Init All
wfgman.rhic	Check Errors:	clear	
wfgman.rhic	Ramp File:	Au14-v0_1401904073	
wfgman.rhic	Comment:	physics	
wfgman.rhic	Main Ramp:	Main Ramp	Excluded fecs:
wfgman.rhic	Other Ramps:	AuxRamp	none
wfgman.rhic	slowFactor:	10	
wfgman.rhic	Ramp Duration (s):	18.411	
wfgman.rhic	dmain rate (A/s):	0.041	
wfgman.rhic	where am I?:	FirstStone	On Hysteresis
wfgman.rhic	Message:	Auxramp to first initiated (519 PS moved)	Disconnect
wfg.rt-brigidity	blue b-rho	81.1138	DONE
wfg.rt-yrigidity	yellow b-rho	81.1138	DONE
wfg.rt-brampvar	pseudo	100.00	DONE
	Reference	Measured current	
wfg.b-dmain-ps	473.218	473.212	DONE
wfg.b-qmain-ps	449.713	449.707	DONE
wfg.b-qtrim-ps	5.091	5.090	DONE
wfg.y-dmain-ps	473.067	473.057	DONE
wfg.y-qmain-ps	449.722	449.716	DONE
wfg.y-qtrim-ps	5.452	5.447	DONE
ev-hardstop	Hard Stop	Trigger	
wfgman.rhic	Blue species	Au	
wfgman.rhic	Yellow species	Au	
wfgman.rhic	Tune Feedback	0n	
wfgman.rhic	Chromaticity Feedback	0n	
wfgman.rhic	Radial Feedback	0n	
wfgman.rhic	Orbit Feedback	0n	
wfgman.rhic	Feedbacks:	[1 1 1 1]	

(13.3) wfgman.rhic:messageM

Nudge: 0

306

Wed Jun 4 13:24:59 2014: Get and Async requests complete.  
 Wed Jun 4 13:29:30 2014: Get and Async requests complete.

- Largest errors (differences) are in the tunes from skew quadrupoles.
  - Modeling problem?
  - Sign errors?

Yellow-IP2-Au14-v0::injection-18389-2014-06-04-14-28-48.ctm -- Coupled Transfer Matrix

Summary Model Solver

Initial Guess Simplex Lmdif TNC Evaluate

**Model Base Tunes**

$Q_1$	0.233278474302	$Q_2$	0.223780283869	$\Delta Q_{\min}$	0.000704348660144
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**Model Twiss Parameters and Coupling**

$\alpha_1$	$\beta_1$	a	b
0.11437344208	8.94295170271	0.00980657122295	0.507584090686
$\alpha_2$	$\beta_2$	c	d
-0.0124159463373	10.1480556136	-0.00242338597398	0.0150592940215

**Waist**

$\beta_1^w$	8.82747696726	$s_1^w$	1.00962892563	$\beta_2^w$	10.1464914739	$s_2^w$	-0.125978293651
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**Model Beam Transfer Matrix**

0.21867056	8.9084963	0.026751761	0.08492696
-0.11257162	-0.0087653356	0.0011308506	-0.031065542
0.03222363	0.14486913	0.15091496	10.025591
0.00084466546	-0.024973341	-0.097174031	0.17692063

**Model and Measurement Differences**

Device	$\Delta Q_1$	$\Delta Q_2$	$\Delta(\Delta Q_{\min})$
Base	0.0	0.0	0.5769
q1b	0.2125	-0.8336	0.2546
q2b	0.2277	0.2902	-0.6157
q3b	2.177	-0.9234	-0.1627
q3e	-0.8971	2.605	0.1165
q2e	1.138	0.4493	-0.0004096
q1e	-0.5645	-1.109	-0.4627
<b>Penalty (sum of the squares)</b>			18.13

Open Save Measure Evaluate Edit Tunes Off Quit