

Coupling Matrix Measurement

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- This program reproduces simulated data from MADX with $\pm\sigma$ of about 10^{-5}
- Two possible places of failure
 - The model of the beginning and end of the line doesn't match the real machine
 - The measurement of the tunes and ΔQ_{\min} isn't good enough
- Selected IP2 since there are no experimenter solenoids on this IP
 - This simplifies the model needed for this method
- Shown below are two runs on each ring
 - From measured data large $\pm\sigma$

Yellow-IP2-Au14-v0::injection-18286-2014-05-07-08-46-50.ctm -- Coupled Transfer Matrix

Summary Model Solver

IP2 Stone: Au14-v0::injection Fill#: 18286

Yellow Time: 2014-05-07 08:46:50.700000 Bp: 81.1137653725

Measured Base Tunes

Type	Q1	Q2	ΔQ_{\min}
Value	0.234487	0.225557	0.001469

Measured Tweak Tunes

Quad	Device	$\Delta K L$	Type	Q1	Q2	ΔQ_{\min}
q1b	yo1-qd1	0.000600	Value	0.237241	0.221978	0.001646
q2b	yo1-qr2	0.000600	Value	0.240572	0.223279	0.001819
q3b	yo1-qs3	-0.000400	Value	0.235673	0.224687	0.006923
q3e	yi2-qs3	0.000400	Value	0.235199	0.224782	0.005138
q2e	yi2-qd2	0.000600	Value	0.237456	0.220807	0.001251
q1e	yi2-qr1	0.000600	Value	0.238686	0.223539	0.001436

Summary

Name	Value	$\pm\sigma$	Name	Value	$\pm\sigma$
α_1	0.27382049	0.3661	α_2	-0.27733302	0.4987
β_1	10.645403	3.778	β_2	12.530406	6.415
S_1^w	2.7116186	3.264	S_2^w	-3.2269025	5.241
β_1^w	9.9029058	3.97	β_2^w	11.635479	6.664
a	-0.059796084	0.1594	b	-1.1131397	1.989
c	0.0059387134	0.02157	d	-0.017698257	0.1085

Open Save Measure Evaluate Edit Tunes Off Quit

Blue-IP2-Au14-v0::injection-18286-2014-05-07-08-53-21.ctm -- Coupled Transfer Matrix

Summary Model Solver

IP2 Stone: Au14-v0::injection Fill#: 18286

Blue Time: 2014-05-07 08:53:21.410000 Bp: 81.1137653725

Measured Base Tunes

Type	Q1	Q2	ΔQ_{\min}
Value	0.234517	0.229266	0.000872

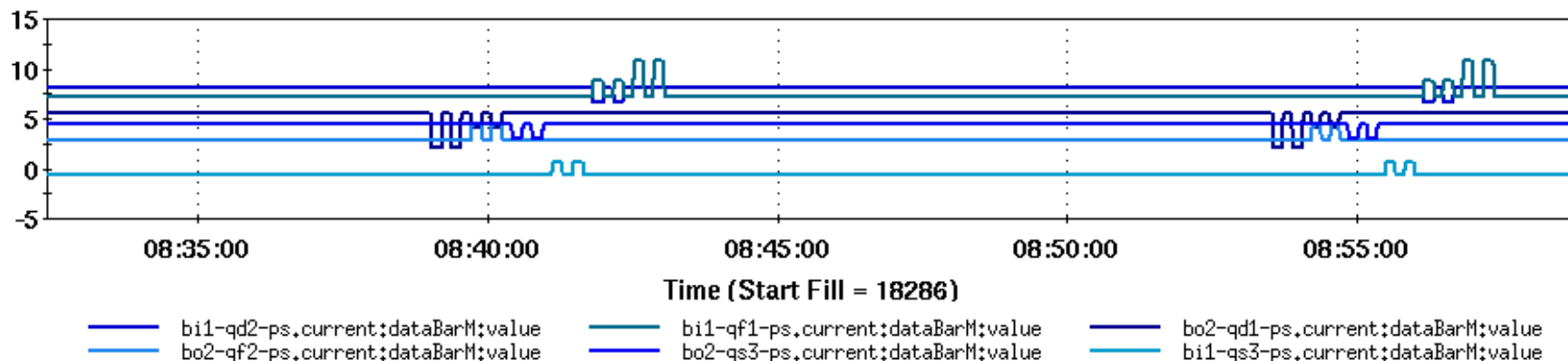
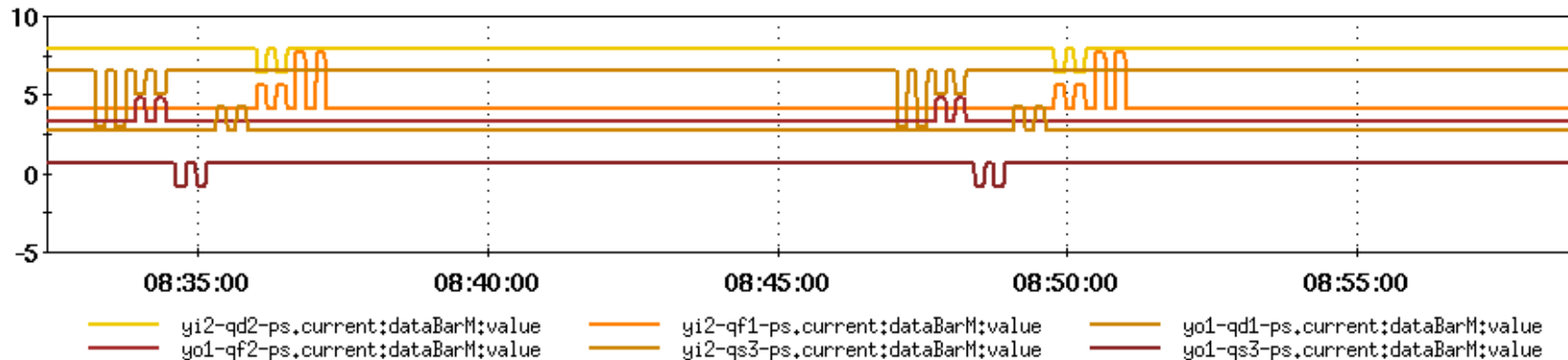
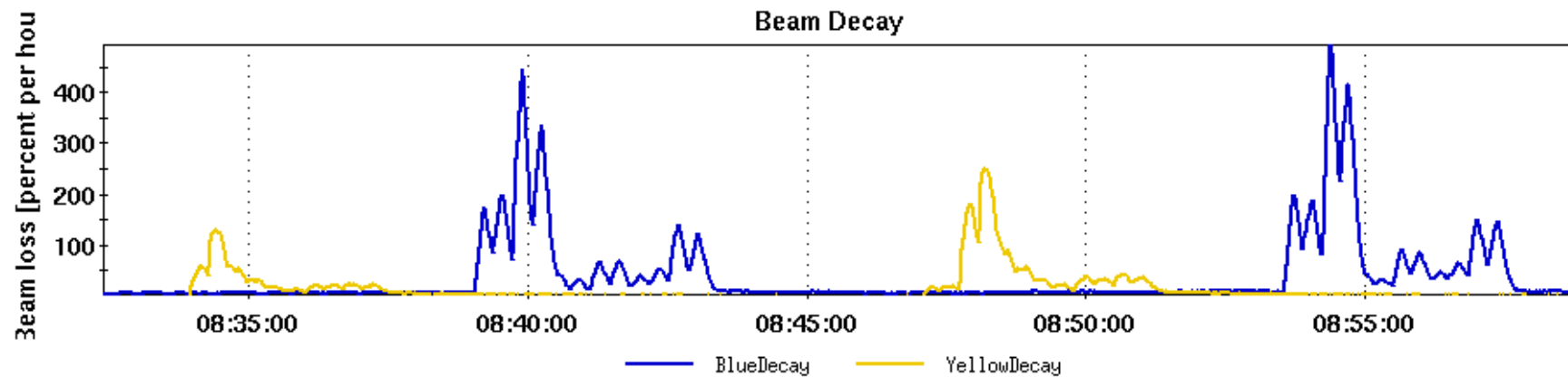
Measured Tweak Tunes

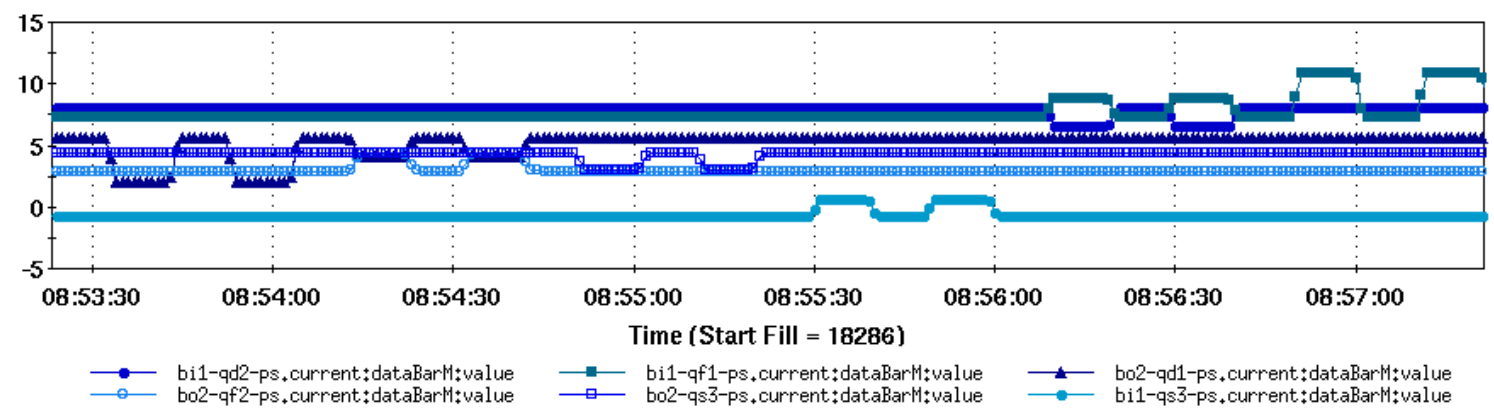
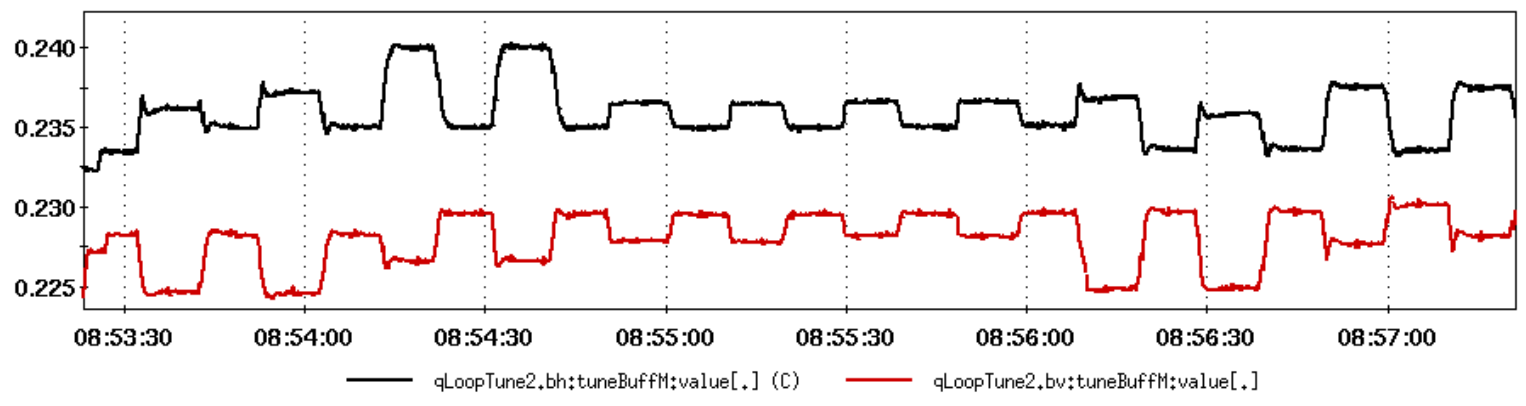
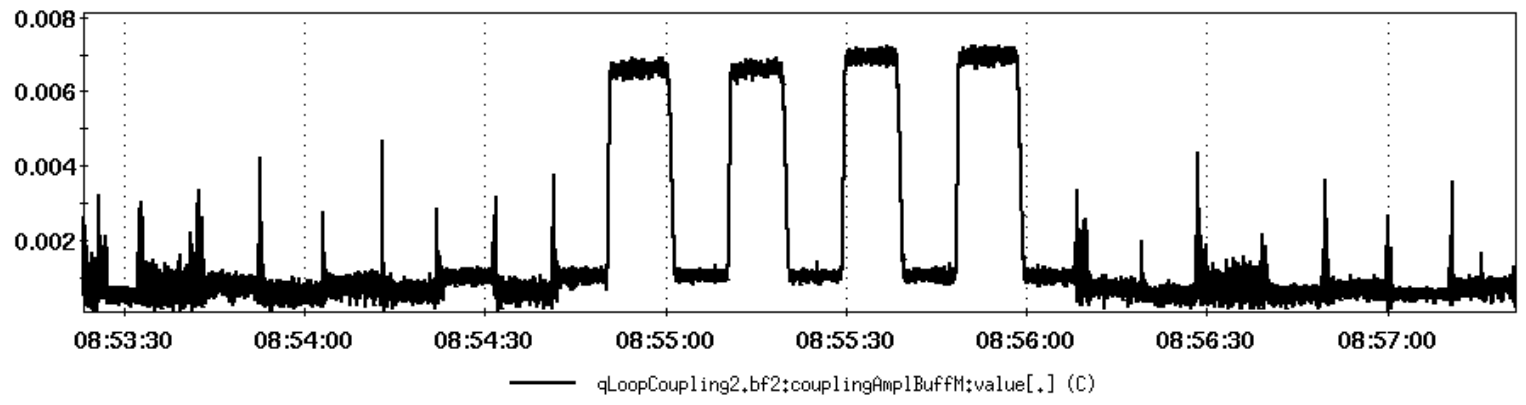
Quad	Device	$\Delta K L$	Type	Q1	Q2	ΔQ_{\min}
q1b	bo2-qd1	0.000600	Value	0.236977	0.225803	0.000783
q2b	bo2-qr2	0.000600	Value	0.239536	0.226984	0.000573
q3b	bo2-qs3	-0.000400	Value	0.236060	0.227575	0.006420
q3e	bi1-qs3	0.000400	Value	0.236140	0.227889	0.006758
q2e	bi1-qd2	0.000600	Value	0.236487	0.224431	0.000822
q1e	bi1-qr1	0.000600	Value	0.238429	0.227248	0.001036

Summary

Name	Value	$\pm\sigma$	Name	Value	$\pm\sigma$
α_1	0.28403737	0.6672	α_2	-0.75239586	1.115
β_1	10.919385	5.377	β_2	13.235212	9.437
S_1^w	2.869972	5.906	S_2^w	-6.3585476	5.232
β_1^w	10.104206	6.108	β_2^w	8.4510667	10.88
a	0.13774356	1.156	b	0.25897028	9.944
c	0.0086878694	0.1934	d	0.08824513	0.4706

Open Save Measure Evaluate Edit Tunes Off Quit





- There are 120Hz side-bands in the spectrum
- To avoid the BBQ PLL locking onto the side-band rather than the main peak:
 - Perhaps the quadrupole changes could be applied more slowly so that PLL can track the proper peak

M. Minty

