Circumference Lengthening

02/25/15 measurements

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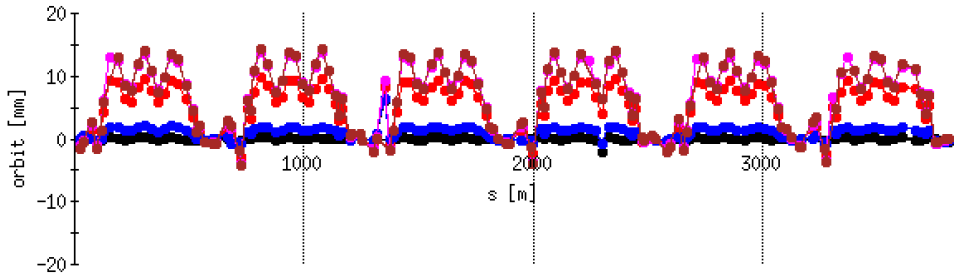
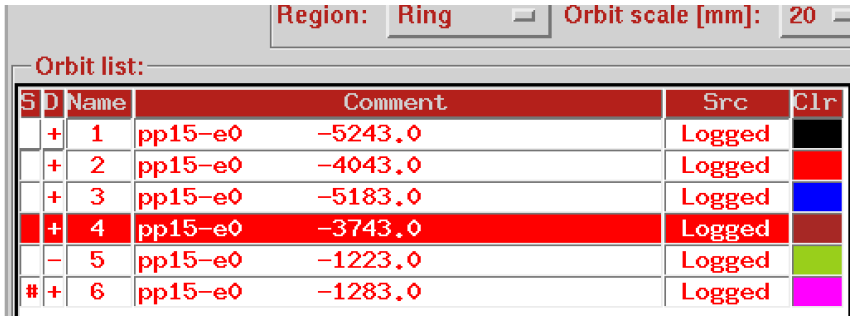
02/25/15 study

- Started 50min later, because of injector problems
- Measurements were done at the injection
  - Expected minimal chromatic effects

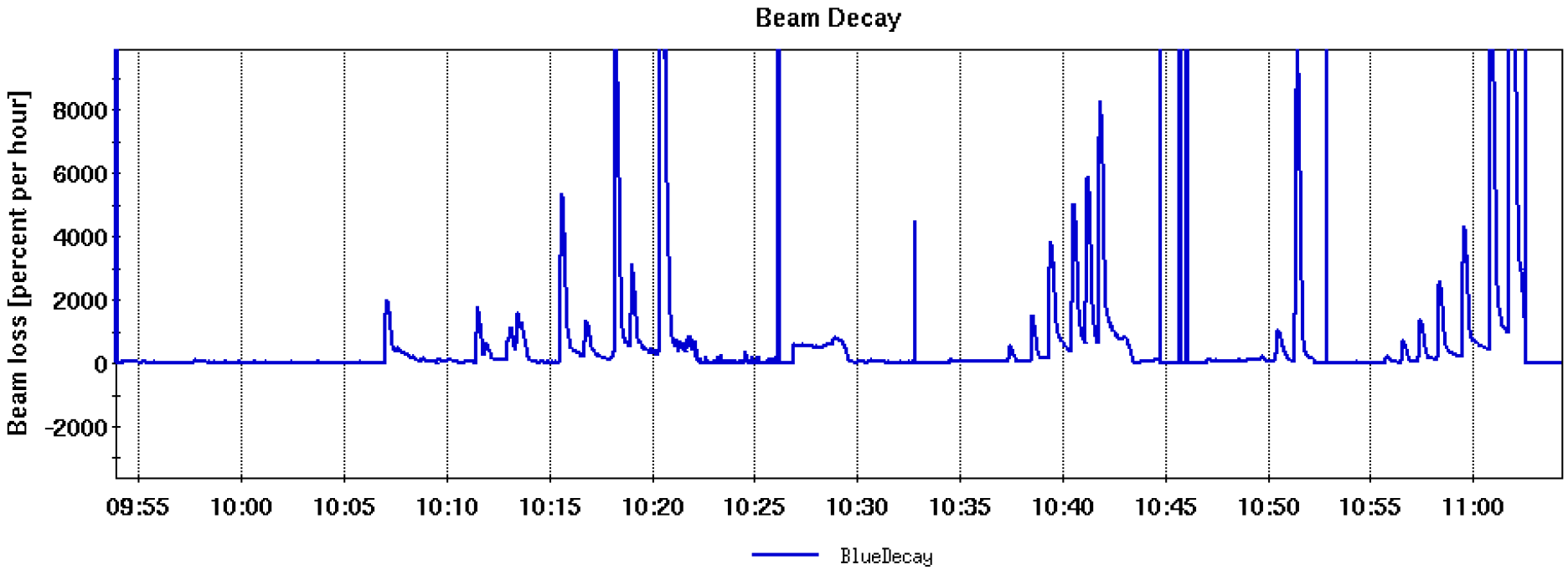
Horizontal orbit shifts

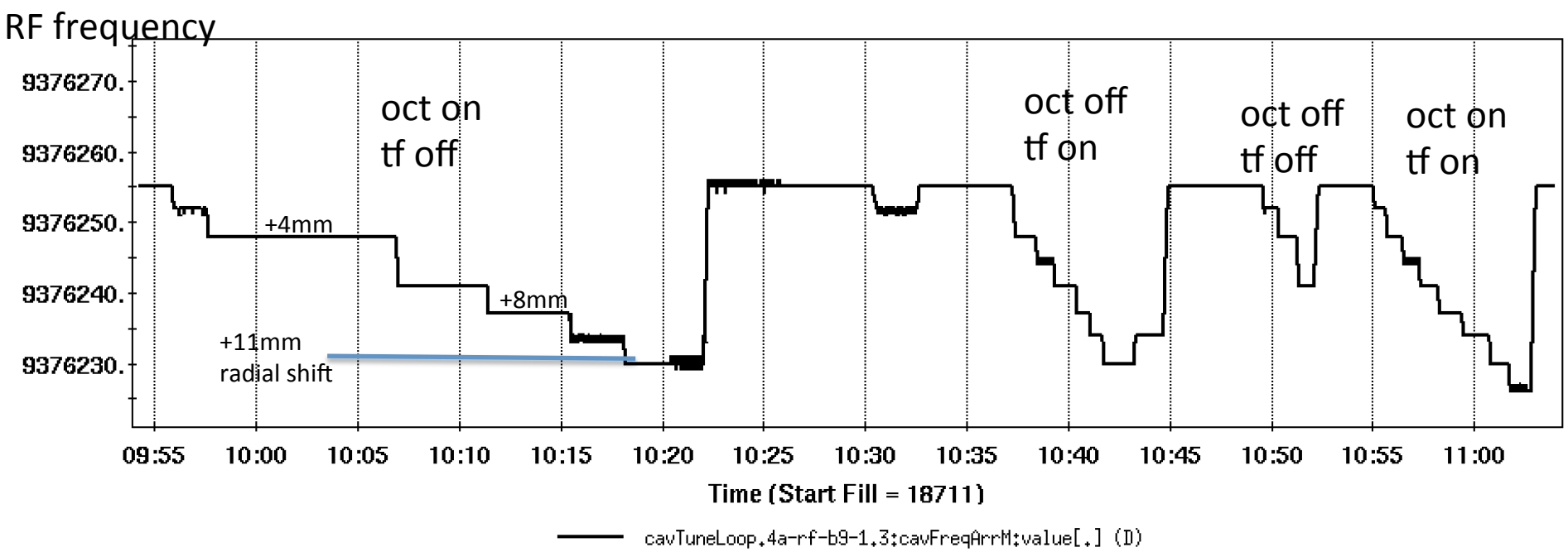
Reached maximum ~+11 mm radial orbit shift





S	D	Name	Comment		Src	Clr
	+	1	pp15-e0	-5243.0	Logged	
	+	2	pp15-e0	-4043.0	Logged	
	+	3	pp15-e0	-5183.0	Logged	
	+	4	pp15-e0	-3743.0	Logged	
	-	5	pp15-e0	-1223.0	Logged	
#	+	6	pp15-e0	-1283.0	Logged	


Beam Decay
Beam loss [percent per hour]
8000
6000
4000
2000
0
-2000
09:55
10:00
10:05
10:10
10:15
10:20
10:25
10:30
10:35
10:40
10:45
10:50
10:55
11:00
BlueDecay

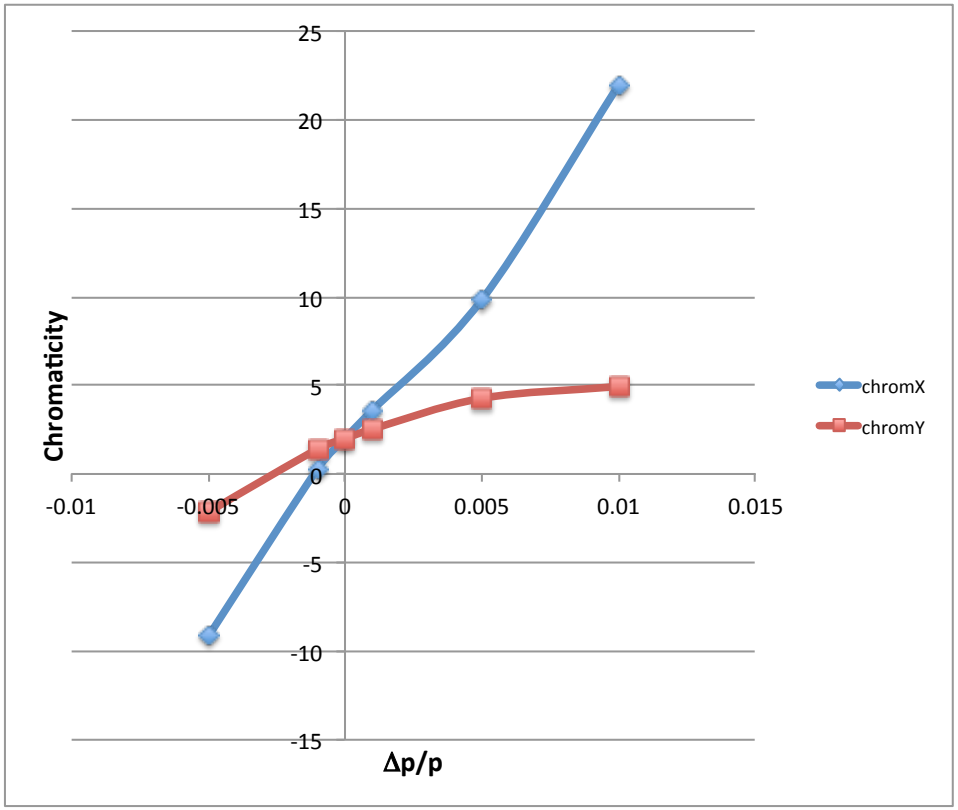

RF frequency
9376270.
9376260.
9376250.
9376240.
9376230.
oct on
tf off
oct off
tf on
oct off
tf off
oct on
tf on
+4mm
+8mm
+11mm
radial shift
09:55
10:00
10:05
10:10
10:15
10:20
10:25
10:30
10:35
10:40
10:45
10:50
10:55
11:00
Time (Start Fill = 18711)
cavTuneLoop.4a-rf-b9-1.3:cavFreqArrM:value[.] (D)

Summary of survival

- Best results are with octupoles on
- Minimal frequency ramp losses up to +4mm
- Acceptable lifetime: up to +8mm

Chromatic effects

- Surprisingly large nonlinear chromatic effect were seen at the injection



MAD calculation

The chromaticity dependence looks similar either with or without tune feedback

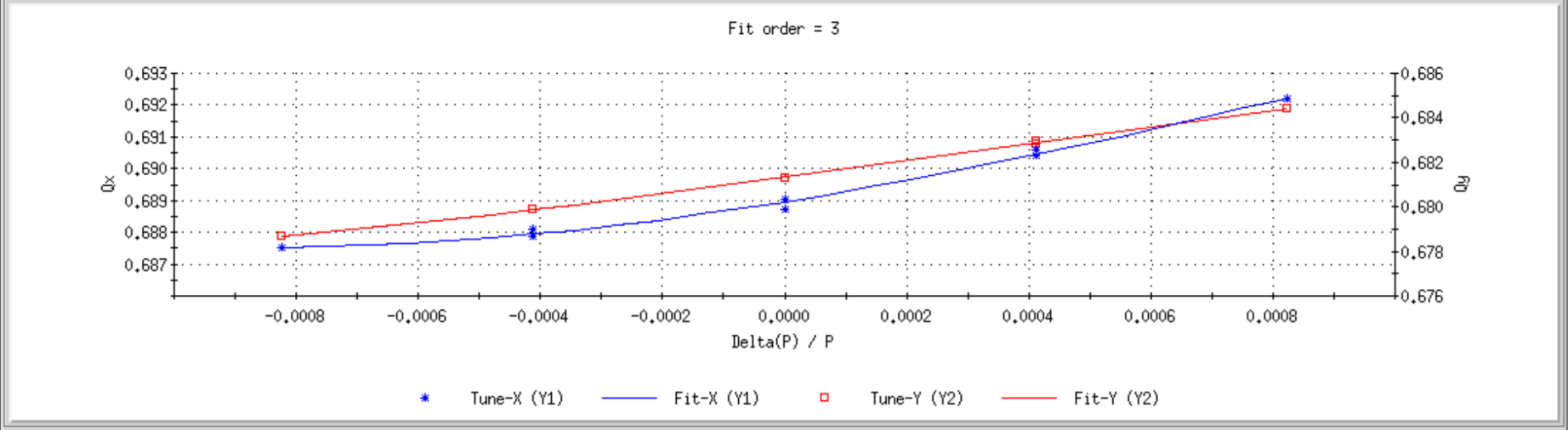
Second order chromaticities:
X:~880
Y:~300

Chromaticity measurements
no octupoles

Analysis of Data -- Blue ring -- Thu Jan 29, 2015 03:35:08

Tunes | Skew-Tunes

Tunes vs. Momentum



Row	Delta(p)/p	Skew q1	BBQ X	Tune X #1	Tune X #2	Select	Skew q2	BBQ Y	Tune Y #1	Tune Y #2	Select
1	-0.000823387	-0.000498283	0.687505	-999	-999	BBQ	0.000672908	0.678679	-999	-999	BBQ
2	-0.000411693	-0.000828068	0.687873	-999	-999	BBQ	0.000303998	0.679866	-999	-999	BBQ
3	-0.000411693	-0.000789581	0.68811	0.692383	0.685547	BBQ	0.000367513	0.679895	0.682617	0.673828	BBQ
4	0	-0.00104142	0.688739	-999	-999	BBQ	-0.000224693	0.68131	-999	-999	BBQ
5	0	-0.00100128	0.689035	-999	-999	BBQ	3.85194e-05	0.681309	-999	-999	BBQ
6	0.000411693	-0.001118	0.690398	-999	-999	BBQ	-0.000322092	0.682943	-999	-999	BBQ
7	0.000411693	-0.00114795	0.690584	-999	-999	BBQ	-0.000143262	0.682836	-999	-999	BBQ
8	0.000823387	-0.00121783	0.692193	0.692383	0.685547	BBQ	-0.000247598	0.684404	0.682617	0.673828	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ

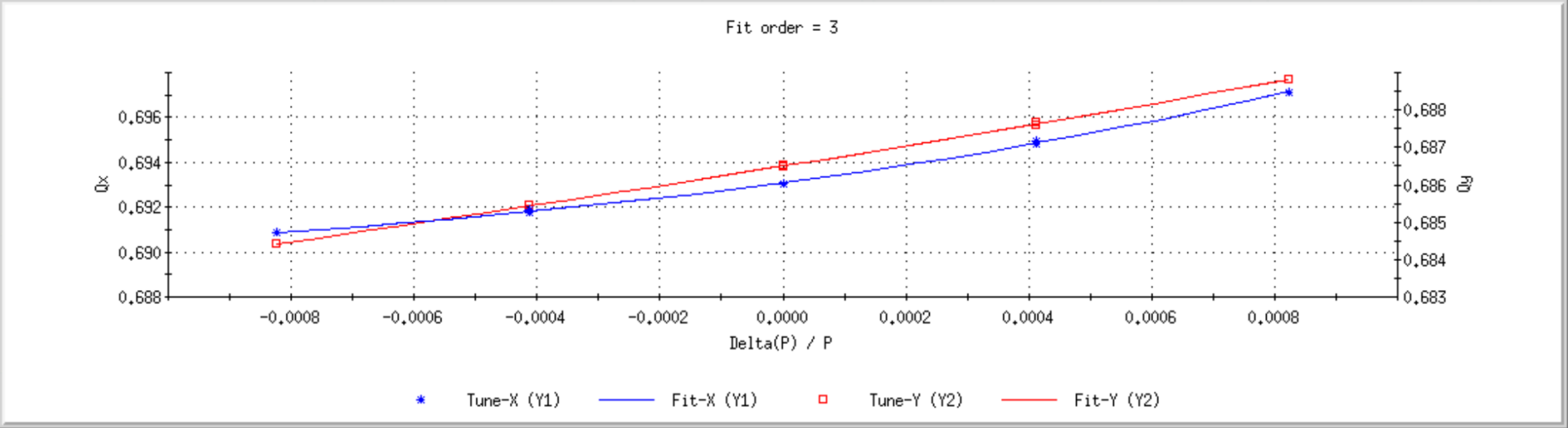
	Corr	Tune	+-Sigma	Chrom[1]	+-Sigma	Chrom[2]	+-Sigma	Chrom[3]	+-Sigma
Horizontal	0.996925	0.688963	5.92326e-05	3.10	0.12	1344	233	-370582	490093
Vertical	0.999869	0.681321	1.44412e-05	3.71	0.03	330	57	-349662	119487
Skew-q1	0.99726	-0.00101493	8.21424e-06	-0.38	0.02	235	32	-85085.5	67964.9
Skew-q2	0.965293	-4.76265e-05	4.363e-05	-0.73	0.09	406	172	258389	360996

Another chromaticity measurements
no octupoles

Analysis of Data -- Blue ring -- Wed Jan 28, 2015 14:11:52

Tunes | Skew-Tunes

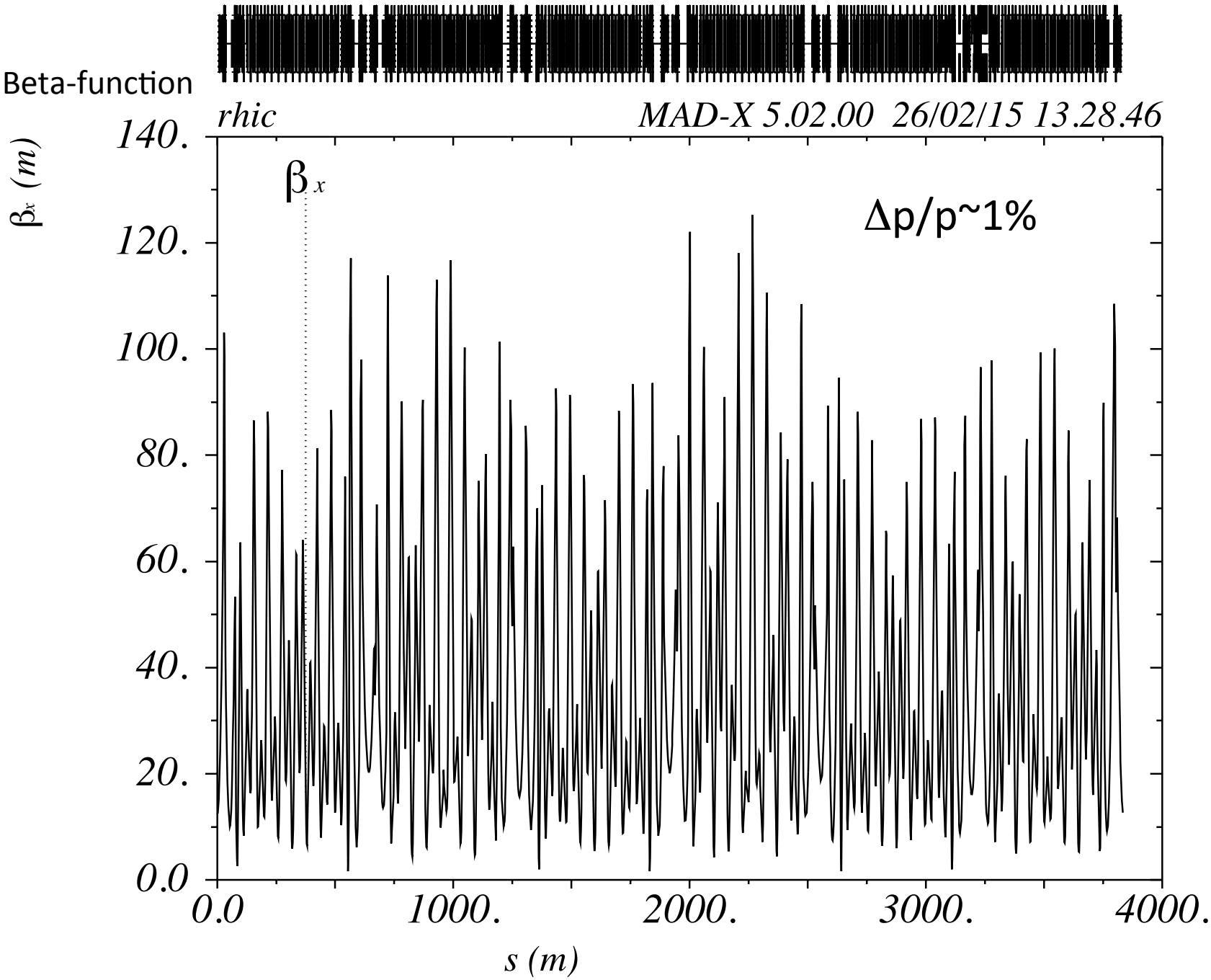
Tunes vs. Momentum



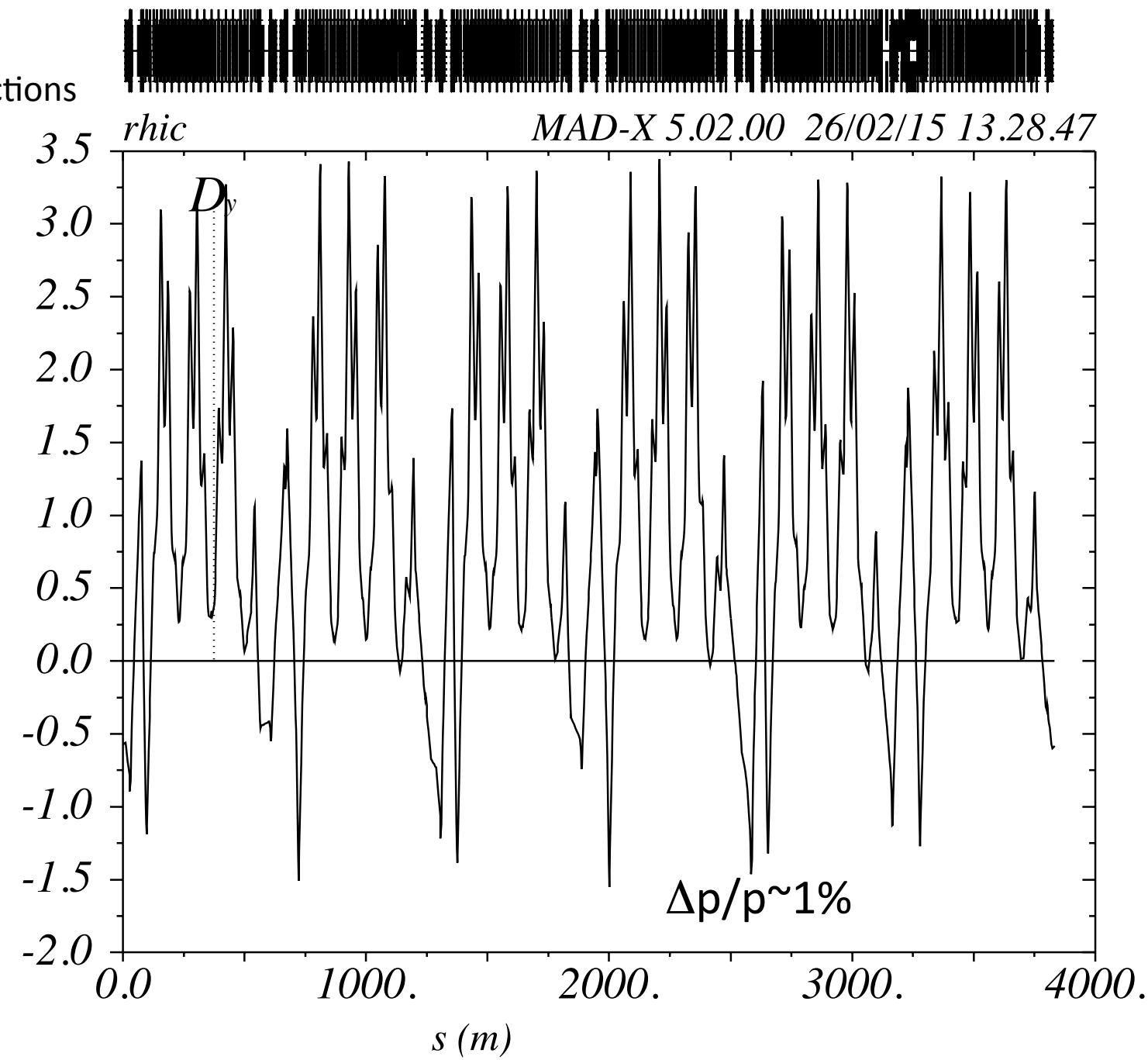
Row	Delta(p)/p	Skew q1	BBQ X	Tune X #1	Tune X #2	Select	Skew q2	BBQ Y	Tune Y #1	Tune Y #2	Select
1	-0.000823251	-0.00047459	0.690847	-999	-999	BBQ	0.00113492	0.684413	-999	-999	BBQ
2	-0.000411626	-0.000742229	0.691773	-999	-999	BBQ	0.000985746	0.685427	-999	-999	BBQ
3	-0.000411626	-0.000732942	0.691917	-999	-999	BBQ	0.00105115	0.685432	-999	-999	BBQ
4	0	-0.00081969	0.69301	-999	-999	BBQ	0.000839523	0.686521	-999	-999	BBQ
5	0	-0.000801811	0.693022	-999	-999	BBQ	0.000913772	0.686497	-999	-999	BBQ
6	0.000411626	-0.000817226	0.694839	-999	-999	BBQ	0.000838289	0.687567	-999	-999	BBQ
7	0.000411626	-0.000866926	0.694959	-999	-999	BBQ	0.000814402	0.687657	-999	-999	BBQ
8	0.000823251	-0.000960154	0.697122	-999	-999	BBQ	0.000701906	0.688824	-999	-999	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ
0	0	0	0	0	0	BBQ	0	0	0	0	BBQ

	Corr	Tune	+-Sigma	Chrom[1]	+-Sigma	Chrom[2]	+-Sigma	Chrom[3]	+-Sigma
Horizontal	0.999327	0.693092	3.55194e-05	3.68	0.07	1355	140	199570	294034
Vertical	0.999835	0.686498	1.22279e-05	2.64	0.02	172	48	55852.6	101224
Skew-q1	0.994824	-0.000812367	6.72787e-06	-0.07	0.01	139	26	-330473	55694.2
Skew-q2	0.972991	0.000900187	1.52041e-05	-0.22	0.03	38	60	-58312.2	125861

Horiz. Beta-function



Dispersion functions



For next study (~2h)

- At injection again
- Min: Realize linear chromaticity correction for radial shifted orbits
- Max: Find optimal lattice for the radial shift ~ +13mm. Do lattice ramp synchronized with the RF frequency change.