Nonlinear chrom correction based on beam-response matrix

(Session 3: April 22-23, 2007)

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1. Data-taking of response matrix
2. Yellow nonlinear chrom correction
3. Plan for next session

Data-taking of beam response matrix

- Changing one sextupole family to measure the off-momentum tune changes and Q' , Q" changes.

- By now we do manually, therefore time-consuming. One complete measurement will take about 20 mins.

- Data are under processing. By now data processing is not done manually, too.

Four tunes in the data-taking

Wed Apr 25 2007
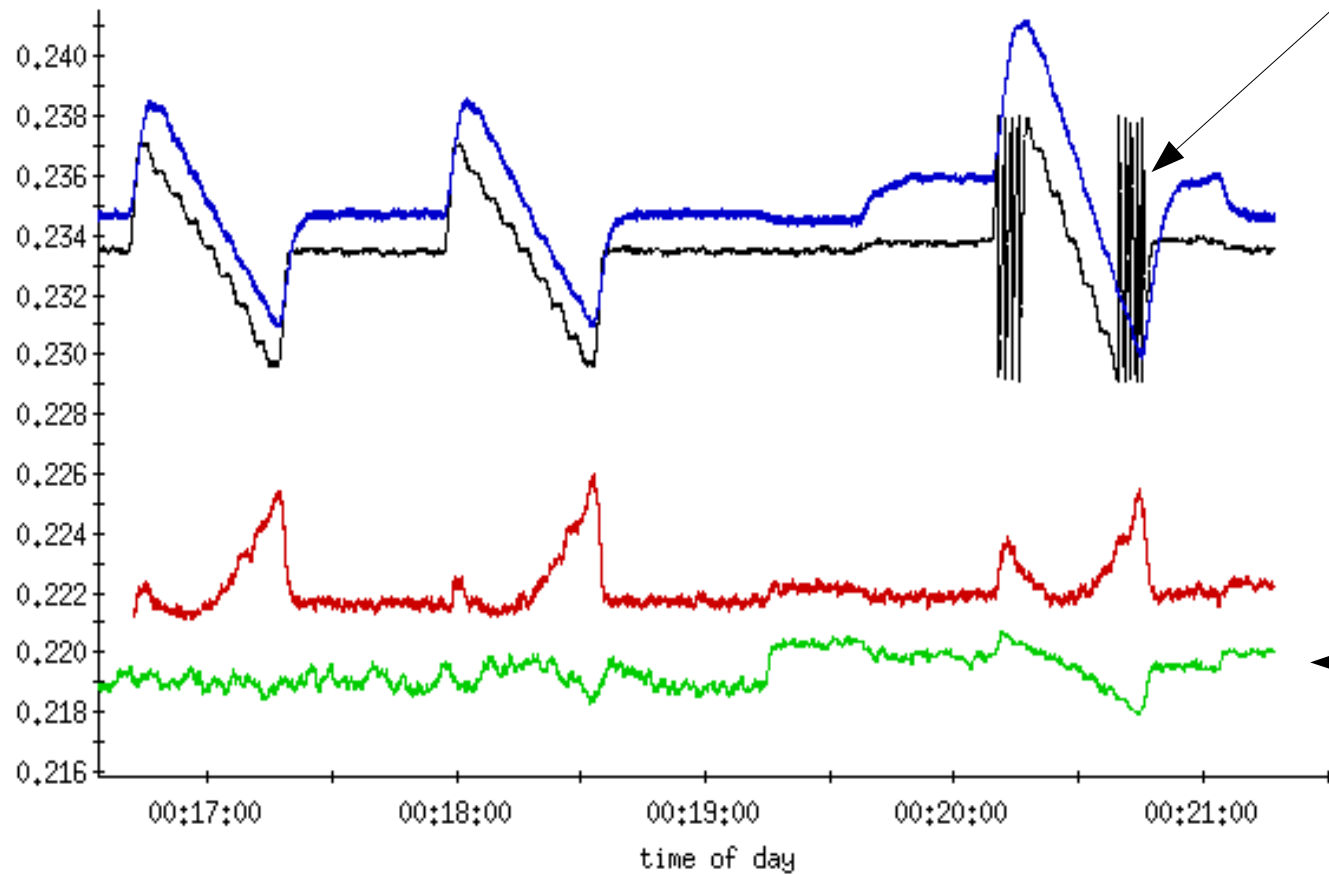
Legend:
- qLoopTune2.yh:tuneBuffM:value[*]
- qLoopTune2.bh:tuneBuffM:value[*]
- qLoopTune2.yv:tuneBuffM:valueAndTime[*]
- qLoopTune2.bv:tuneBuffM:value[*]

Yellow ring second order chrom correction

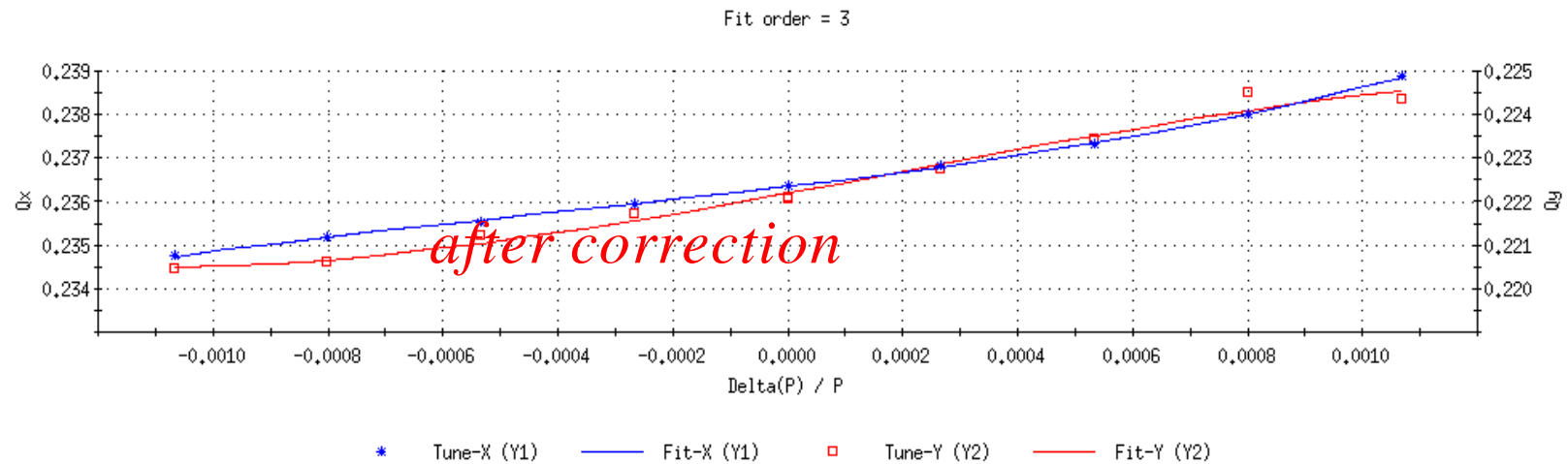▪ The idea (find 8 family strengths online for Q'' corr.):

1) calculate SF/SD's contributions to Q's

2) using 8 families to reproduce the above Q's,
   while cancel the net Q'' contributions among the 8 families
3) activate, measure Q' and Q''.
    Q' shouldn't change.
    Q'' solely contributed by other sources out of 8 families.

4) Using 8 families to cancel the Q'' in 3),
    while keeping their Q' contribution unchanged.
5) activate to check the correction effect.

The test summary

Analysis of Data -- Yellow ring -- Tue Apr 24, 2007 23:56:04
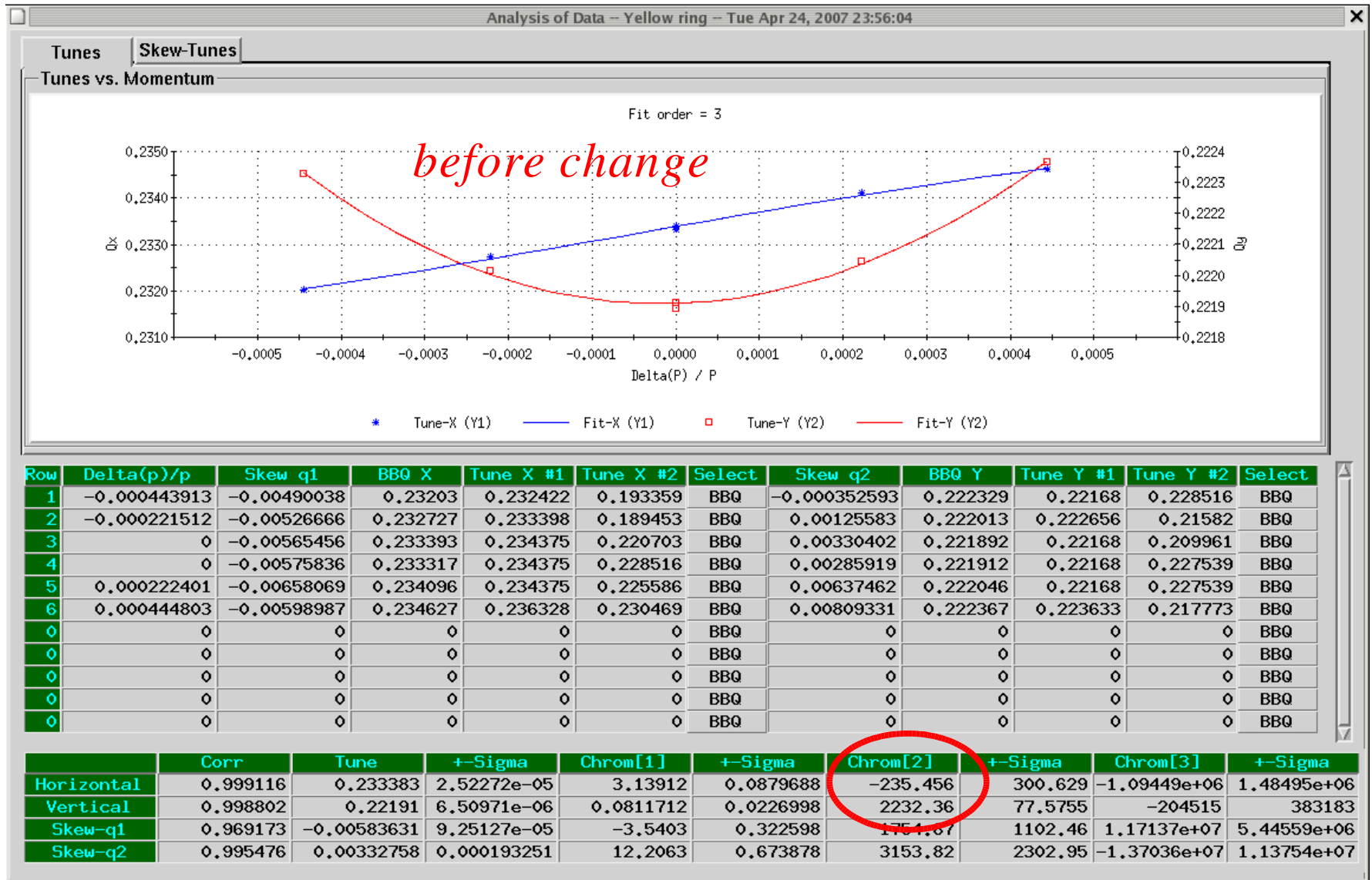
Tunes | Skew-Tunes

Tunes vs. Momentum

Fit order = 3

before change

Legend: * Tune-X (Y1) — Fit-X (Y1) □ Tune-Y (Y2) — Fit-Y (Y2)

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	-0.000443913	-0.00490038	0.23203	0.232422	0.193359	BBQ	-0.000352593	0.222329	0.22168	0.228516	BBQ
2	-0.000221512	-0.00526666	0.232727	0.233398	0.189453	BBQ	0.00125583	0.222013	0.222656	0.21582	BBQ
3	0	-0.00565456	0.233393	0.234375	0.220703	BBQ	0.00330402	0.221892	0.22168	0.209961	BBQ
4	0	-0.00575836	0.233317	0.234375	0.228516	BBQ	0.00285919	0.221912	0.22168	0.227539	BBQ
5	0.000222401	-0.00658069	0.234096	0.234375	0.225586	BBQ	0.00637462	0.222046	0.22168	0.227539	BBQ
6	0.000444803	-0.00598987	0.234627	0.236328	0.230469	BBQ	0.00809331	0.222367	0.223633	0.217773	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
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	0.999116	0.233383	2.52272e-05	3.13912	0.0879688	-235.456	300.629	-1.09449e+06	1.48495e+06
Vertical	0.998802	0.22191	6.50971e-06	0.0811712	0.0226998	2232.36	77.5755	-204515	383183
Skew-q1	0.969173	-0.00583631	9.25127e-05	-3.5403	0.322598	1751.87	1102.46	1.17137e+07	5.44559e+06
Skew-q2	0.995476	0.00332758	0.000193251	12.2063	0.673878	3153.82	2302.95	-1.37036e+07	1.13754e+07

Q' changes observed in second round of correction, under check.

Plan for next session

1. Time request: 2.5 ~ 3.0 hrs.

2. Scheduel:

   ----> applying response matrix for nonlinear chrom corr.
   ----> if time permits, try yellow chrom correction again
with the new method.