Results of January 29 Low-Beta Lattice Measurement

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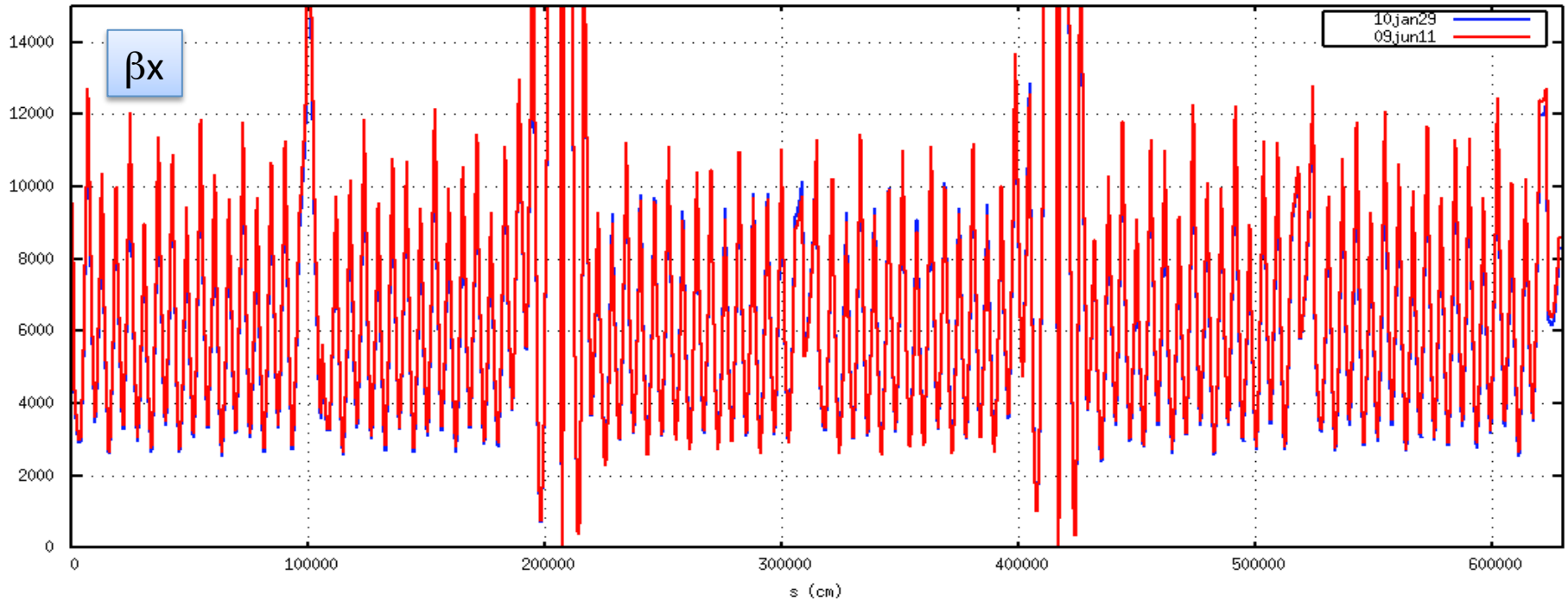
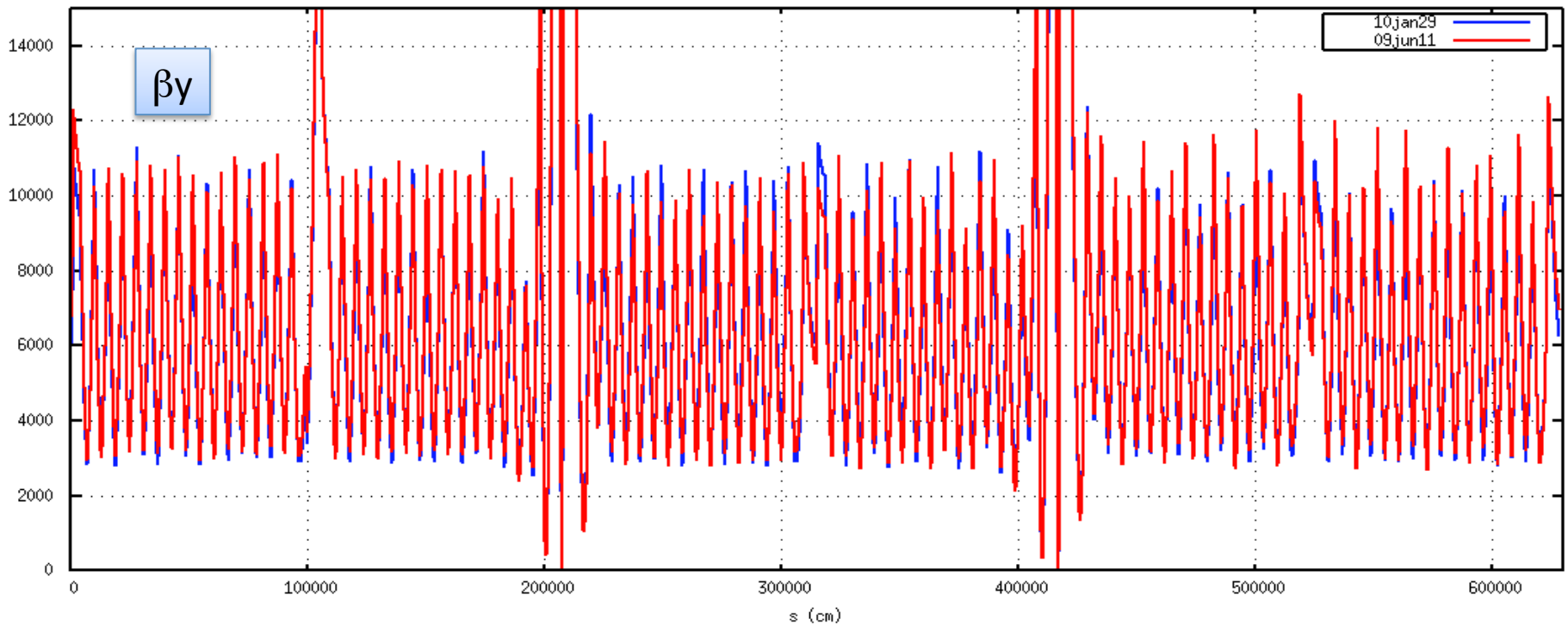
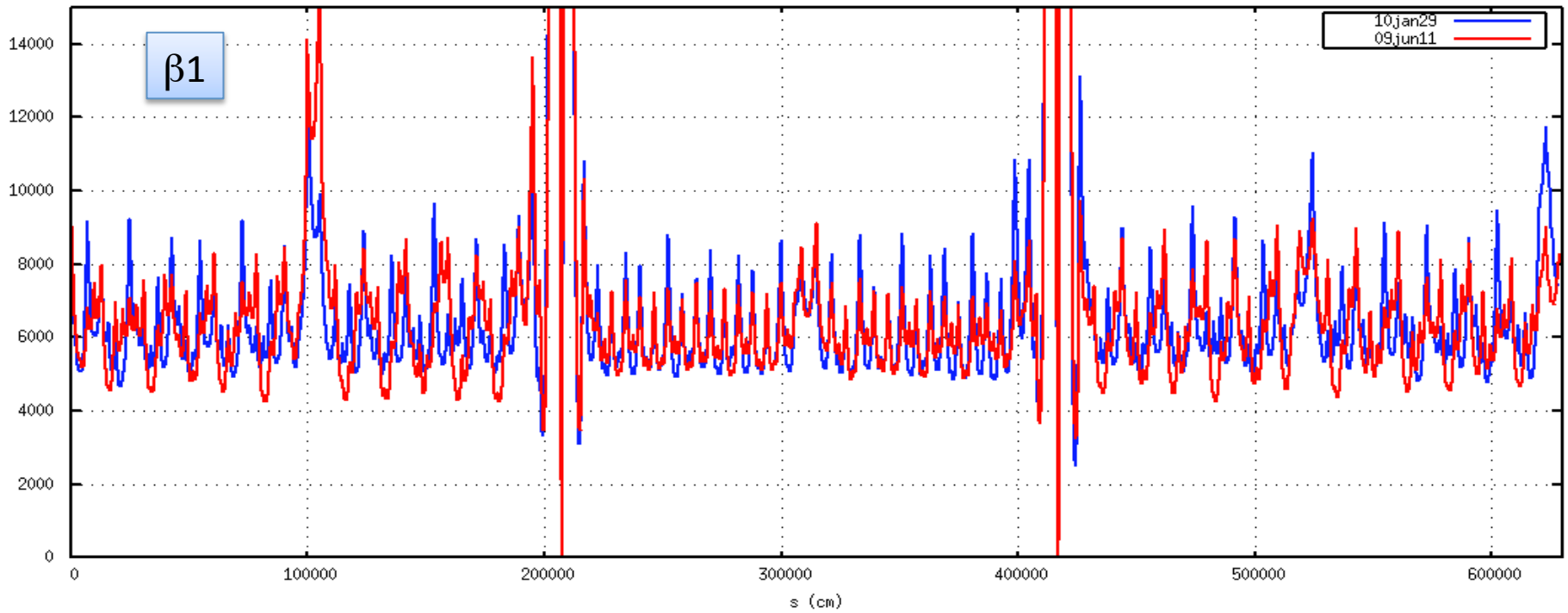
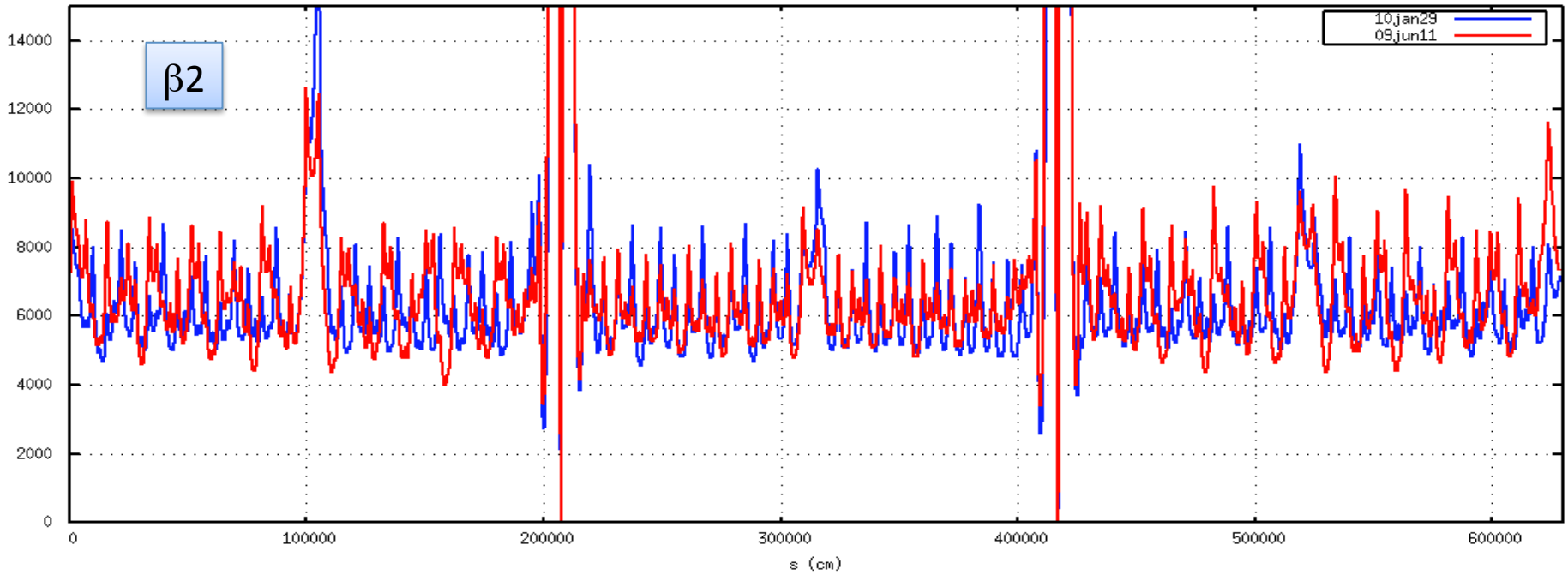
Motivation and notes

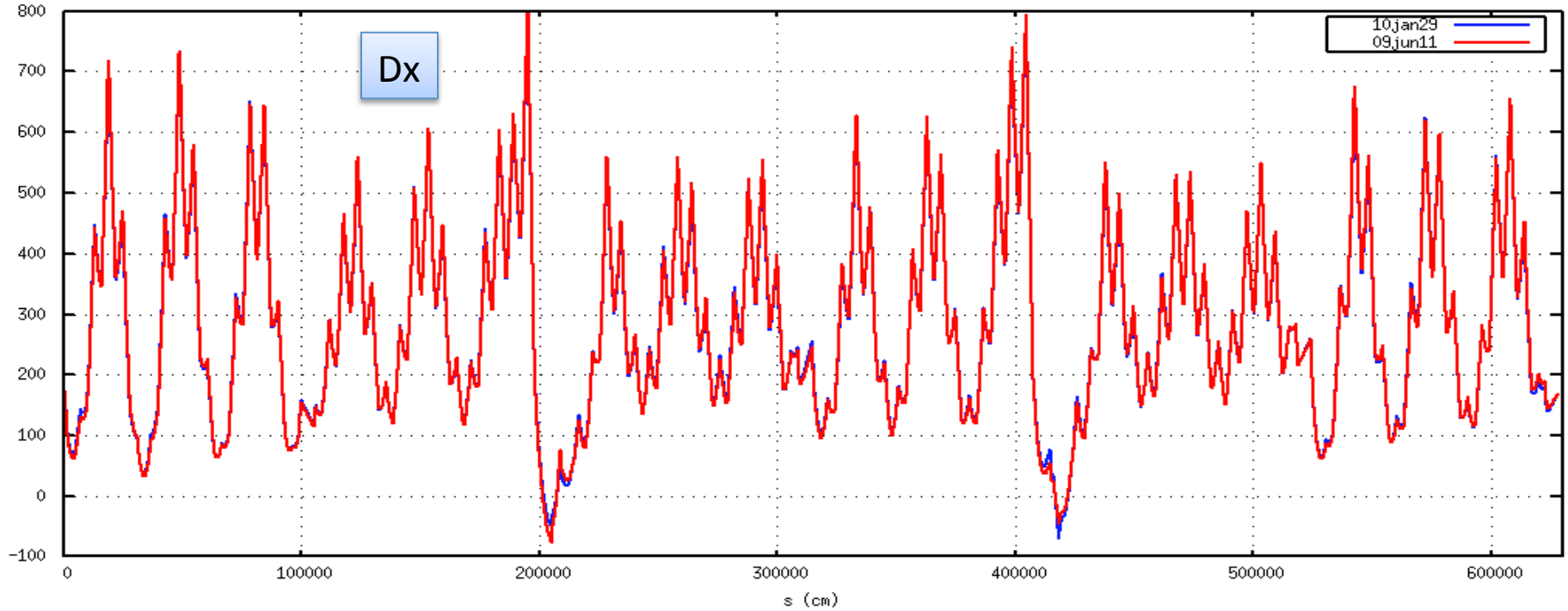
- Purpose of the measurement: see if there are significant changes in the low-beta optics which could be responsible for recent performance issues
- Took orbit response data with many correctors (120 vs. typical 60) to improve accuracy
- Initially the fit was poor, found a bug in software
- Final convergence of the fit is 14-15 μm (rms orbit error) which corresponds to 10-15% error in β-function

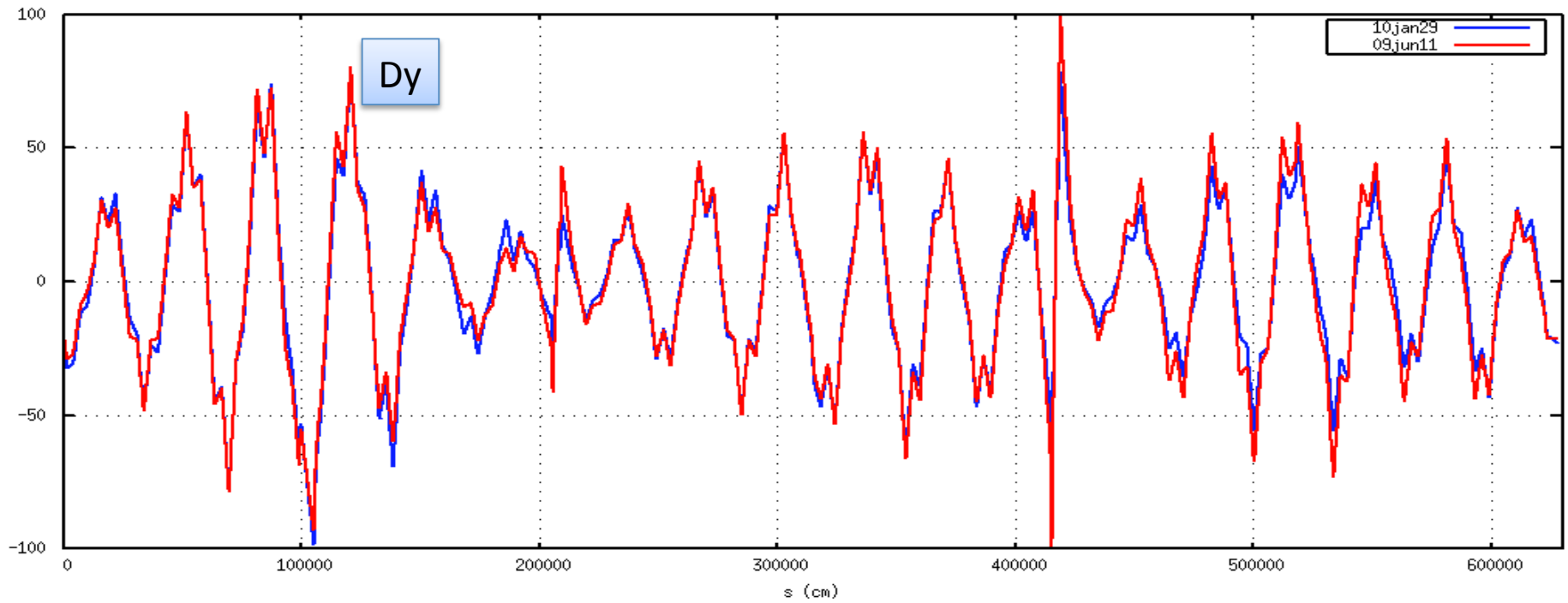

βx
10jan29
09jun11
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


βy
10jan29
09jun11
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


β1
10jan29
09jun11
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


β2
10jan29
09jun11
14000
12000
10000
8000
6000
4000
2000
0
0
100000
200000
300000
400000
500000
600000
s (cm)


Dx
10jan29
09jun11
800
700
600
500
400
300
200
100
0
-100
0
100000
200000
300000
400000
500000
600000
s (cm)


Dy
10jan29
09jun11
100
50
0
-50
-100
0
100000
200000
300000
400000
500000
600000
s (cm)

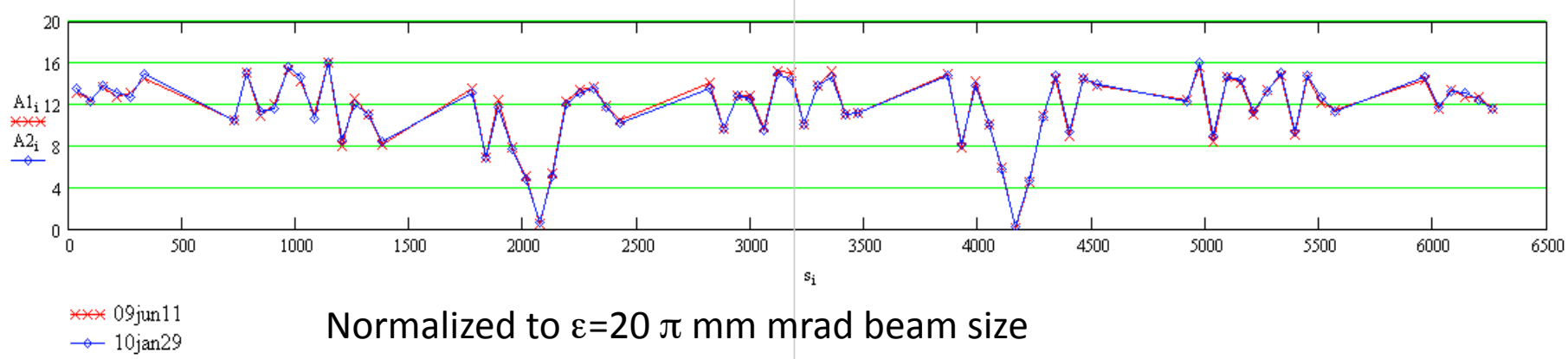
June 11, 2009

	β_x prot	β_y prot	β^*
CDF	28.7	27.9	28.3
D0	25.5	30.3	27.9
	D_x prot	D_y prot	D^*
CDF	0.8	0.3	0.9
D0	2.6	-1.0	2.8

January 29, 2010

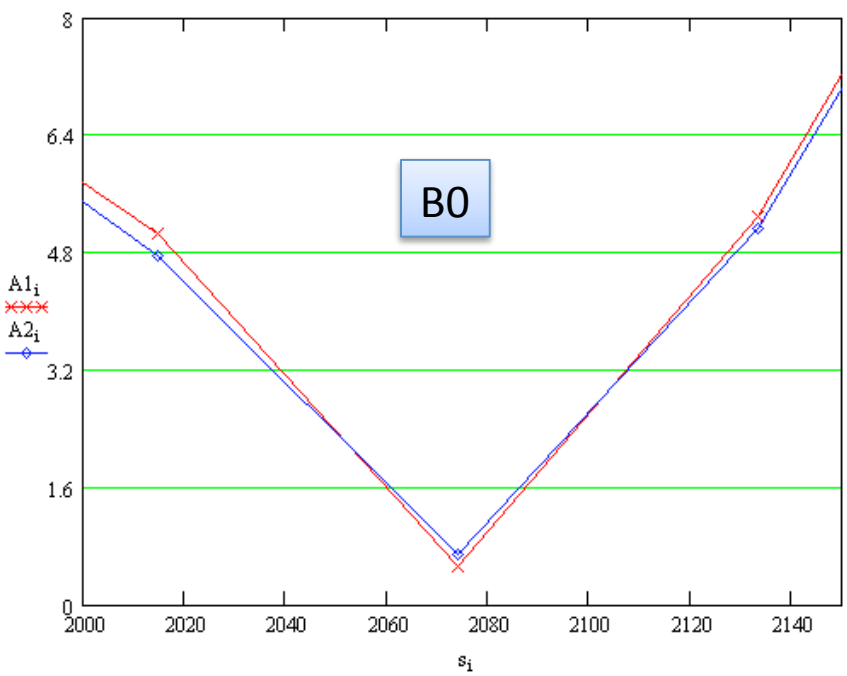
	β_x prot	β_y prot	β^*
CDF	29.7	29.7	29.7
D0	25.9	32.3	29.1
	D_x prot	D_y prot	D^*
CDF	1.0	0.8	1.3
D0	2.3	-1.1	2.5

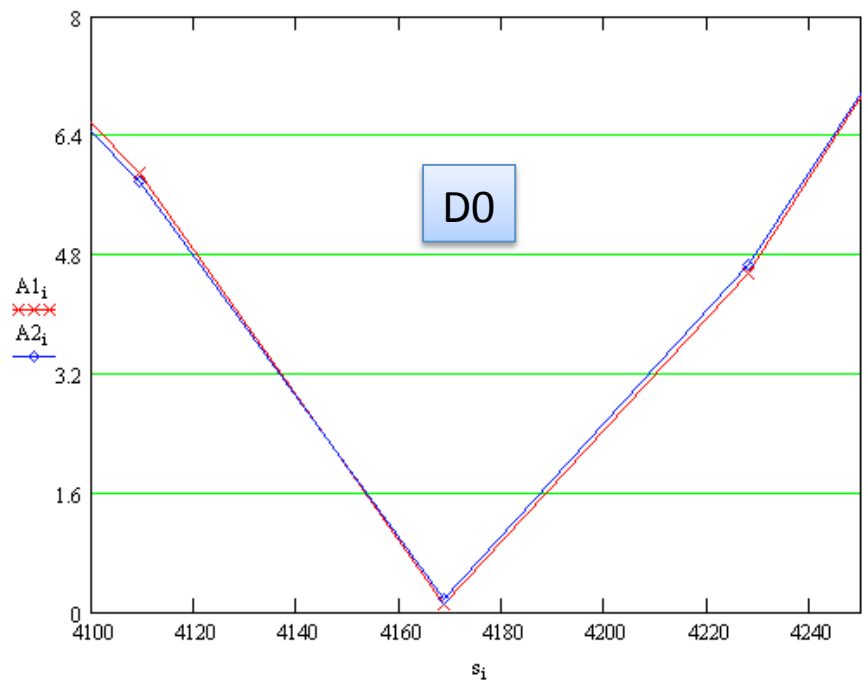
Beam-beam separations

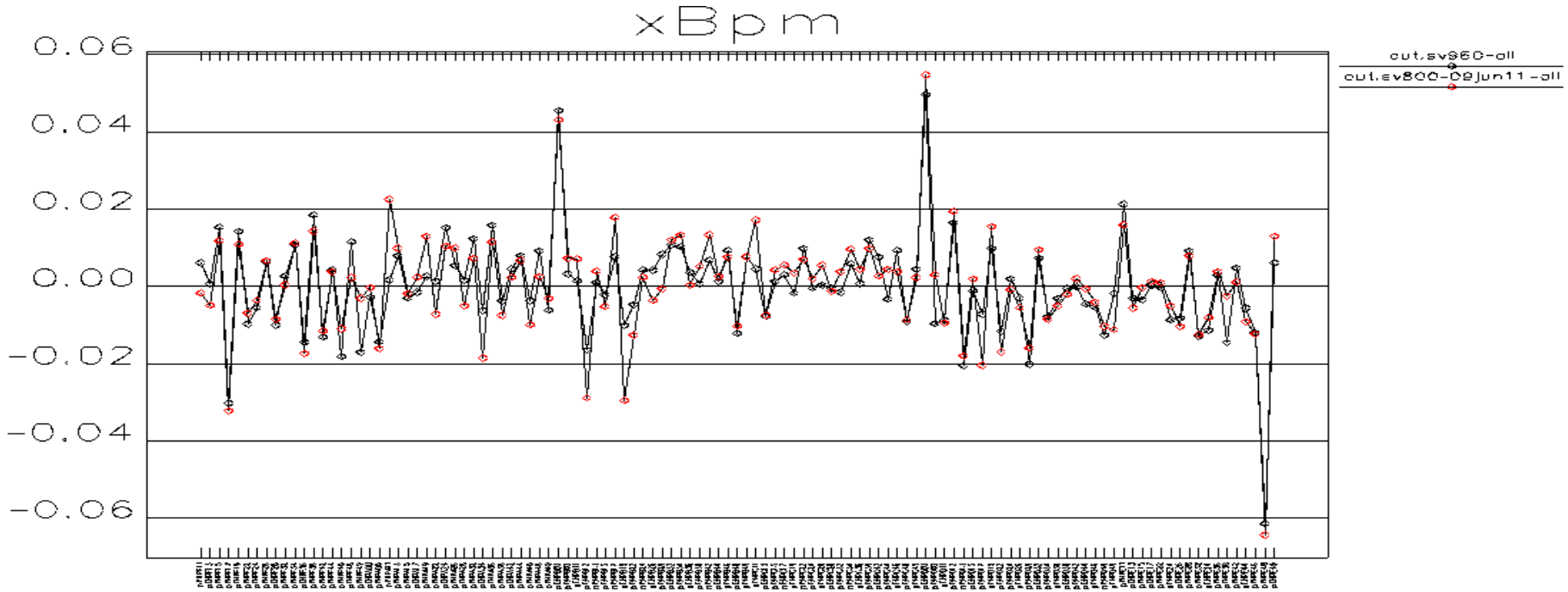


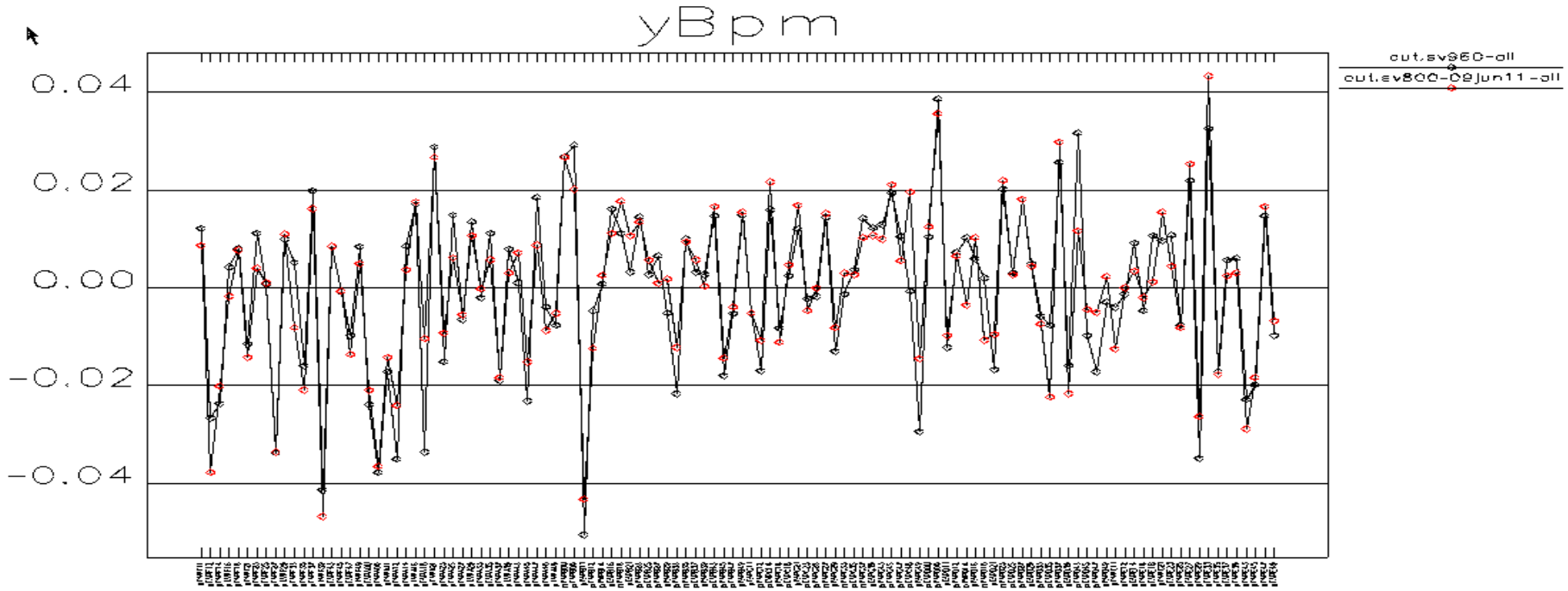
09jun11
10jan29

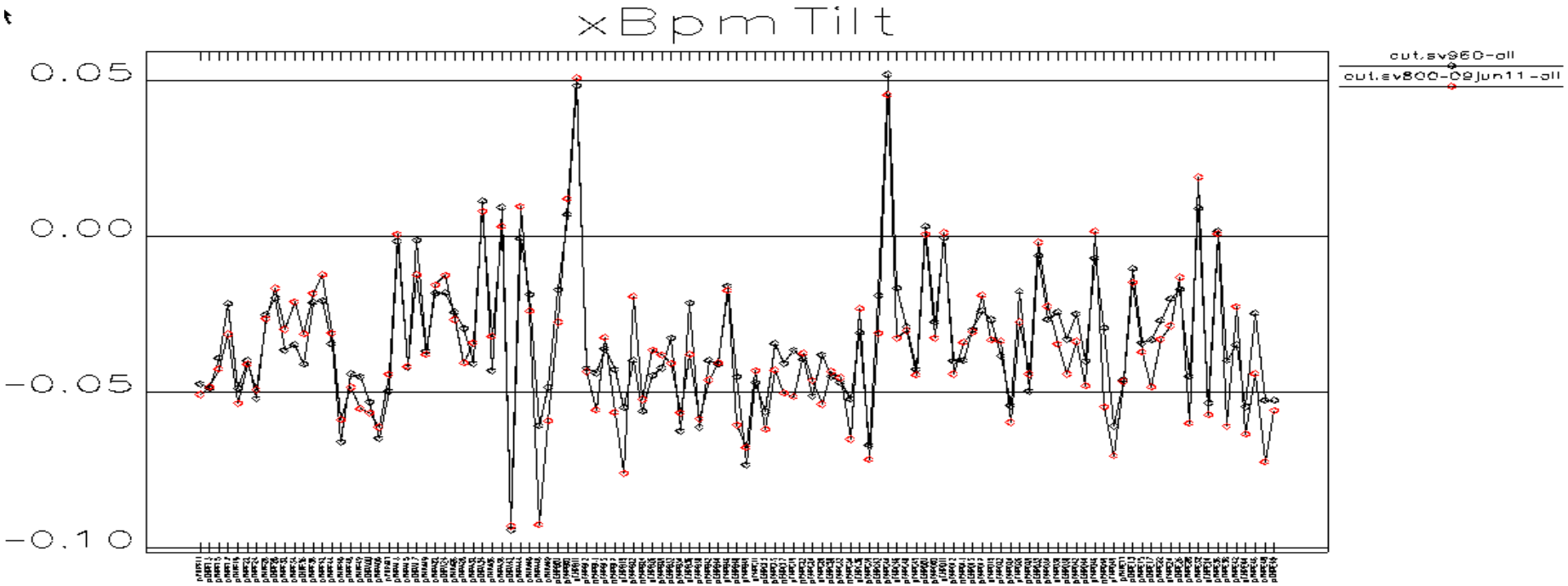
Normalized to ε=20 π mm mrad beam size

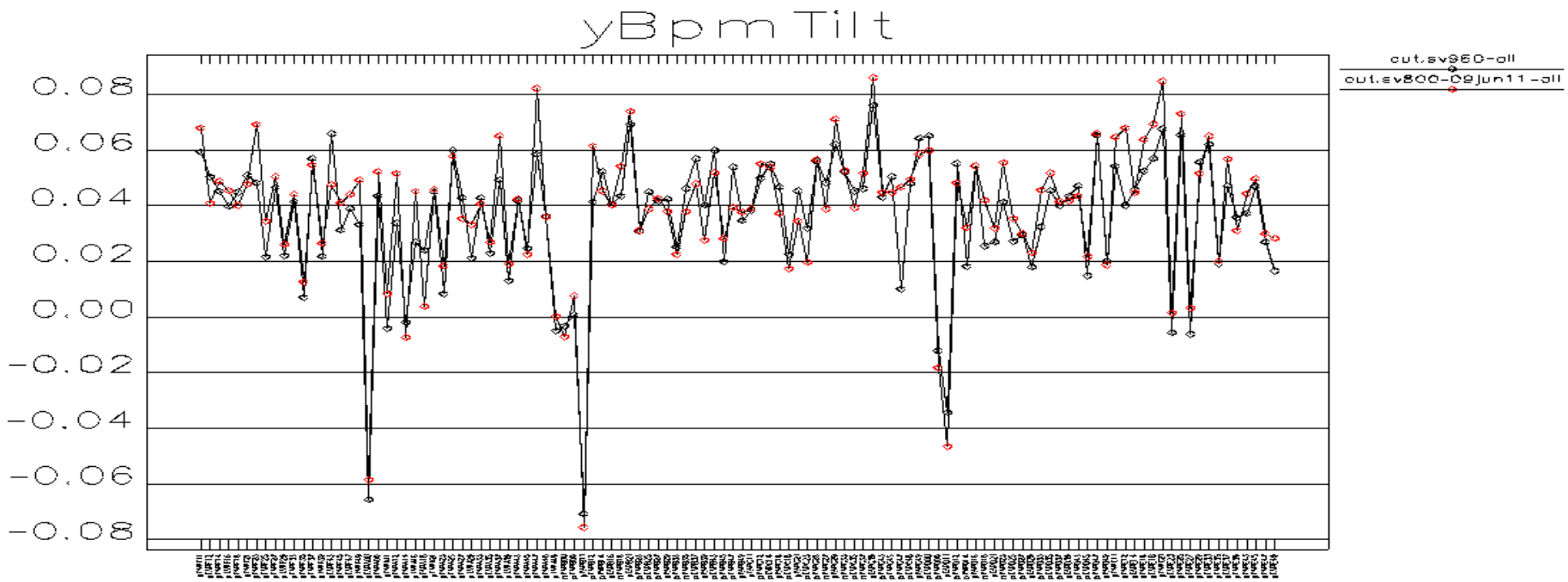


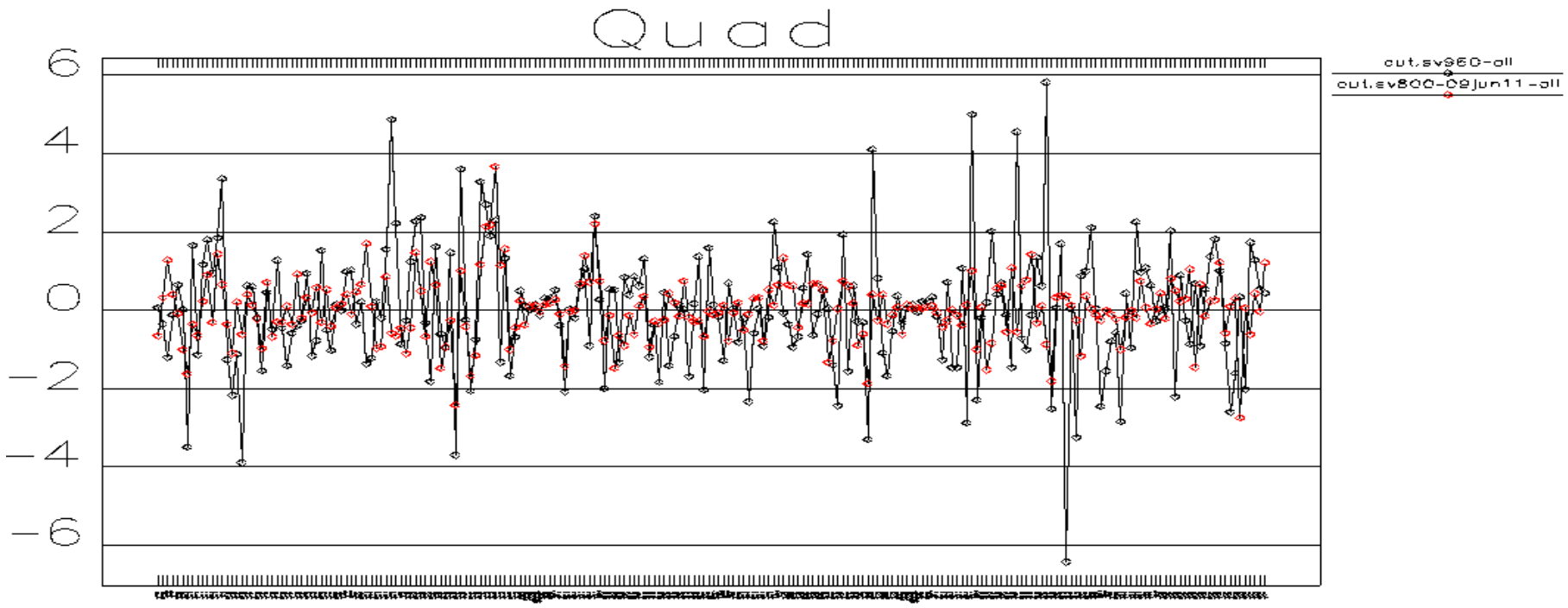


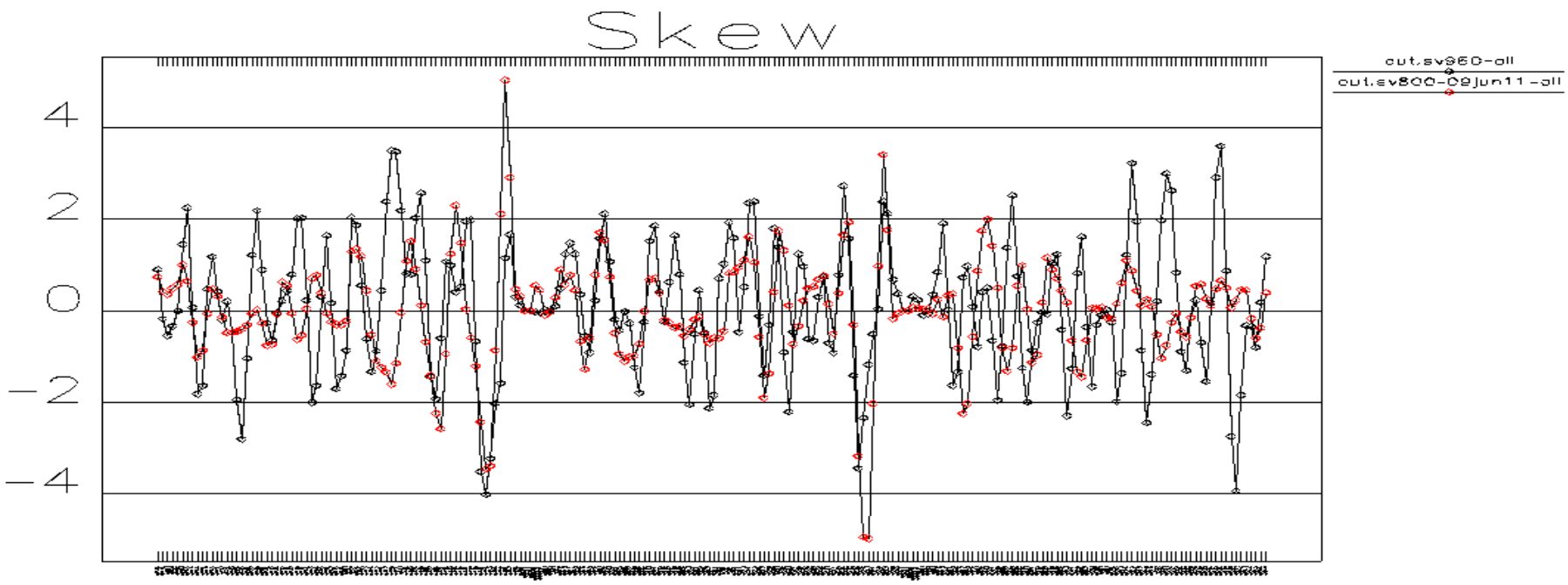

xBpm
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
cut.sv960-all
cut.sv800-09jun11-all


yBpm
0.04
0.02
0.00
-0.02
-0.04
cut.sv960-all
cut.sv800-09jun11-all

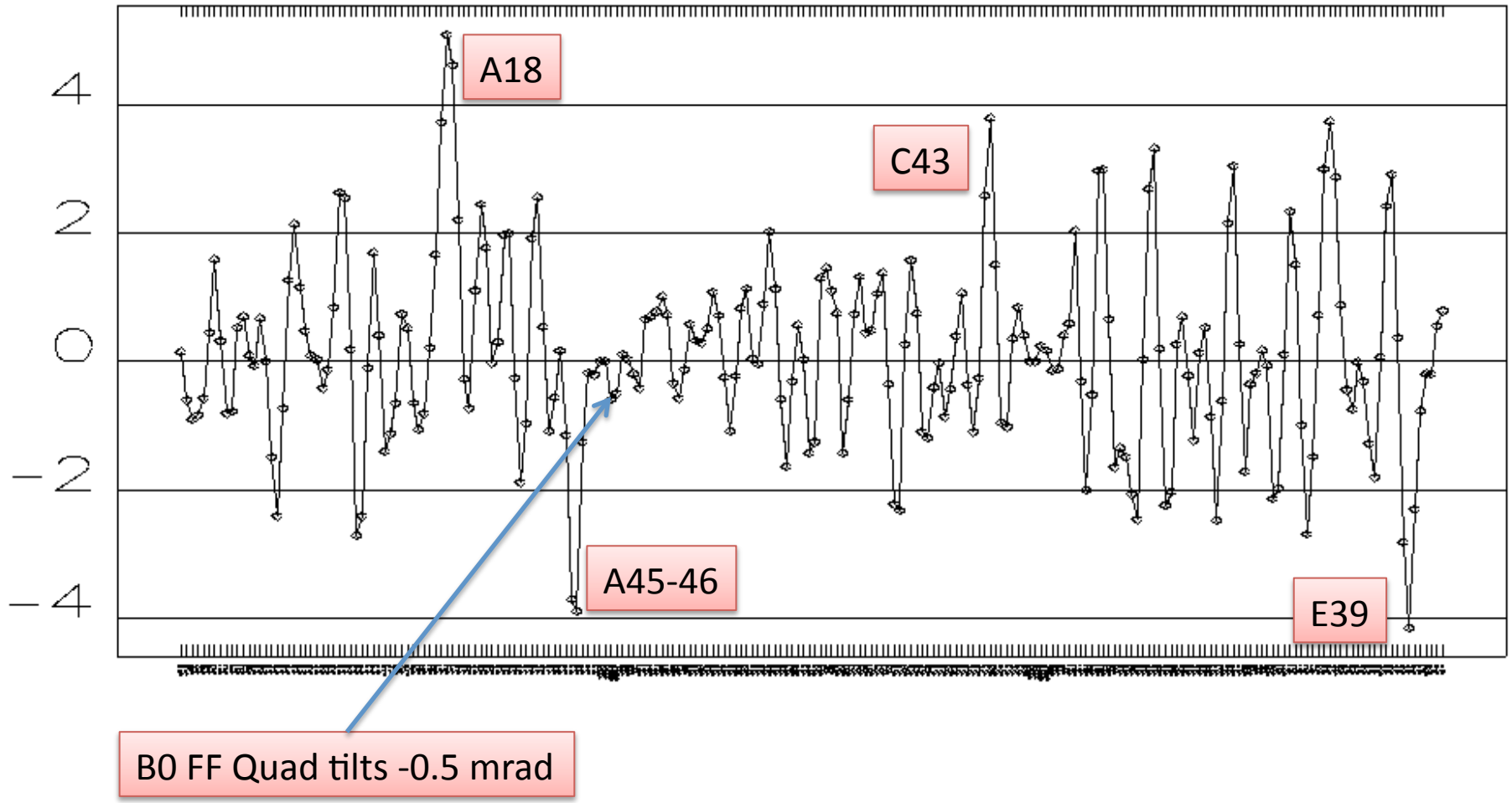

xBpmTilt
0.05
0.00
-0.05
-0.10
cut.sv960-all
cut.sv800-09jun11-all


yBpmTilt
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
cut.sv960-all
cut.sv800-09jun11-all


Quad
6
4
2
0
−2
−4
−6
cut.sv960-all
cut.sv800-09jun11-all


Skew
4
2
0
−2
−4
cut.sv960-all
cut.sv800-09jun11-all

Skew Quad Difference 10jan29-09jun11



Conclusion

- Measurement showed little change of collision optics between 6/11/09 and 1/29/10
- The changes mostly concern coupling.
  - Interestingly, the result shows -0.5 mrad roll of CDF quads and only 0.1 mrad at D0, while most of skew quadrupole changes were done at D0.
  - Other locations are A18, A45-46, C43 and a few in E-sector. However, their magnitude can not be of concern