

S* Control at IP8

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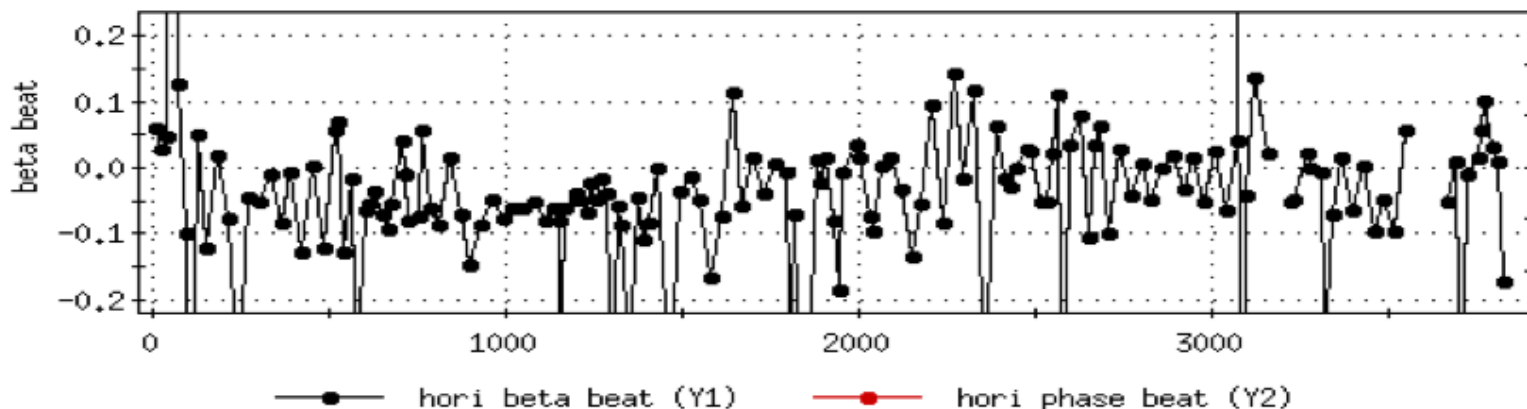
Summary of What was done

S*Control

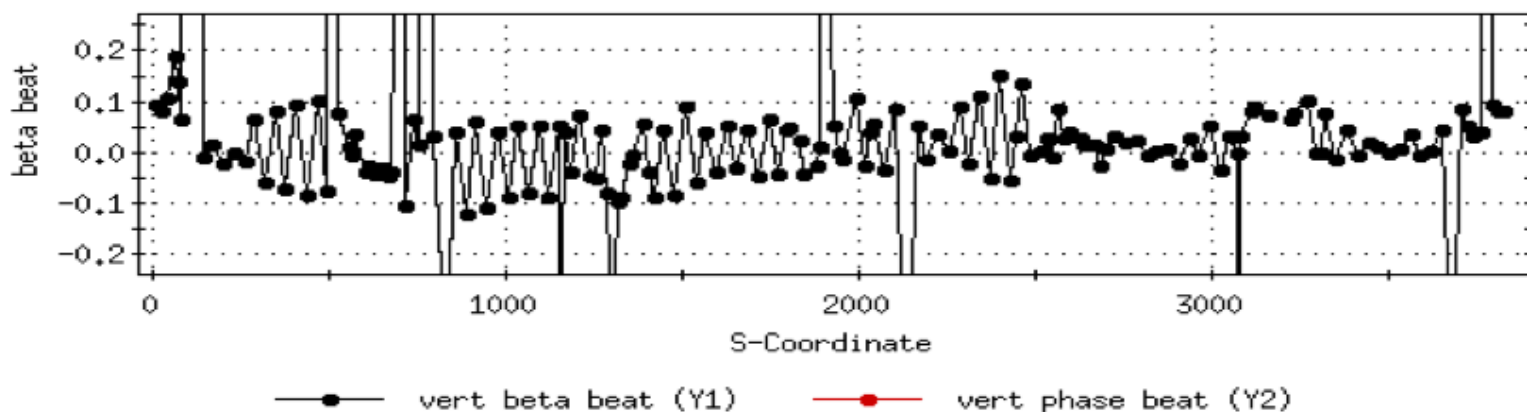
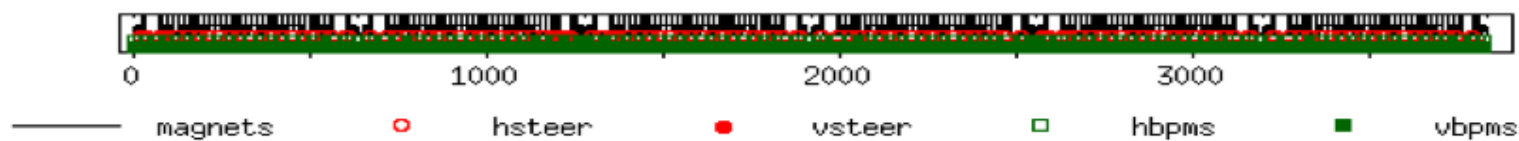
- Linear Optics Correction at Au14-s0::store(beta*0.7m)
 - by GRD, to keep the beta-beat under +/- 10%
- Scanned V s* shift at IP8, requested shifts are +/-0.3m and +/-0.45m
 - Took both bpm based measurements(loptics) as well as Yun's k-modulation
 - Loptics shows V s* shift without significant H s* shift as observed in previous APEX study. Results are on slide 6
- Requested H s* shift at IP8 of +0.45m and -0.35m
 - Similar results
 - No k-modulation measurements taken

Optics Optics Correction

S*Control



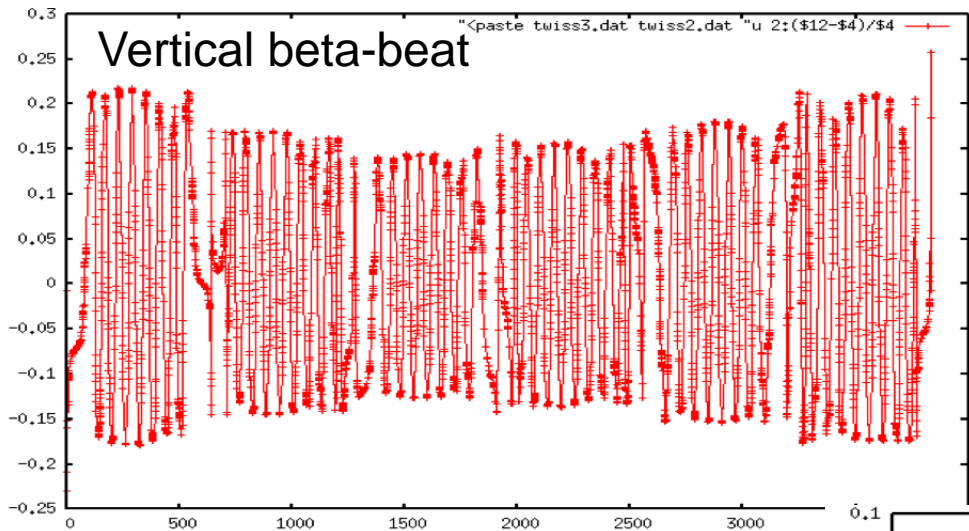
Lattice: Blue



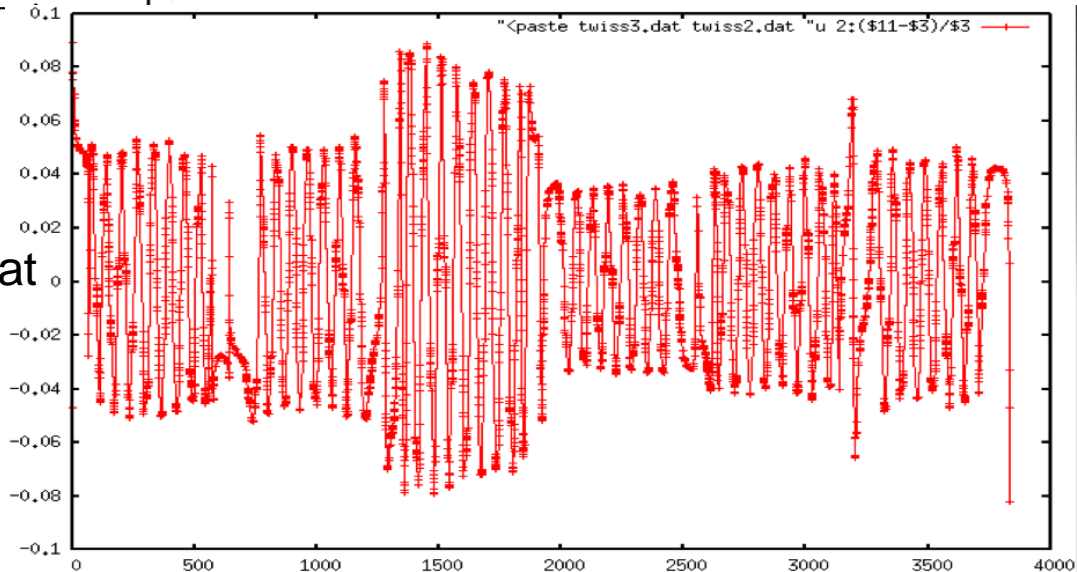
s*control sensitivity to beta-beat

S*Control

- Generate beta-beat with random gradient errors in the model



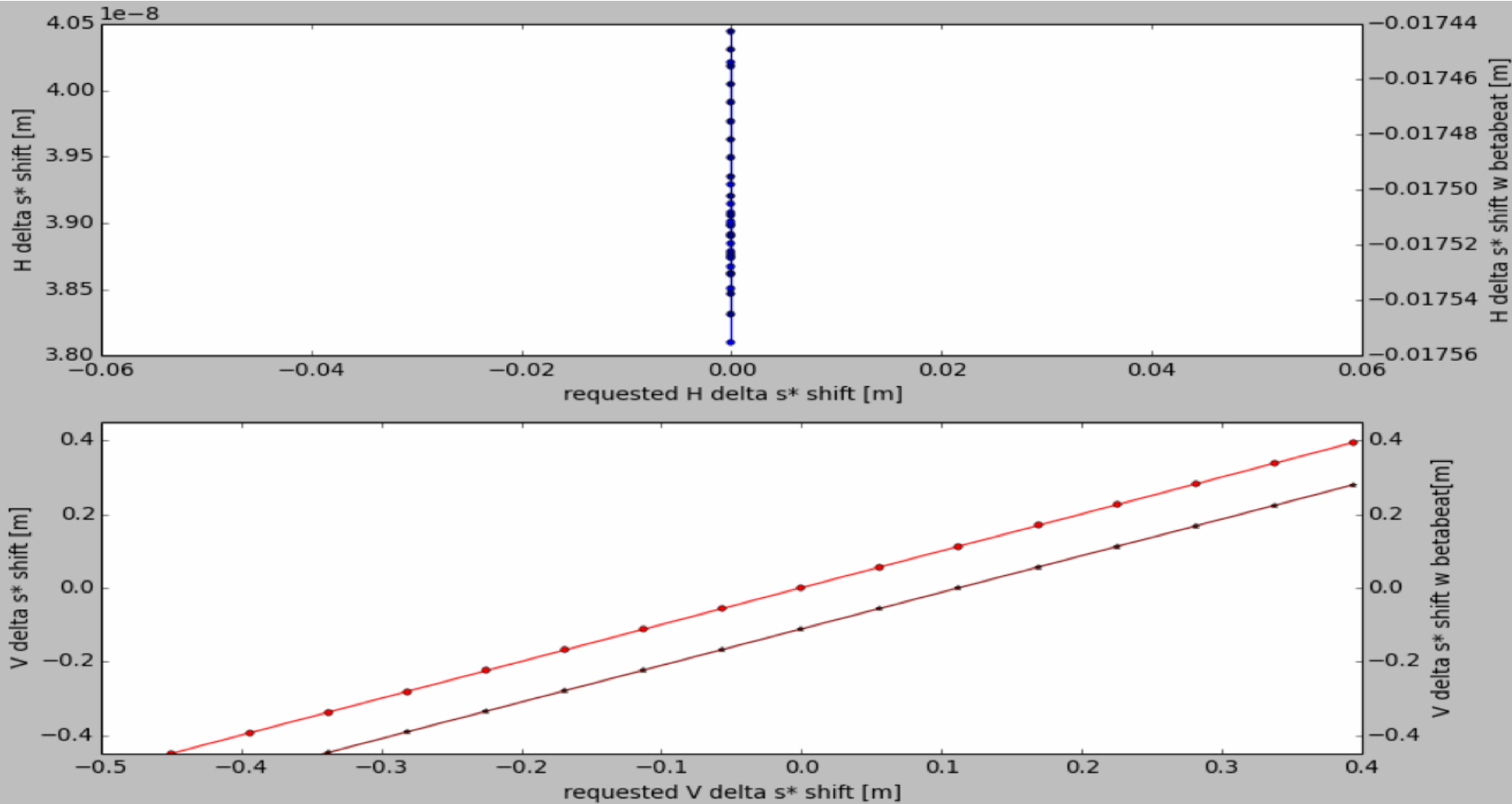
Horizontal beta-beat



s* control sensitivity to beta-beat

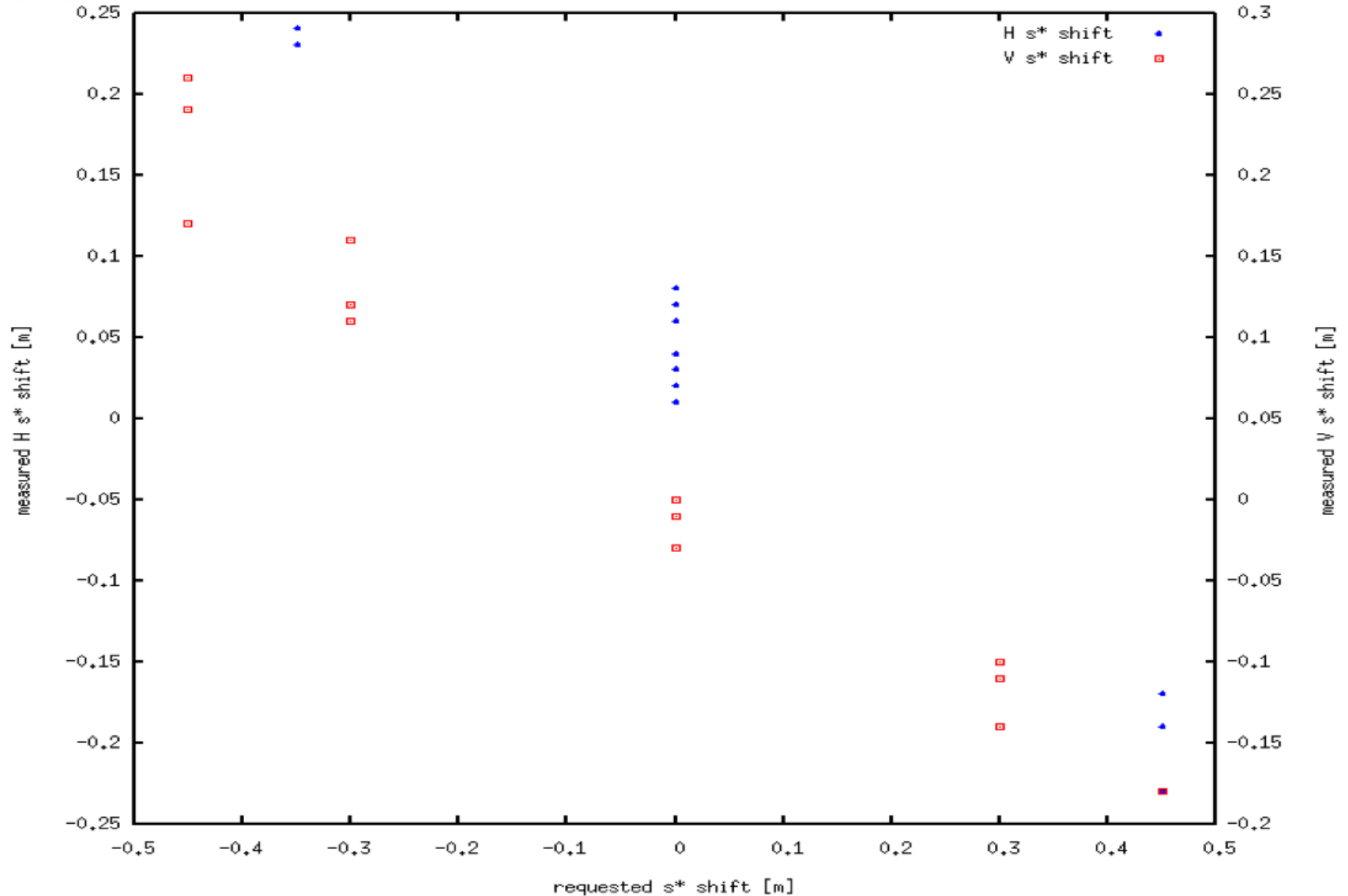
S*Control

- Beta-beat effect on S* knob



s* control study preliminary results

S*Control



Conclusion and Plan

S*Control

- Conclusions
 - We are convinced that a well corrected optics, i.e. minimize the difference between live machine and model is critical in model based s^* control
 - Still needs to understand k-modulation data
- Plan for next APEX
 - Further correct loptics
 - Exam the s^* control using lumi-monitor

Experiment Steps, 3rd Experiment, June 4

S*Control

- 28*28 bunches for better lumi-meter statistics
- Optics correction (By GRD, essential for the knob)
- For the time limit, request $s(b,v,IP8)=0, 45cm, 0, -45cm,0$, then $s(b,h,IP8)=35cm$
- For each step, measure the optics, and record the lumi data(~5min)
- The yellow beam is untouched, uncorrected.

Optics measurements of Blue beam

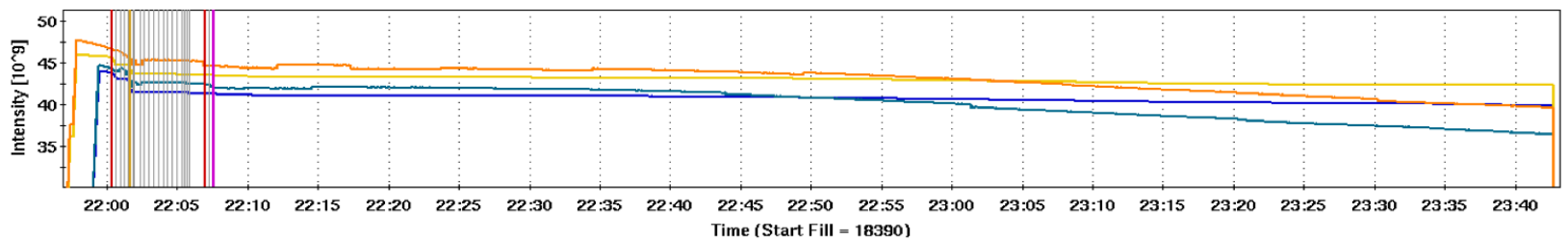
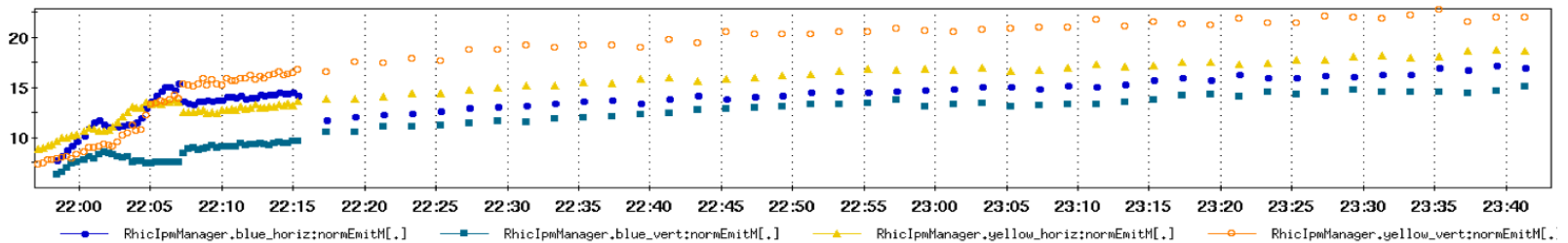
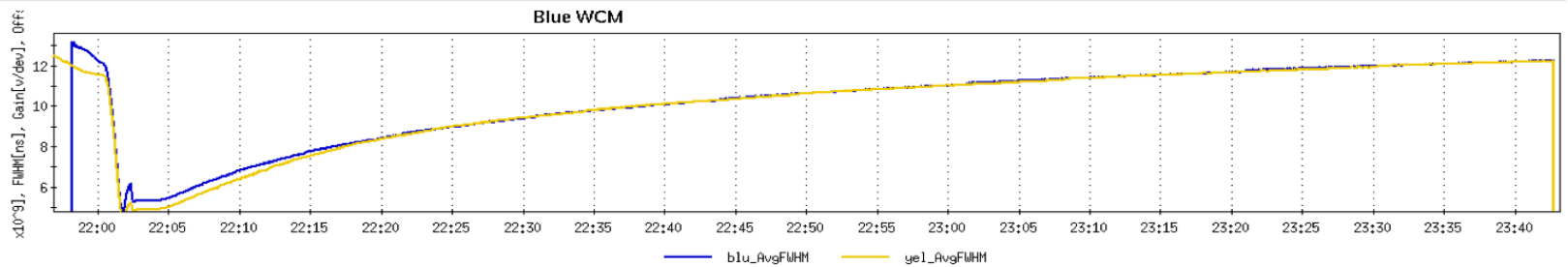
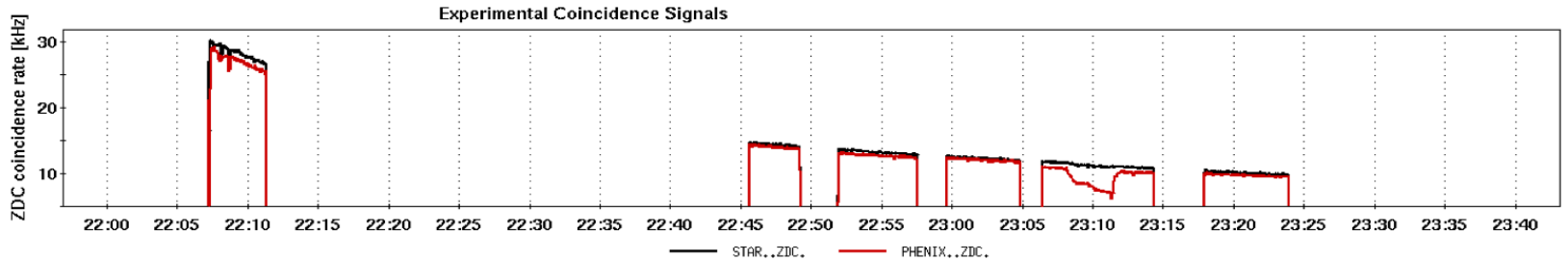
S*Control

requested		measured		Variation	
s_h	s_v	s_h	s_v	ds_h	ds_v
0	0	-4	2		
0	45	-3	46	1	44
0	0	2	5	5	-41
0	-45	5	-34	3	-39
35	0	30	-5		

All in
centimeters

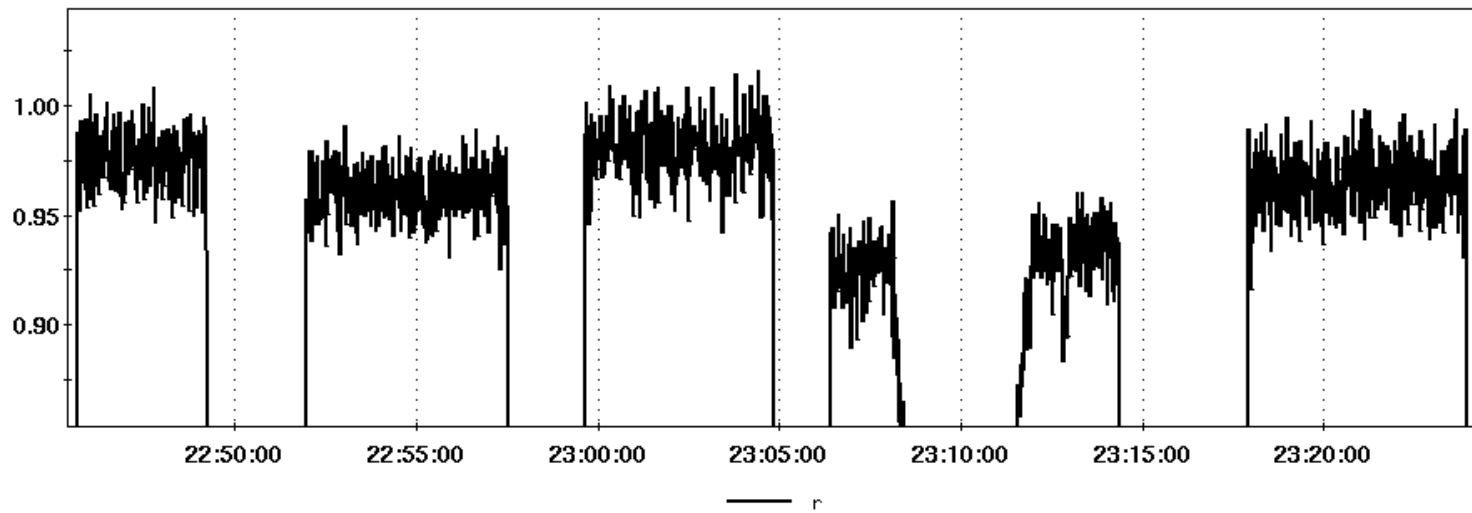
ZDC reading, etc

S*Control

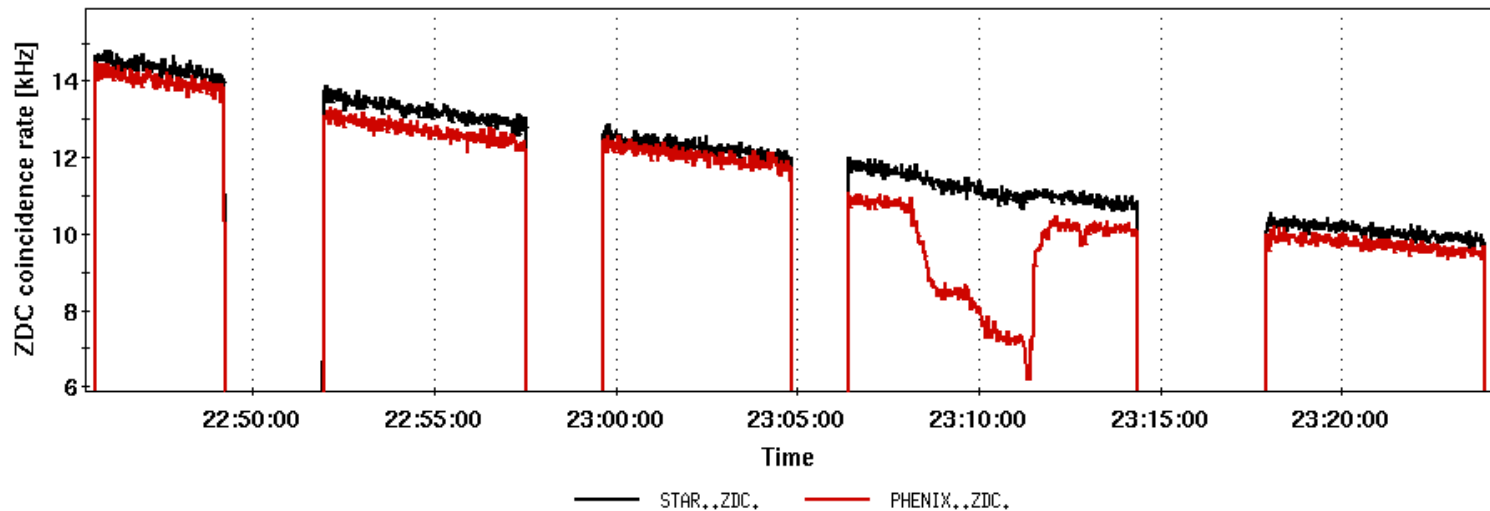


ZDC details

S*Control



Experimental Coincidence Signals



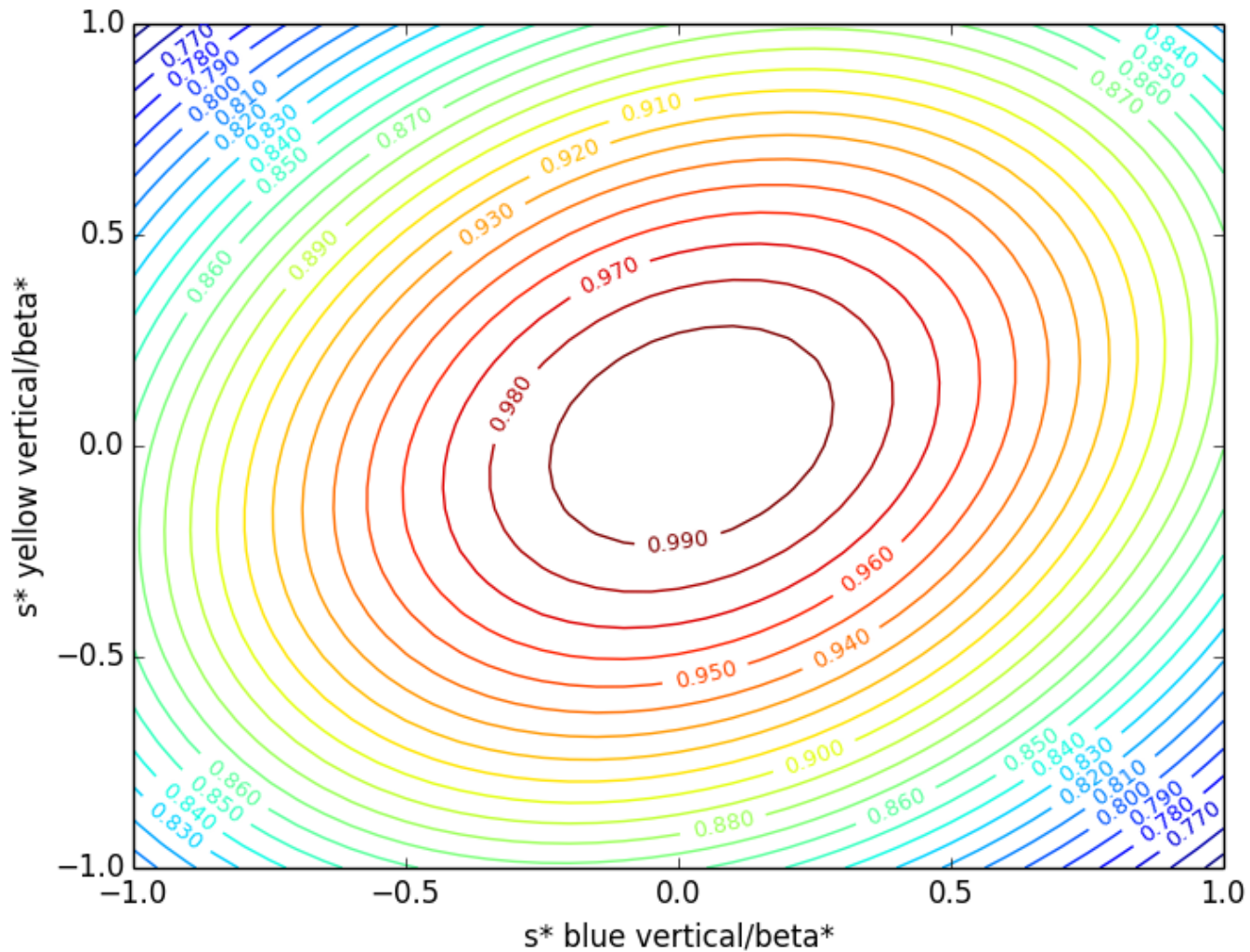
Luminosity effect

S*Control

requested		measured		Variation		Lumi
s_h	s_v	s_h	s_v	ds_h	ds_v	
0	0	-4	2			0.996
0	45	-3	46	1	44	0.98
0	0	2	5	5	-41	1
0	-45	5	-34	3	-39	0.949
35	0	0.3	-0.05			0.984

Lumi from integration

S*Control



What is yellow s^* vertical?

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- From the ratio of Lumi @ $s(b,v,IP8)=45\text{cm}$ and $s(b,v,IP8)=-45\text{cm}$, we can fit the anticipated s^* in yellow.
- We get $s(y,v,IP8)=31\text{cm}$
- From the measurement of yellow orbit:
 $s(y,v,IP8)=29\text{cm}$

Conclusion

S*Control

- Currently the model dependent s^* knob heavily depend on the good optics correction
- The s^* knob is effective and quite accurate.
- The study shows that we can control s^* , this is helpful in the luminosity leverage in the future eRHIC.