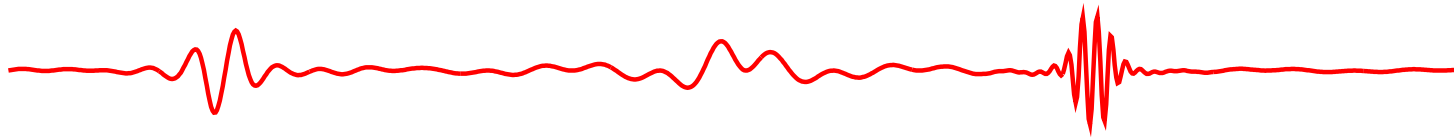


Considerations for the optics commissioning at $\beta^* = 0.6 \text{ m}$



R. Tomás

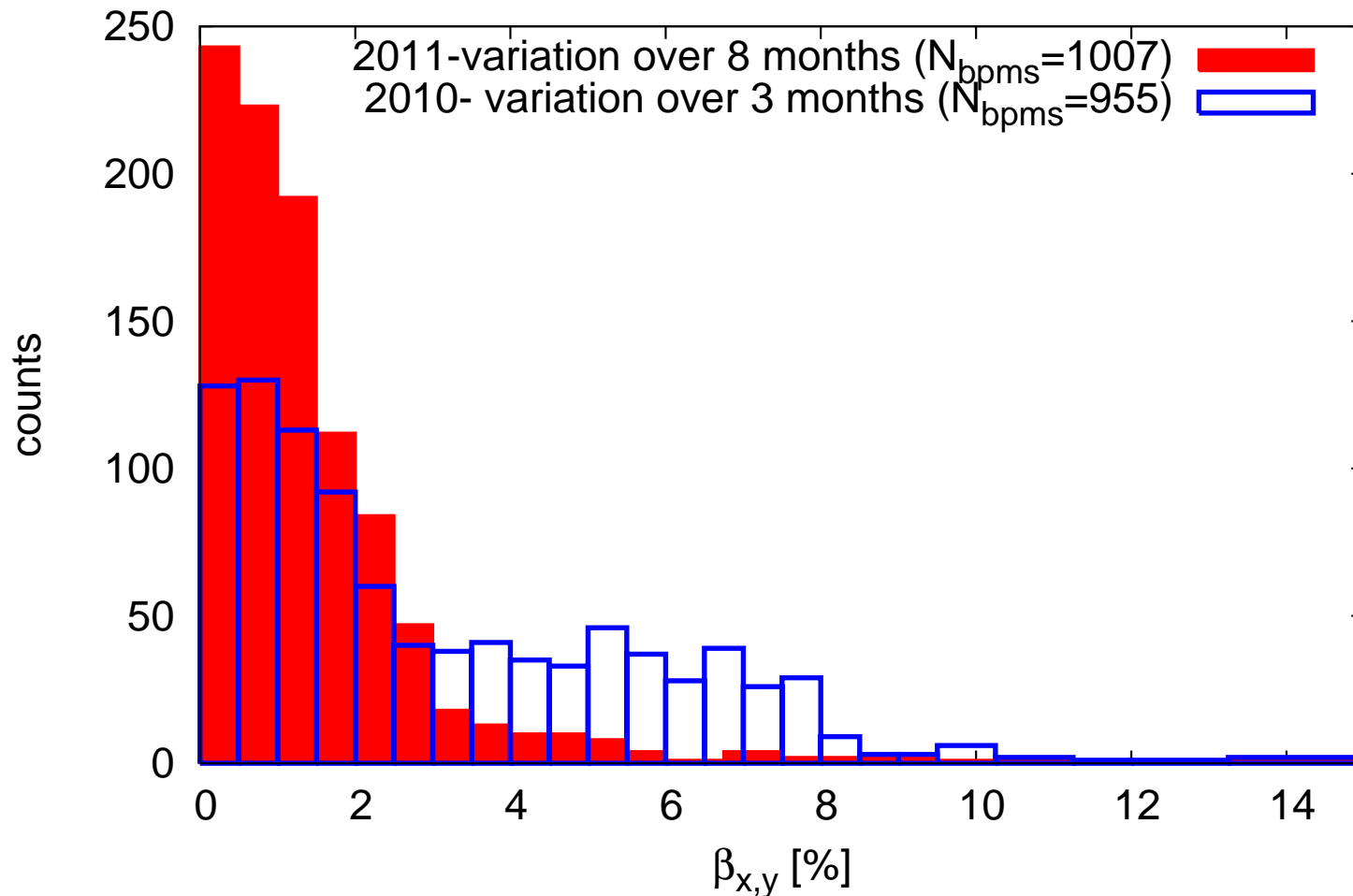
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February 2012

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- ★ Injection optics reproducibility
- ★ Corrections at $\beta^* = 0.4$ m (ATS MD):
 - “Successful” Beam 1 correction
 - Unsuccessful Beam 2 correction
- ★ Plans for 2012

Injection optics reproducibility



Great improvement in 2011

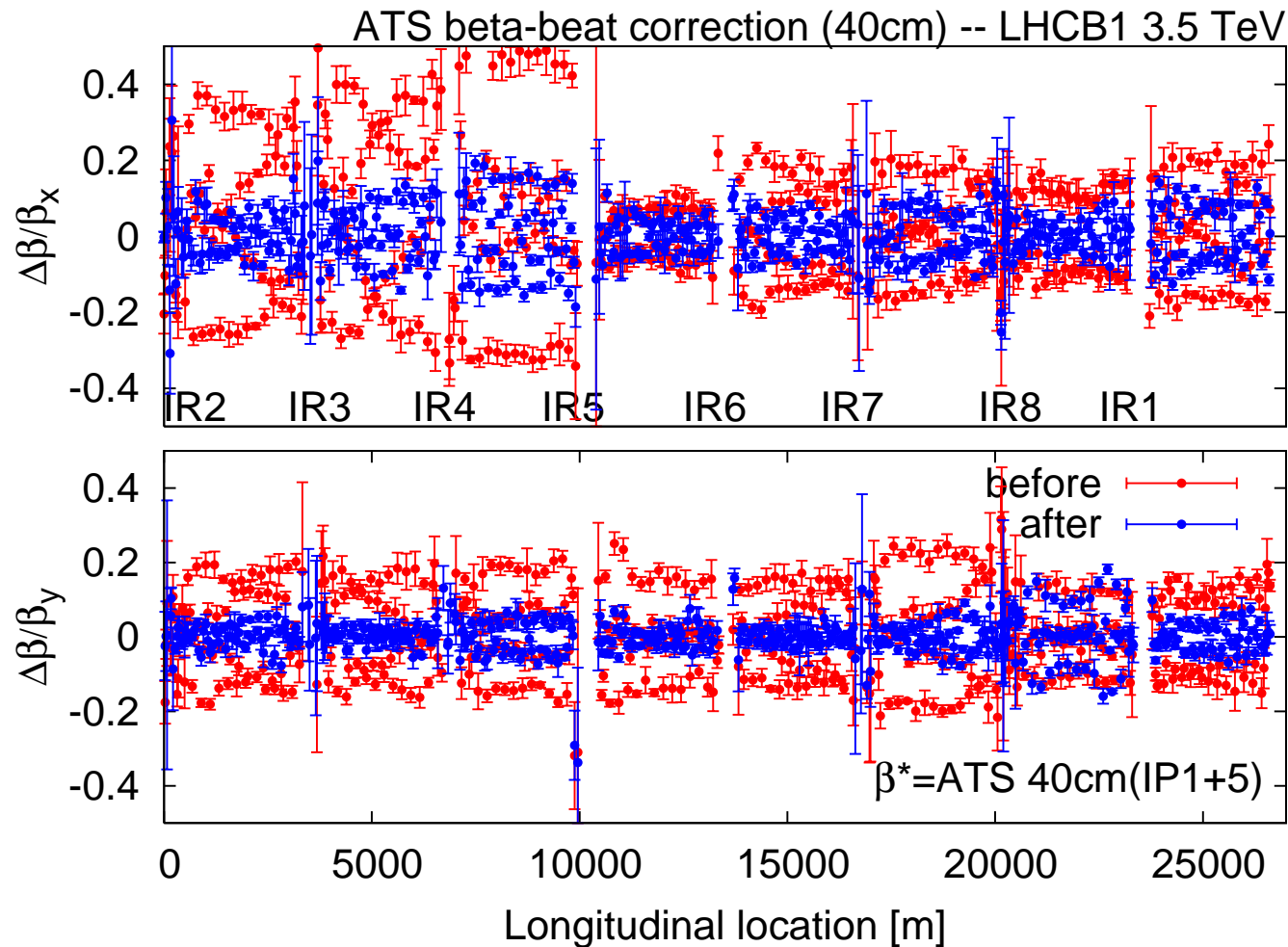
Plans for injection

- ★ Injection corrections are too old (2010, IR2 and IR8 triplets)
- ★ β -beating varied in the 8% level since
- ★ Injection optics are much more stable now
- ★ Old corrections should be removed for 2012 and new ones should be computed

$\beta^* = 0.4$ m ATS MD

- ★ Used precomputed triplet local corrections at $\beta^* = 1.5$ m
- ★ As always, time was short
- ★ Global corrections computed on-line at $\beta^* = 0.4$ m.

$\beta^* = 0.4$ m, ATS Beam 1, β -beat correction



Rather successful for the β -beat but...

$\beta^* = 0.4$ m, ATS Beam 1, ϕ -beat in IR1

IR1			
Selected BPMs in H plane	$\Delta\phi_x [10^{-3} \times 2\pi]$		
	$\beta^* = 1\text{m}$	$\beta^* = 0.4\text{m}$	Correction
BPM.14L1.B1/BPMSW.1L1	4 ± 2	5 ± 2	5 ± 2
BPMSW.1R1/BPM.14R1.B2	4	3 ± 2	-
BPMSW.1R1/BPM.15R1.B1	-8 ± 2	-10 ± 2	-1 ± 2
BPM.15L1.B2/BPMSW.1L1	-5	-6 ± 3	-
Selected BPMs in V plane	$\Delta\phi_y [10^{-3} \times 2\pi]$		
	$\beta^* = 1\text{m}$	$\beta^* = 0.4\text{m}$	Correction
BPM.15L1.B1/BPMSW.1L1	-8 ± 3	-5 ± 3	-9 ± 4
BPMSW.1R1/BPM.15R1.B2	-7	-6 ± 7	-
BPMSW.1R1/BPM.14R1.B1	-12 ± 3	-11 ± 3	-2 ± 5
BPM.14L1.B2/BPMSW.1L1	1	3 ± 6	-

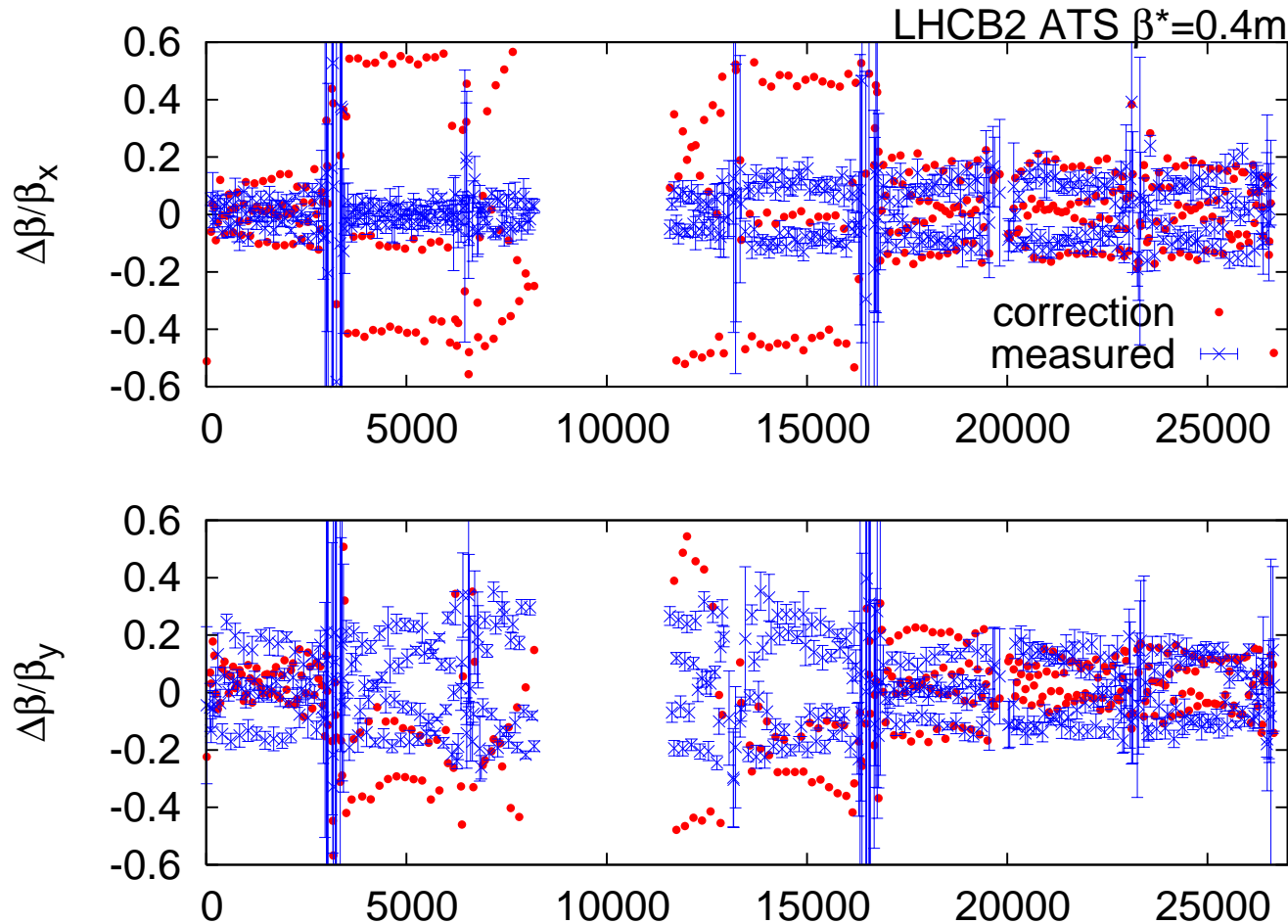
OK

$\beta^* = 0.4$ m, ATS Beam 1, ϕ -beat in IR5

IR5			
Selected BPMs in H plane	$\Delta\phi_x [10^{-3} \times 2\pi]$		
	$\beta^* = 1\text{m}$	$\beta^* = 0.4\text{m}$	Correction
BPM.14L5.B1/BPMSW.1L5	3.5 ± 0.5	0.4 ± 1.8	15 ± 2
BPMSW.1R5/BPM.14R5.B2	-19	3 ± 2	-
BPMSW.1R5/BPM.15R5.B1	0 ± 2	3.6 ± 1.0	14.8 ± 1.0
BPM.15L5.B2/BPMSW.1L5	-7	5 ± 2	-
Selected BPMs in V plane	$\Delta\phi_y [10^{-3} \times 2\pi]$		
	$\beta^* = 1\text{m}$	$\beta^* = 0.4\text{m}$	Correction
BPM.15L5.B1/BPMSW.1L5	4.1 ± 0.5	7 ± 2	-10 ± 3
BPMSW.1R5/BPM.15R5.B2	-7	-5 ± 7	-
BPMSW.1R5/BPM.14R5.B1	5 ± 2	5 ± 3	3 ± 4
BPM.14L5.B2/BPMSW.1L5	11	4 ± 6	-

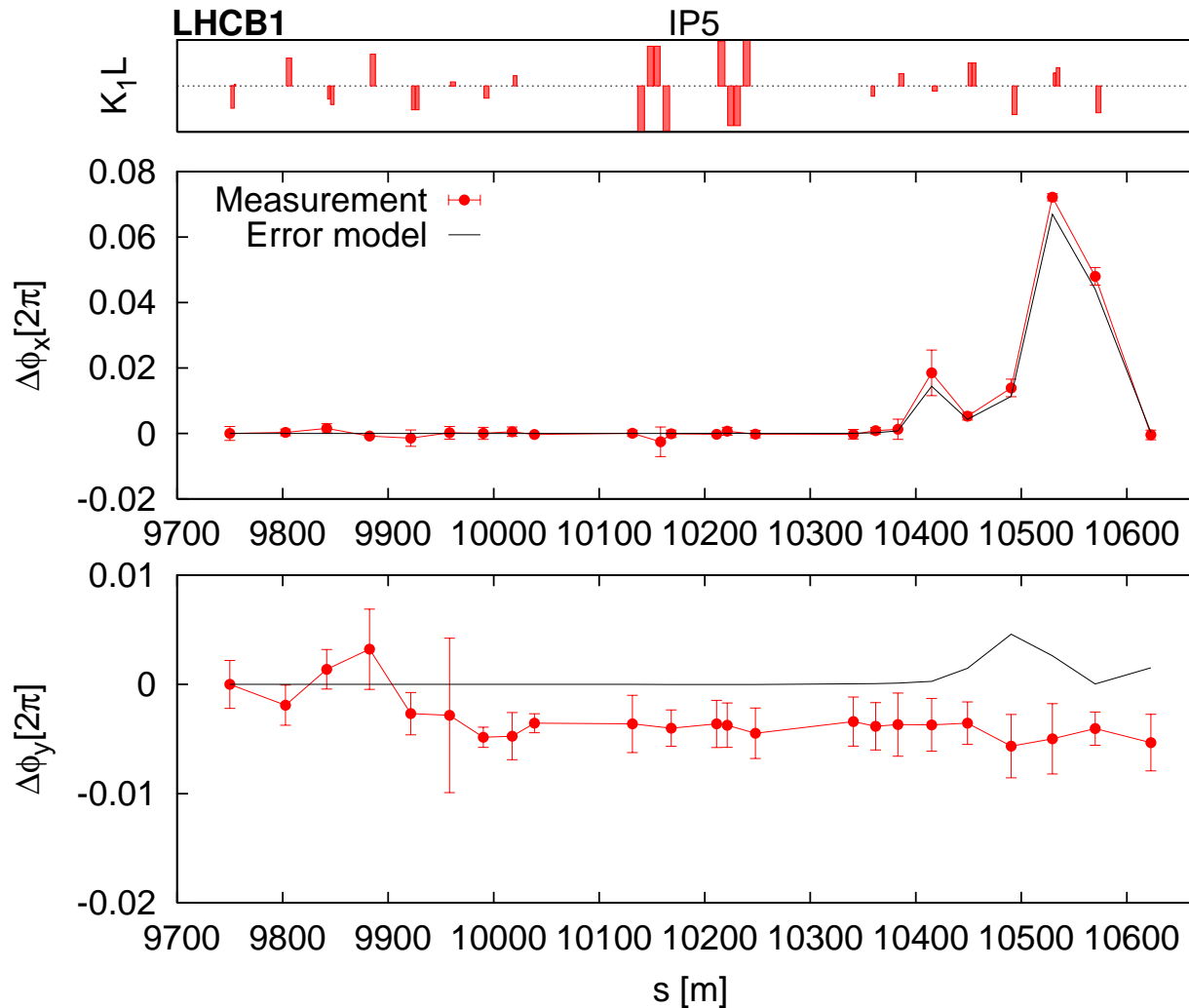
Not OK, ϕ -beat after correction larger than initial ϕ -beat.

$\beta^* = 0.4$ m, ATS Beam 2, global correction



Not successful during the MD. Piotr already found ways to stabilize correction (not 100% clear yet).

Beam 1, close look at IP5



Large local error in IR5 \rightarrow Local corrections at

$\beta^* = 1.5$ m do not work at $\beta^* = 0.4$ m

Summary

- ★ Injection corrections need an update
- ★ From ATS MD:
 - Local corrections need to be recomputed between $\beta^* = 1.5$ m and 0.4 m.
 - Global corrections must come only after good local corrections
- ★ To achieve 0.6 m in 2012 we would propose:
 - Measure the virgin machine throughout the LHC cycle (1-1.5 shift)
 - Compute local corrections Vs. β^* (days)
 - Apply local corrections (1-1.5 shift)
 - Global correction at 0.6 m (0.5 shift)