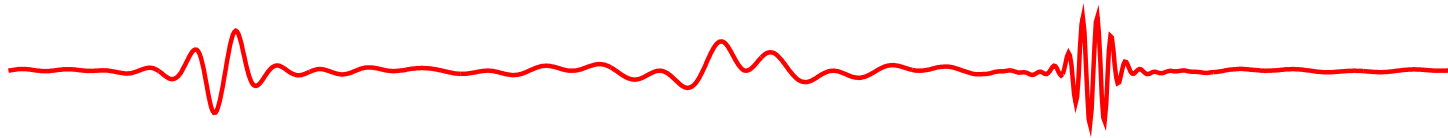


# MQY errors



R. Tomás for the OMC team

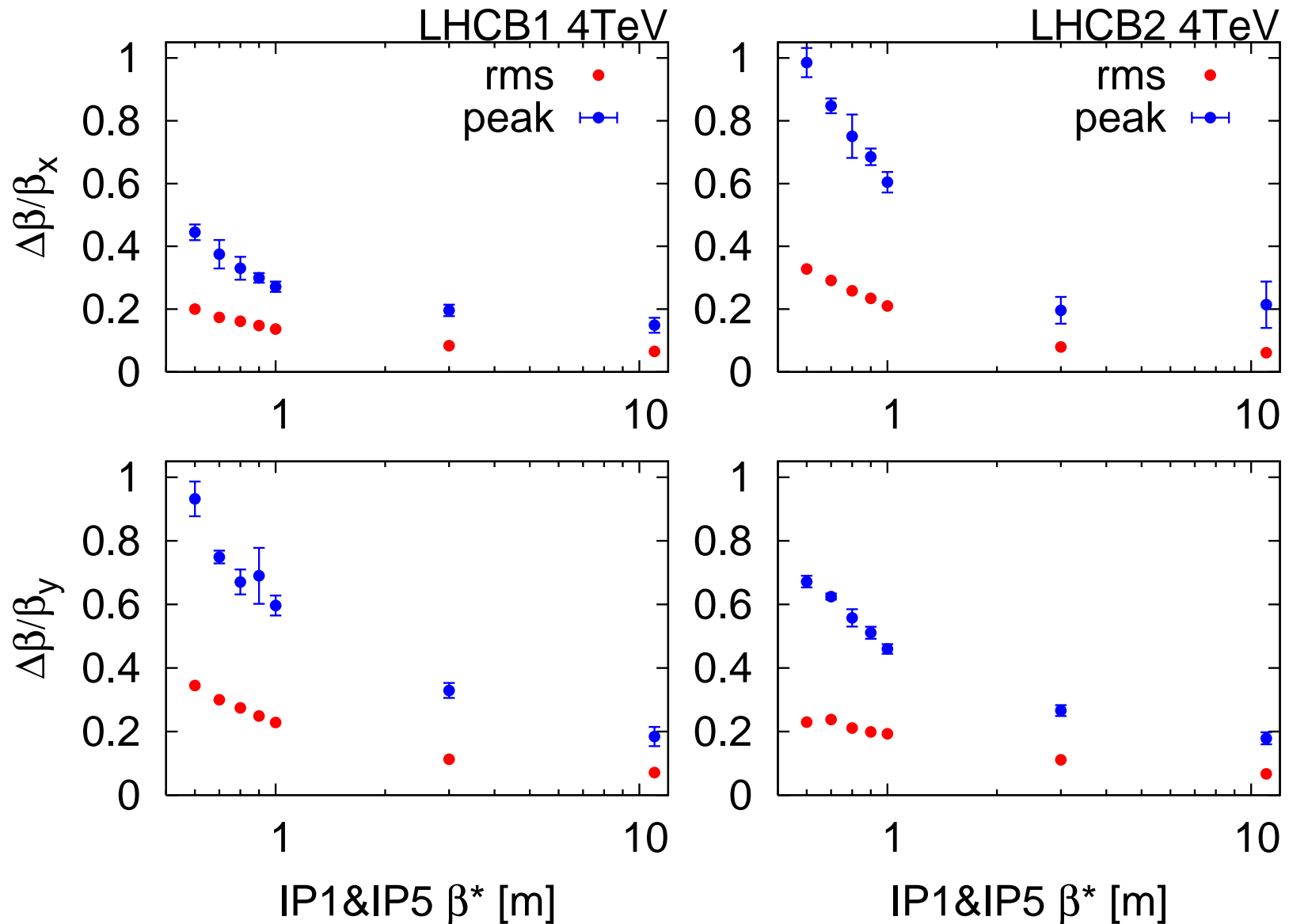
Thanks to Per Hagen and Stephane Fartoukh

July 2012

# Contents

- ★ Measured  $\beta$ -beating for the virgin machine
- ★ Per's errors versus 2012 local corrections (MQY only)
- ★ Close look at IR8
- ★  $\beta$ -beating and  $\Delta Q$  from Per's MQY errors at injection and collision
- ★ Conclusions

# Measured virgin $\beta$ -beating



# IR1 and IR2: OK

| Element  | Local Corrs | Per's |
|----------|-------------|-------|
| RQ4.L1B2 | -13         | 0     |
| RQ4.L1B1 | 0           | 0     |
| RQ4.R1B2 | 0           | 0     |
| RQ4.R1B1 | 0           | 0     |
| RQ4.L2B1 | 0           | 0     |
| RQ4.L2B2 | 0           | 0     |
| RQ4.R2B1 | 0           | 0     |
| RQ4.R2B2 | 0           | 0     |
| RQ5.L2B2 | 0           | 36    |
| RQ5.L2B1 | 0           | 41    |

# IR4: We never corrected it...

| Element  | Local Corrs | Per's |
|----------|-------------|-------|
| RQ5.L4B2 | 0           | 0     |
| RQ5.L4B1 | 0           | 0     |
| RQ5.R4B1 | 0           | 21    |
| RQ5.R4B2 | 0           | 10    |
| RQ6.L4B2 | 0           | 61    |
| RQ6.L4B1 | 0           | 72    |
| RQ6.R4B2 | 0           | 0     |
| RQ6.R4B1 | 0           | 0     |

The AC dipole is in IR4 and local corrections need care.

# IR5: Nice correlation!

| Element  | Local Corrs | Per's |
|----------|-------------|-------|
| RQ4.L5B2 | 101         | 153   |
| RQ4.L5B1 | 0           | 32    |
| RQ4.R5B2 | 0           | 0     |
| RQ4.R5B1 | 0           | 0     |

# IR6: Nice correlation!

| Element  | Local Corrs | Per's |
|----------|-------------|-------|
| RQ4.L6B1 | 0           | 0     |
| RQ4.L6B2 | 0           | 0     |
| RQ4.R6B1 | 0           | 0     |
| RQ4.R6B2 | 0           | 0     |
| RQ5.L6B1 | 60          | 72    |
| RQ5.L6B2 | 70          | 73    |
| RQ5.R6B1 | 10          | 0     |
| RQ5.R6B2 | -10         | 0     |

# IR8: Always difficult

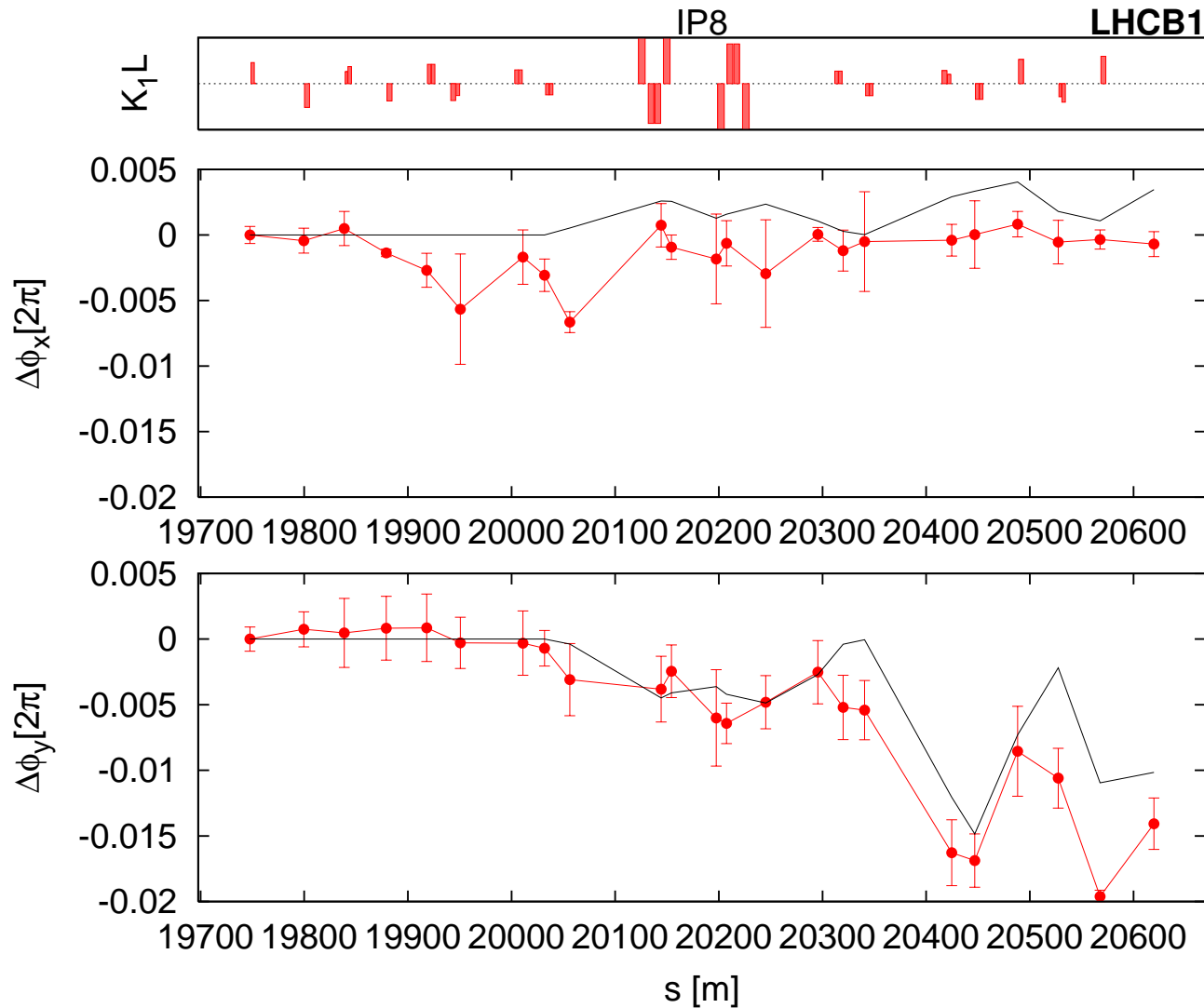
| Element  | Local Corrs | Per's |
|----------|-------------|-------|
| RQ4.L8B1 | 100         | 122   |
| RQ4.L8B2 | 0           | 119   |
| RQ4.R8B1 | 0           | 0     |
| RQ4.R8B2 | 240         | 0     |
| RQ5.R8B2 | 80          | 95    |
| RQ5.R8B1 | 270         | 99    |

Some correlations and some discrepancies...  
(in 2011 we used only the triplets)

Per's errors might shed light to the always difficult IR8.

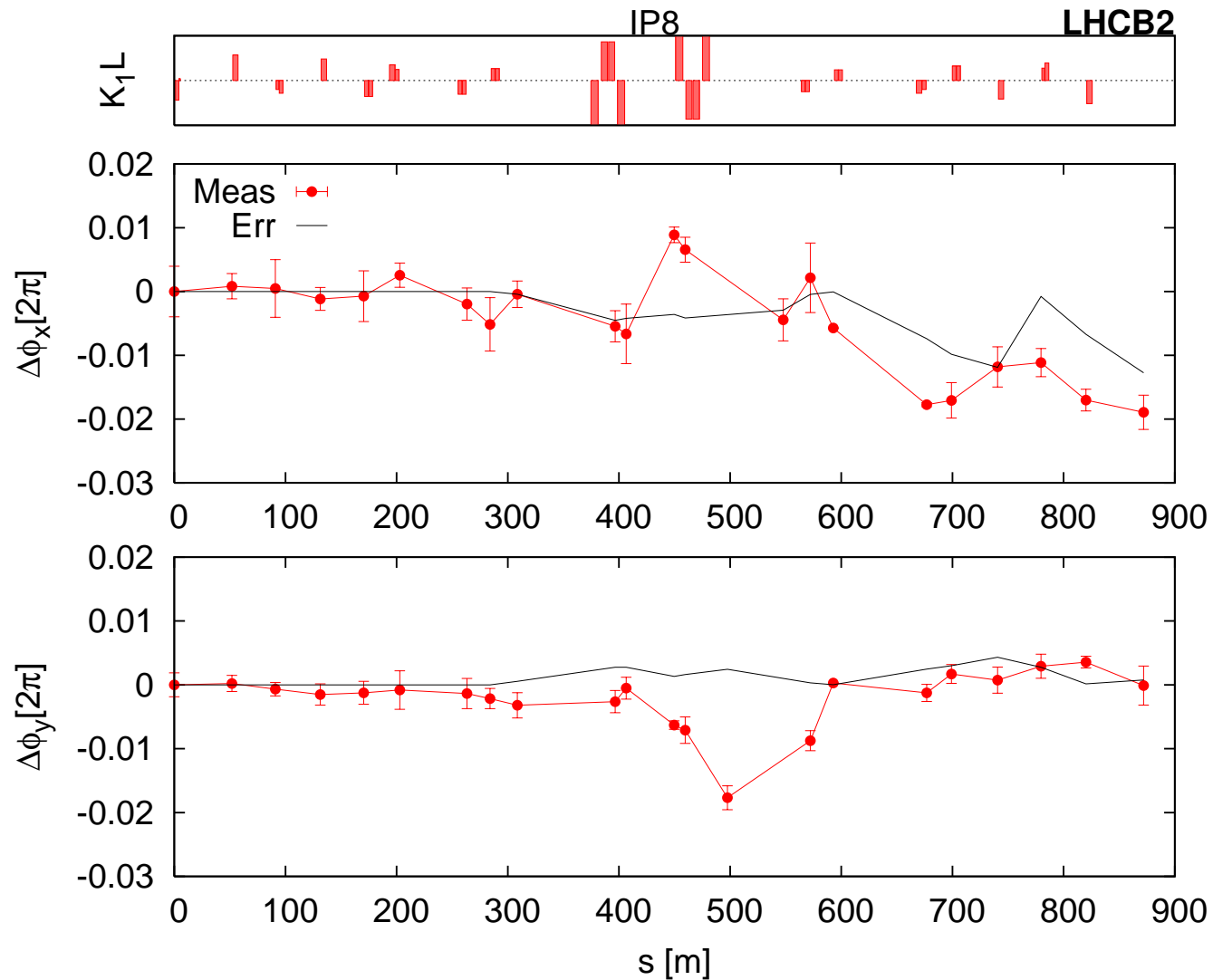


# IR8 at flattop using Per's errors (I)



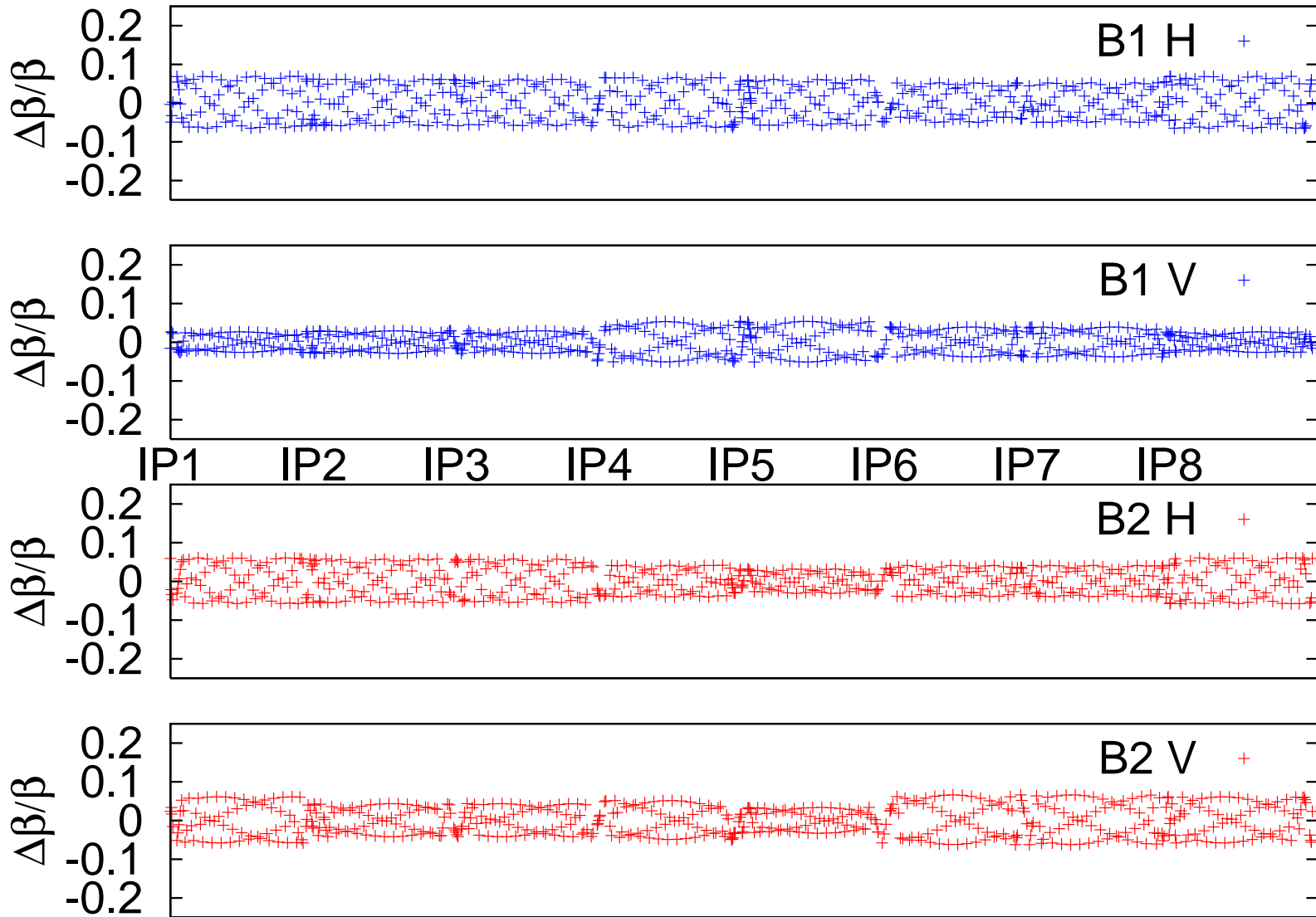
Per's errors explain about half the deviation.

# IR8 at flattop using Per's errors (II)

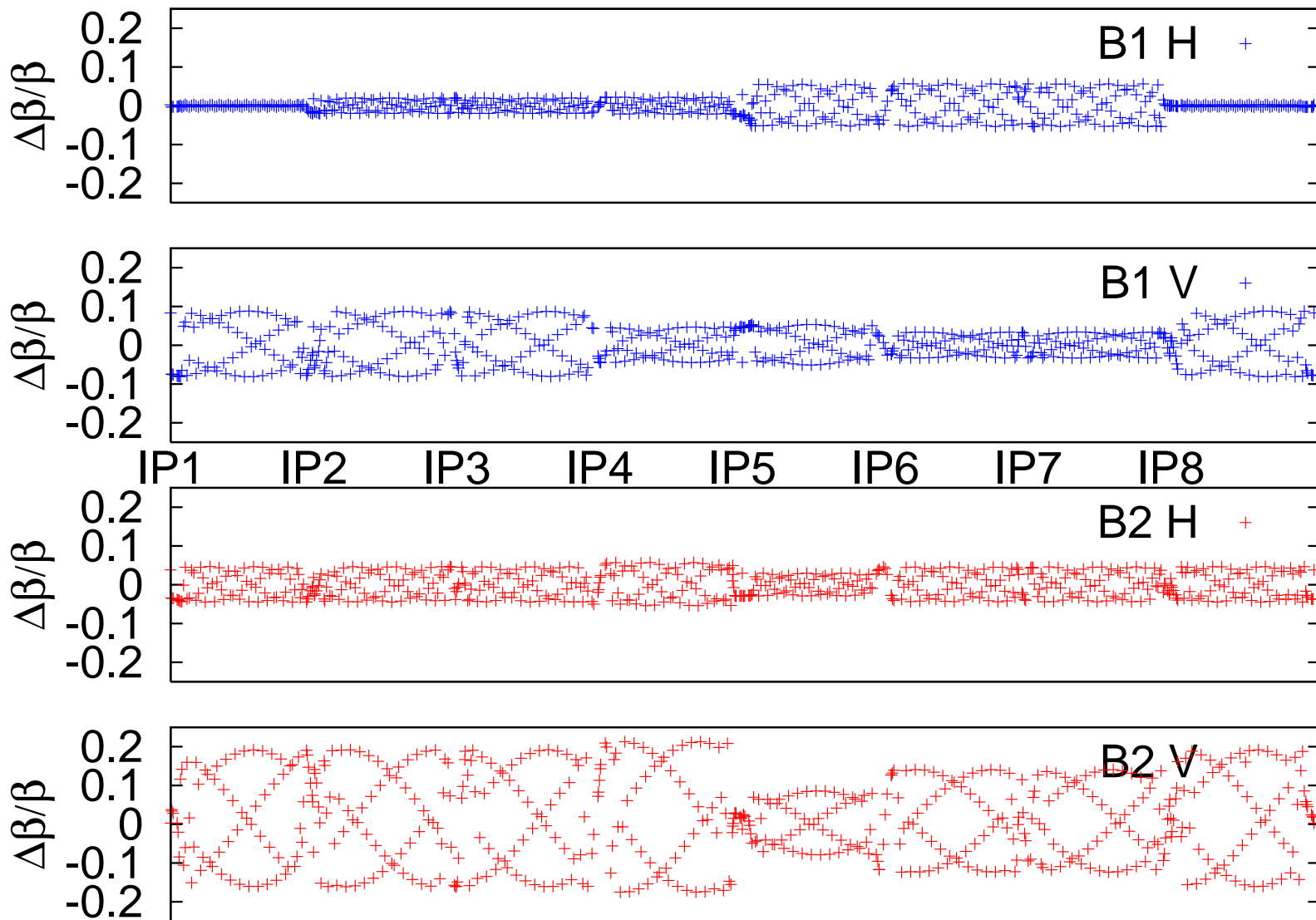


Similarly for Beam 2.

# $\beta$ -beating from Per's errors, injection



# $\beta$ -beating from Per's errors, collision



# Tune shifts from Per's errors

|                 | Injection | Collision |
|-----------------|-----------|-----------|
| $\Delta Q_x B1$ | 0.008     | 0.008     |
| $\Delta Q_y B1$ | 0.006     | 0.011     |
| $\Delta Q_x B2$ | 0.002     | 0.005     |
| $\Delta Q_y B2$ | 0.010     | 0.024     |

# Summary

- ★ Per's errors show excellent correlations with the local corrections for IR5 and IR6
- ★ IR1 and IR2 show reasonable agreement (or no disagreement)
- ★ IR8 has always been difficult, Per's errors shed light.
- ★ Significant effect on  $\beta$ -beating and tunes
- ★ Very interesting, shall we propose an MD?

# IR1 local corrections

| Element  | $\Delta k$ [ $10^{-5} \text{m}^{-2}$ ] |      | rel. [%] |
|----------|--|------|----------|
|          | 2011                                   | 2012 | 2012     |
| ktqx2.r1 | -0.8                                   | -1.4 | 0.16     |
| ktqx2.l1 |  | 1.0  | 0.11     |
| ktqx1.r1 |  | 1.0  | 0.11     |
| kq4.l1b2 |  | -0.5 | 0.13     |
| kq9.l1b1 | 3.8                                    | 1.5  | 0.23     |

# IR5 & IR6 local corrections

| Element  | $\Delta k$ [ $10^{-5} \text{m}^{-2}$ ] |      | rel. [%] |
|----------|--|------|----------|
|          | 2011                                   | 2012 | 2012     |
| ktqx2.r5 | 1.3                                    | 1.05 | 0.12     |
| ktqx2.l5 | 1.0                                    | 0.70 | 0.08     |
| kq4.l5b2 |  | 3.80 | 1.00     |
| kq5.l6b1 |  | -3.9 | 0.6      |
| kq5.r6b1 |  | 0.9  | 0.1      |
| kq5.l6b2 | 4.6                                    | 4.8  | 0.7      |
| kq5.r6b2 |  | 1.0  | 0.1      |



# IR8 local corrections

| Element  | $\Delta k$ [ $10^{-5} \text{m}^{-2}$ ] |       | rel. [%] |
|----------|--|-------|----------|
|          | 2011                                   | 2012  | 2012     |
| ktqx2.r8 | -0.5                                   |       |          |
| ktqx2.l8 | -2.3                                   |       |          |
| kq4.r8b2 |  | -10.0 | 2.4      |
| kq5.r8b2 |  | -3.0  | 0.8      |
| kq6.l8b2 |  | -3.0  | 0.5      |
| kq4.l8b1 |  | 4.0   | 1.0      |
| kq5.r8b1 |  | 8.0   | 2.7      |
| kq6.l8b1 |  | 2.0   | 0.4      |