$\begin{array}{l} \mbox{Beta-beat over time}\\ \mbox{Box} \mbox{Local}\ \beta\ \mbox{corrections at } 3.5\ \mbox{Tev},\ \beta^* = < 3.5, 1.5 > m\\ \mbox{Global}\ \beta\ \mbox{corrections at } 3.5\ \mbox{Tev},\ \beta^* = 1.5m\\ \mbox{Local coupling corrections at } 3.5\ \mbox{Tev},\ \beta^* = < 3.5, 1.5 > m\\ \mbox{Dynamic beta-beating}\\ \mbox{Dynamic beta-beating}\\ \mbox{Summary and outlook} \end{array}$ 

### Beta-beat measurements and corrections 2011

G. Vanbavinckhove, M. Aiba, R. Calaga, R. Miyamoto and R. Tomás García

March 8, 2011

イロト イポト イヨト イヨト

 $\begin{array}{c} \text{Beta-beat over time}\\ \text{Local }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<1.5m\\ \text{Local coupling corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook}\\ \end{array}$ 

## Acknowledgments

### Thanks to: V. Kain, M. Lamont, S. Redaelli and F. Schmidt

Beta-beat measurements and corrections 2011

・ロン ・回と ・ヨン・

## Table of contents

- 1 Beta-beat over time
- 2 Local  $\beta$  corrections at 3.5 Tev,  $\beta^* = <3.5, 1.5 > m$
- **3** Global  $\beta$  corrections at 3.5 Tev,  $\beta^* = 1.5m$
- 4 Local coupling corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$
- 5 Dynamic beta-beating
- 6 Summary and outlook

- 4 回 5 - 4 三 5 - 4 三 5

### Beta-beat over time

Local  $\beta$  corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$ Global  $\beta$  corrections at 3.5 Tev,  $\beta^* = 1.5m$ Local coupling corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$ Dynamic beta-beating Summary and outlook

### Beta-beat over time



Beta-beat measurements and corrections 2011

 $\begin{array}{l} \text{Beta-beat over time}\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<1.5m\\ \text{Local coupling corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

### Local corrections

Local corrections at IP1, IP5, IP6 and IP8.

Corrector	ΔK	Relative change [%]
kq9.l1b1	3.8e-05	0.6 %
ktqx2.r1	-0.8e-5	0.09%
ktqx2.l5	1e-5	0.11 %
ktqx2.r5	1.3e-5	0.15 %
kq5.l6b2	-4.6e-05	0.7 %
ktqx2.18	-2.3e-5	0.26 %
ktqx2.r8	-5.3e-6	0.06 %

・ 回 と ・ ヨ と ・ ヨ と

### Example local correction



Beta-beat measurements and corrections 2011

< Ξ

 $\begin{array}{c} \text{Beta-beat over time}\\ \text{Beta-beat over time}\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5>m\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<1.5m\\ \text{Local coupling corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5>m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

### Local corrections



・ロト ・回ト ・ヨト



# Global corrections beam 1

Local  $\beta$  corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$  **Global**  $\beta$  corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$ Local coupling corrections at 3.5 Tev,  $\beta^* = 4.35, 1.5 > m$ Local coupling corrections at 3.5 Tev,  $\beta^* = 4.35, 1.5 > m$ Summary and outlook

լիլ

 $\begin{array}{l} \text{Beta-beat over time}\\ \text{Local }\beta \text{ corrections at } 3.5 \ \text{Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \textbf{Global }\beta \text{ corrections at } 3.5 \ \text{Tev}, \ \beta^* = 1.5m\\ \text{Local coupling corrections at } 3.5 \ \text{Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

## Global corrections beam 1





# Global corrections beam 2

Local  $\beta$  corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$  **Global**  $\beta$  corrections at 3.5 Tev,  $\beta^* = < 3.5, 1.5 > m$ Local coupling corrections at 3.5 Tev,  $\beta^* = 4.35, 1.5 > m$ Local coupling corrections at 3.5 Tev,  $\beta^* = 4.35, 1.5 > m$ Summary and outlook

 $\begin{array}{l} \text{Beta-beat over time}\\ \text{Beta-beat over time}\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^* = 1.5m\\ \text{Local coupling corrections at }3.5 \text{ Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

### Global corrections beam 2



 $\begin{array}{l} \text{Beta-beat over time}\\ \text{Beta-beat over time}\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^* = 1.5m\\ \text{Local coupling corrections at }3.5 \text{ Tev}, \ \beta^* = < 3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

### Local coupling corrections

### Local coupling corrections at IP1, IP5 and IP8

Corrector	ΔK
kqsx3.l5	0.0007
kqsx3.r5	0.0007
kqsx3.l1	0.0008
kqsx3.r1	0.0008
kqsx3.l8	-0.0005
kqsx3.r8	-0.0005

→ E → < E →</p>

 $\begin{array}{l} \text{Beta-beat over time}\\ \text{Beta-beat over time}\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^{*}=<3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at }3.5 \text{ Tev}, \ \beta^{*}=<3.5, 1.5 > m\\ \text{Local coupling corrections at }3.5 \text{ Tev}, \ \beta^{*}=<3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook} \end{array}$ 

### Example coupling correction



Beta-beat over time Local  $\beta$  corrections at 3.5 Tev,  $\beta^* = \langle 3.5, 1.5 \rangle m$ Global  $\beta$  corrections at 3.5 Tev,  $\beta^* = 1.5m$ Local coupling corrections at 3.5 Tev,  $\beta^* = \langle 3.5, 1.5 \rangle m$ Dynamic beta-beating Summary and outlook

### Local coupling corrections



Beta-beat over time

 $\begin{array}{l} \mbox{Local $\beta$ corrections at 3.5 Tev, $\beta^* =< 3.5, 1.5 > m$ \\ \mbox{Global $\beta$ corrections at 3.5 Tev, $\beta^* = 1.5m$ \\ \mbox{Local coupling corrections at 3.5 Tev, $\beta^* =< 3.5, 1.5 > m$ \\ \mbox{Dynamic beta-beating} \end{array}$ 

Summary and outlook

## Dynamic beta-beating at injection ?



Beta-beat measurements and corrections 2011

(D) (A) (A) (A) (A)

 $\begin{array}{c} \text{Beta-beat over time}\\ \text{Local }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Global }\beta \text{ corrections at 3.5 Tev}, \ \beta^*=<1.5m\\ \text{Local coupling corrections at 3.5 Tev}, \ \beta^*=<3.5, 1.5 > m\\ \text{Dynamic beta-beating}\\ \text{Summary and outlook}\end{array}$ 

# Summary and outlook

- Beta-beat in both beams has been reduced to the 10% level.
- Local coupling corrections have been carried out.
- K-modulation will be conducted to measure β\* with more accuracy and apply corrections with β\* knobs.

・ 同 ト ・ ヨ ト ・ ヨ ト