

# $\beta^* = 1000$ m physics run

## Teams

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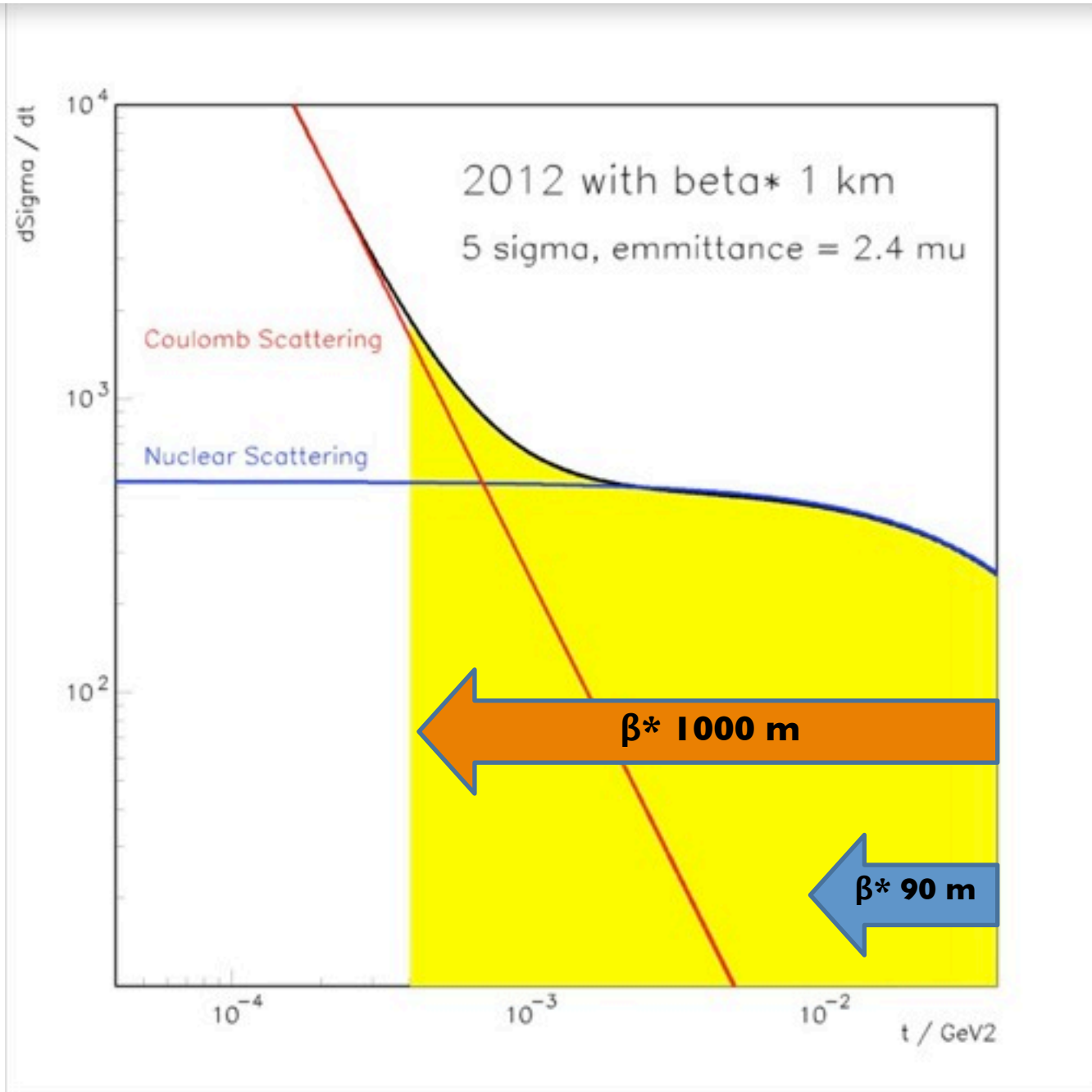
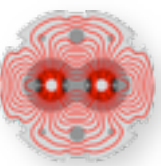
## Overview over $\beta^* = 1000$ m runs this year

- **23/6, 8h high- $\beta$  MD, reaching  $\beta^*=1000$  m, first optics measurement**
- **13 /9 24h commissioning of 1000 m, correct and measure optics, find collisions**
- **11/10 8h MD, K-modulation  $\beta^*$  measurement at 1000m, 1st tests of collimators ( $2\sigma$ ) and RPs ( $3\sigma$ ) very close to beam**

**and now as planned**

- **24/10, 24 hours **physics run** including collimator and roman pot alignment**

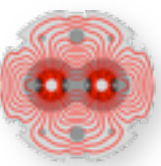
# very forward pp Cross Section



schematic, based on slide from K. Hiller / ALFA LPC 29/10/2012

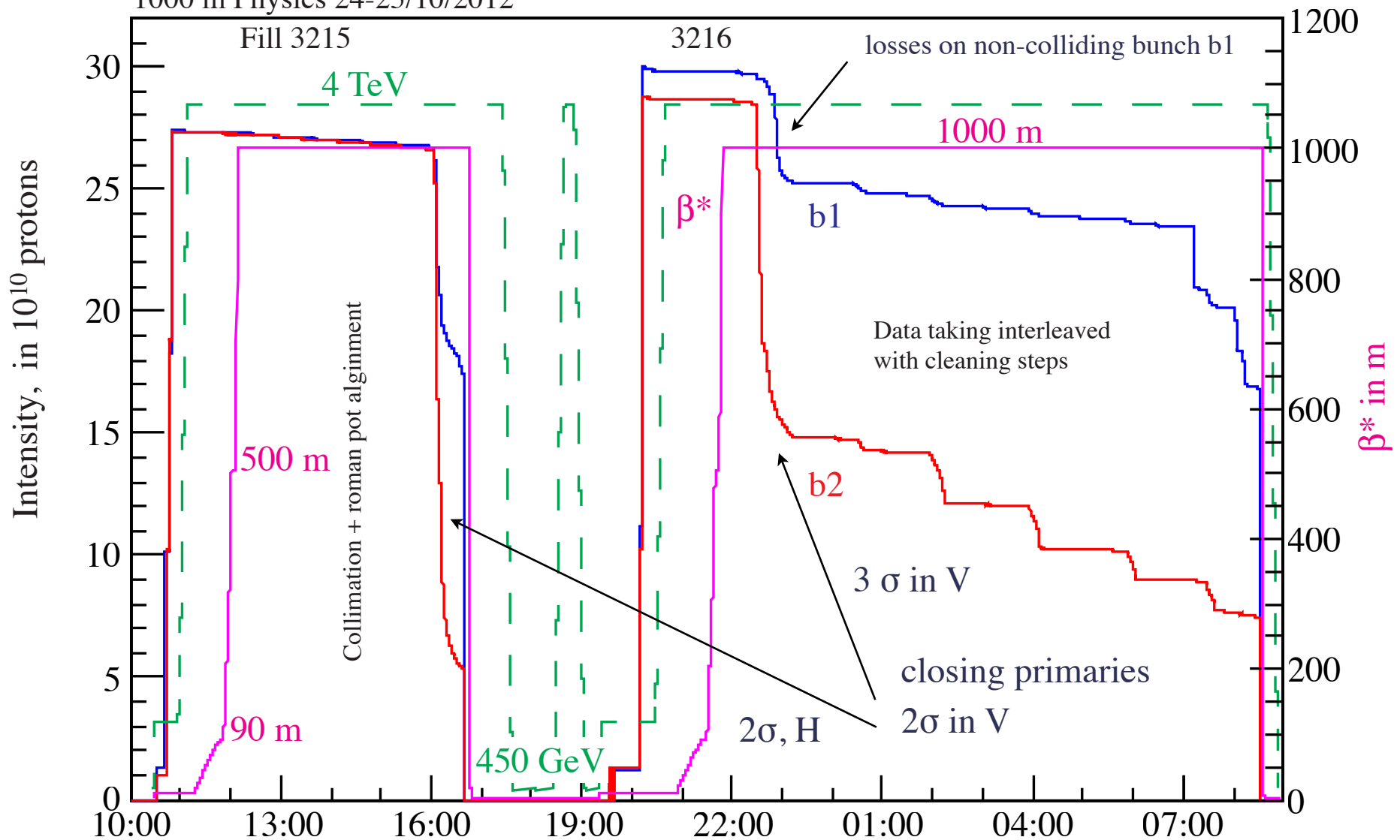


# Beam conditions, timeline

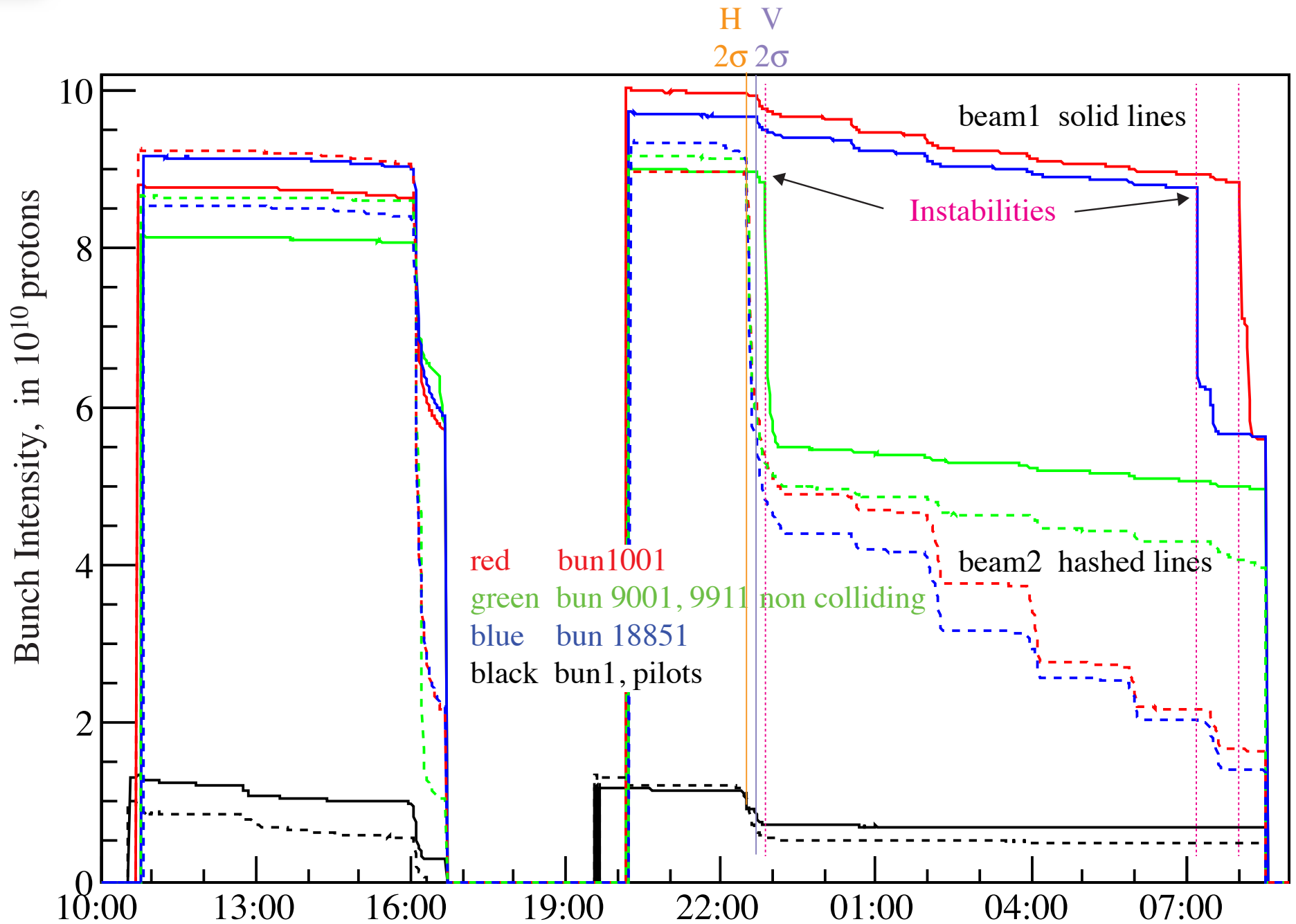
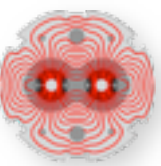


**Beam conditions : 3 bunches of nearly  $1 \cdot 10^{11}$  protons each beam**  
**2 colliding, 1 non-colliding in 1&5 (separated in IP2, 8)**  
**emittances at injection below  $1.3\text{-}1.5 \mu\text{m}$ ,  $b2 \text{ H} \sim 3.5 \mu\text{m}$  at 90 m**

1000 m Physics 24-25/10/2012



Fill 3215 lost after collimator + RP adjust by spurious QPS trigger



# Roman Pot Hit Maps before Scraping

(raw distributions from online event display, local track segments)



Sector 45 (beam 2)

Sector 56 (beam 1)

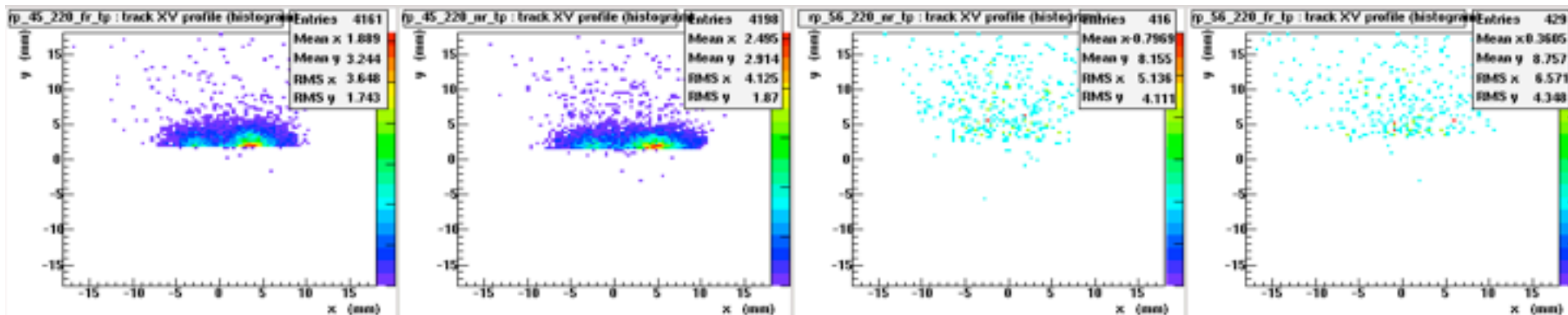
far unit

near unit

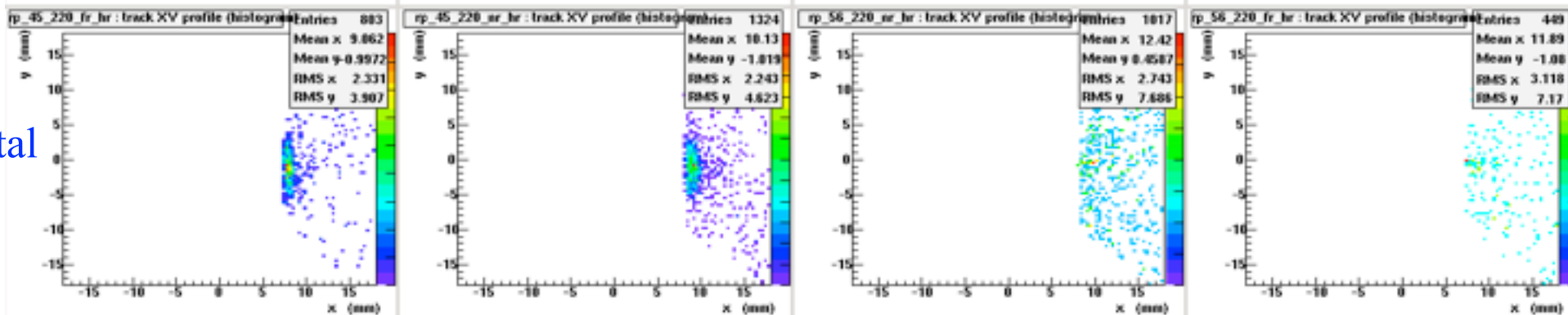
near unit

far unit

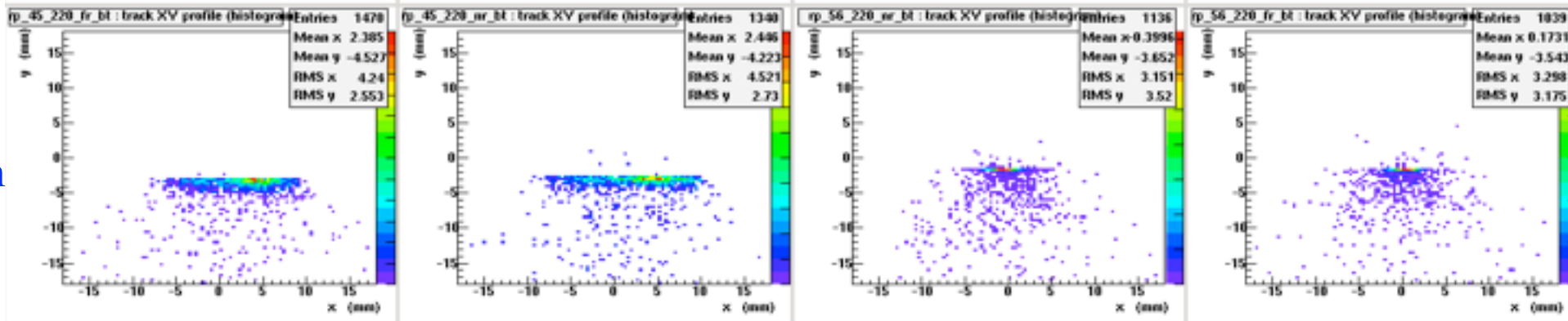
Top



Horizontal



Bottom



Dominant halo background

# Roman Pot Hit Maps after Scraping

(raw distributions from online event display: local track segments)



Sector 45 (beam 2)

Sector 56 (beam 1)

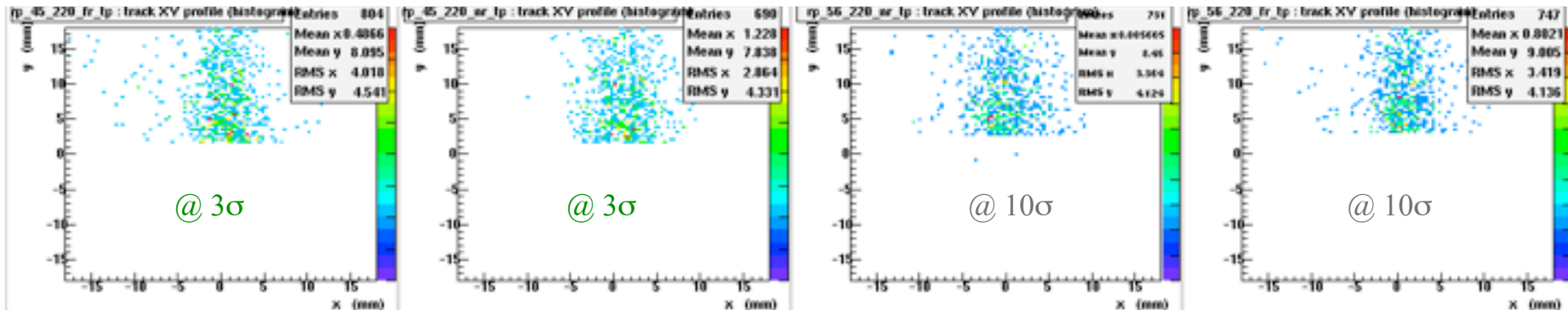
far unit

near unit

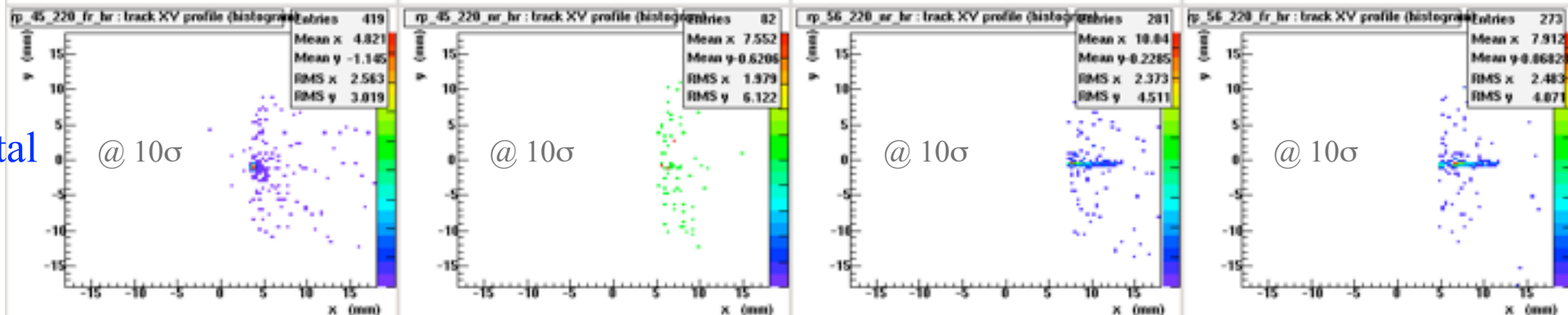
near unit

far unit

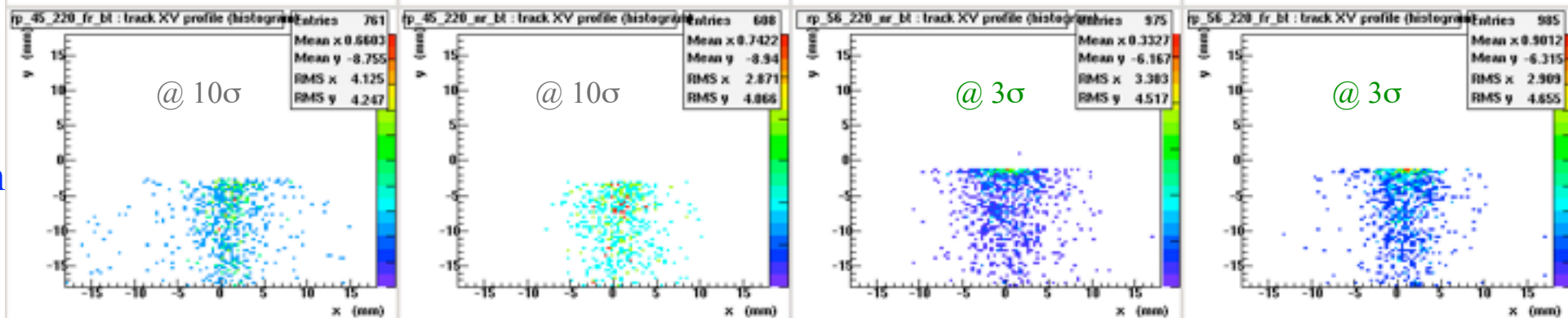
Top



Horizontal



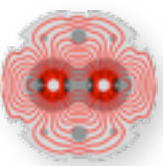
Bottom



Strong elastic contribution



# Summary



The physics run at  $\beta^* = 1000$  m in 1&5 at 4 TeV with roman pots at 3 nominal  $\sigma$  in V was very challenging and stretching things to the limits, but finally very successful

**TOTEM and ALFA collected over 300k elastic events extending into the CI region**

Many interesting observations - to be analyzed in detail together with systematics from optics measurements from previous studies

- halo scraping and re-population on 1-2h intervals
- signs of instabilities by loss of Landau damping on non-colliding bunches with very tight collimation

Even higher  $\beta^*$ s are requested after LS1 and needed to get the CI region at 7 TeV will require to remove some of our powering limits (finally install the missing return cables)

Further plans for this year :

Request for a 4h MD on injection at 90 m in MD#4 block +

TOTEM requests for 90m for the lower energy pp run and pPb early next year