



# VELO Software Status

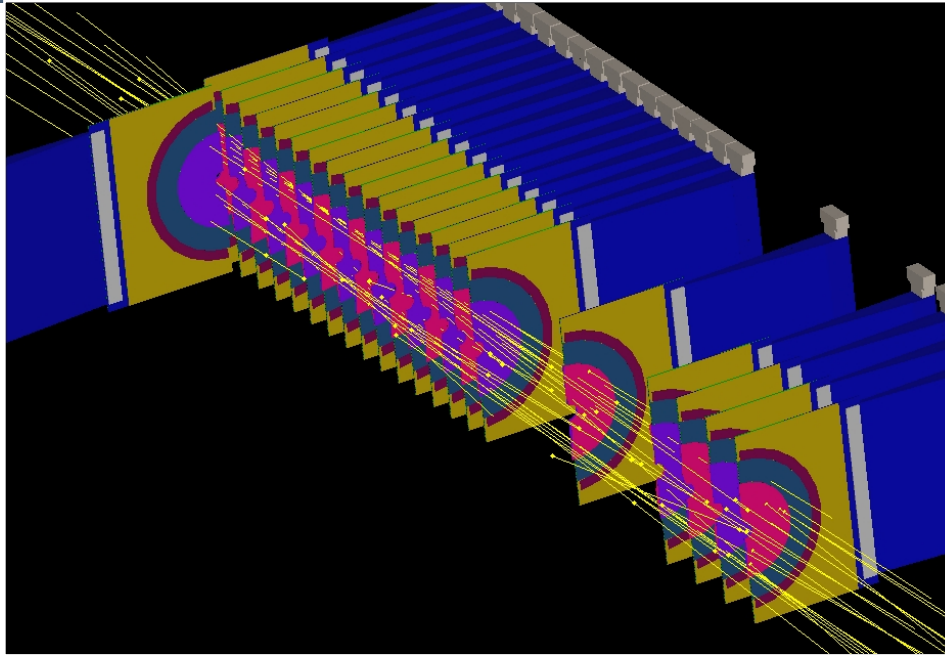
- Some highlights of recent work
  - LHC beam on absorber data (TED)
  - Alignment
  - Timing
  - TELL1 Algorithms & Uploading
  - Monitoring
- Current/future Focus areas
  - Error Banks
  - Noisy Strips
  - Simulation/reconstruction activities

# Highlights

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- Selected highlights, illustrated with TED run performance
- See slides of talks this week:
  - Aras – Traversing Track Finder (velo commisioning meeting)
  - Tomasz – Vetra Python Configurables
  - Silvia – TED results
  - James – Velo Monitoring

# LHC beam on absorber: 6<sup>th</sup> & 7<sup>th</sup> June



Total ~ 60k Tracks (last year ~2000)

Single bunches

every 48s

Typically  $5 \times 10^9$  particles per bunch

Time alignment events +/-2

Bunch trains

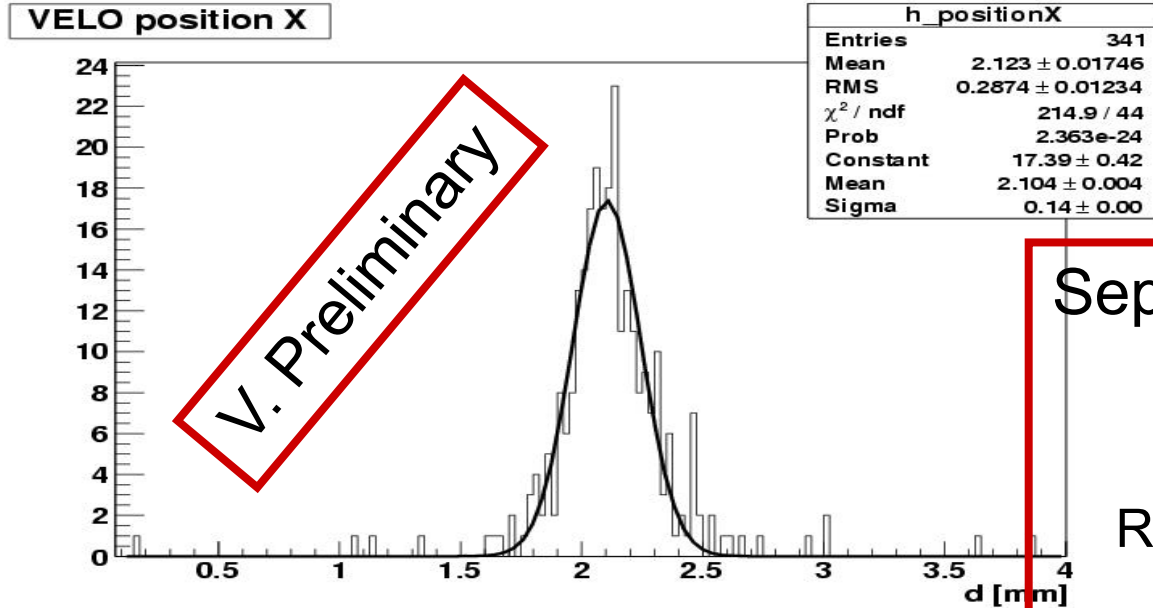
12 consecutive bunches 25ns spacing

Mostly  $1 \times 10^{10}$  particles per bunch, some  $5 \times 10^{10}$  particles per bunch

See talk from Silvia Borghi on Thursday

# First determination of separation of two VELO halves

Silvia Borghi & Aras Papadelis



Separation was set to 2mm  
in motion system

(photogrametry error +/-  
200 $\mu\text{m}$ )

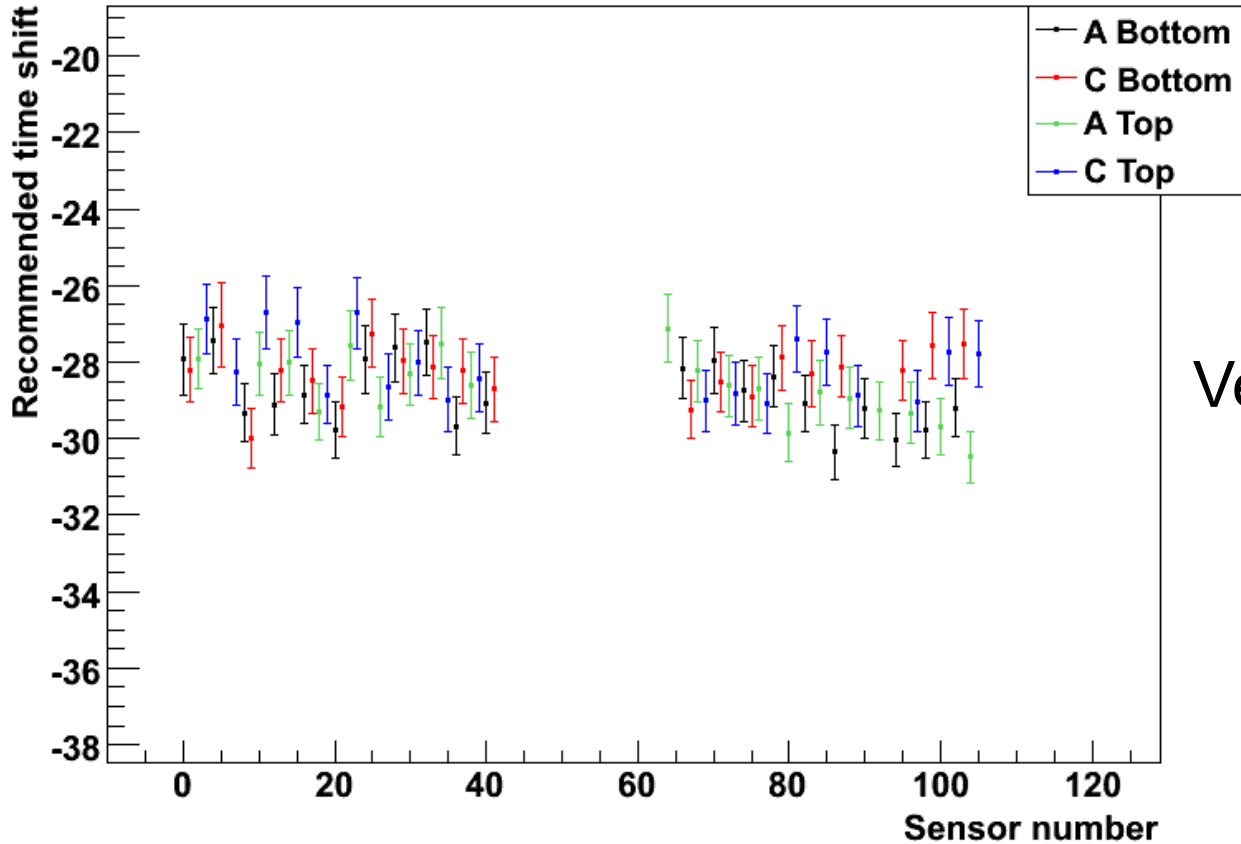
Reconstruct with Histogram  
& Millepede Method

- Use tracks traversing both halves of VELO  
(New pattern recognition Aras Papadelis)
- Data taken in two VELO positions
- Difference reconstructed by Silvia at 450 chocolates

# Velo Timing

Kazu Akiba & Ivan Mous

## Timing summary

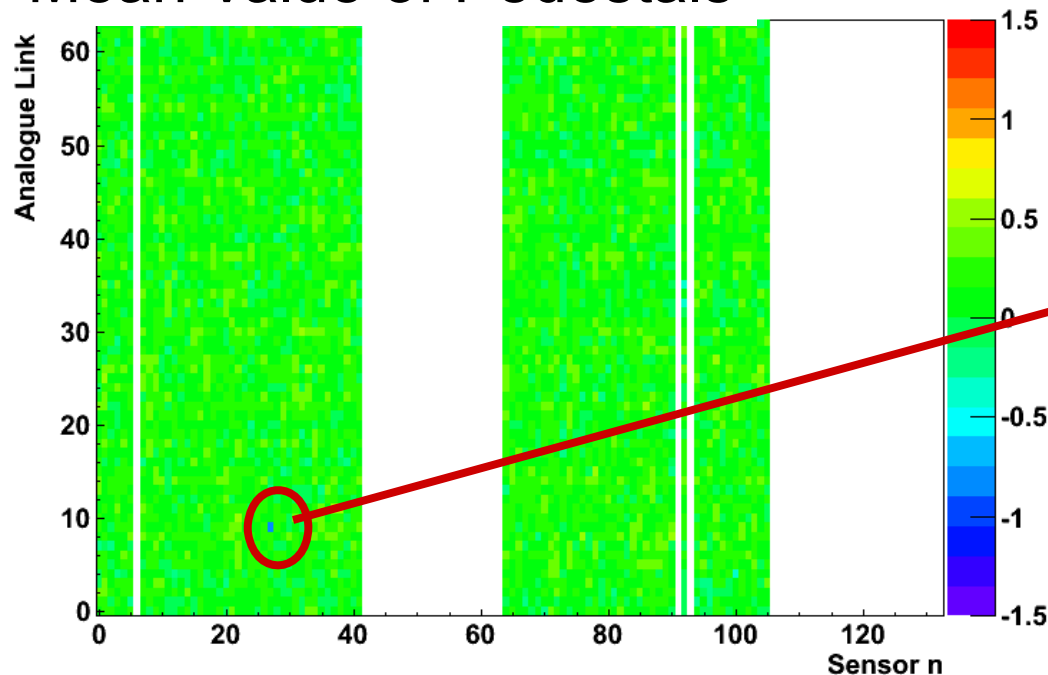


Velo timing calibrated  
to +/- 2ns

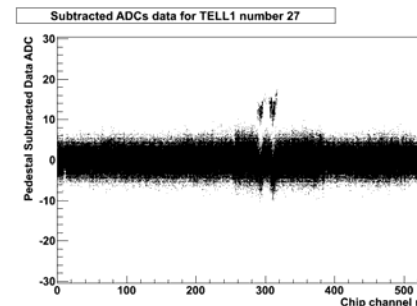
- Data taken at 4 timing steps 0, 6.5, 12.5, 19 ns
- Fit pulse shapes
- Fast turn around on procedure
- Cross-checked for stability with later data sample

# TELL1 Algorithm Parameters

## Mean Value of Pedestals



Tomasz Szumlak,  
Kurt Rinnert



Bad A-Link masked

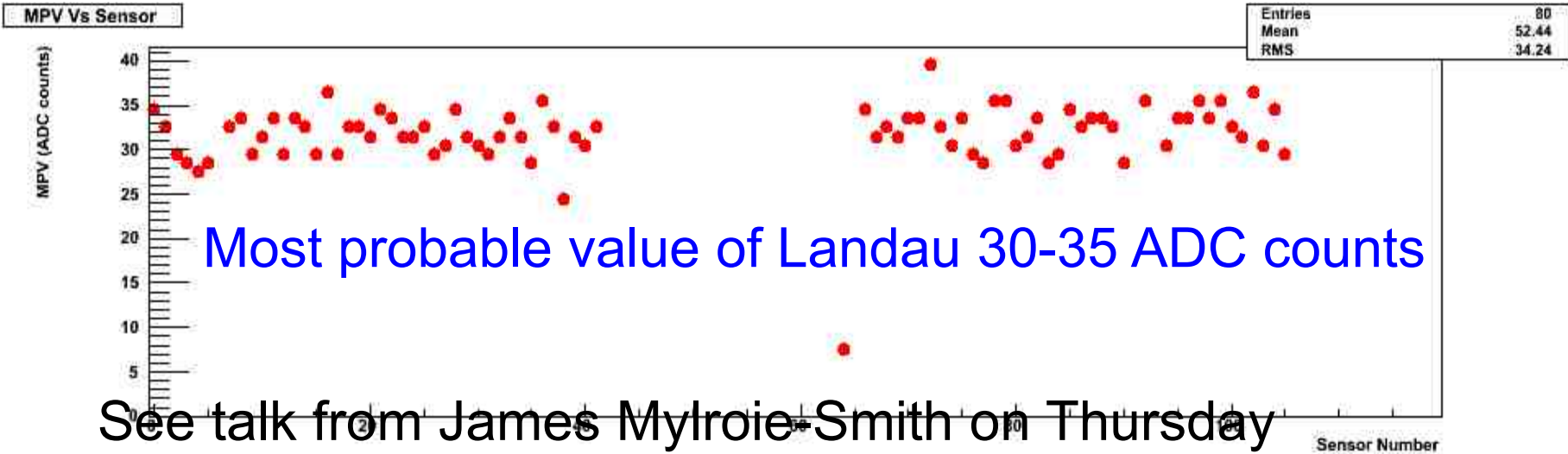
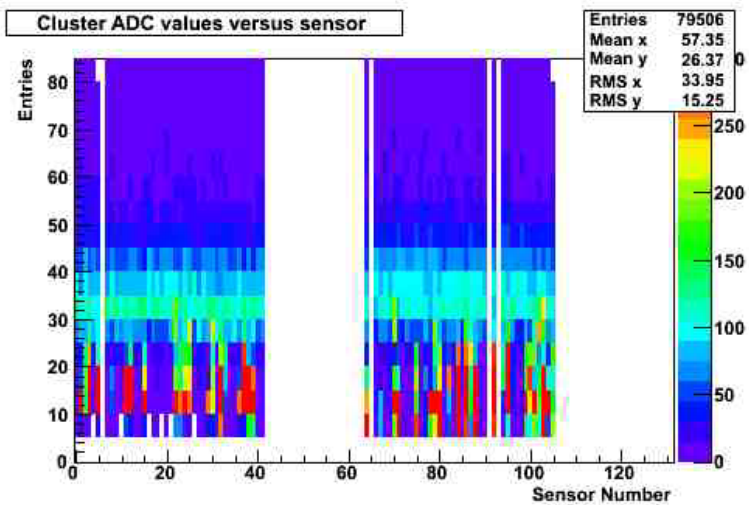
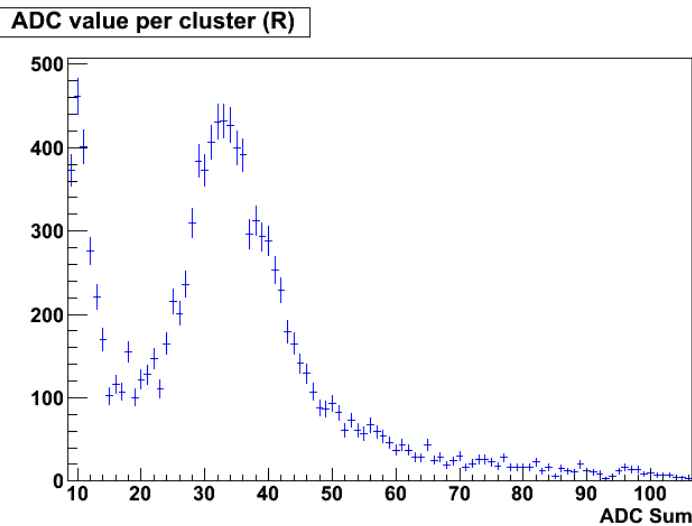
- **Automated (and documented) procedure to determine TELL1 Algorithm parameters**
- Pedestals, Clustering Thresholds determined on a noise run with Vetra
- Noisy strips, A-links masked out
- Xml produced, stored in database and uploaded to TELL1, read back and verified

Configuration of Vetra – see slides of talk from Tomasz on Tuesday

# Extensive use of Online & Offline Monitoring

- Offline on plus – 5 min turnaround
- Plots from one example run

Kurt Rinnert  
Eduardo  
Rodrigues



See talk from James Mylroie-Smith on Thursday

# Current/future activities

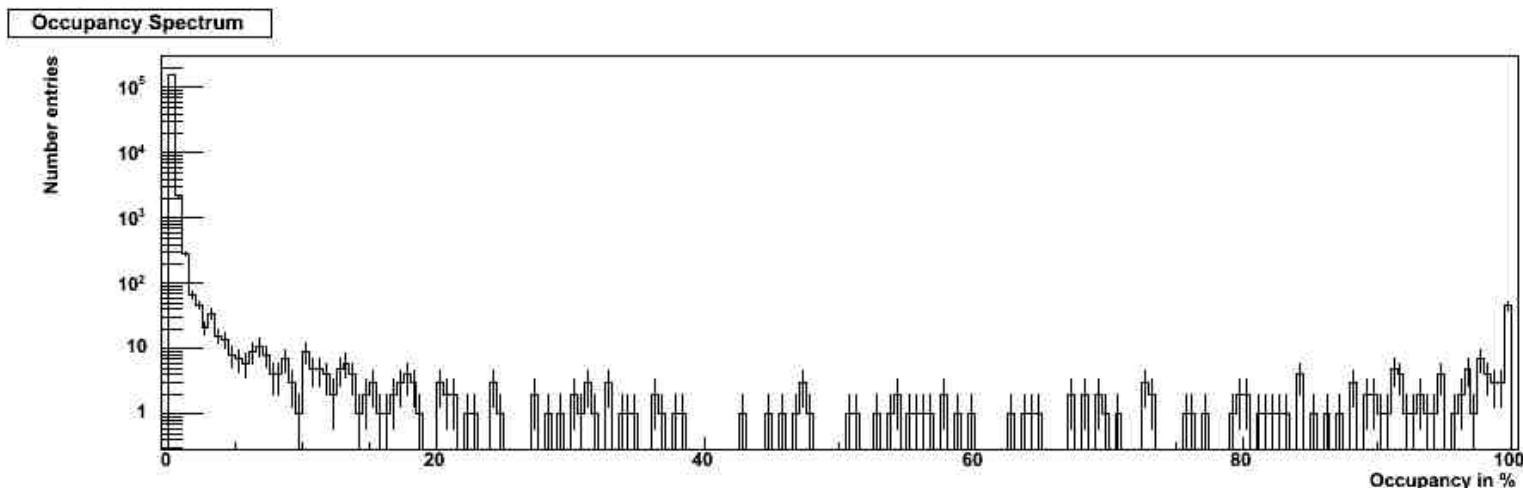
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- 50+ milestones over next months
- Pick a few items....



- Aim: develop effective monitoring for Beetle errors
- Velo Error banks sent out by TELL1 if problems occur
  - Beetle Desynchronisation
  - FIFO errors
  - Headers not decoded
- Error banks turned off for TED run
- Decoding in place (Tomasz Szumlak)
- Progress made on understanding all three error types
- Monitoring in Development

- Issues:
  - Noisy strips that give high occupancy
  - Bad Analogue Links (groups of 32 channels)
  - Stuck Bits on digitisation cards
- Monitoring under development based on noise measurements
  - with additional input from module construction
- And on occupancy
  - Initial masks & monitoring in place for TED



# Simulation/Reconstruction Activities

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- **Clustering** (Tomasz Szumlak)
  - (finally) move to TELL1 Velo clustering algorithm
- **Study delta ray effect** (David Hutchcroft & James Mylroie-Smith)
  - Evaluate effect
- **Material Description updates** (Tom Latham, Mark Whitehead)
  - Pile-up, Tank, rf-foil
- **Pattern Recognition** (David Hutchcroft)
  - Improve standard VELO algorithms
  - Integrate new work from Aras

# Summary

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- TED run demonstrated performance of 3 critical areas
  - TELL1 Parameters
  - Timing
  - Monitoring
  - Additional highlight – alignment - separation of VELO halves
- Still much to be done...
  - Error Banks
  - Noisy Strips
  - Simulation/Reconstruction Activities