

LHCb  
THCP
ST Analysis

**Wednesday 01 April 2009**  
 from 10:00 to 12:20  
 Europe/Zurich  
 at CERN ( 2-1-034 )

**Description:** Phone conference available  
 + 41 22 767 7000 + ask for ST Analysis

**Material:**

[Wednesday 01 April 2009](#)

**Wednesday 01 April 2009** [top](#)↑

10:00	Data rates (15)	Matthew David Needham (EPFL)
10:15	PVSS + Tell1 Configuration Status (20)	Johan Luisier (Lab. de Phys. des Hautes Energies (LPHE-IPEP)-Ecole Polytechnique)
10:35	IT Alignment: Eigenvalue studies (20)	Vincent Arnaud Fave (Lab. de Phys. des Hautes Energies (LPHE-IPEP) - Ecole Polytechnique)
10:55	IT Alignment: Studies of TED MC (20)	Louis Nicolas (Ecole Polytechnique Federale Lausanne (EPFL))
11:15	Pulse shapes studies (15)	Matthew David Needham (EPFL)
11:30	Pulse shape studies with TED data (15)	Nicola Chiapolini (Physik-Institut-U)
11:45	Online Monitoring (15)	Jeroen van
12:00	ST cluster resolution (20)	

Since last software week:  
3 ST software meetings

- 2 dedicated to TED preparations.

LHCb  
THCP
ST Analysis (TED preparations)

**Tuesday 12 May 2009**  
 from 09:30 to 12:30  
 Europe/Zurich  
 at CERN ( 14-4-030 )  
 chaired by: **Jeroen van Tilburg**

**Description:** Phone conference available  
 + 41 22 767 7000 + ask for LHCb ST software

**Material:**

[Tuesday 12 May 2009](#)

**Tuesday 12 May 2009** [top](#)↑

09:30	General considerations for TED run (20)	Jeroen van Tilburg (Universitaet Zuerich)
09:50	Experience from previous TED run (20)	Mathias Oleg Knecht
10:10	Emulation of TED data (20)	Anne Keune (EPFL)
10:30	Open channel finder (20)	Viktor Hangartner (Physik-Institut-Universitaet Zuerich-Unknown)
10:50	Monitoring (readiness for TED) (20)	Mark Tobin (Physik Institut Universitaet Zuerich)
11:10	Alignment experience with TED data (20)	Matthew David Needham (EPFL)

LHCb  
THCP
ST TED Preparations

**Friday 29 May 2009**  
 from 14:00 to 17:00  
 Europe/Zurich  
 at CERN ( 2-1-034 )

**Description:** Phone conference available: + 41 22 767 7000  
 ask for ST TED preparation meeting

[Friday 29 May 2009](#)

**Friday 29 May 2009** [top](#)↑

14:00	TED planning and shifts (20)	
14:20	Tell1 calibration (20)	Johan Luisier (Lab. de Phys. des Hautes Energies (LPHE-IPEP)-Ecole Polytechnique)
14:40	Timing plots and monitoring (20)	
15:00	Alignment with TED (20)	
15:20	Timing analysis per ladder (05)	Mathias Oleg Knecht

Following the request from Niko the **expected occupancy** numbers are updated on **Twiki** page:

<https://lbtwiki.cern.ch/bin/view/Online/Tell1PortNum>

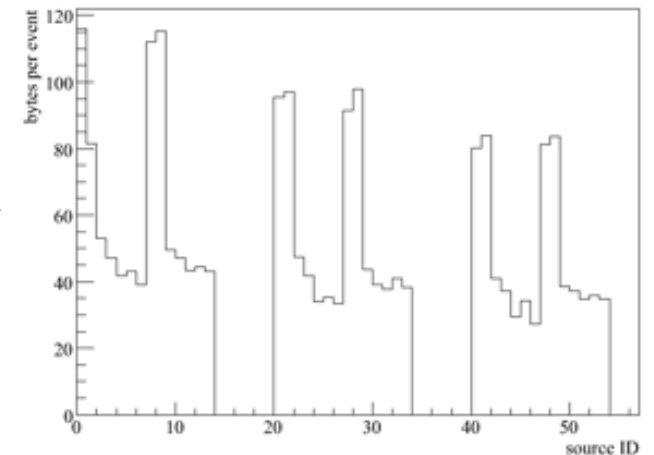
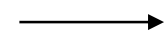
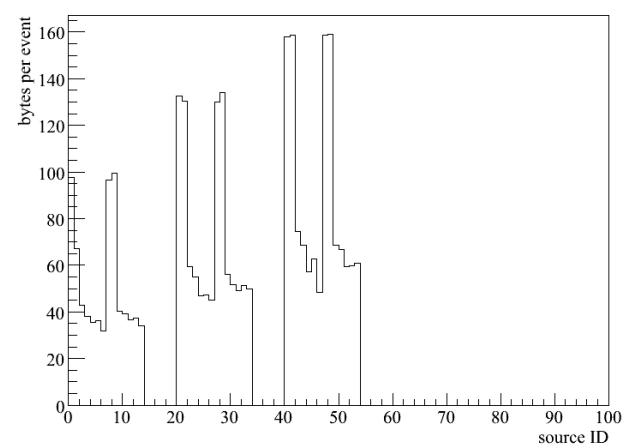
IT

Numbers are from MC09, nu = 1, L0 selected. For IT1 I took the numbers directly... apart from Tell1 2 where I took the value for tell1 2 to account for a dead module now fixed... For IT2 and 3 to work around the OT bug I took the numbers from IT1 and scaled by a factor from DC06 I also looked with nu = 2, the numbers are 25 % higher

Readout Brd.	Average Event Size	Number of Links	Average Link Load	Current Names	Comment
IT_Tell1_1	97.8	2	41.99%		
IT_Tell1_2	97.8	2	42.86%		
IT_Tell1_3	43	1	47.91%		
IT_Tell1_4	38.2	1	44.81%		
IT_Tell1_5	35.5	1	40.99%		
IT_Tell1_6	36.2	1	42.21%		
IT_Tell1_7	32.0	1	39.50%		
IT_Tell1_8	97.	2	41.42%		
IT_Tell1_9	99.4	2	42.32%		
IT_Tell1_10	49.4	1	45.22%		

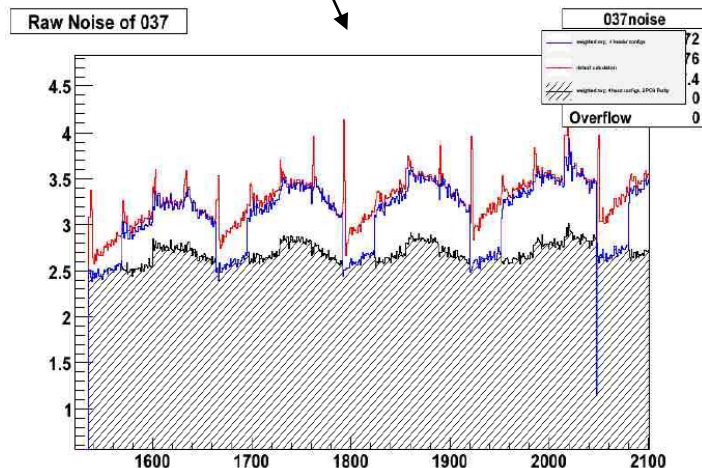
IT occupancy increased dramatically in MC09 (up to 160 bytes/event)

→ Identified to problem with wrong material in OT foam. Fixed in the latest version of the dbase.

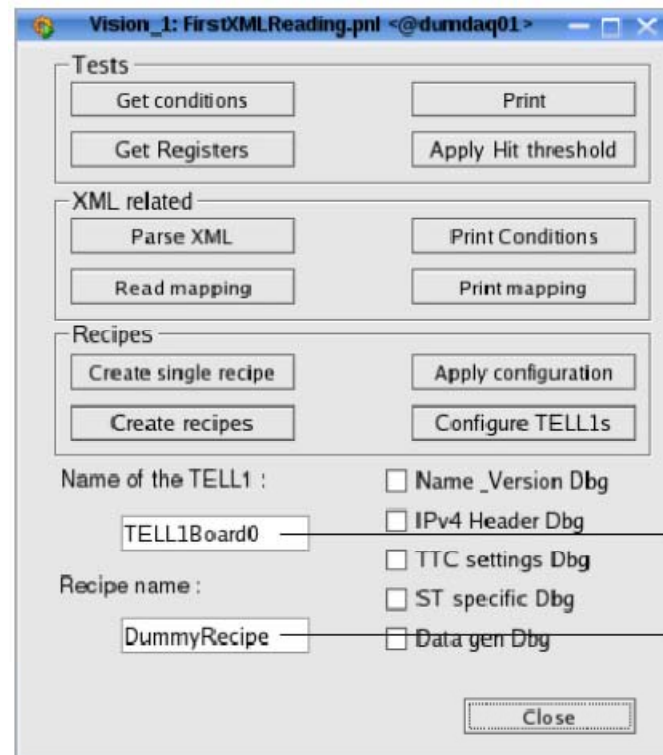


Anne Keune  
Viktor Hangartner  
Nicola Chiapolini

- Current emulation
  - Extensively studied by Anne.
  - Bit-perfect when events arrive in order.
  - Data taken during TED run to study pedestal following with clusters.
  - Investigate running emulation online to find discrepancies.
- New studies indicate that
  - Header correction can be more effective
    - Either, calculate pedestal for each header configuration
    - or, fixed correction for each header configuration
  - Pedestal depends on whether PCN is odd/even
    - Order of 5 ADC counts
    - Effect is removed by the common mode correction.
- Revise the current implementation of the TELL1
  - Discussion with Guido on 30 June.
  - Improve header correction...
  - Simplify and improve LCMS algorithm...



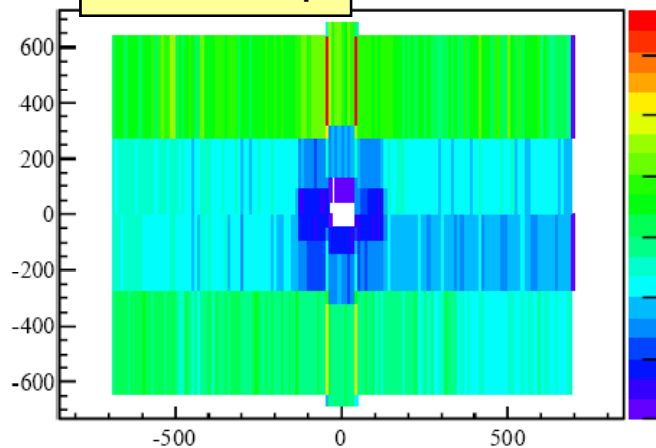
- Create PVSS recipes from TELL1 parameters in conditions DB.
  - Common effort with VELO.
  - Get the XML data and converts to addresses and registers.
- Existing fwTell1 component extended.
  - Tested and working
- Creation of recipes ready before TED
  - Discrepancies in pedestals found between old and new TELL1 configuration.
  - Under investigation...



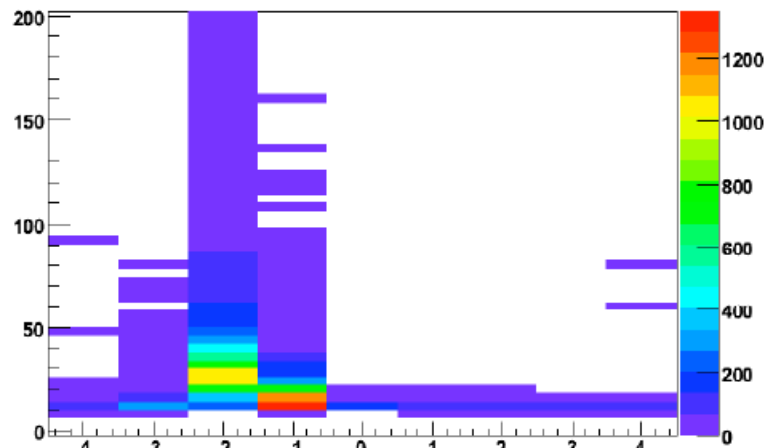
## A lot of work done in last few months

- Optimizing of code.
- All online histograms defined Twiki page
  - Divided into **Expert** and **Summary**
  - e.g. noise values for each channel
- Repacking of algorithms in
  - STMonitors: real and simulated data
  - STCheckers: only simulated data
- Tool to create Pages in Presenter (HistDBPython)
  - Created by Nicola.
  - Heavily used to setup pages
- Setting up monitoring pages for the TED
  - Especially histograms to display TAE data.
  - Histograms to verify timing settings. →
  - Monitoring of all banks (NZS, raw, error)
  - New and useful histograms.
  - All online histograms defined Twiki page.

TT hit map

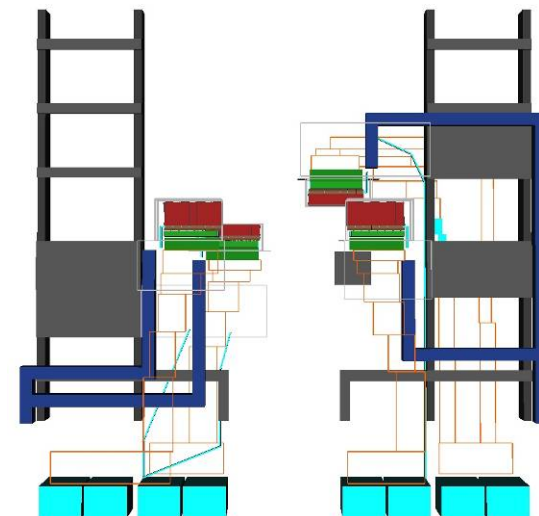


Cluster ADC values vs sampling point CB



### TED spin-offs:

- Discovery of infrequent problems
  - Tell1 parity errors
  - Error banks due to low optical power
- Discovery of cable swaps, HV problems.
- Boosted software development
- Many other things.



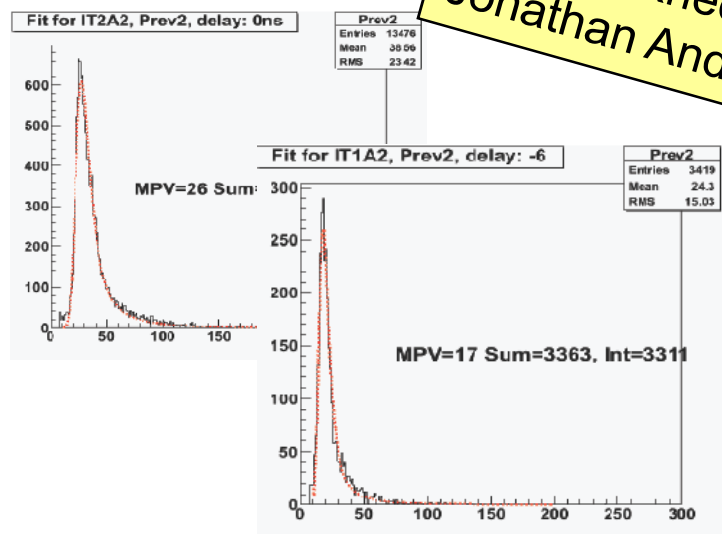
### Still working on:

- Reprocessing of NZS data needed due to wrong Tell1 configuration
  - **Already finished 50% by Johan!**
  - Need to put in a central place.
  - Note that old (ZS) data was not totally useless.
- Updating the databases
  - IT in open position
  - Masking of bad channels/ports for track reconstruction
- Tracking and alignment with June TED data.
- Pulse shapes and HV scan.

Mathias Knecht  
Jonathan Anderson

## Well-prepared analysis chain

- setup by Mathias and Jonny:
- Fit MPV of Landau (charge) distributions.
- Plot MPV as function of delay.
- Fit and find the maximum and adjust timings.
  - At some point minimize for spill-over.

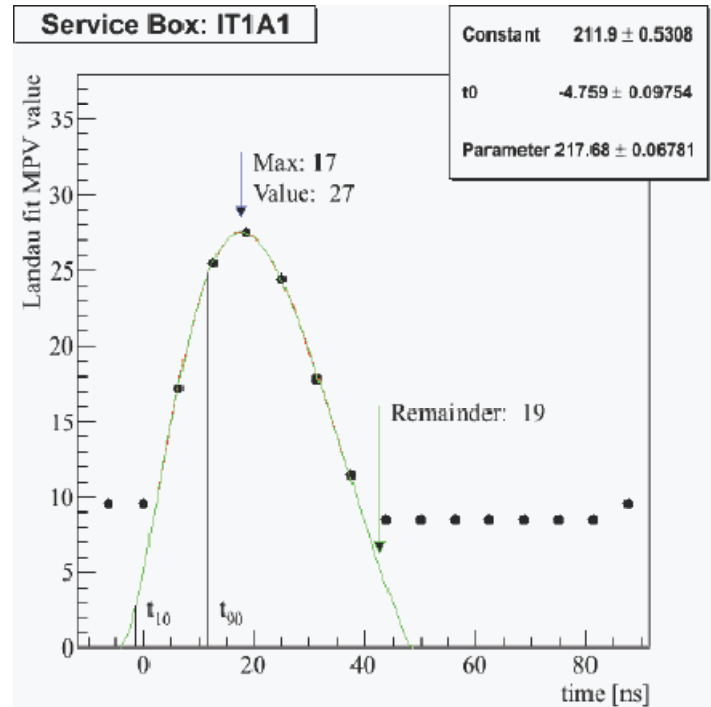


## During preparations:

→ In TT found 2 TFC cables swapped by looking at 2008 TED data.

After timing scan correct timing settings at hand within 10 minutes!

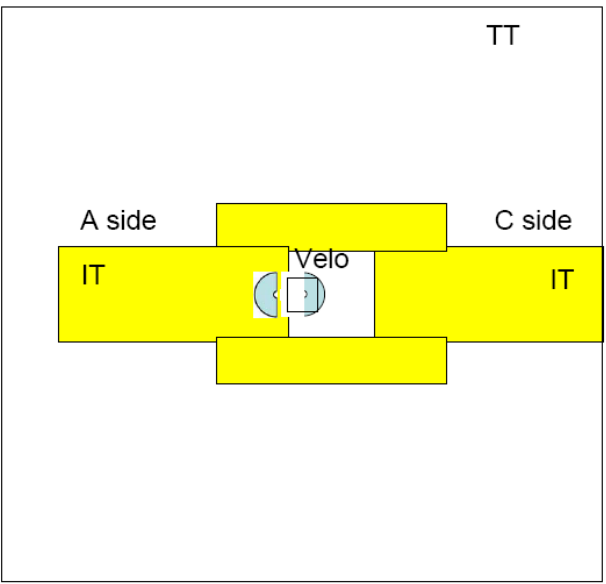
- IT timing setting took a bit longer
  - Many different delay settings
  - Code confusing
  - Late hour of the day



*“Do you have long tracks?”*

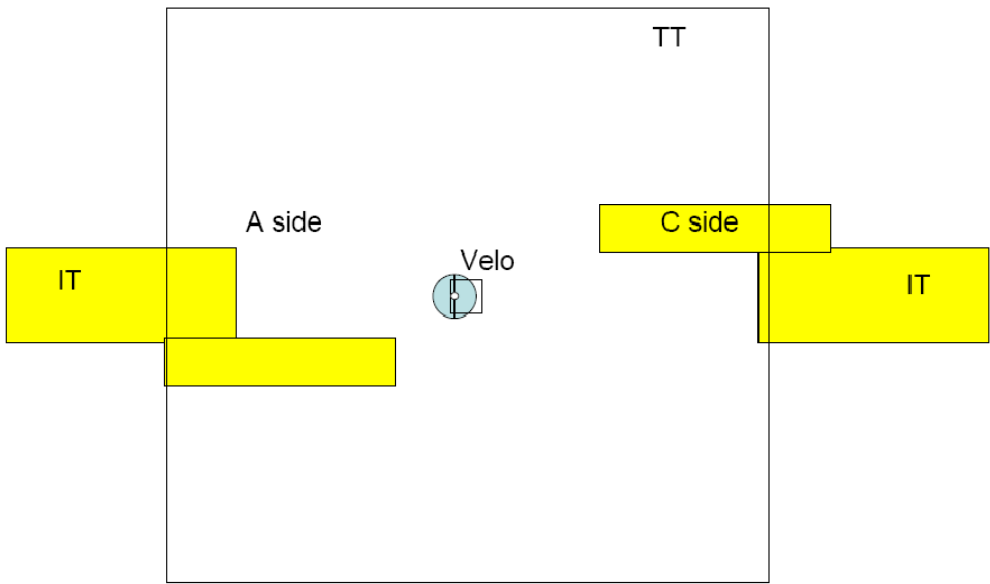
- Used numbers
- Slope of TED tracks: 11.4 mrad
  - IT open position:  $\pm 50$  cm
  - Velo open position:  $\pm 30$  mm

### 2008 TED run



- **Excellent** overlap IT—TT
- **Good** overlap Velo—IT
- **Good** overlap Velo—TT

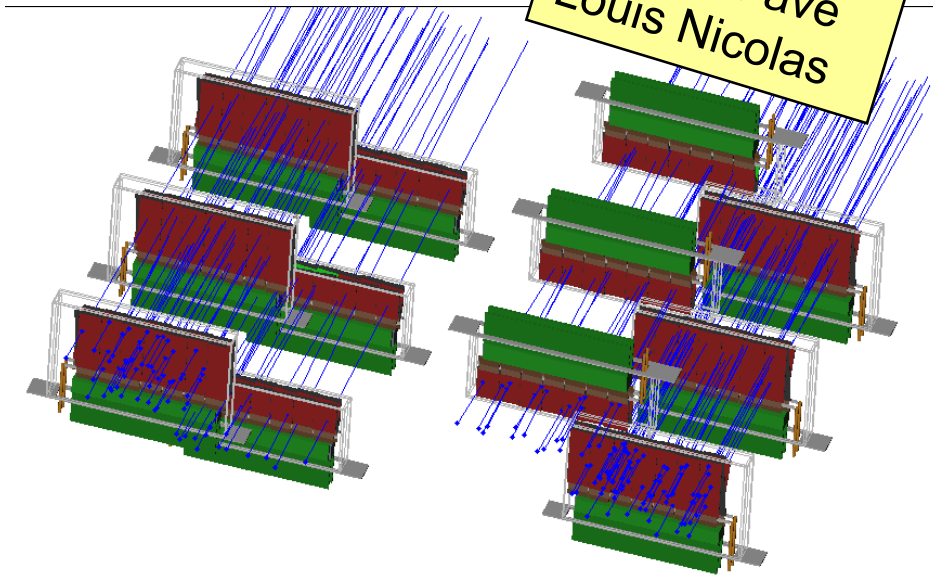
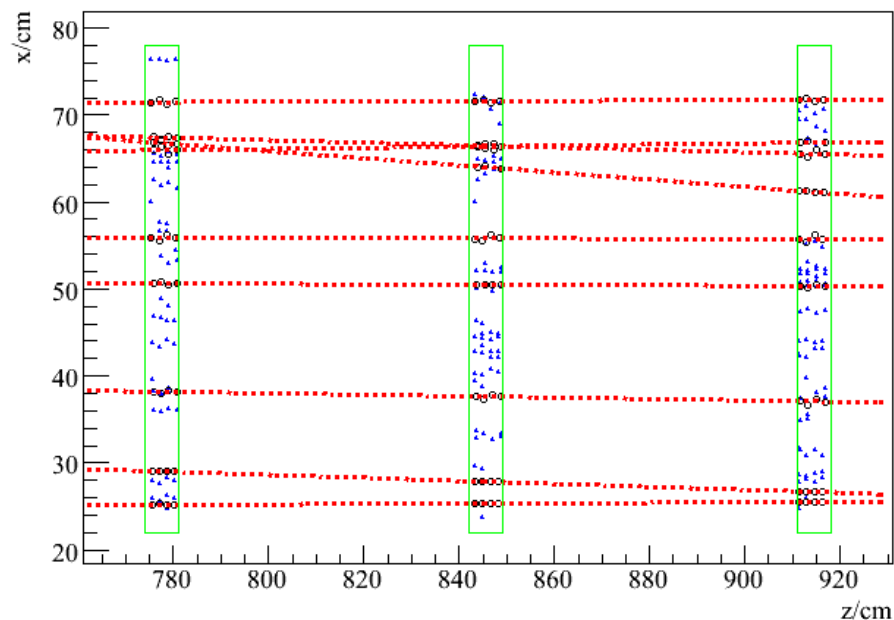
### June 2009 TED run



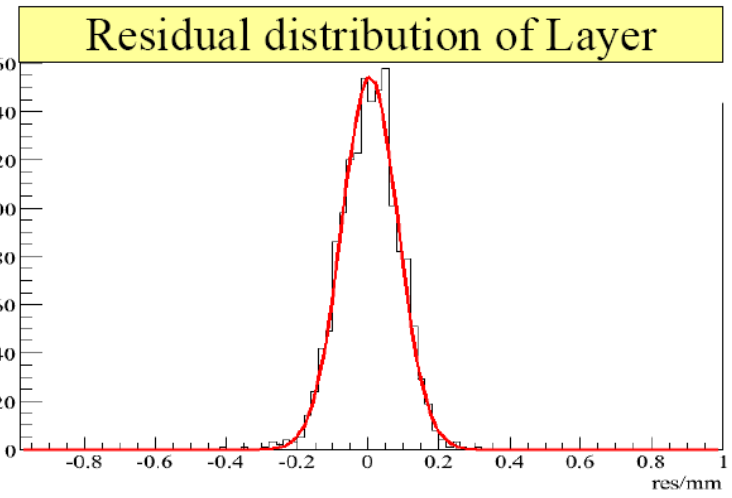
- **Moderate** overlap IT—TT
- **No** overlap Velo—IT
- **Moderate** overlap Velo—TT



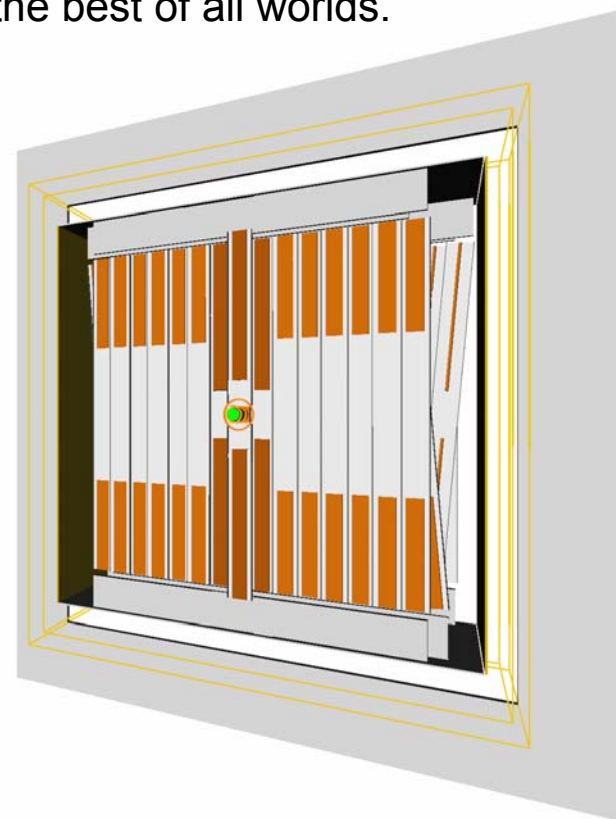
Matt Needham  
Vincent Fave  
Louis Nicolas



- IT in **open** position
- Sample of **~ 12k** IT tracks collected with low intensity (very useful for alignment)
- **~ 50k** tracks in total
- Box and layer alignment performed
- Alignment confirmed with a precision of **30 μm**



- Currently, several methods exist to add TT hits to a track
  - Home-grown algorithms from PatForward, Matching, Upstream and Downstream tracking.
- Idea:
  - Investigate the commonalities of these methods.
  - Create a single tool which combines or takes the best of all worlds.
- Manpower: Jonathan and Michel (Zurich)



- Updated occupancy numbers based on MC09
  - Available on Twiki.
- TELL1 algorithms
  - Bit-perfect emulation
  - Discussion on improving algorithms.
- TELL1 uploading
  - Creating recipes from XML ready. Debugging parameter calculation.
- Monitoring
  - Successfully used during TED run.
- TED runs
  - Reprocessing the data. Need to insert in bookkeeping.
- Tracking and alignment with TED
  - First tracking and alignment performed.
  - Still requires a lot of work for a more detailed study.