LHCb Status Report

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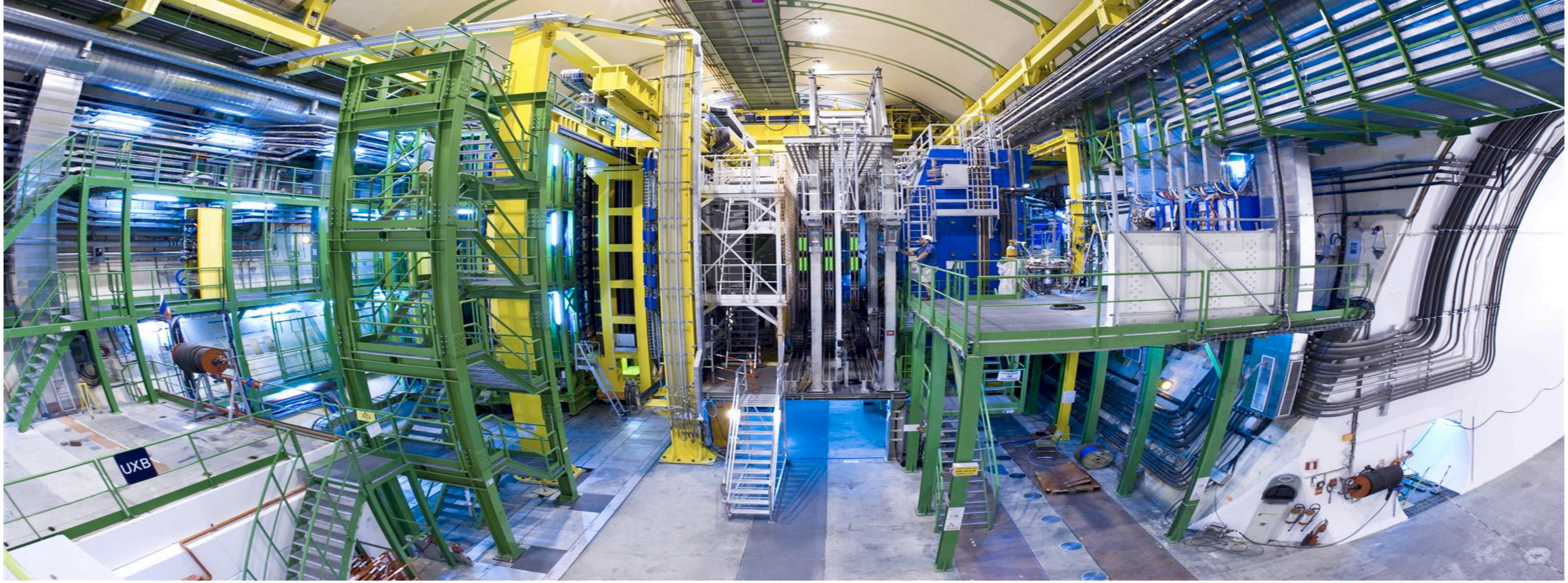
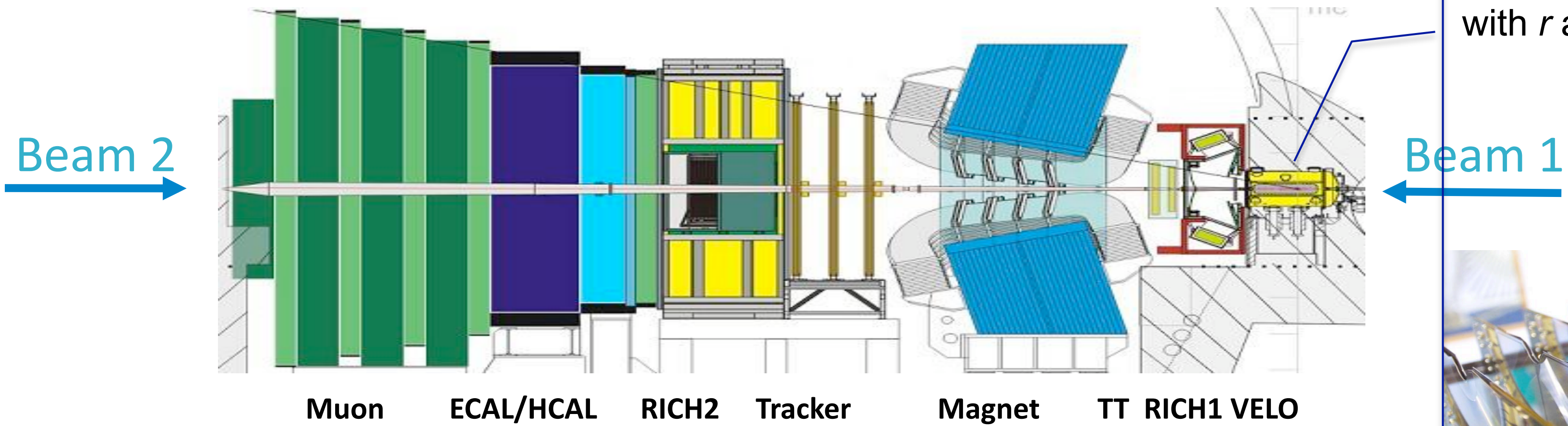
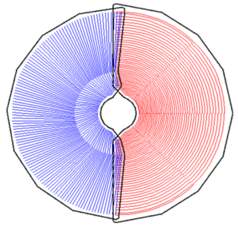
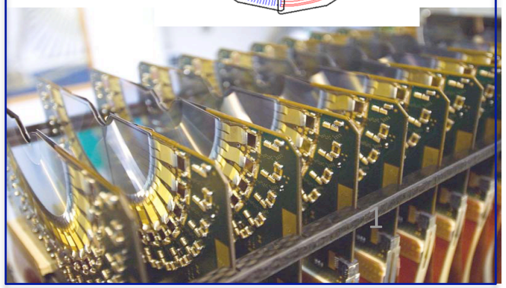




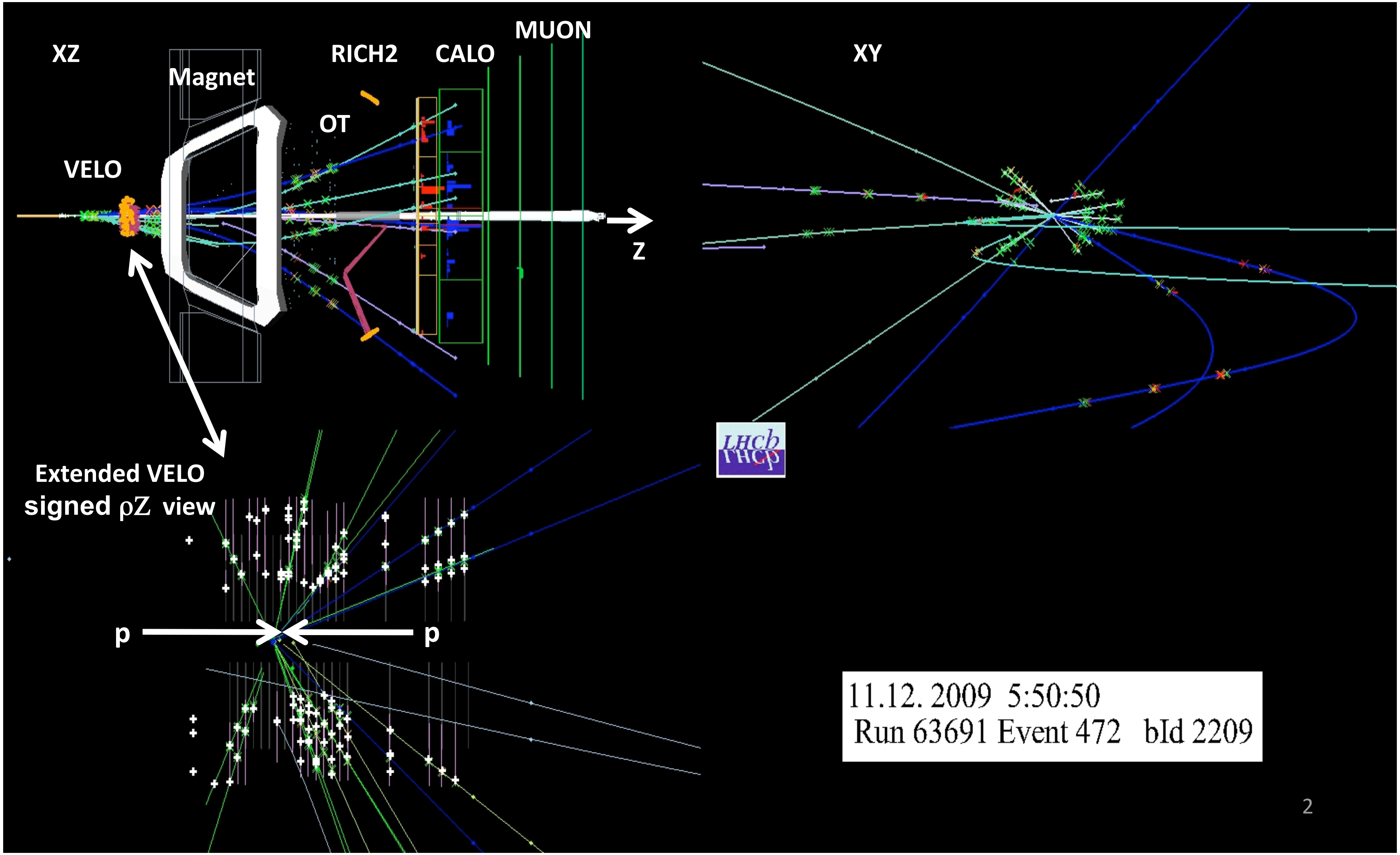
21 stations of Si wafer pairs with *r* and f strip readout





A few highlights from LHCb

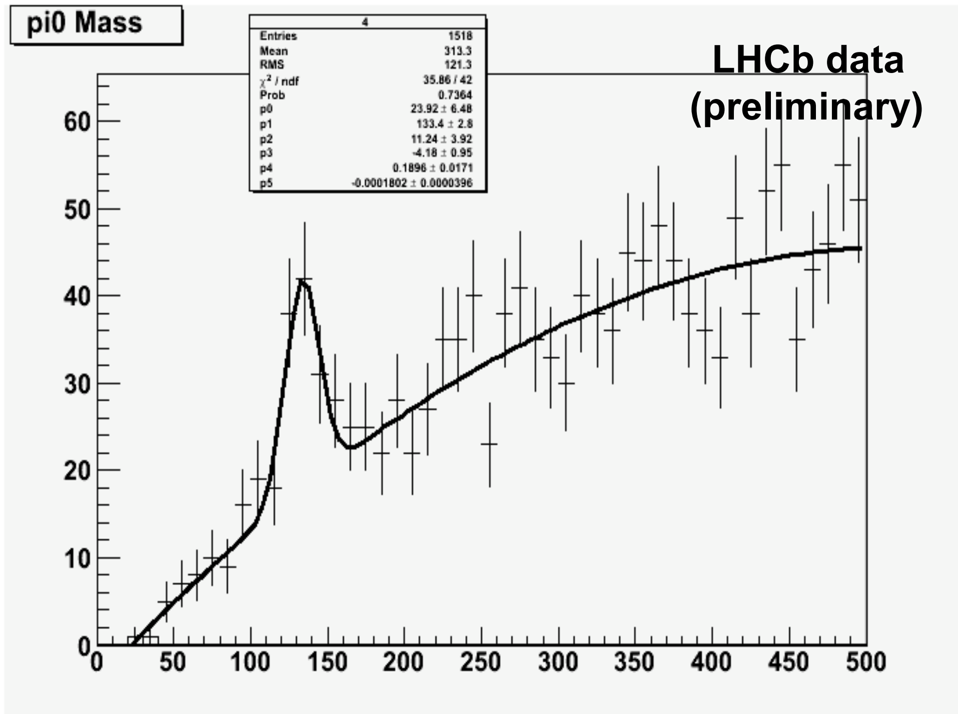
thanks to the outstanding start-up LHC performance



ECAL reconstructs π^0 signal

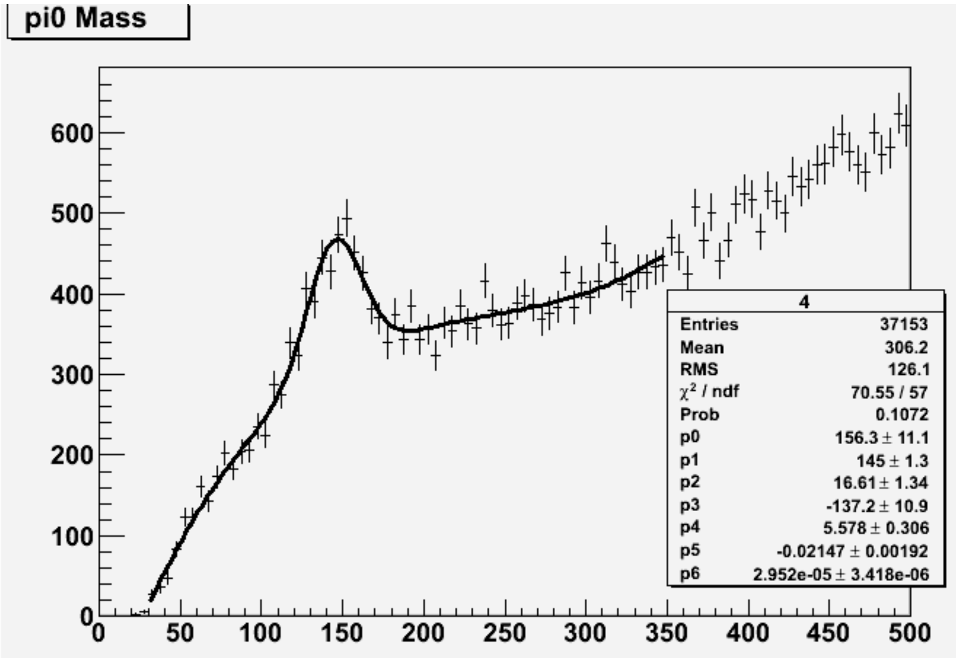
Very first data : 23 November 2009, No B-field

$\langle m \rangle = (133 \pm 3)$ MeV/c^2
(perfect agreement with the PDG value)
$\sigma = (11 \pm 4)$ MeV/c^2



$M_{\gamma\gamma}$ (MeV/c^2)

Now π^0 peak can be routinely monitored on-line:

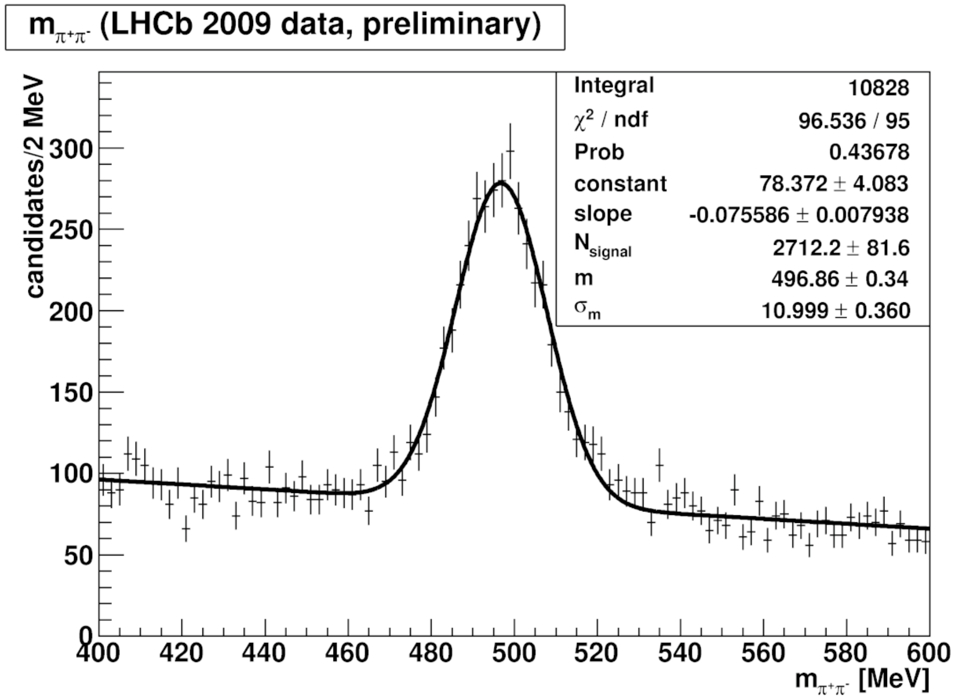


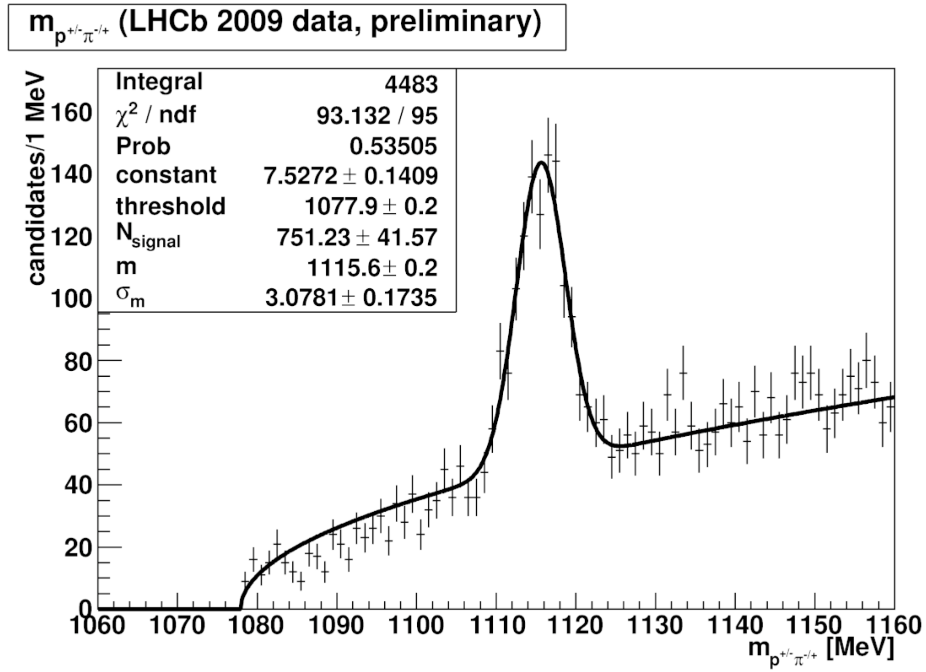
$M_{\gamma\gamma}$ (MeV/c^2)

The masses of the reconstructed K_S and Λ in agreement with the PDG values

Tracking without VELO

Tracking detectors were well calibrated at the start-up !





$M(K_S) = 496.9 \pm 0.3$ MeV/c^2

$\sigma = 11.0 \pm 0.4$ MeV/c^2

$M(\Lambda) = 1115.6 \pm 0.2$ MeV/c^2

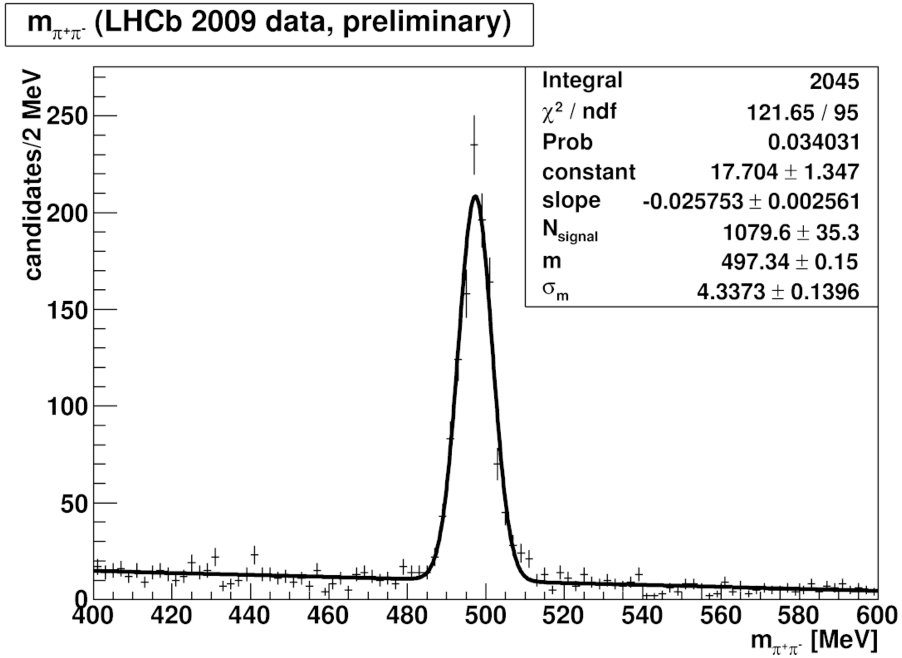
$\sigma = 3.1 \pm 0.2$ MeV/c^2

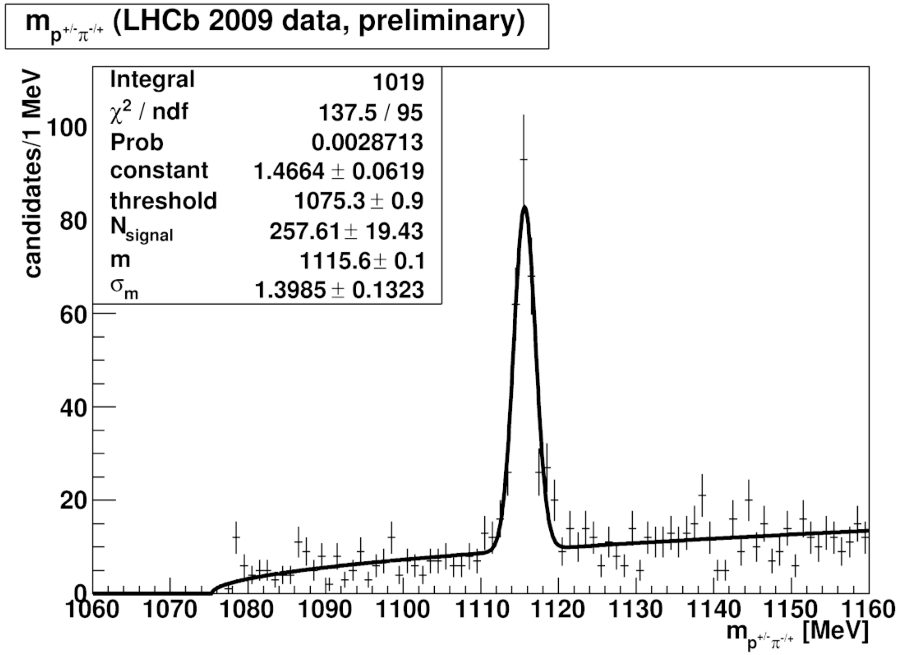
$M(K_S^{PDG}) = 497.7$ MeV/c^2

$M(\Lambda^{PDG}) = 1115.7$ MeV/c^2

The masses of the reconstructed K_S and Λ in agreement with the PDG values

Using full tracking power, including VELO





$M(K_S) = 497.3 \pm 0.2\ MeV/c^2$
$\sigma = 4.3 \pm 0.1\ MeV/c^2$

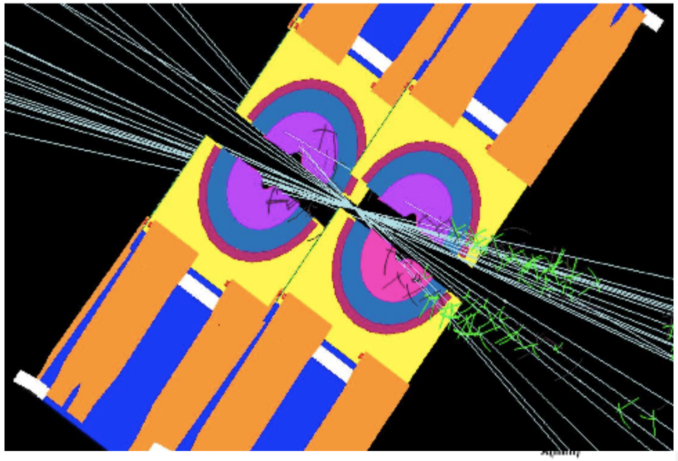
$M(K_S^{PDG}) = 497.7\ MeV/c^2$

$M(\Lambda) = 1115.6 \pm 0.1\ MeV/c^2$
$\sigma = 1.4 \pm 0.1\ MeV/c^2$

$M(\Lambda^{PDG}) = 1115.7\ MeV/c^2$

Accuracy will be further improved after complete alignment

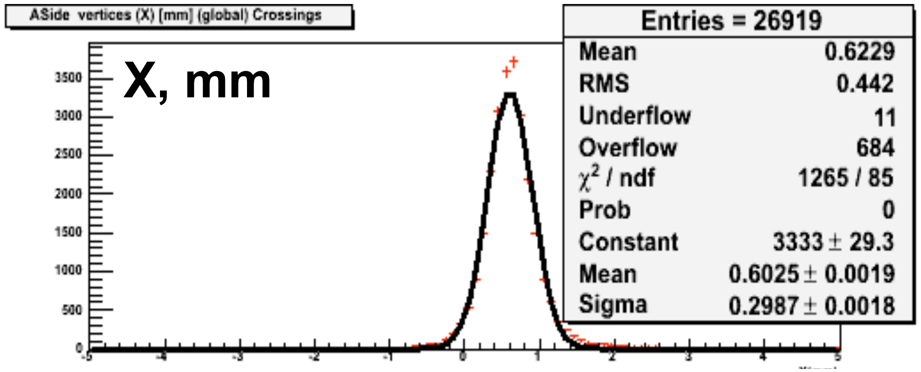
pp interaction vertex (VELO)

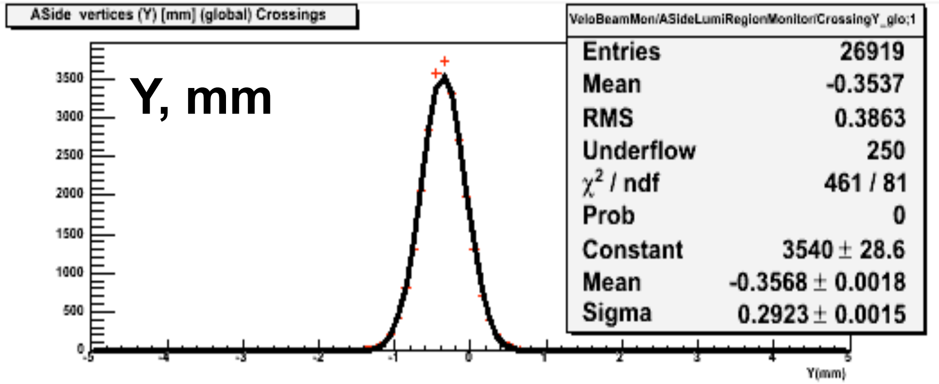


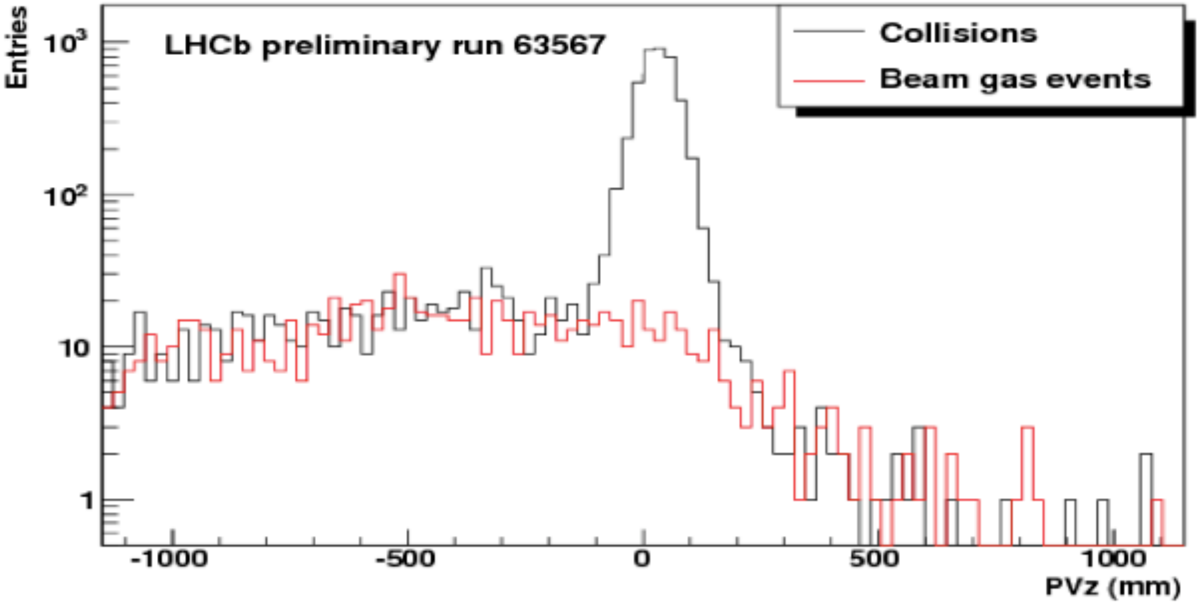
VELO can not be fully closed at √s = 900 GeV; each side is 15 mm away from the nominal position

VELO moved in and out routinely;

Kept 30 mm away during injection





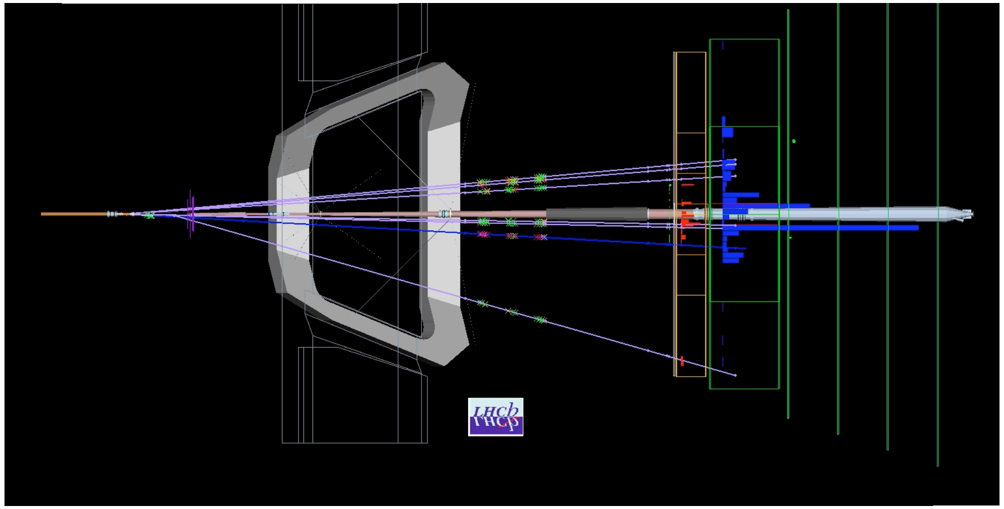


Measured dimensions of the luminous region:

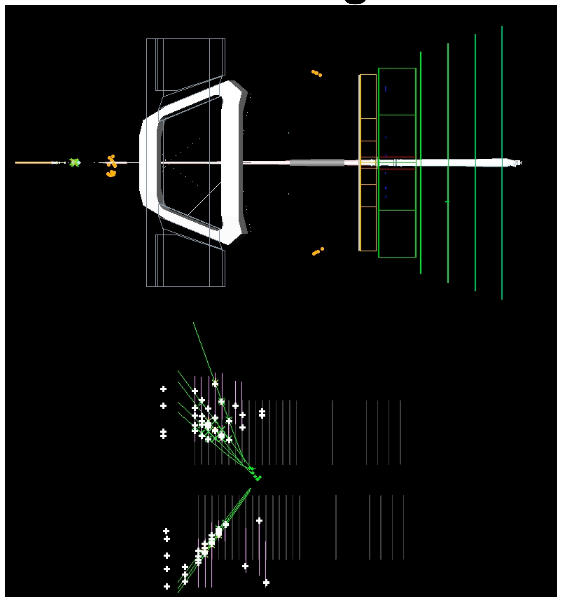
$\sigma_X \approx \sigma_Y \approx 0.3$ mm

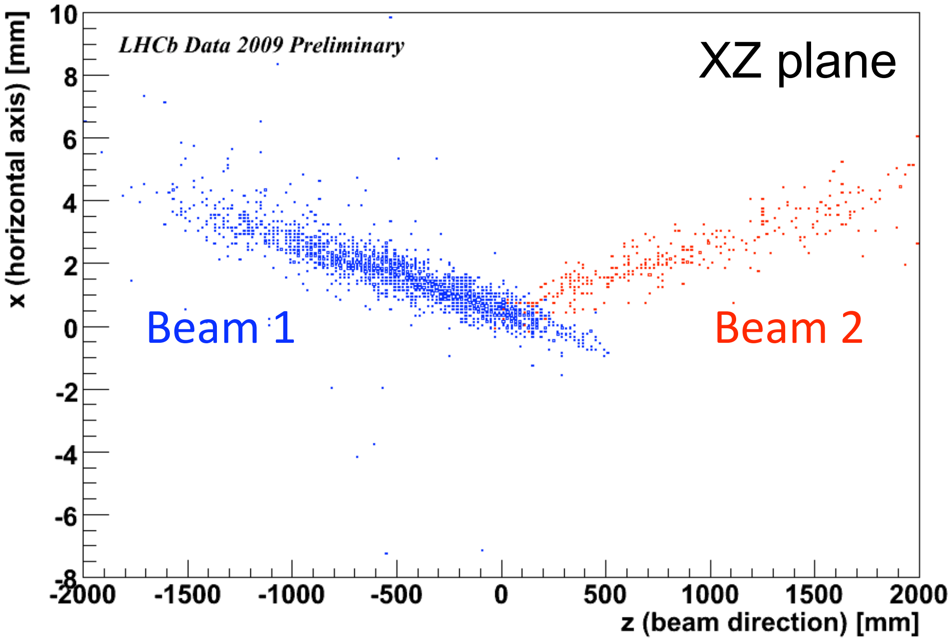
$\sigma_Z \approx 40$ mm

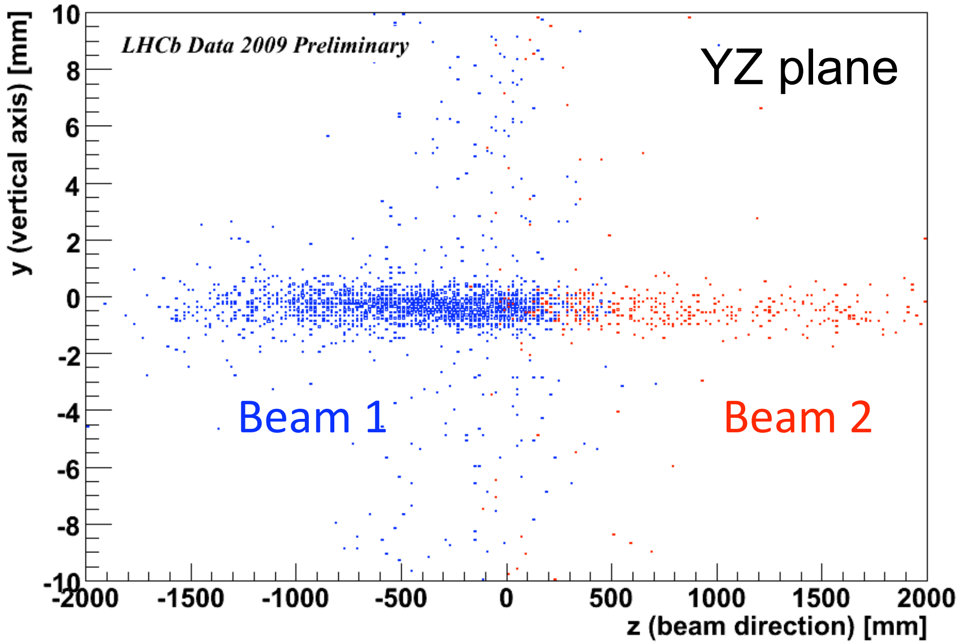
Beam 1: beam gas event



Beam 2: beam gas event

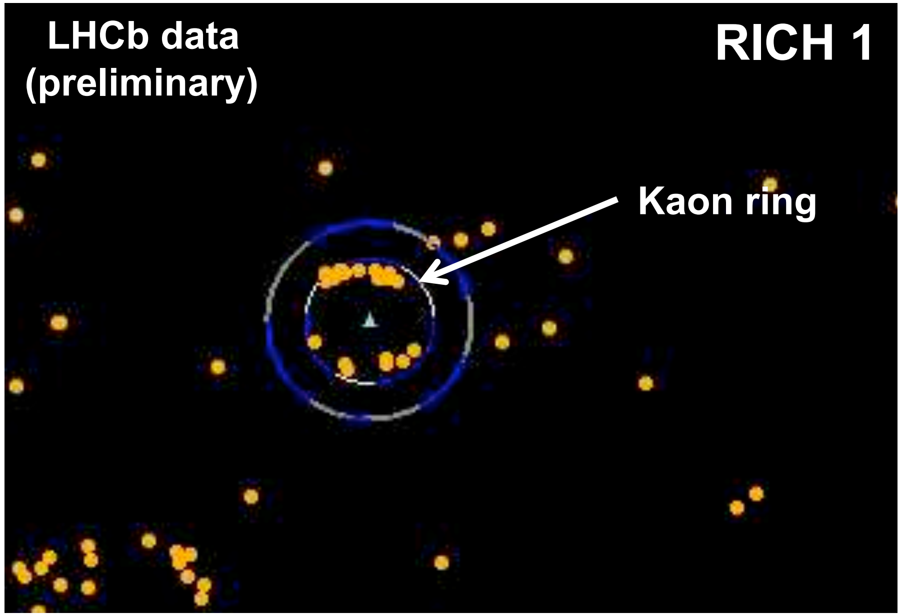


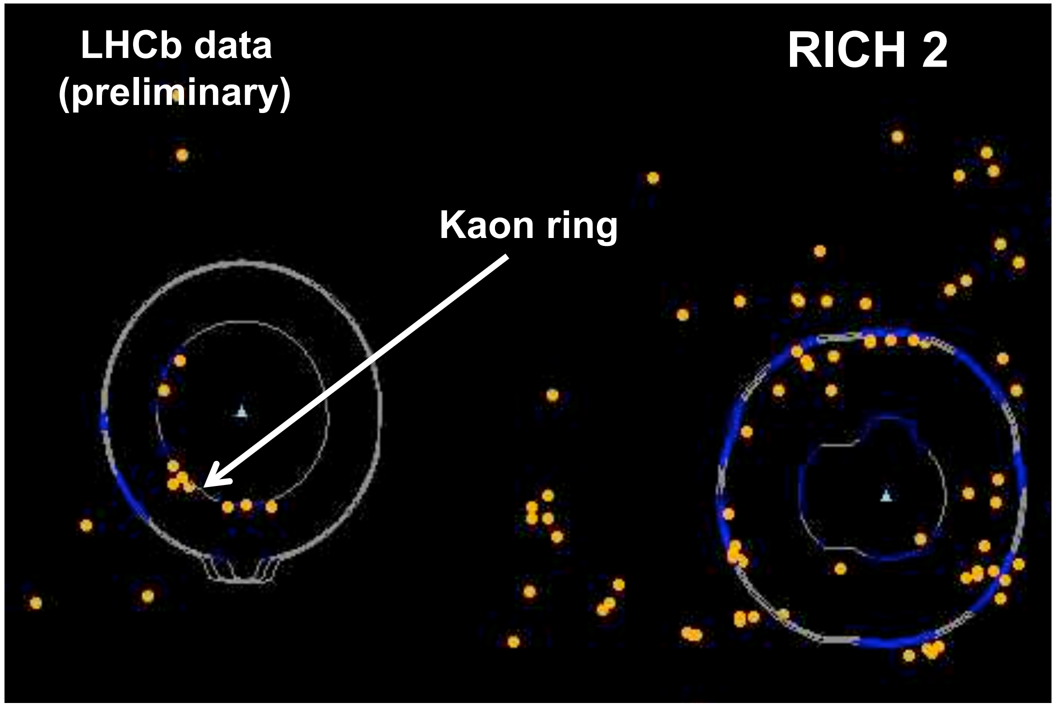




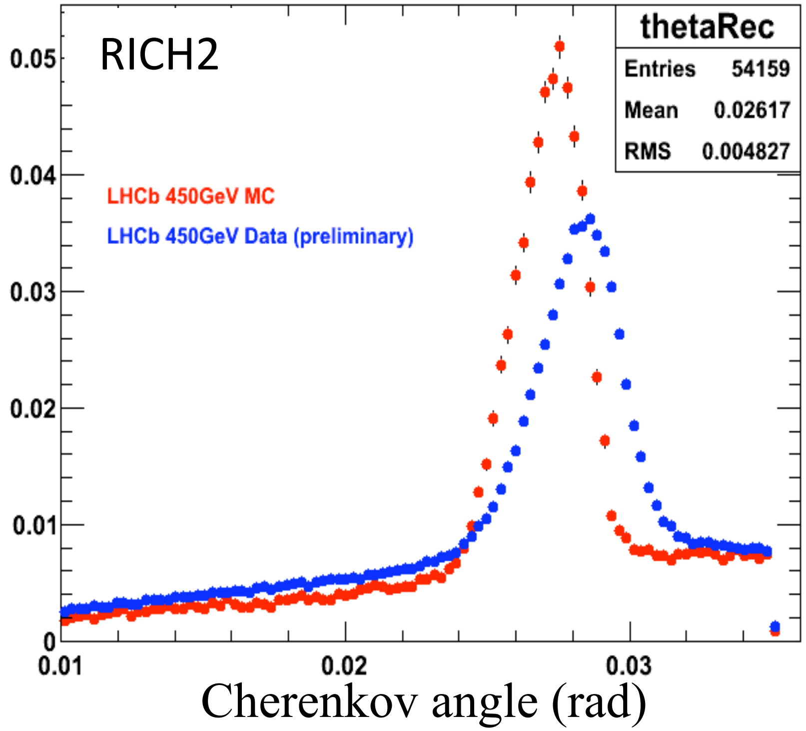
Impact of LHCb dipole magnet: LHC beams cross at 2 mrad angle in horizontal plane as expected at the full magnetic field

RICH identifies charged kaons





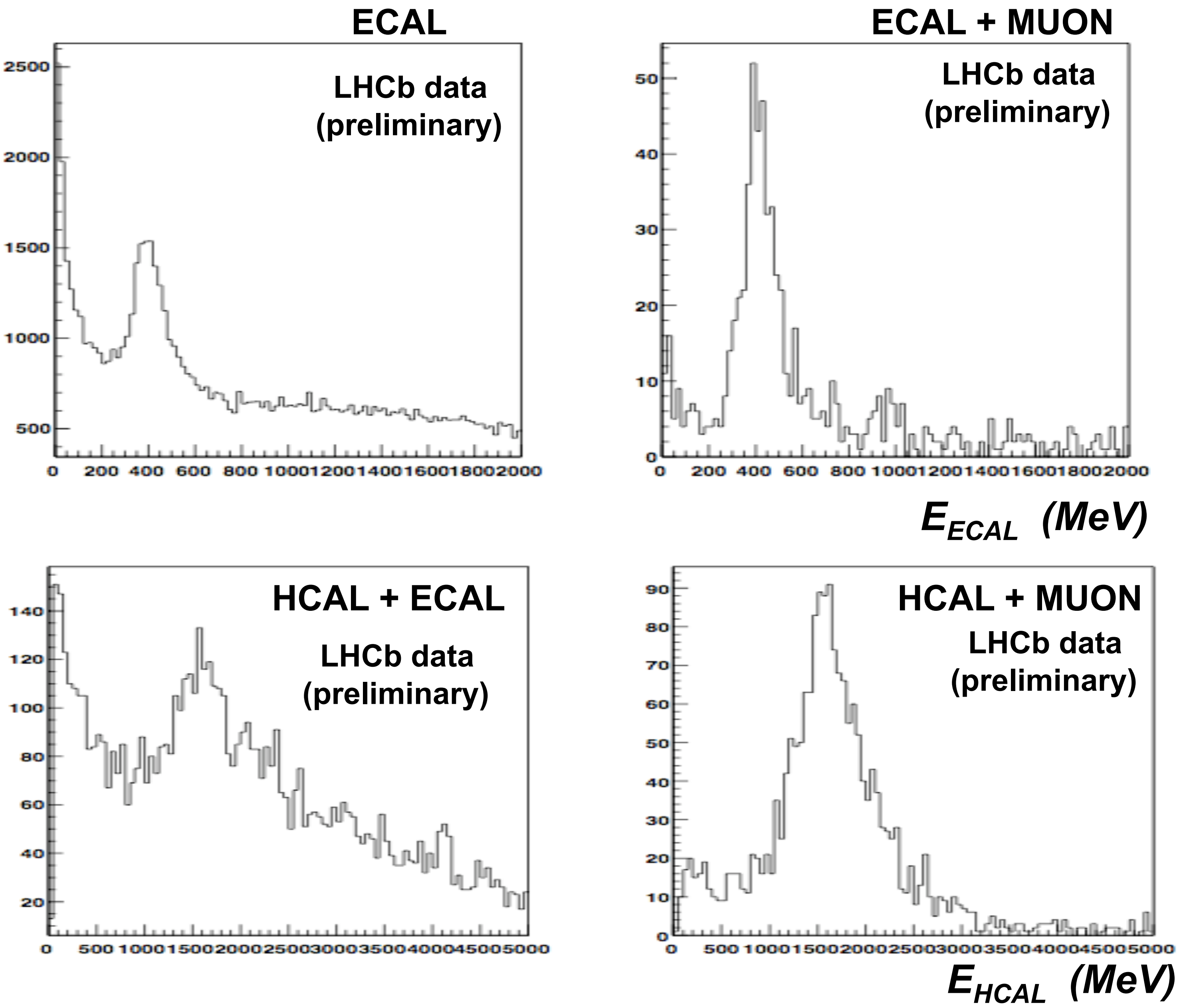
Orange points – photon hits
Continuous lines – expected distribution for each particle hypothesis (proton below threshold)



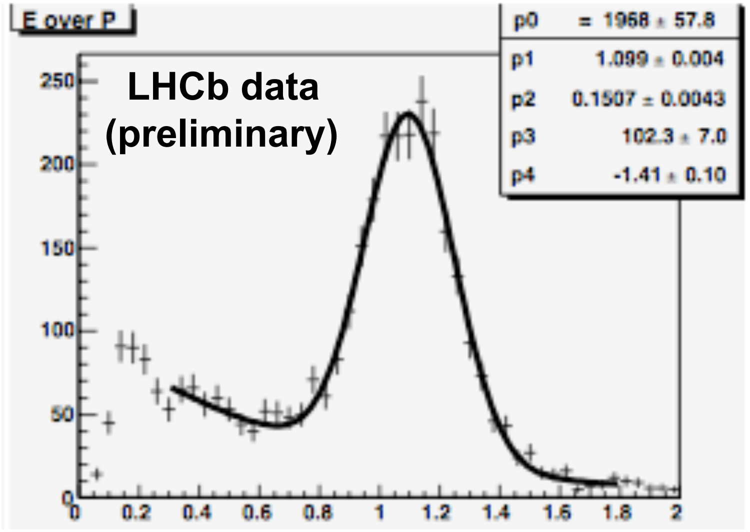
Detailed calibration and alignment in progress

MIP identification using ECAL, HCAL & Muon

(MIP = Minimum Ionizing Particle)



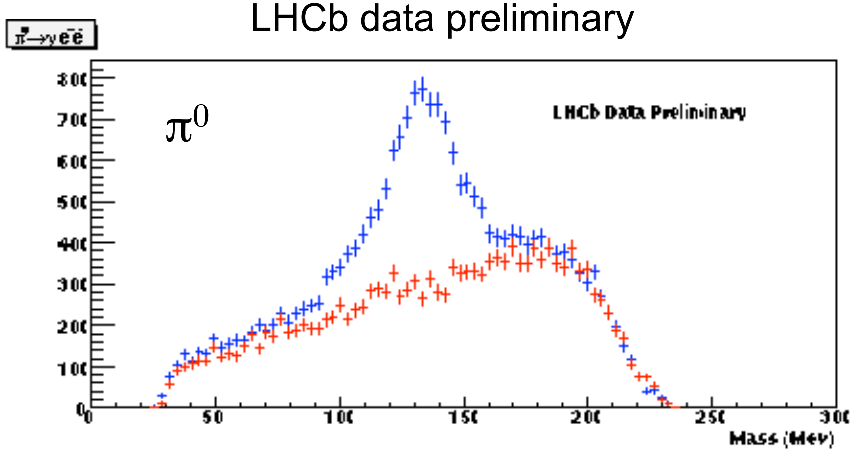
Converted photons reconstructed using Tracking and ECAL

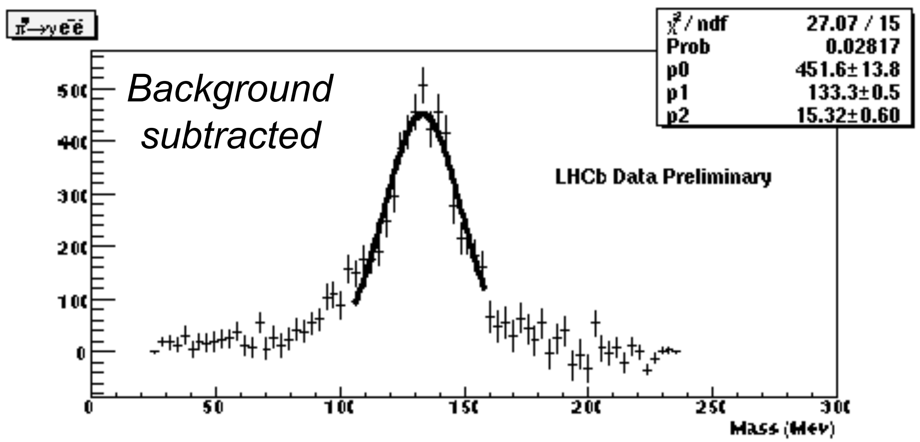


E / P

$M(e^+e^-) < 200$ MeV/c^2 for any pair of oppositely charged tracks

LHCb data preliminary





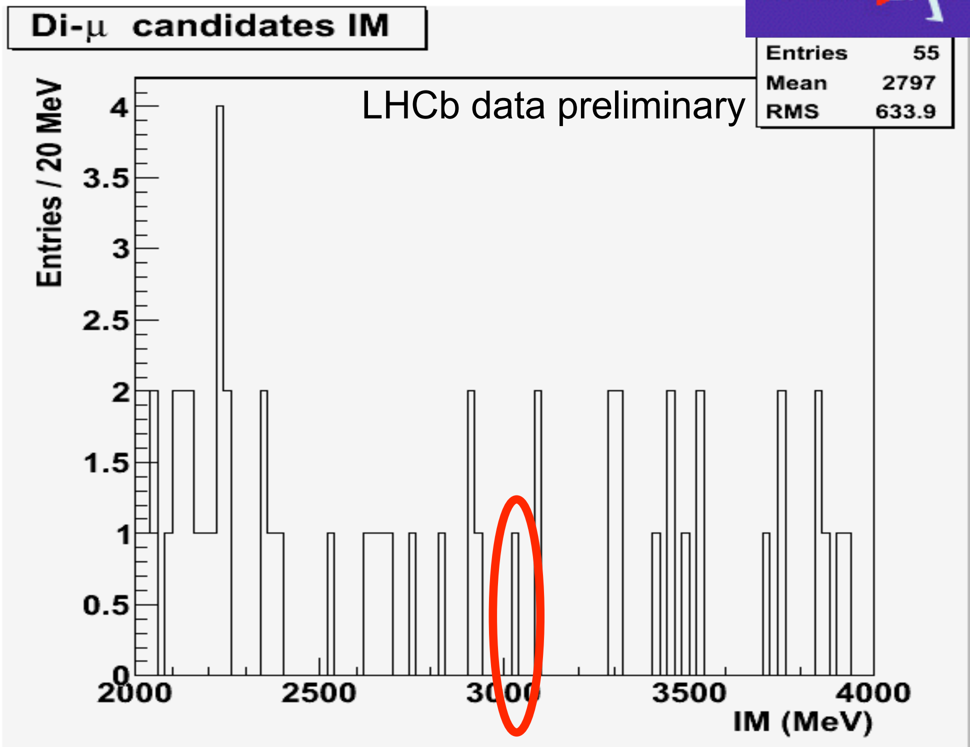
π^0 reconstructed using converted photons:
$\pi^0 \rightarrow \gamma\, e^+e^-$ ($\gamma \rightarrow e^+e^-$)

$M(\pi^0) = 133$ MeV/c^2
$\sigma = 15$ MeV/c^2 (slightly worse than for $\pi^0 \rightarrow \gamma\gamma$ due to bremstrahlung)

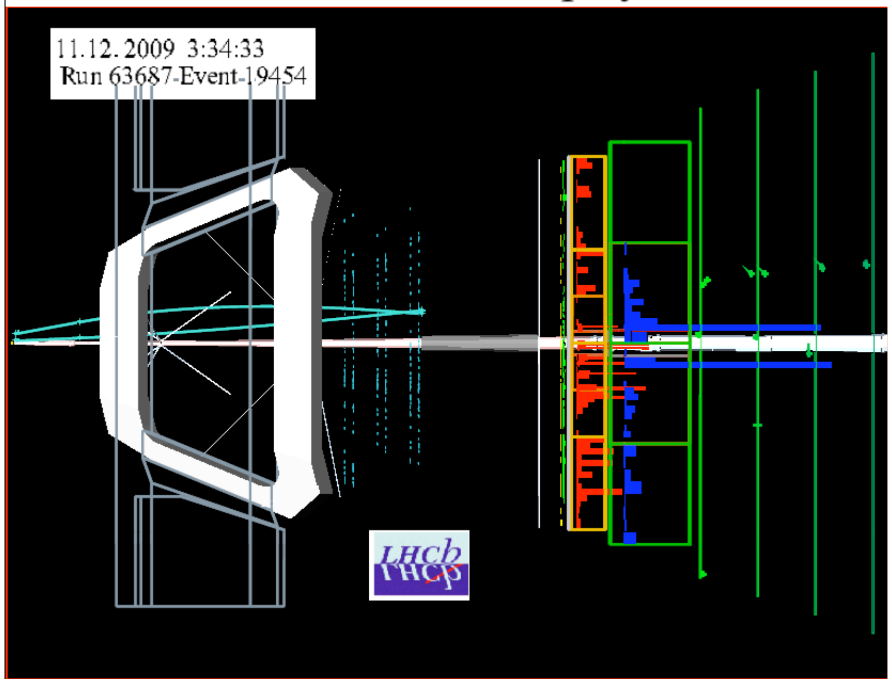
Events with dimuons

Selection:

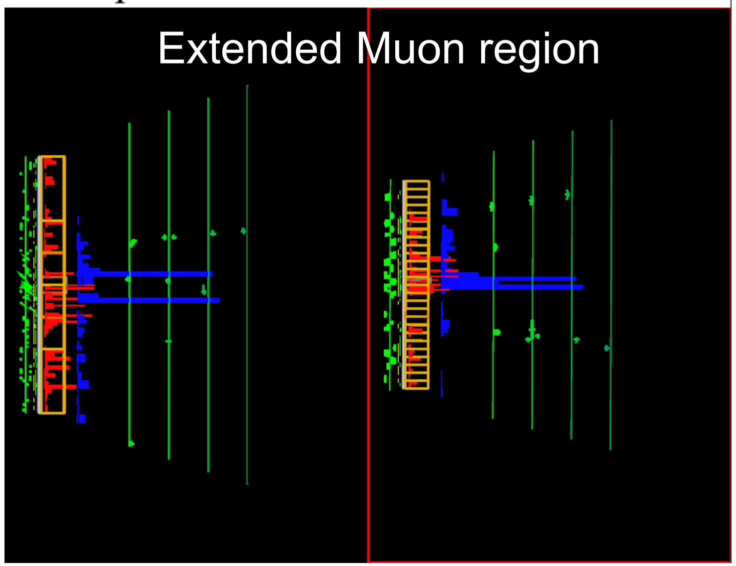
- *Oppositely charged muon candidates from the interaction region*
- *Vertex quality & Muon identification*
- *There is a candidate with $M(\mu\mu) = 3035$ MeV/c^2, P_{T1}= 2.2 GeV, P_{T2}=1.2 GeV*



LHCb Event Display



Top Downstream Side



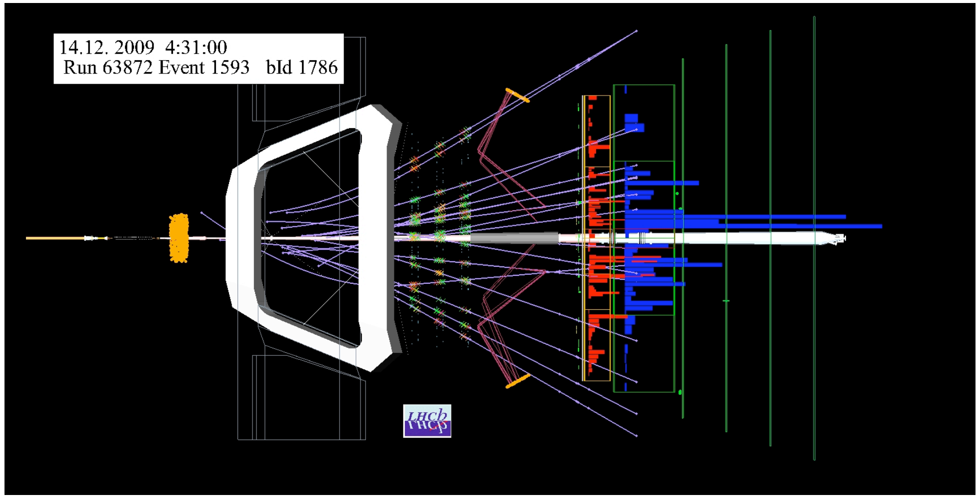
Summary of 8 days LHCb data taking

Date	Fill	Activity	# triggers	# Beam gas	#Collision	VELO trigger	Trigger rate
			2x450 GeV				
08-déc	905	Collision	20373	4000	11200	18597	1.4Hz
09-déc	906	Collision	4186	1500	2680	3488	
11-déc	907	Collision	93197	36000	57000	83676	
11-déc	908	TAE	47579	16000	30000	45707	
11-déc	909	TAE	41538	20000	21500	41100	
12-déc	909	TAE	26203	12000	14000	21800	5Hz
12-déc	910	Collision	94978	34000	60000	87011	6Hz
12-déc	911	Collision	117883	50000	67000	102000	10Hz
1 2-déc	912	Collision	94380	14000	80000	82000	17Hz
			540317	187500	343360	485379	

Enough data to understand the detector performance in order to be in even better shape for physics at $\sqrt{s}$ = 7 TeV

High Energy Fill at √s = 2.36 TeV

(still not sufficient to close VELO; looking forward for
***stable beams** at higher energy)*

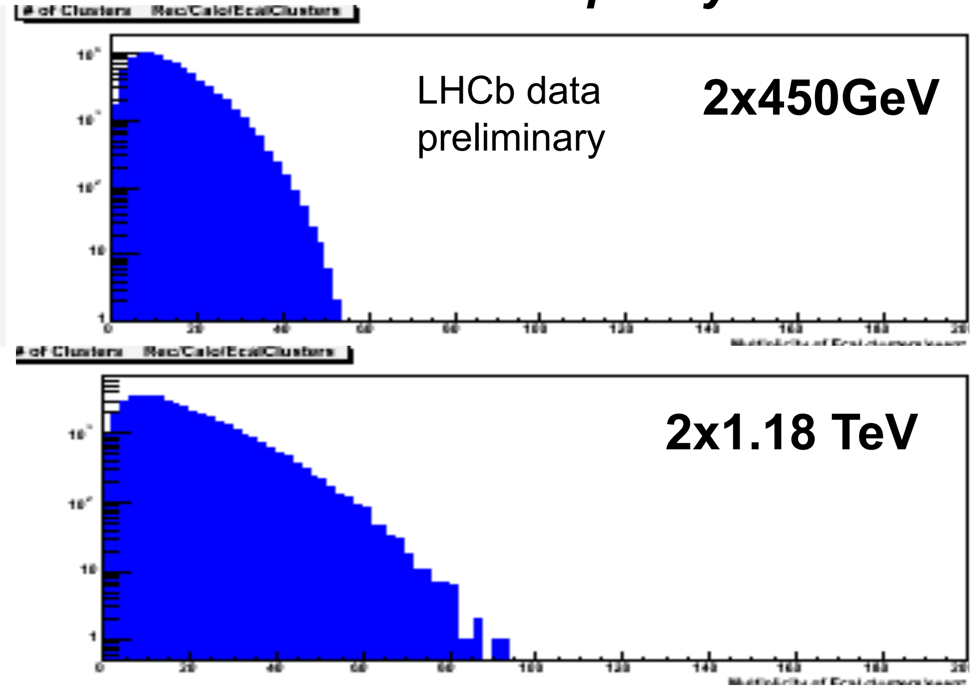


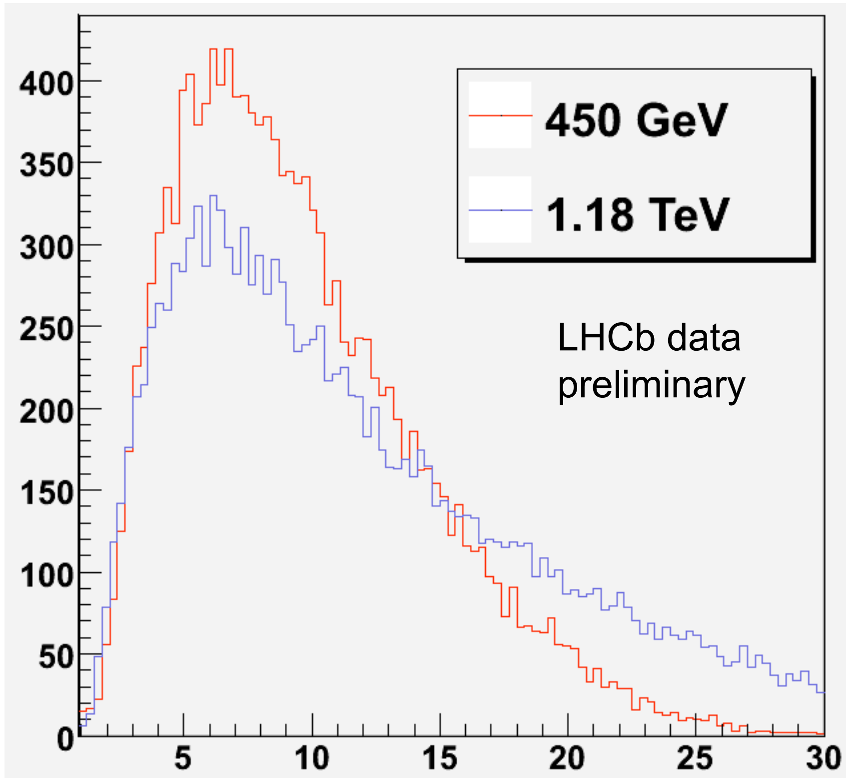
No stable beam flag →
Si detectors were switched off

On: OT, RICH, CALO and MUON

~30k events reconstructed

ECAL Cluster multiplicity

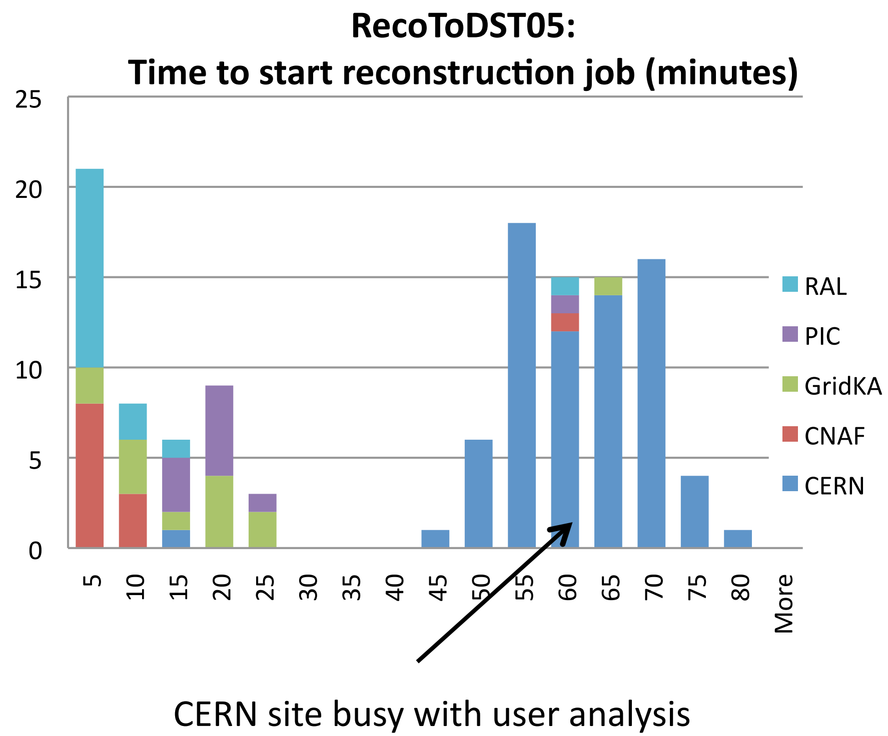




E_T (ECAL + HCAL), GeV

Very Efficient Data Processing

- ***Two copies of raw data are made***
  - *One copy at CERN*
  - *One copy distributed over tier1 sites*
- ***Reconstruction automatically triggered by presence of new raw data file***
  - *DST typically available for physics analysis within one hour of file closed at the pit*
    - *Dominated by migration time to mass storage (longer wait for small files)*
    - *Reconstruction jobs last a few minutes (small files, low multiplicity events). Design is 24 hours*
- ***2 Reprocessings of full dataset***
  - *Completed on the grid in <2 hours*



Thanks to the team effort the LHCb detector works very well !

We are ready for the Long Physics Run in 2010