Detector & Trigger Status

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11/6/2000

Detectors

System		Coverage	Limitation
Track	COT	$30^\circ < \phi < 120^\circ$ $210^\circ < \phi < 330^\circ$	TDC
	Si-4	$45^\circ < \phi < 105^\circ$	
Muon	CMU	full	
	CMP	Top, Bottom, South Wall	
	CMX	North-West	TDC
	IMU	North-West	TDC
Calor.	CEM	full	
	CHA	full	
	WHA	full	
	PEM	full	
	PHA	full	
	CES	$225^\circ < \phi < 255^\circ$ (West)	electronics
	PES	$225^\circ < \phi < 315^\circ$ (West)	electronics
	HadTDC	$225^\circ < \phi < 270^\circ$	electronics
Lum.	CLC	full	
Beam Loss Mon.		full	

ToF 16/216 channels readout using CLC electronics
SOC readout

Triggers

System		Coverage
L1 Trigger	Calorimeter	full
	Muon stub	full
	XFT	full
	XTRP	$30^\circ < \phi < 90^\circ$
	2-Track	none
	Global	full
L2 Tagging	Cal	full
	SVT	$45^\circ < \phi < 105^\circ$
	~~XCES~~	~~$225^\circ < \phi < 255^\circ$~~
	Global	1 ~~2~~ / 4 processors
L3 Tagging		30 / 144 processors

The Comm. Run (~57 nb^{-1}, ~160 hours)

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Date (hrs)	bunches	Init.L($cm^{-2}s^{-1}$) Tot.L (nb-1)		CDF accomplishment
10/08 (21)	1 x 8	6 x 10^{27} (0.2)		Commission CLC. CLC based Min. bias trigger (inelastic scattering)
10/13 (17)	1 x 8	2 x 10^{27} (0.1)		Min bias, Calor. triggers (centeral). CLC, Calor. timing-in. First COT, Silicon tracks.
10/23 (30)	1 x 8	2 x 10^{28} (1.0)		Min bias + Cal trig. Silicon, Cal timing-in
10/27 (4)	1 x 8	2 x 10^{28} (0.3)		Min bias + Cal trig. Silicon, Cal timing-in
10/30 (34)	36 x 36	4 x 10^{29} (27)		Timing-in : fine adjustment. Establish operating points.
11/02 (18)	36 x 36	2 x 10^{29} (11)		Min bias + mu-stub, mu + track trigger. Timing-in : fine adjustment.
11/04 (35)	36 x 36	3 x 10^{29} (18)		Track trigger (tracks for si barrel-4). L2 processor, L3 reconst., TOF, SOC ~4 million “high Et” events on tape

CLC (Cerenkov Lum. Counter)

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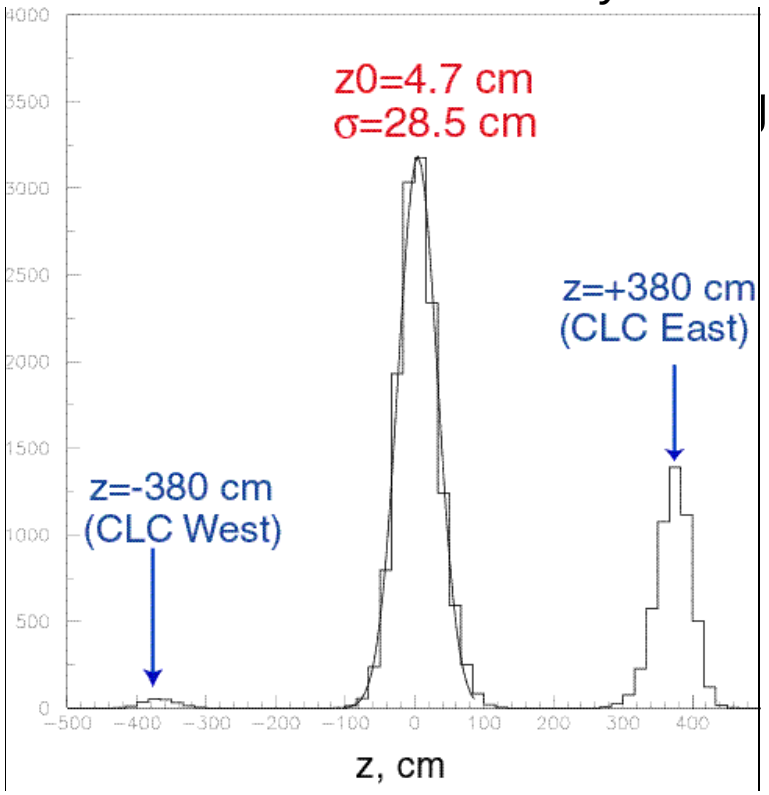
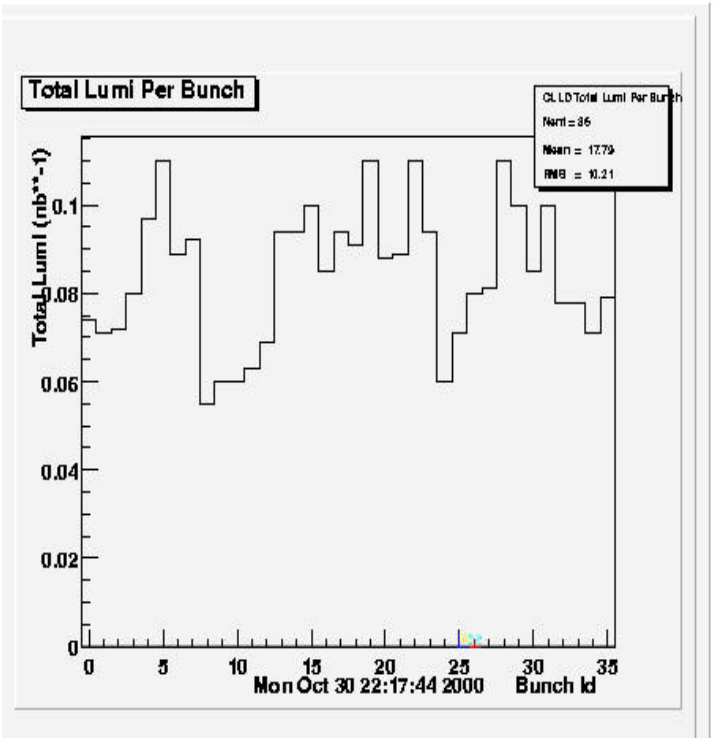
Cogged beam for collisions at B0

Measured Luminosity bunch by bunch





Measured Z position using CLC arrival time

Bunch by bunch luminosity

Timing-in

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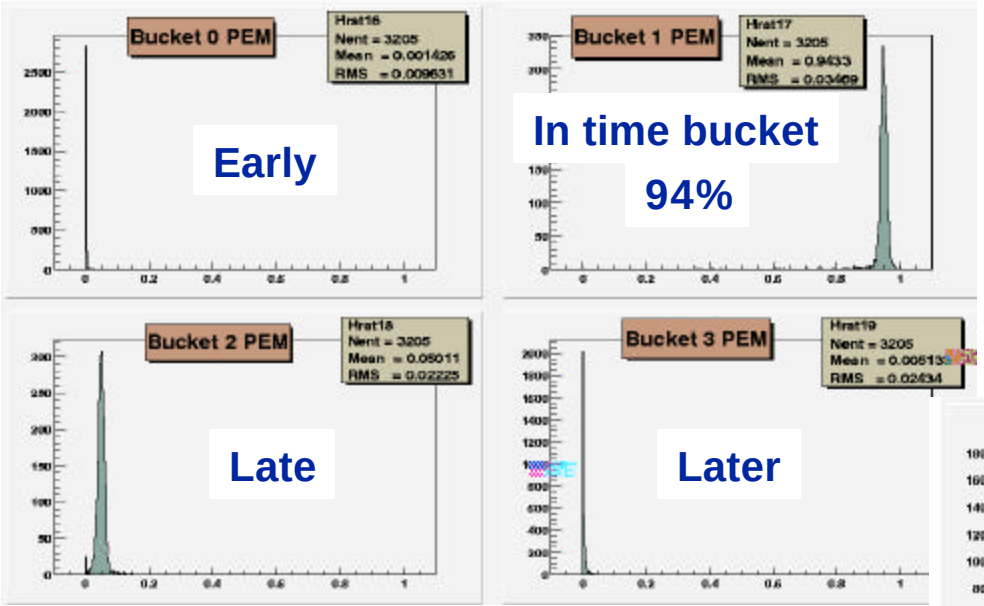
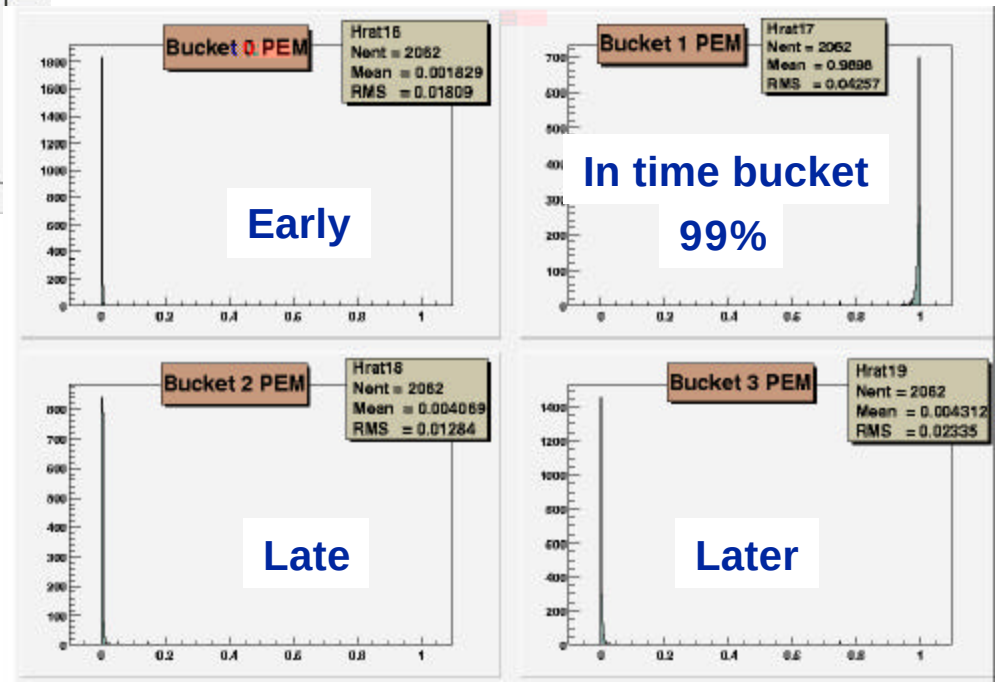
Detectors & triggers were roughly timed in
i.e. Data arrive in the same 132 ns bucket



Data was taken for
Fine timing adjustment



Read out 4 sequential L1 accepts (132 ns)

Min Bias + 2 Tower Trigger

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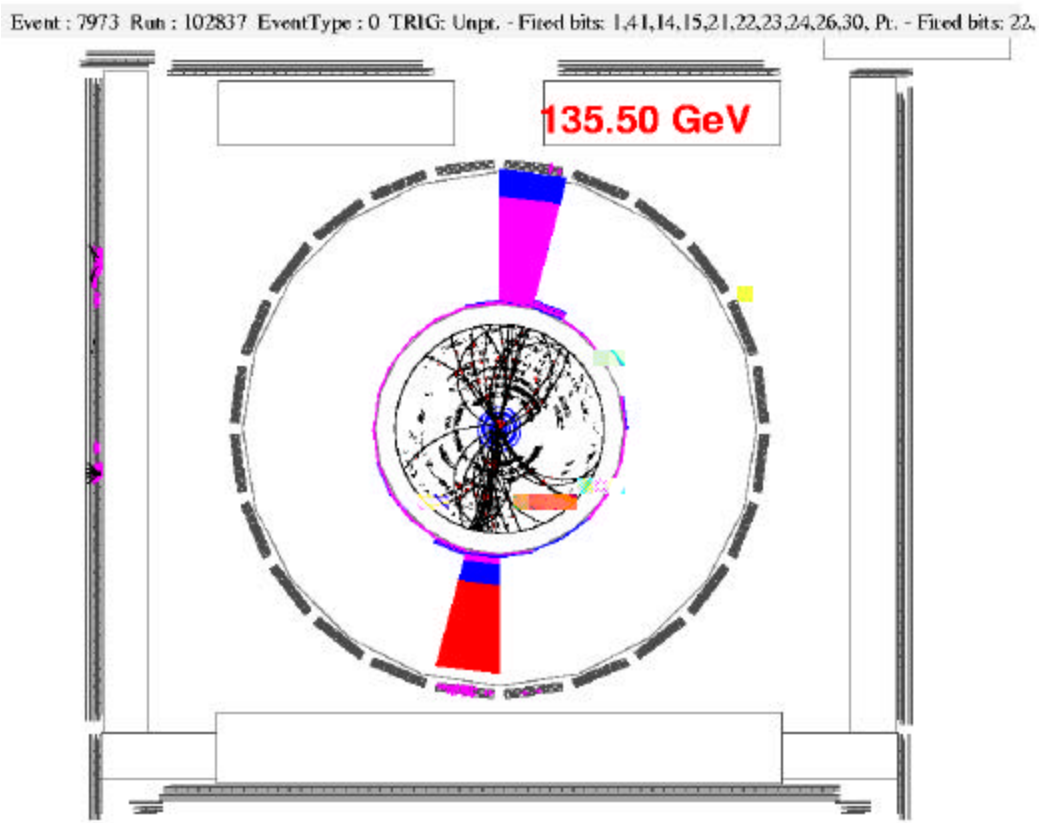
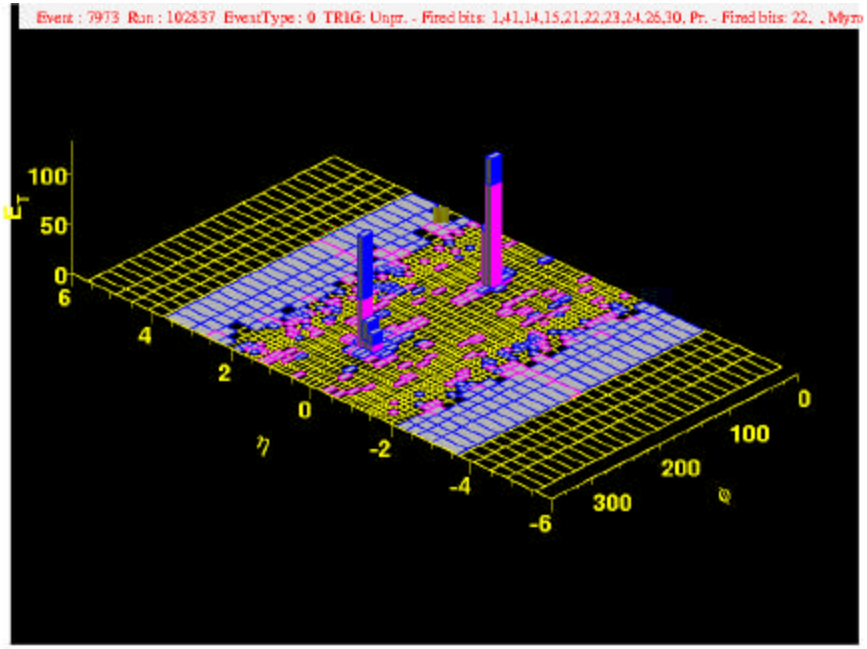
Two ~200 GeV jets
Missing Et ~ 25 GeV pointing to lower energy jet





Calor. Offline Reconstruction

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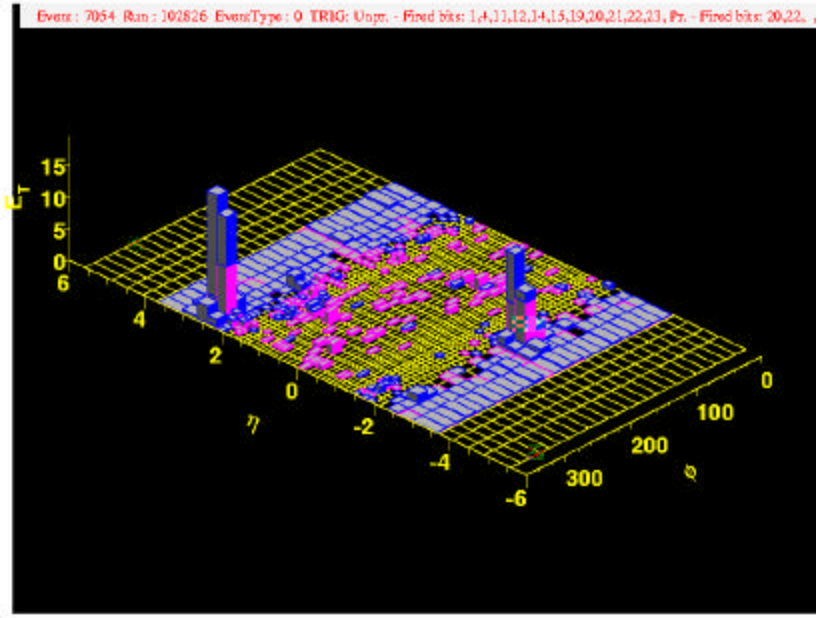

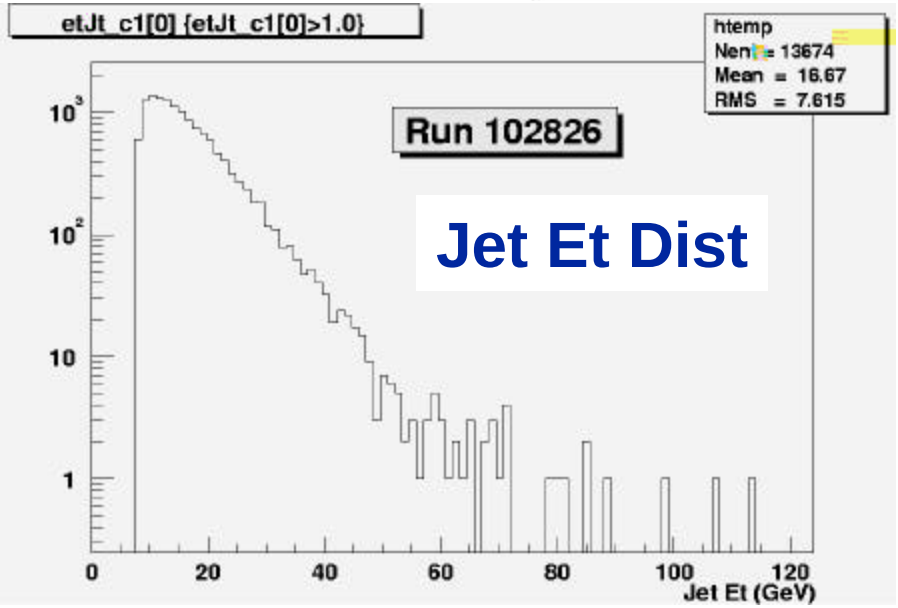

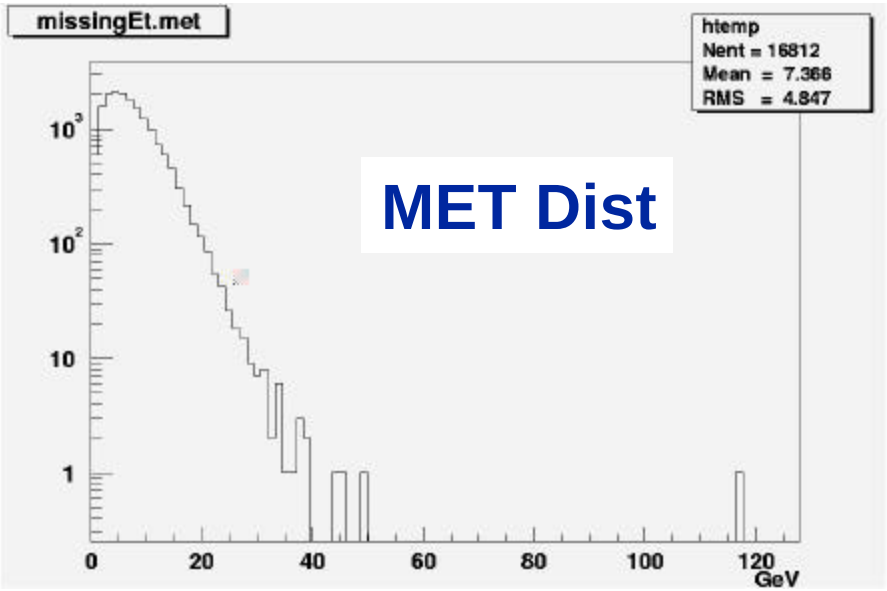

COT Offline Reconstruction

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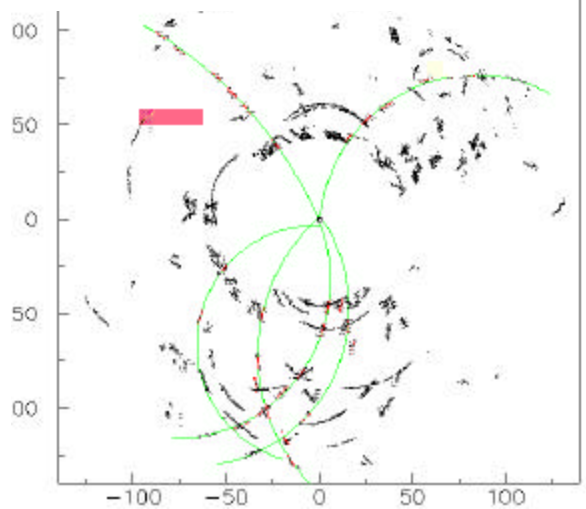
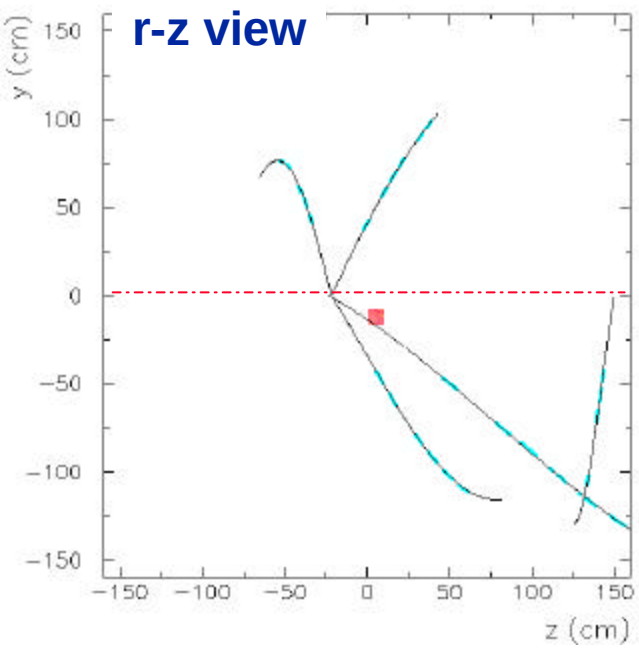
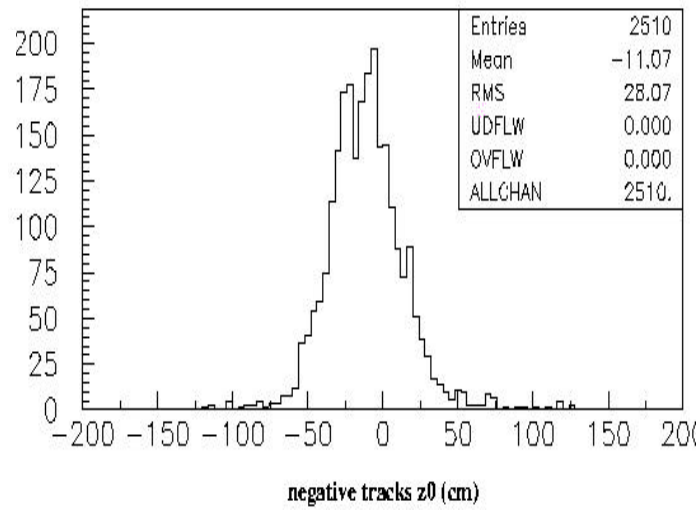
Beam axis view



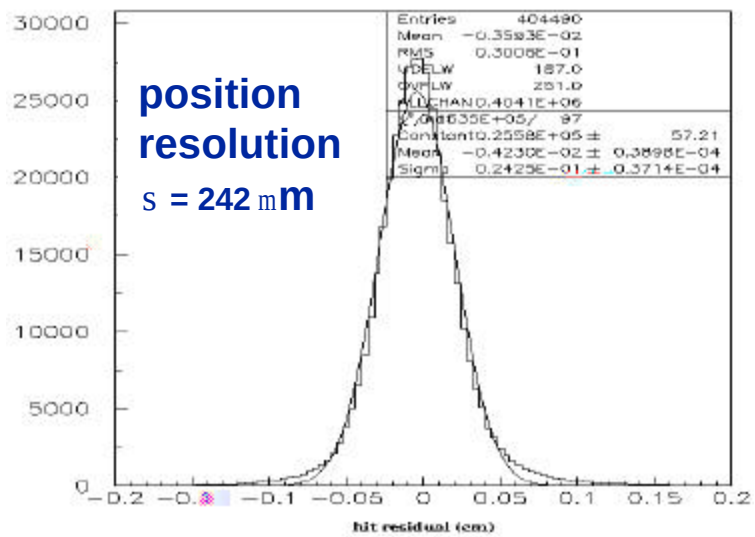
r-z view



Z_0 (cm)
rms =28 cm



position resolution
s = 242 mm



No wire by wire calibration, alignment,
Rough time to distance model

Min Bias + Muon-stub trigger

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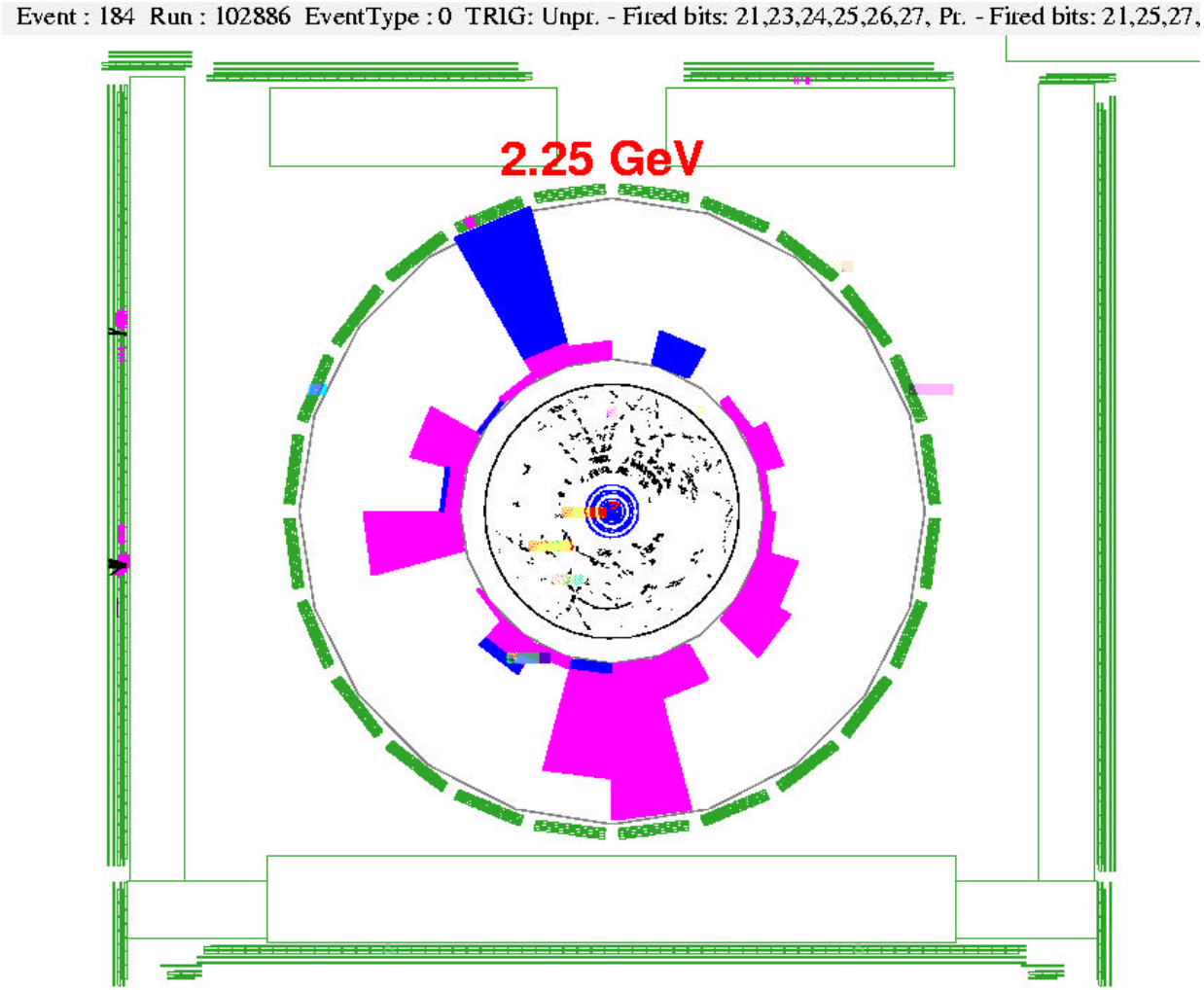

Track Trigger

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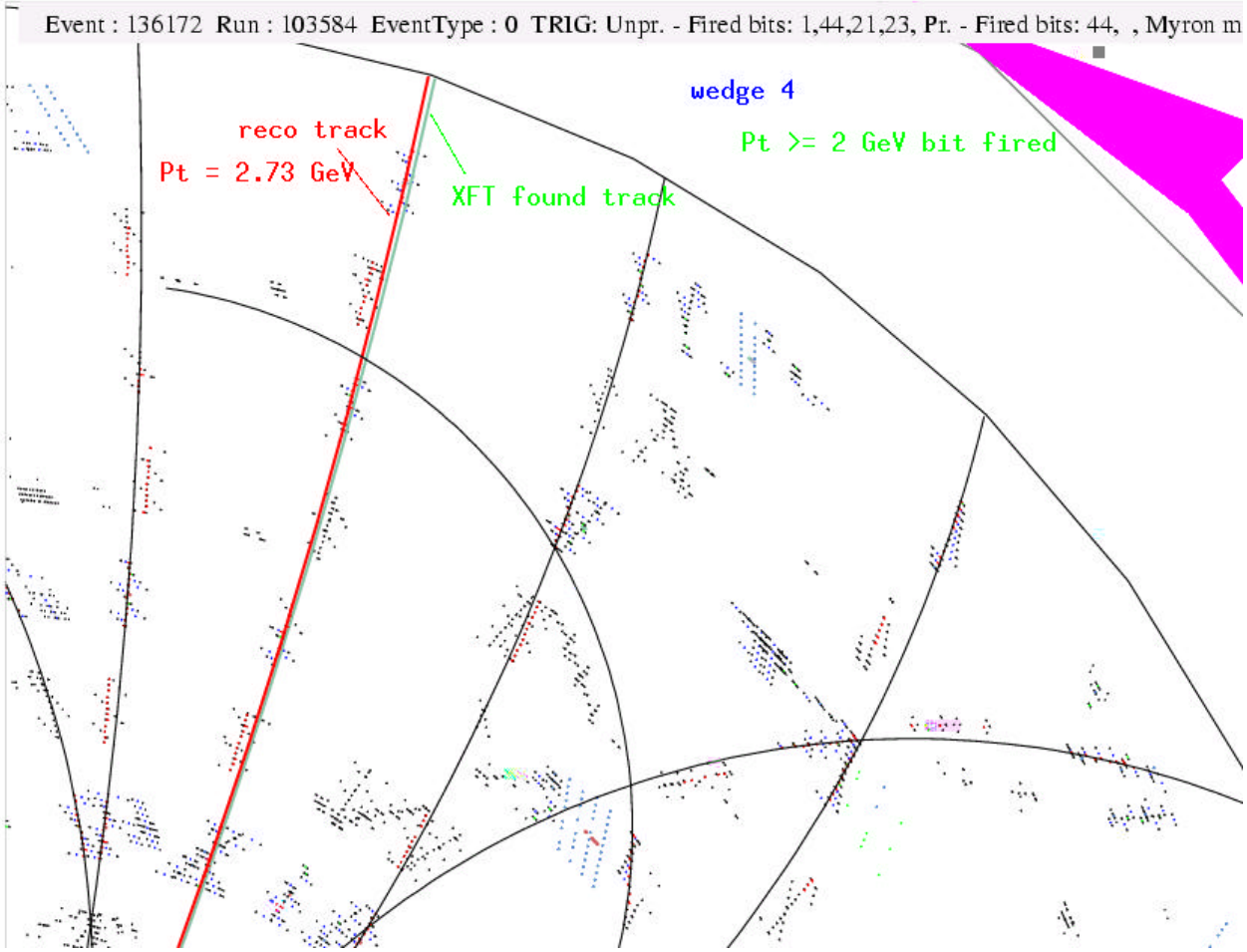
COT → XFT → XTRP → L1 Decision



XFT (Offline)

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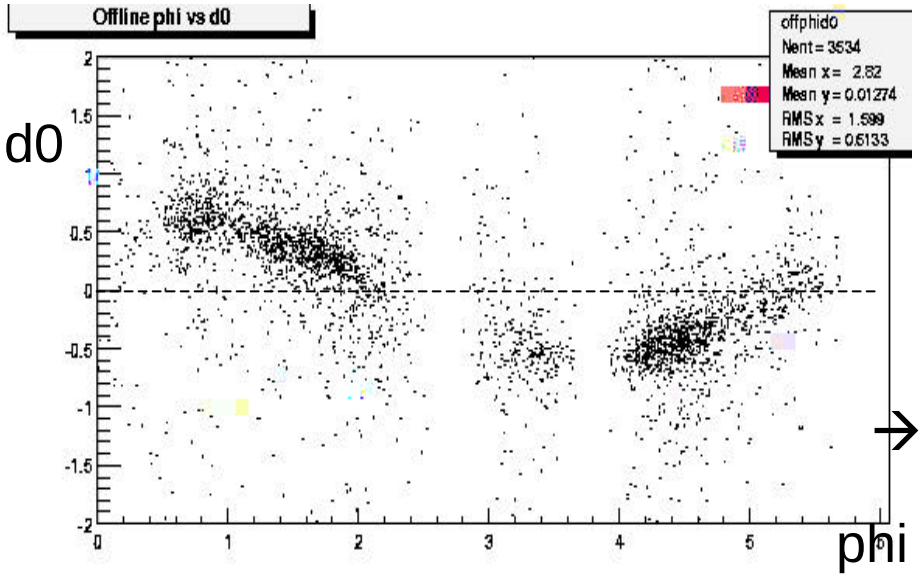
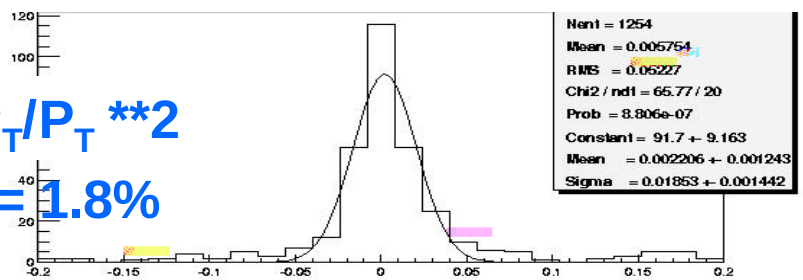


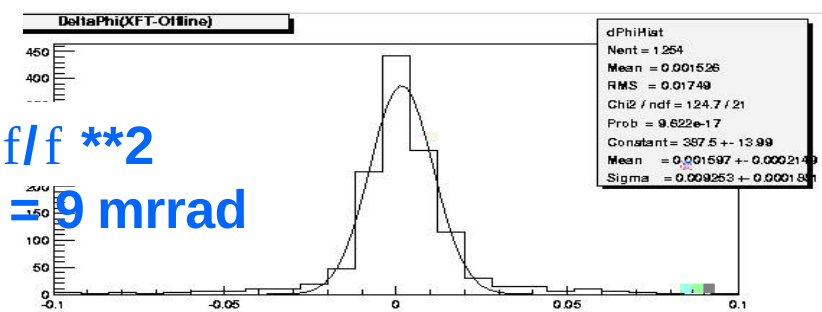
COT center line is off.
Vertically by ~6 mm
wrt. TeV beamline

→ XFT will put in beamline offset roughly



DP_T/P_T **2

s = 1.8%



Df/f **2

s = 9 mrrad

Goals :

Pt resolution < 2 %

Phi resolution < 8 mrad

Muon Track Trigger

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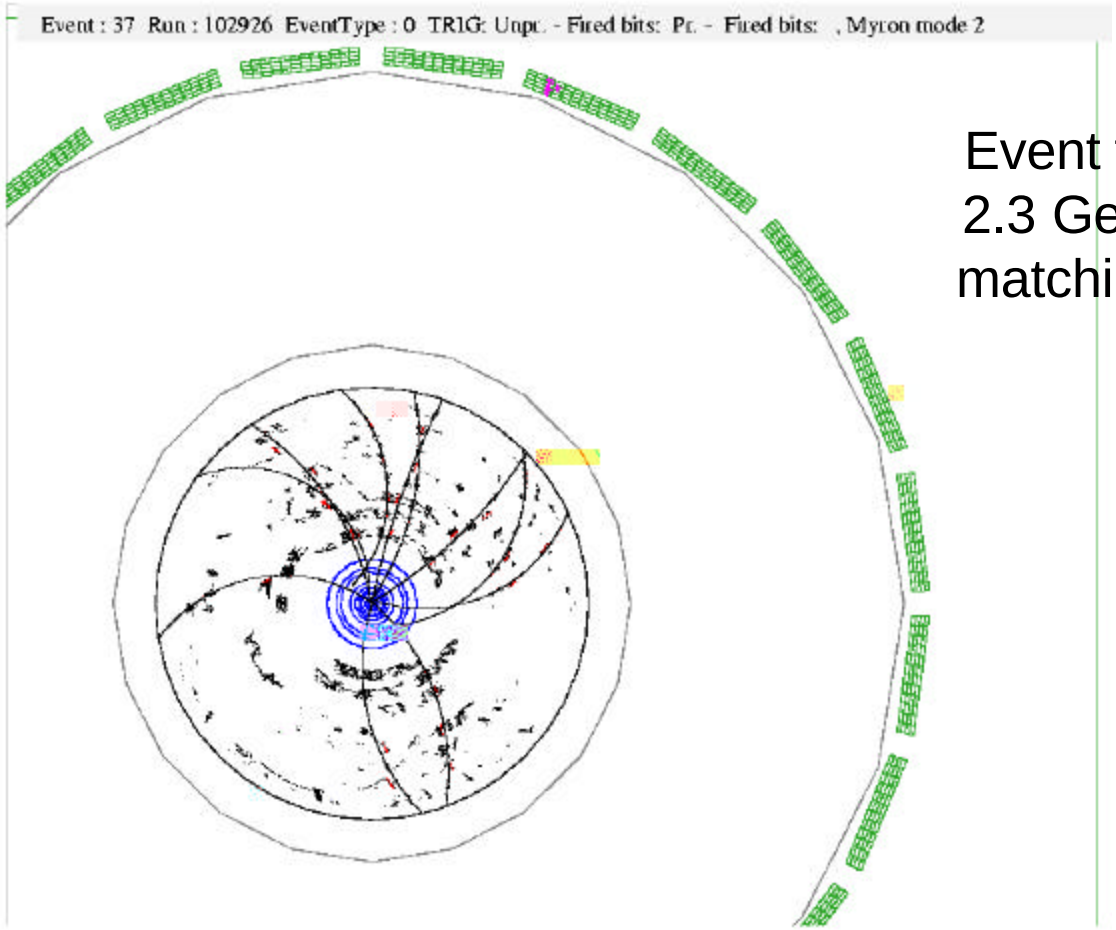
Muon stub
COT → XFT → XTRP

→ L1 decision



Event triggered on
2.3 GeV XFT track
matching CMU stub

Silicon Barrel-4

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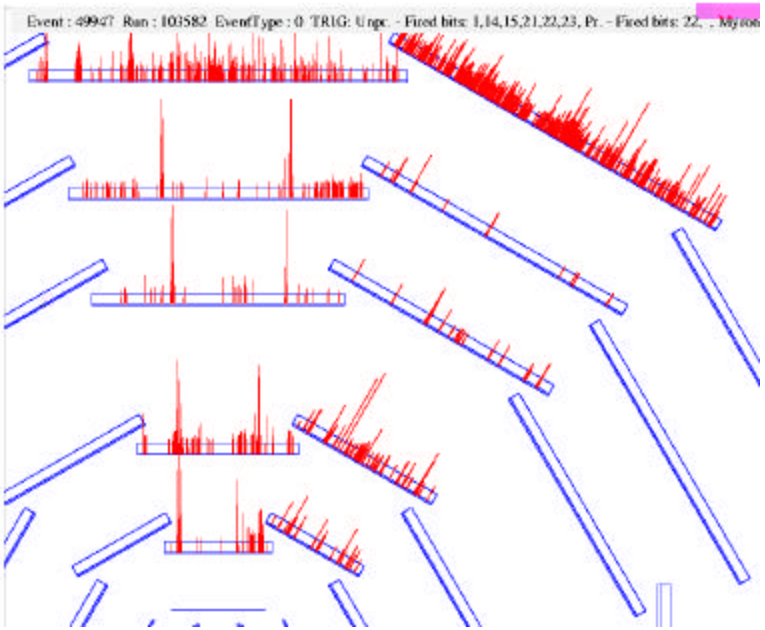
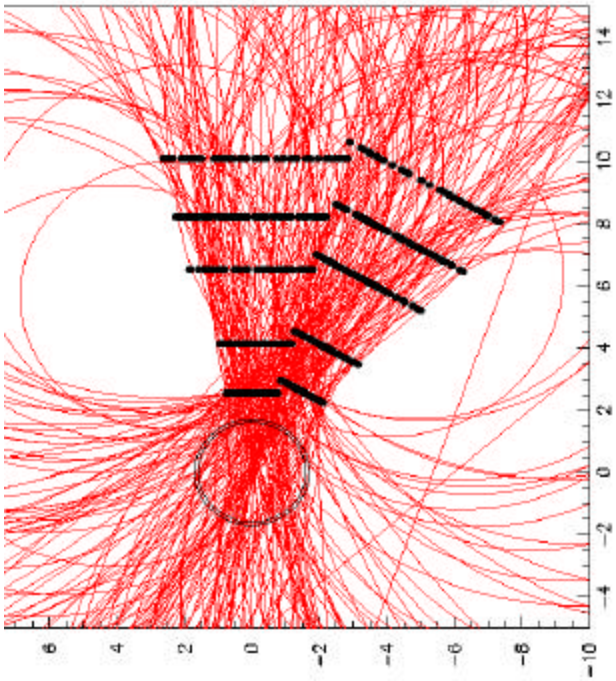
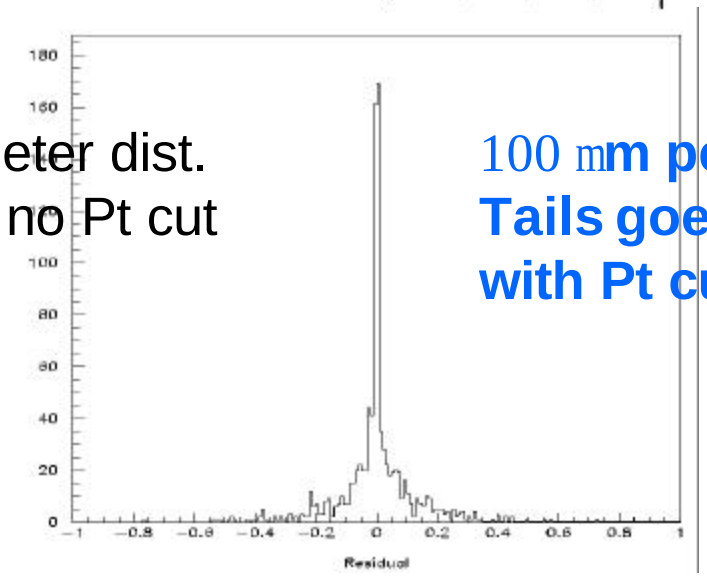




Impact parameter dist.
No alignment, no Pt cut



100 mm per bin
Tails goe away with Pt cut

SVT (silicon trigger for b)

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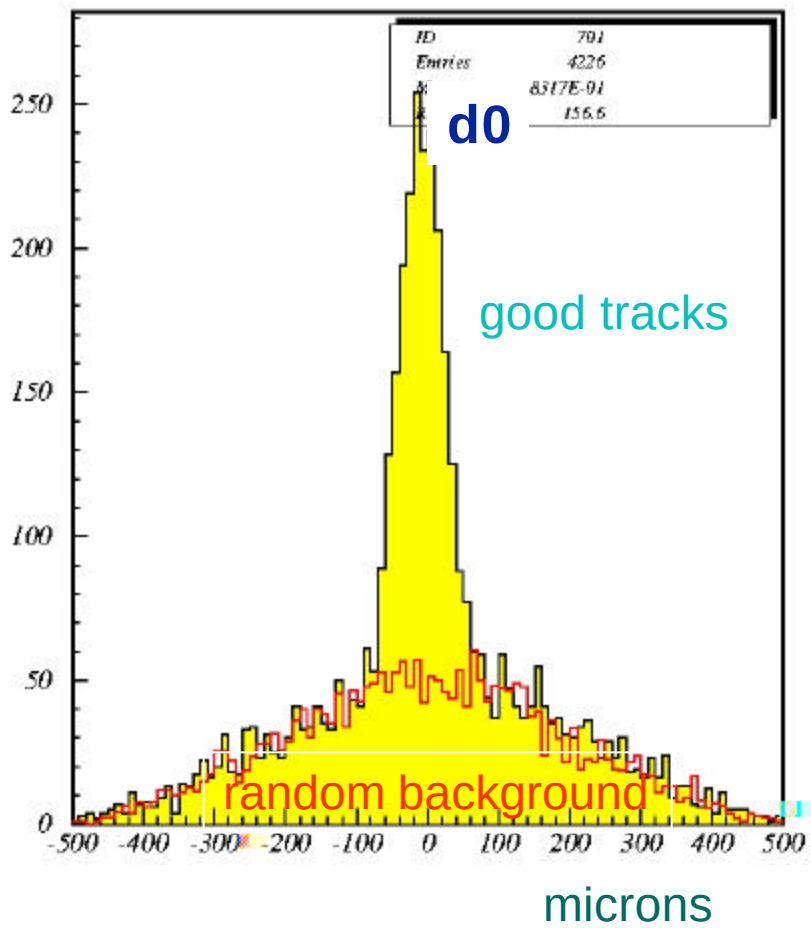
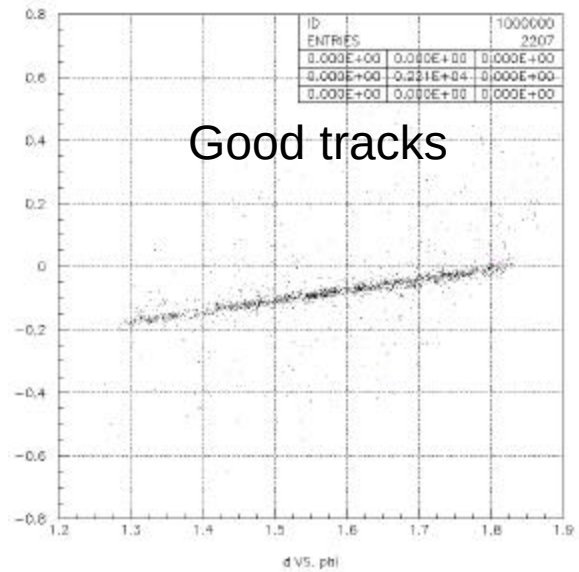
4 layers used.
3 hits make a circle
Look at residuals on 4th hit



d0



f

Data for one 30 deg wedge of SVX-II (small piece of sin wave due to vertical offset of beamline wrt silicon)

X_{beam} = +0.085 cm

Y_{beam} = -0.396 cm

SVT (silicon trigger for b)

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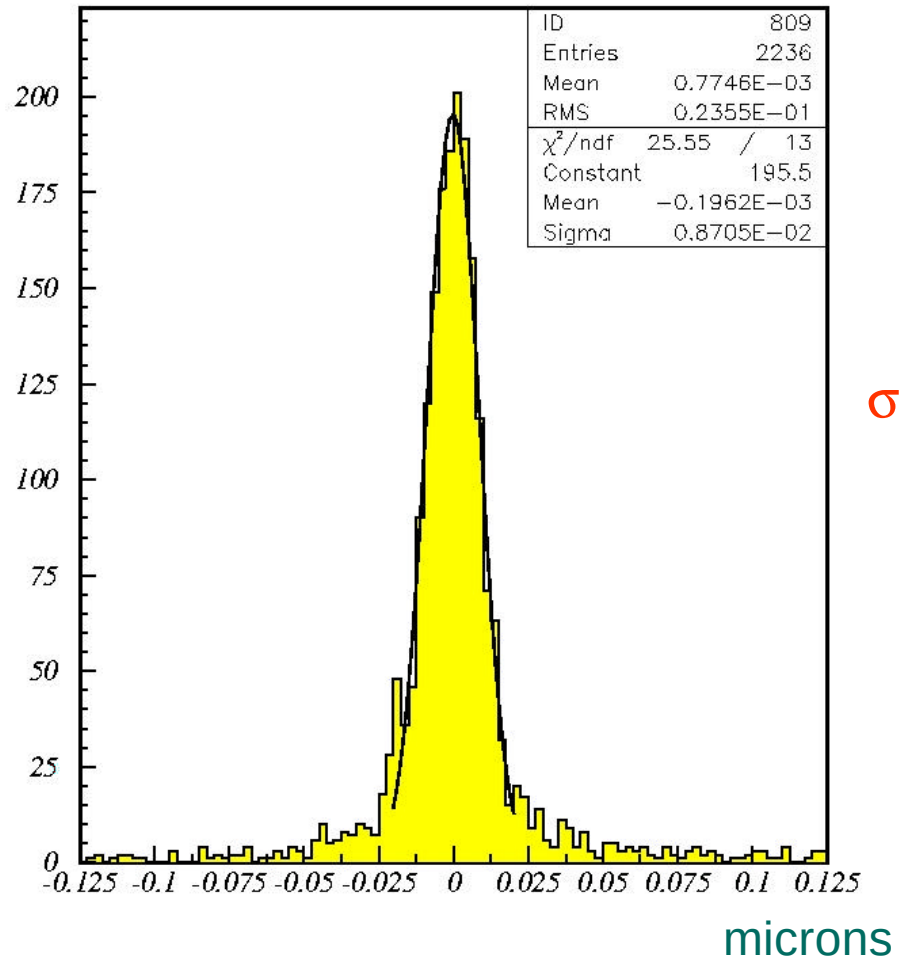
good tracks



$\sigma \sim 87\ \mu m$

No alignment or other corrections
➔ Silicon constructed with good alignment

Level-1 Trigger Rates

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At L ~ 1 x 10^{29}

Content	Rate	Prescale factor
Minimum bias	8 Hz	1,000
Min bias + 2 calor. tower with Et > 3 GeV	53 Hz	1
Min bias + 1 plug calor. tower with Et > 4 GeV	36 Hz	1
Track (phi = 30 – 90 deg) with Pt > 2 GeV	46 Hz	1
Pt > 4 GeV	11 Hz	1
Pt > 8 GeV	3 Hz	1
Pt > 12 GeV	2 Hz	1
Muon stub + track (phi = 30 – 90 deg)	0.6 Hz	1

K0 peak

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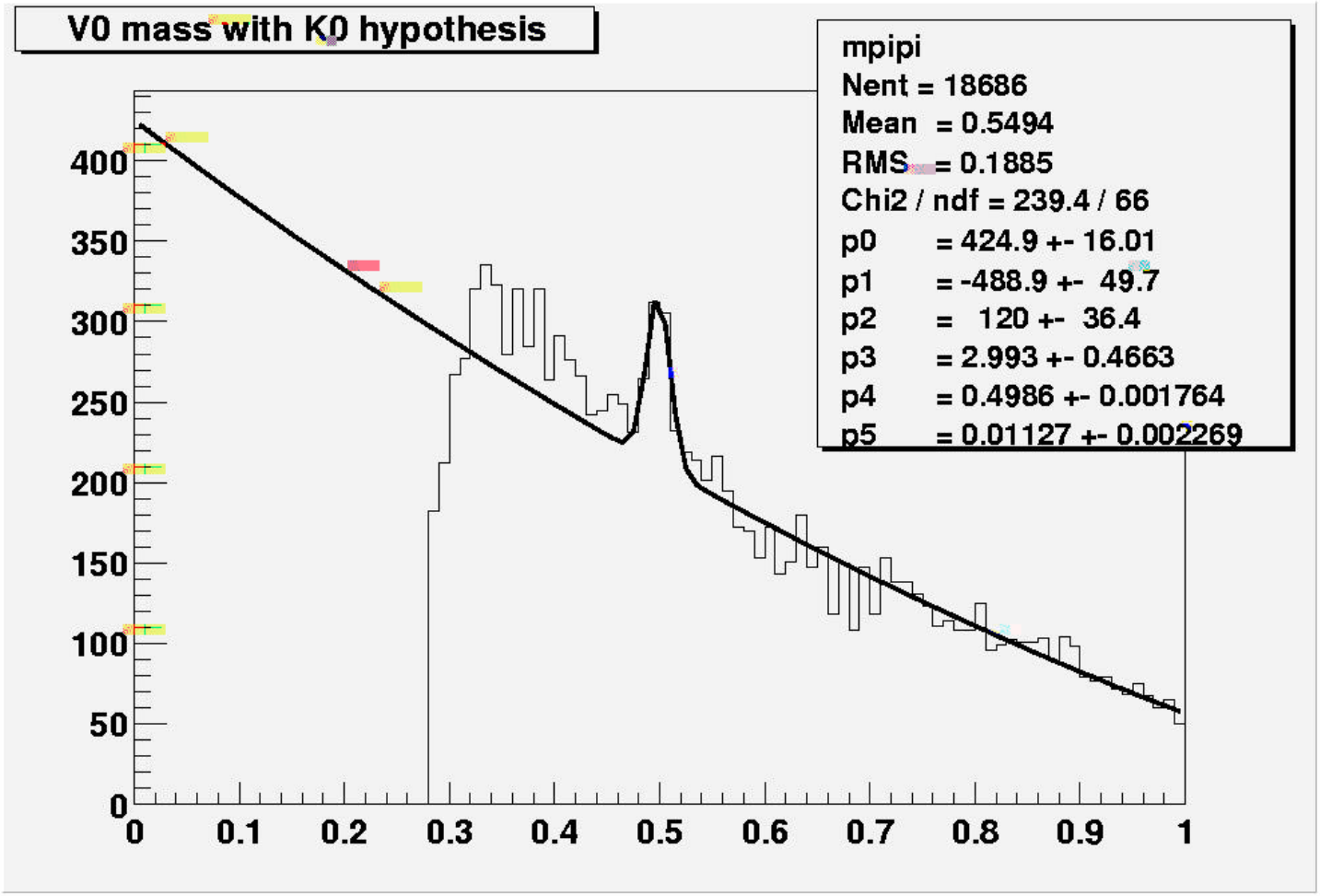

M = 498.6 +- 1.8 MeV

DAQ, Data Flow, Offline

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- Tested the full chain including
  - Level-2 processors (no rejection)
  - Level-3 calorimeter & COT track reconstruction (no rejection)
  - Consumer monitors
    - Event Display, Trigger Monitor, Detector Monitor, Luminosity Monitor
- 20 MB/s data rate to tape achieved
  - 60 Hz – 160 Hz depending on triggers used (luminosity)
- Offline reconstruction works.
- Online/Offline calibration procedures tested.

Conclusions

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- Our new CDF-II detector works !!
- New Offline, Offline infrastructure works !!
- Many misc. things to fix.
- Many areas to improve.
- Data on tape to analyze
  - detector alignment, calibration
  - help to establish operating points

- For CDF,
  the Commissioning Run has been a remarkable success.

- Many thanks to the Beams Division for their hard work
- Many thanks to the Directorate for the opportunity