Gap-X-Gap update

1) New runs
2) Artur Święch:
    1) Middle gap
3) Dominik Wrana
    1) Nie wiem
    2) Nie wiem
4) Maria Żurek
    1) Particle Identification

Our triggers

- Forward Gap – BSC1, CLC, FwdPlug $|\eta|>2,11$
- Something central:
  - Jet > 5GeV
  - 2 Jets > 0.5 GeV
  - Track > 1.5 GeV/c
  - 2 Tracks > 1.5 GeV/c
  - 2 EM Showers > 0.5 GeV

Current data:

- Run 292319:
  - Date: 05/10/2010
  - Lumi ~ 65*E30
  - BSC1 & CLC Veto
  - FwdPlug Veto – offline
  - Offline cleanups
  - Silicon OFF
  - Number of events: **18433**
- Run294607:
  - Date: 07/12/2010
  - Lumi ~ 67*E30
  - BSC1 & CLC Veto
  - FwdPlug Veto
  - Offline cleanups
  - Silicon OFF
  - Number of events: **62281**

Expected:

- Runs: 292319, 294607, 294630, 294773, 294775, 294777:
  - Lumi ~ 33-67 * E30
  - BSC1, CLC, Fwd Plug Veto, Offline cleanups
  - Number of events ~ **2.5M** (31 times more statistics)
  - Integrated luminosity ~ 1.46 pb^{-1}
  - For 294630+ Silicon was ON (96% of events)

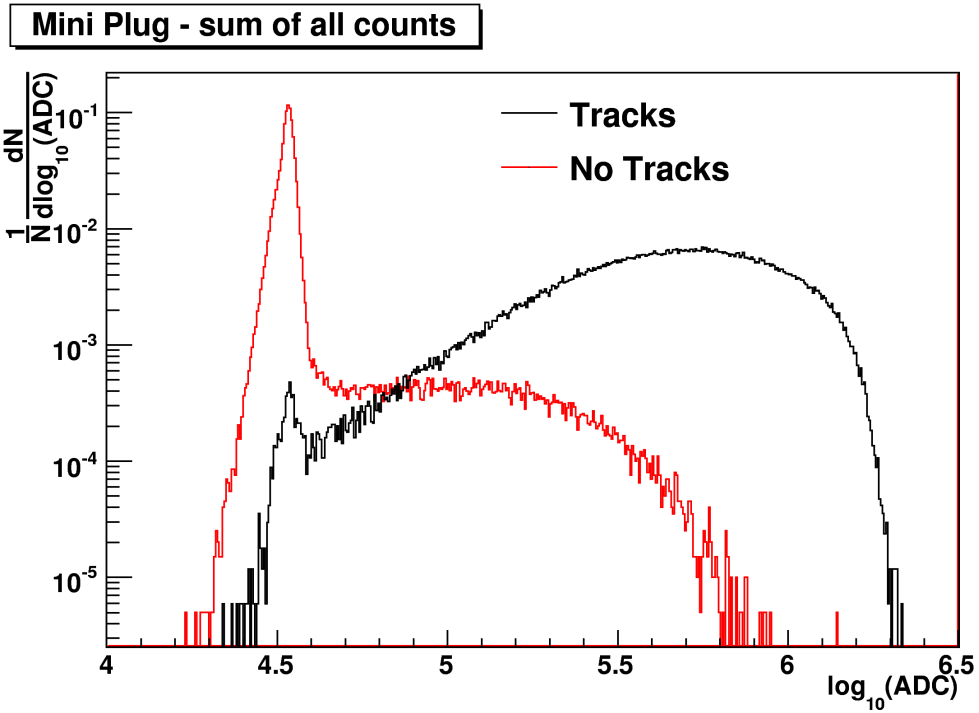
Middle Gap

Artur Święch

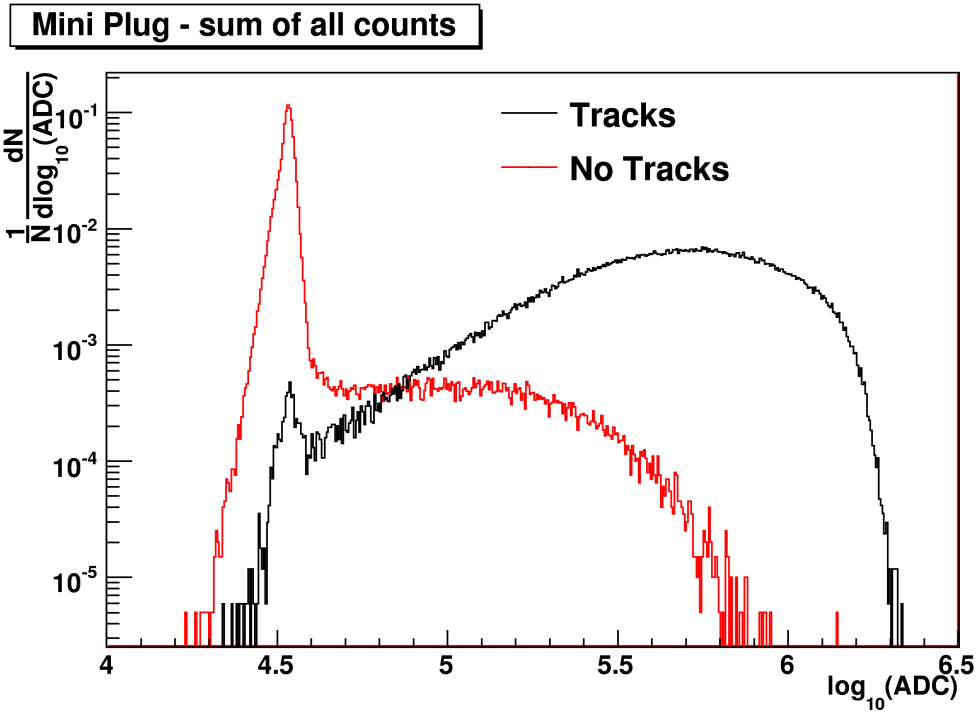
- Mini plug analysis

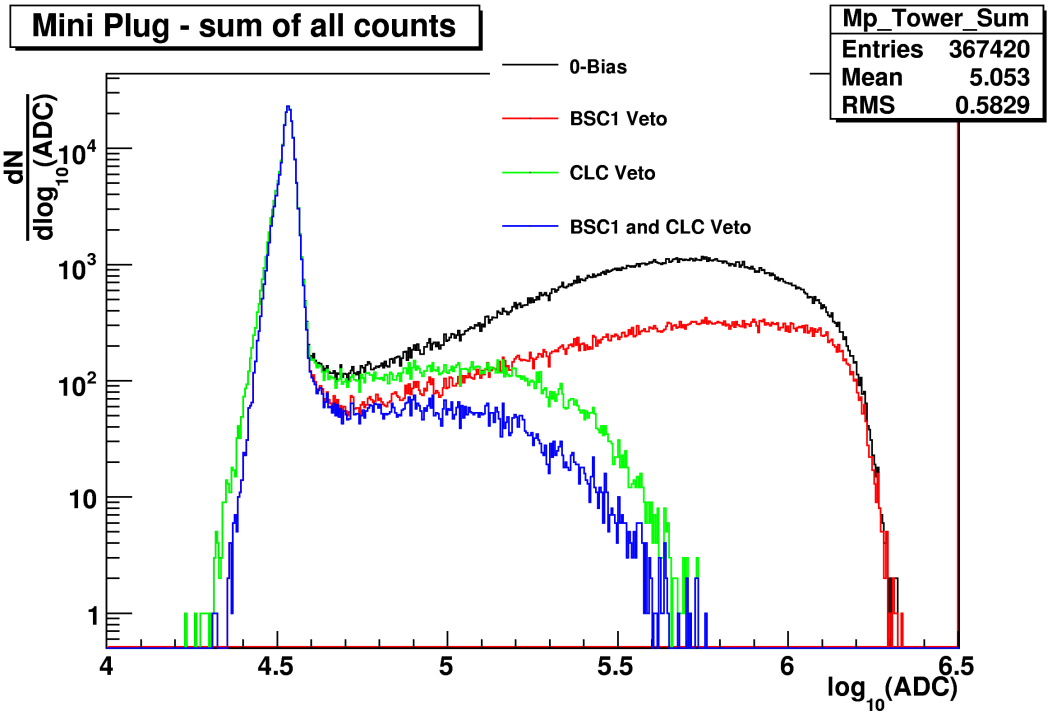
Middle Gap

- Middle gap – uncovered region between BSC1 and CLC, ~ 0.7 in η on each side
- Influence of BSC1 & CLC veto on middle gap analysed using Mini Plug in 0-Bias data from runs 190697-191197 (12/2004)

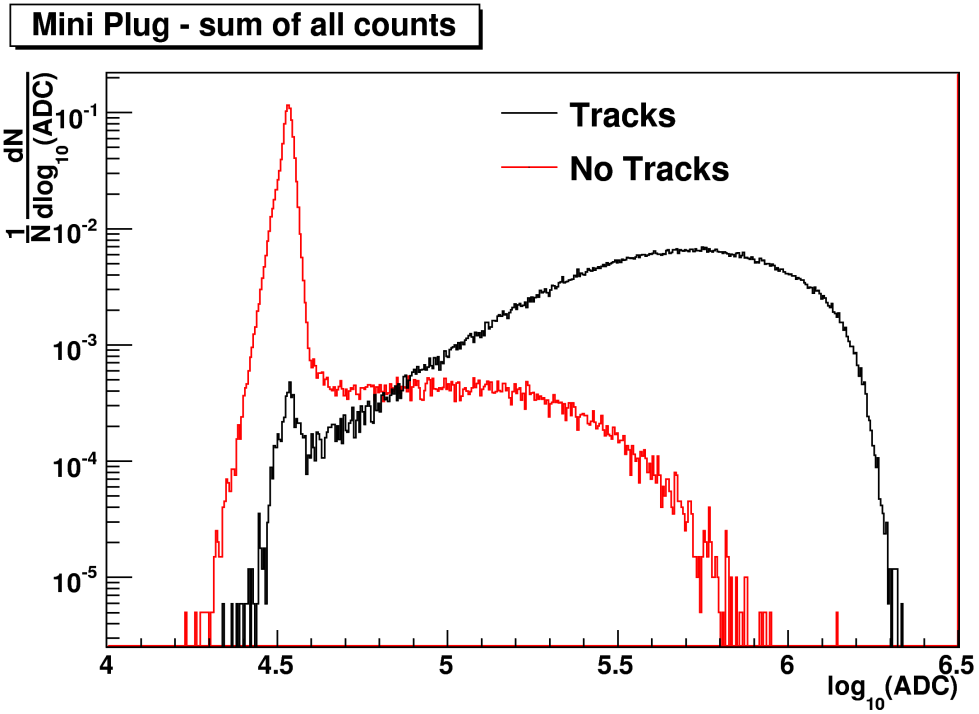


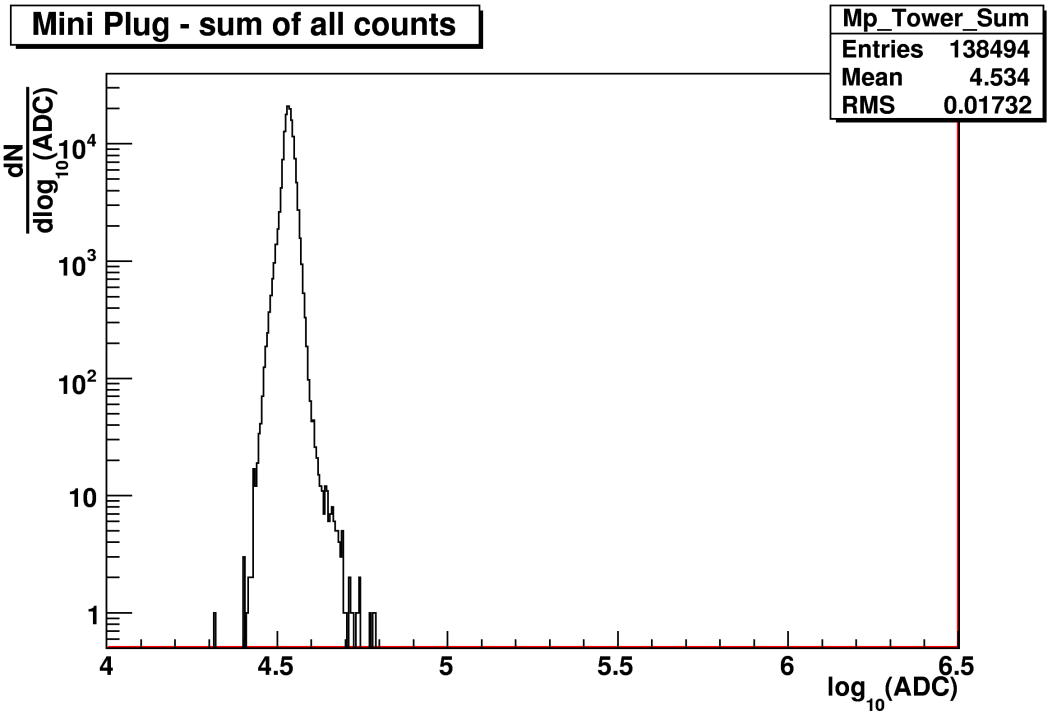
- Separated sample in two subsets to define noise level.





- Separated sample in two subsets to define noise level.
- BSC Veto
- CLC Veto





- Separated sample in two subsets to define noise level.
- BSC Veto
- CLC Veto
- Forward Plug Veto

- Almost all events are below noise level. Middle gap is not important.

Exclusive 2 central tracks

Dominik Wrana

Used data
general informations

Data from:	May 2010	+	July 2010
Run number:	292319		294607

Trigger vetoes: CLC, BSC1, Forward plug trig

Offline cuts of CLC, BSC1, Forward Plug applied (East, West separately, EM, HAD also)

Events left

(tighter cuts – fplug cal)

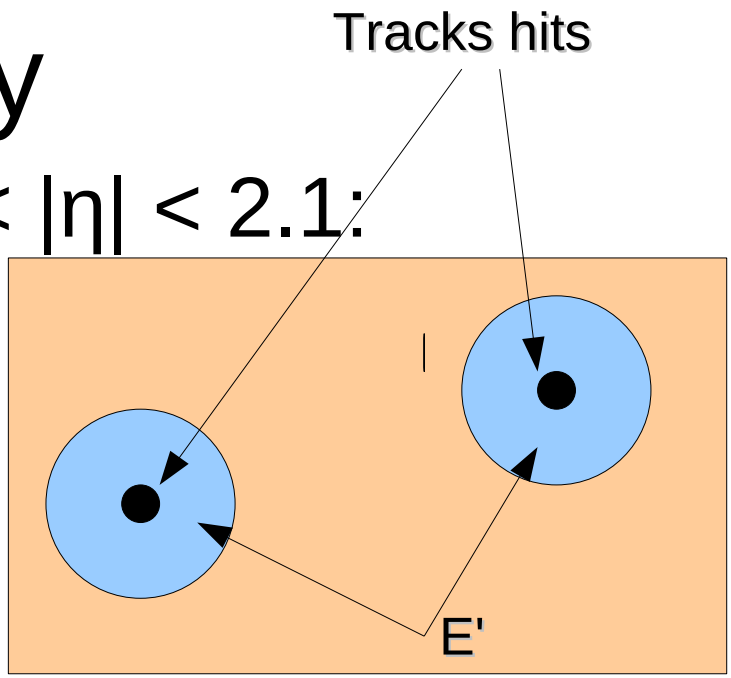
	May (292319)	May + July (292319 + 294607)
• After gaps requirements:	36354	80714
• After beam halo cut:	31985	60116
• Side EM calorimetry clean	7905	21014
• Side HAD calorimetry clean	7403	19887
• 2 tracks with opposite charge	348	1097
• Central ($\lvert\eta\rvert<1.2$) tracks only	336	1070
• Muons cut	317	1042
• Cosmics cut	314	1035
• Low Pt tracks cut (Pt < 0.4)	236	738
• Central exclusivity cuts	214	685

Calorimetry

١) Side calorimeter clean - 1.2 < |η| < 2.1:

- Sum of EM < 0.3 GeV
- Sum of HAD < 1 GeV

٢) Central calorimeter clean:



E' = Sum of all towers E with Δφ, Δη between tracks hits and calorimeter towers that R < 0.6

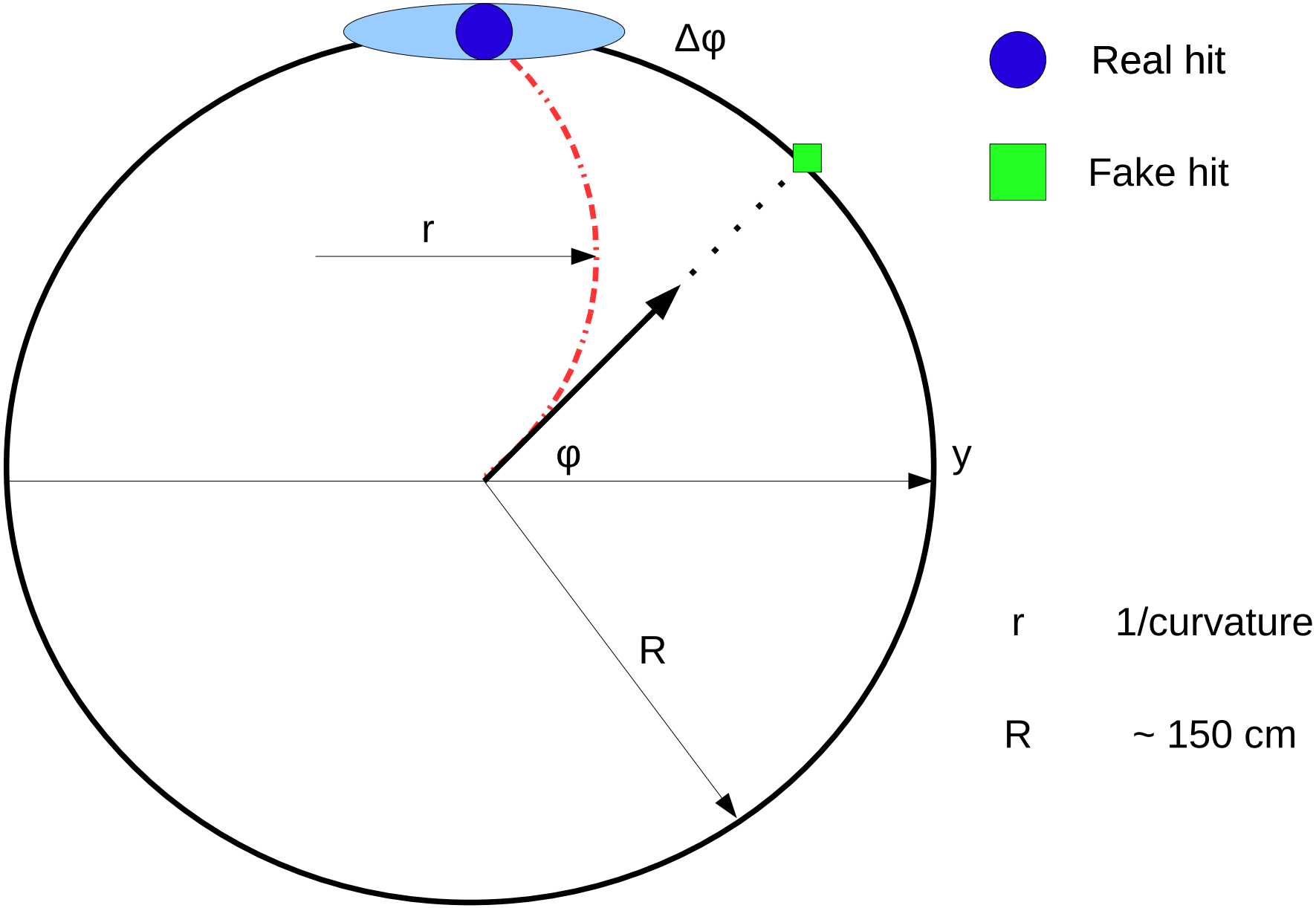
Condition to have exclusive 2 particles events:

(E' – Sum of tracks P) < 0.84 * 1 GeV

Cleaning cut coefficient

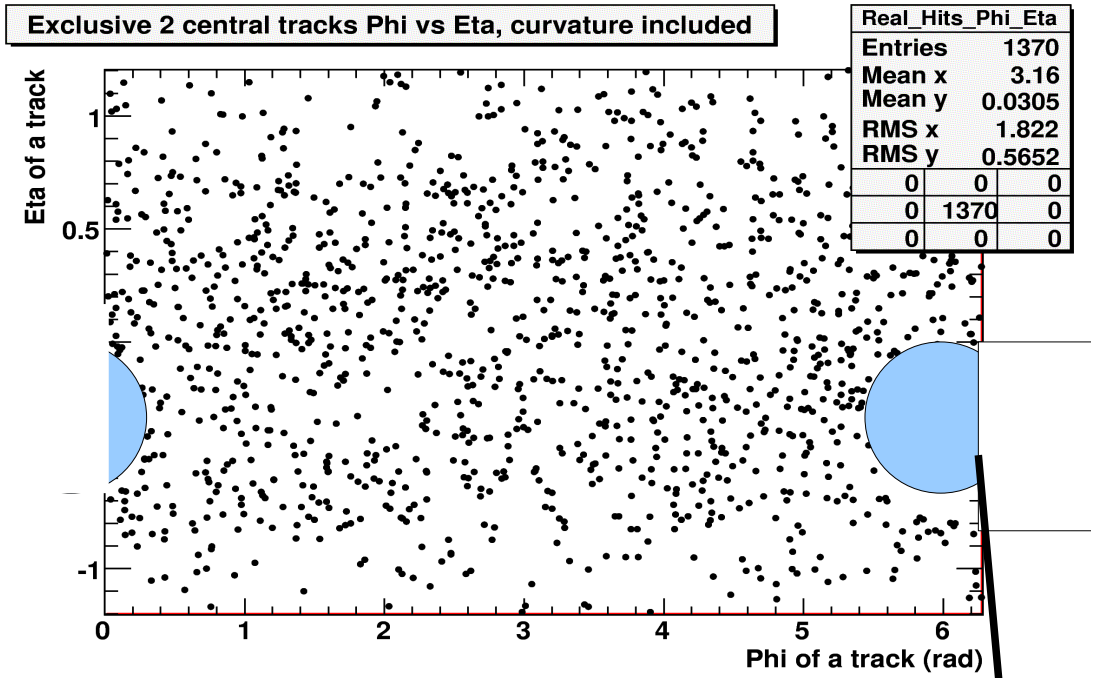
(Overall – areas of disks)

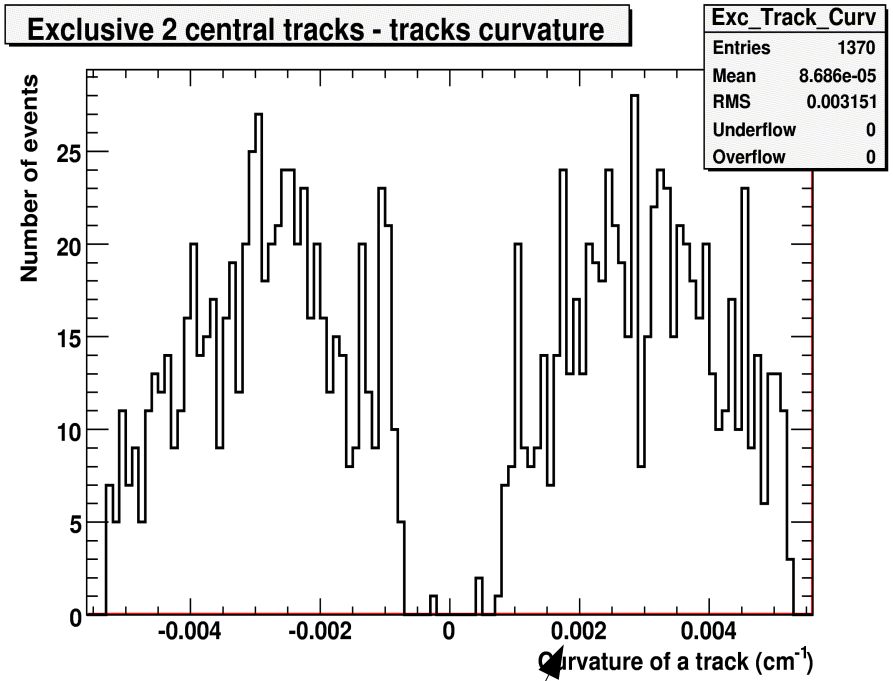
Including tracks curvature



$\Delta\varphi = \pi/2 - \mathrm{acos}(R / 2r)$

Average $\Delta\varphi \sim 0.3$ → important contribution !



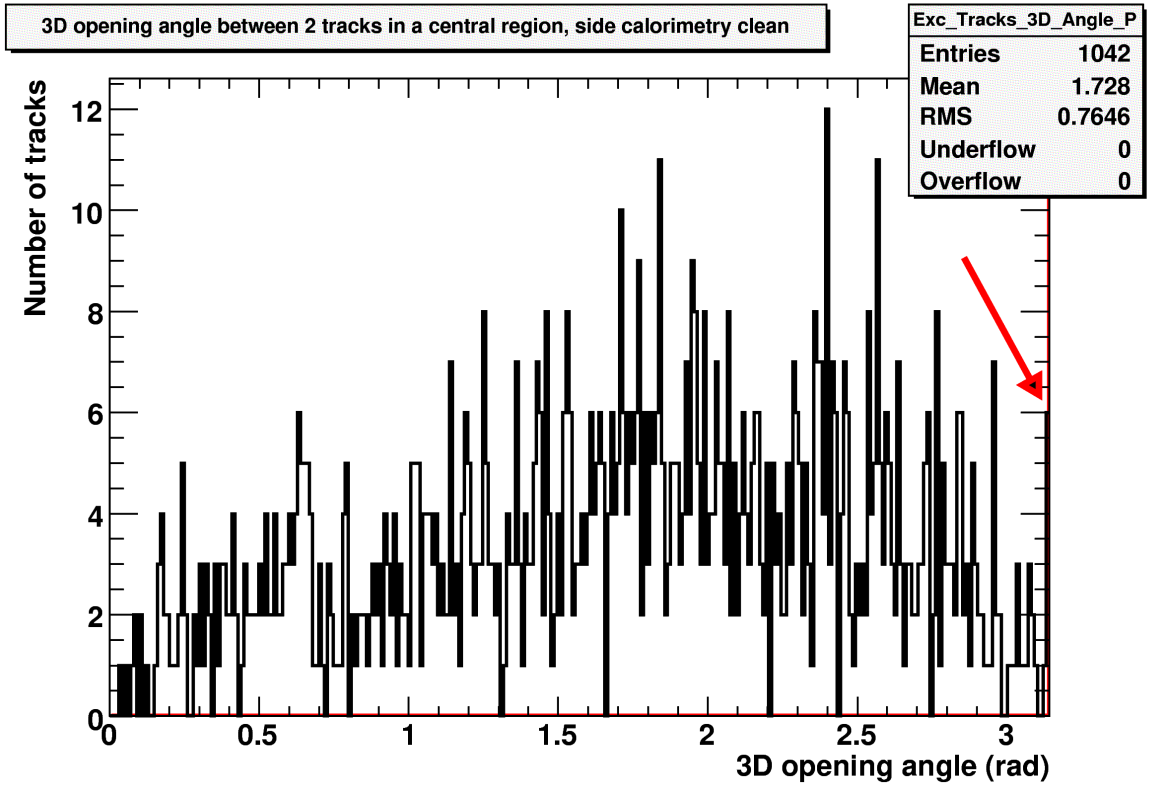


Still flat distribution

0.01 <-> Pt ~ 2 GeV/c
0.02 <-> Pt ~ 1 GeV/c

In addition:
cylinder-like phase space topology included

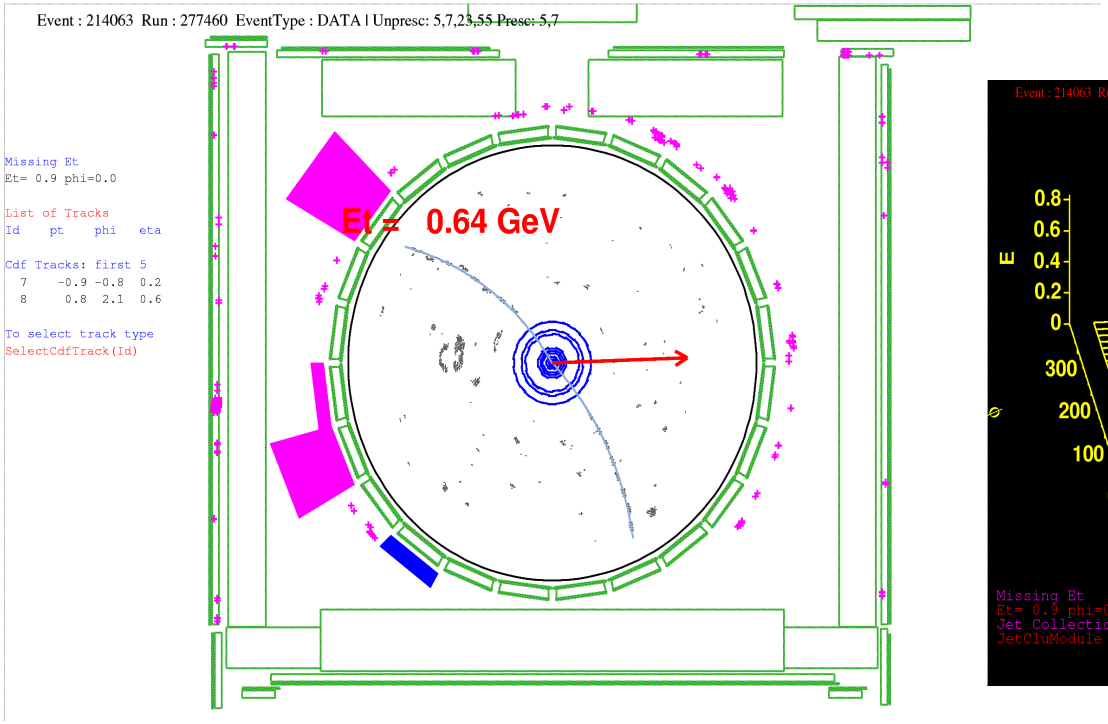
3D opening angle

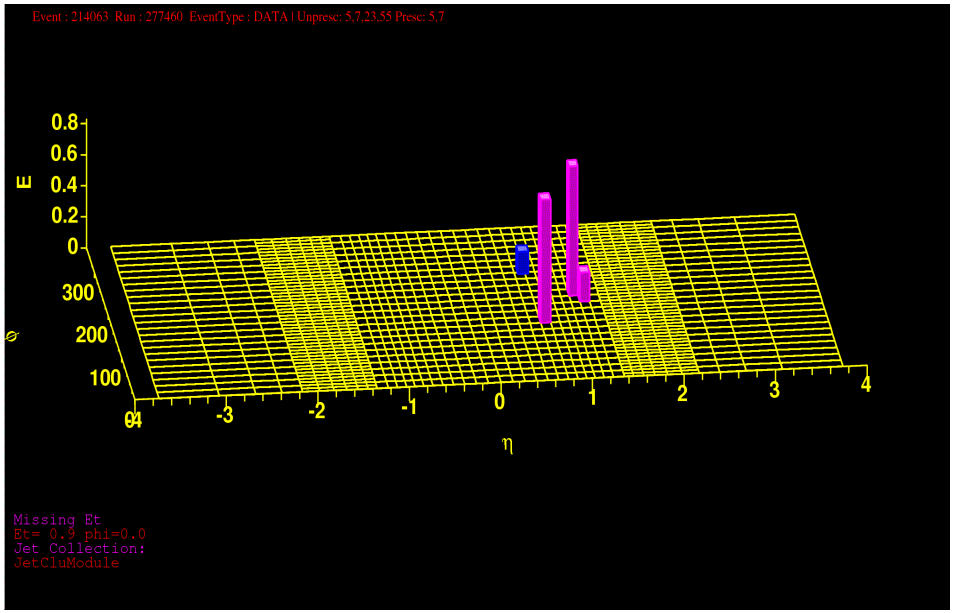


7 events with angle > 3.1 → cosmics

3D opening angle for exclusive 2 tracks events (central, without muons)

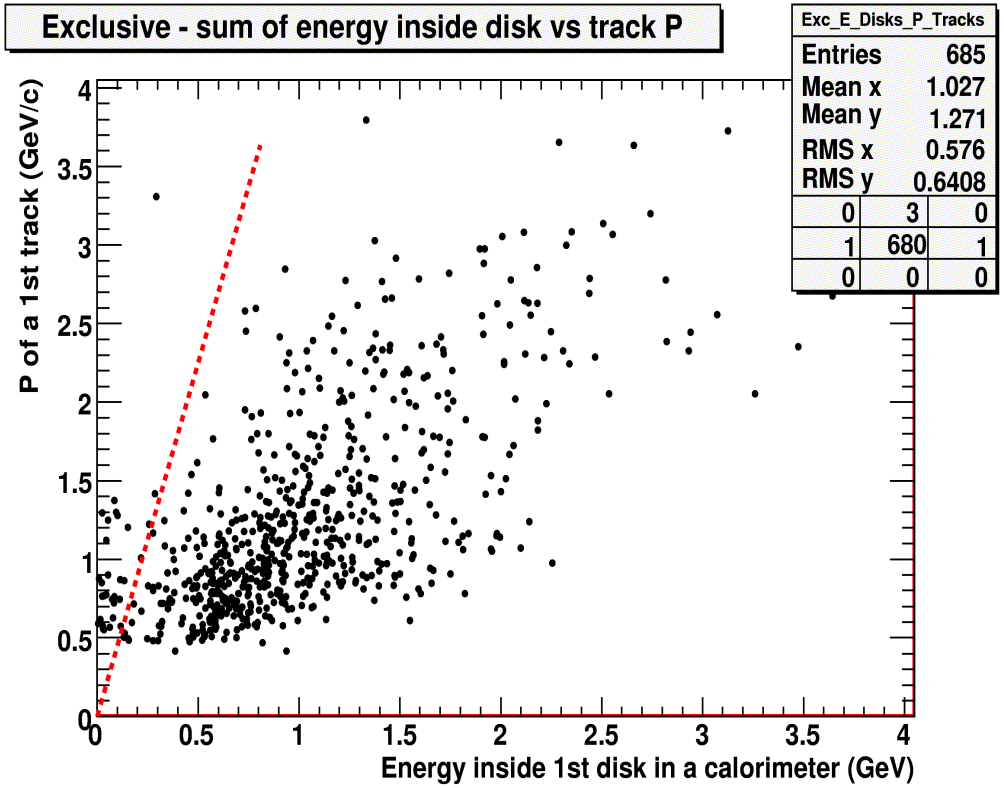
Some EVD images

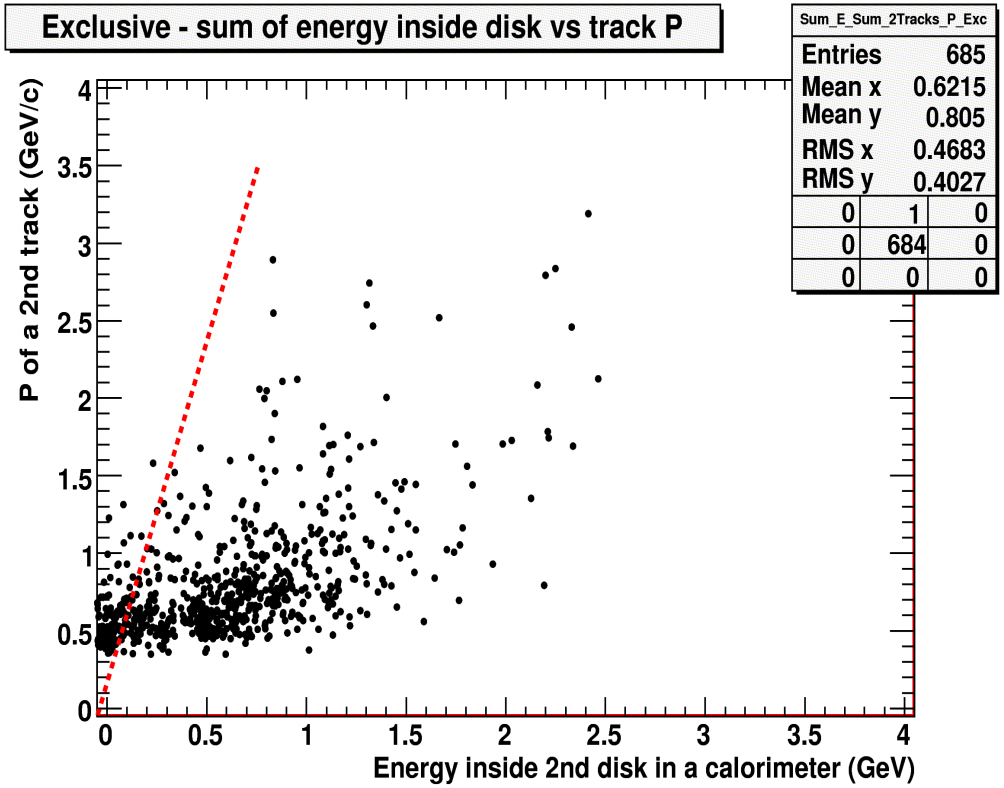




Track sometimes (~20%) does not hit any calorimeter towers → we need to exclude these events.

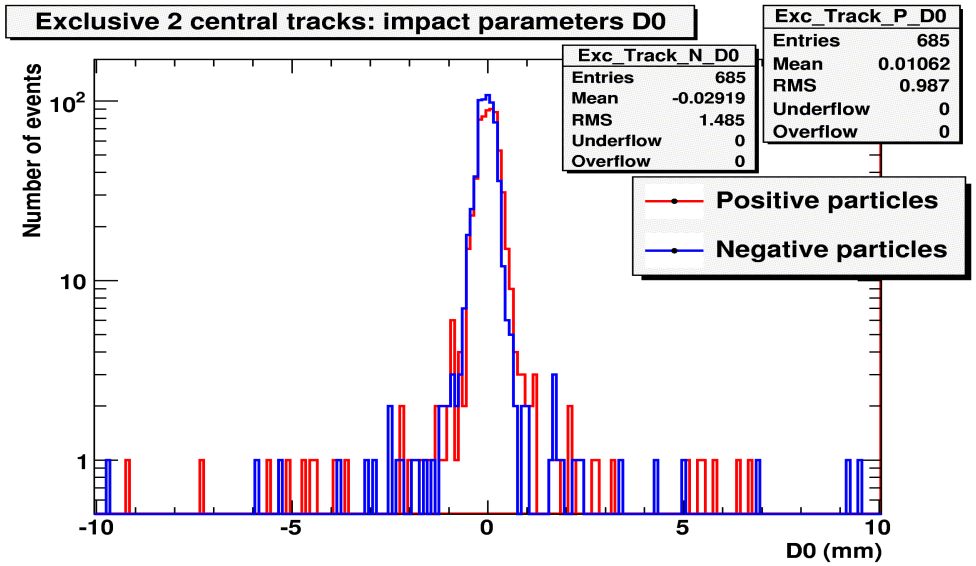
Energy inside disks vs tracks P



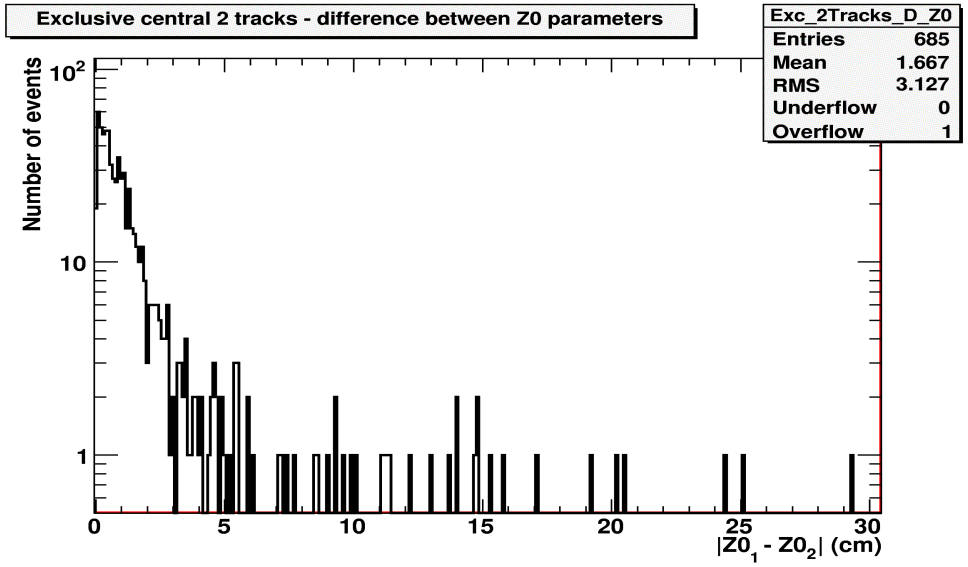


Some events with (sum of E) << (sum of P) – to cut

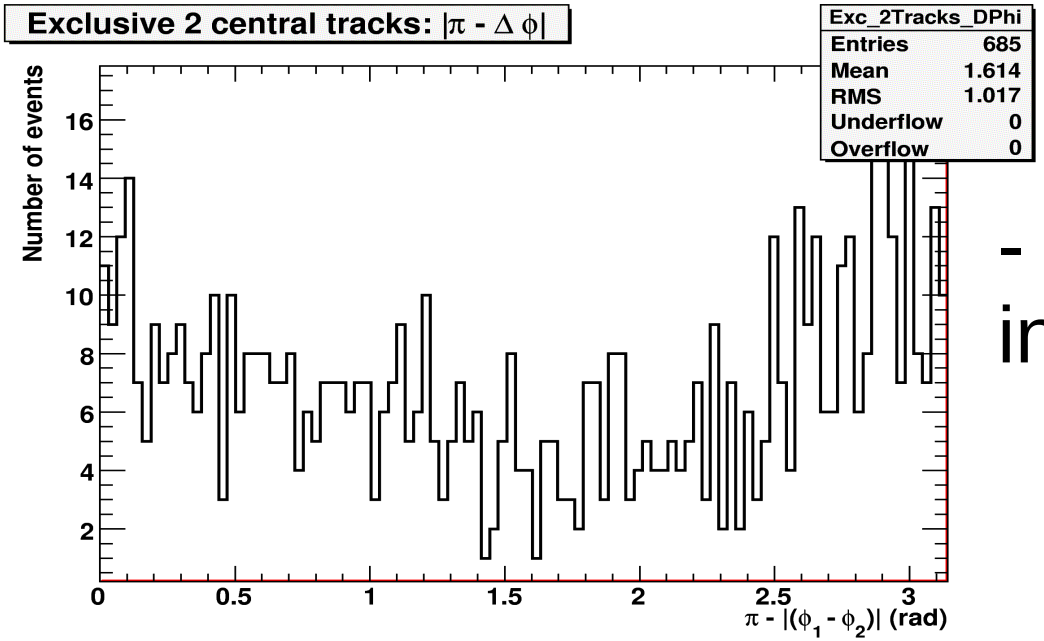
Exclusive 2 tracks: ΔZ0, D0



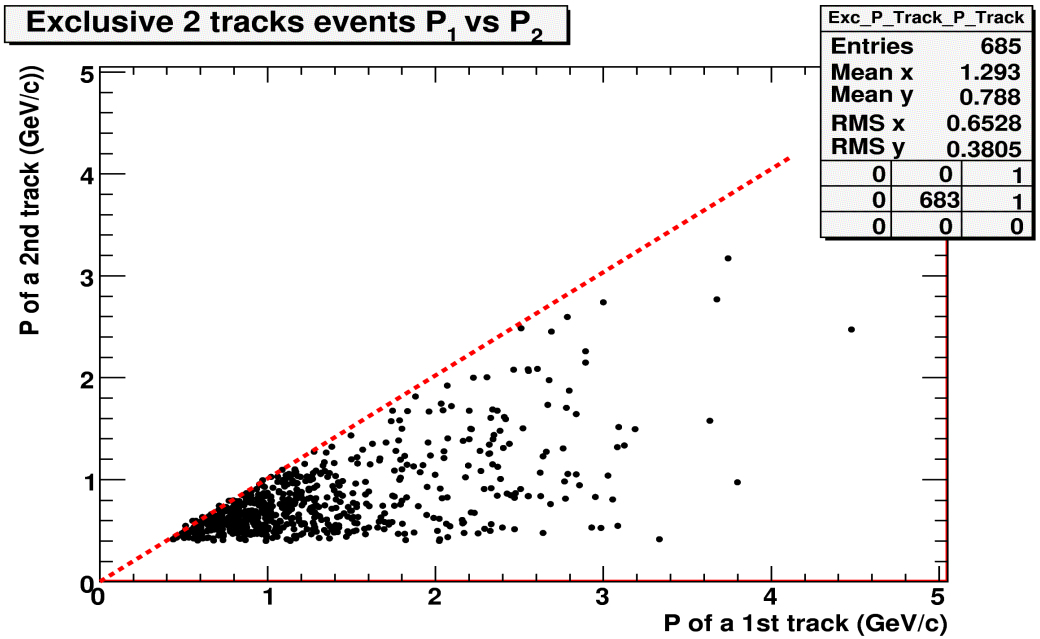
D0 for different charges:
- proposed cuts:
  - > 1 mm
  - < - 1 mm



ΔZ0 distribution:
- to cut about 6 cm

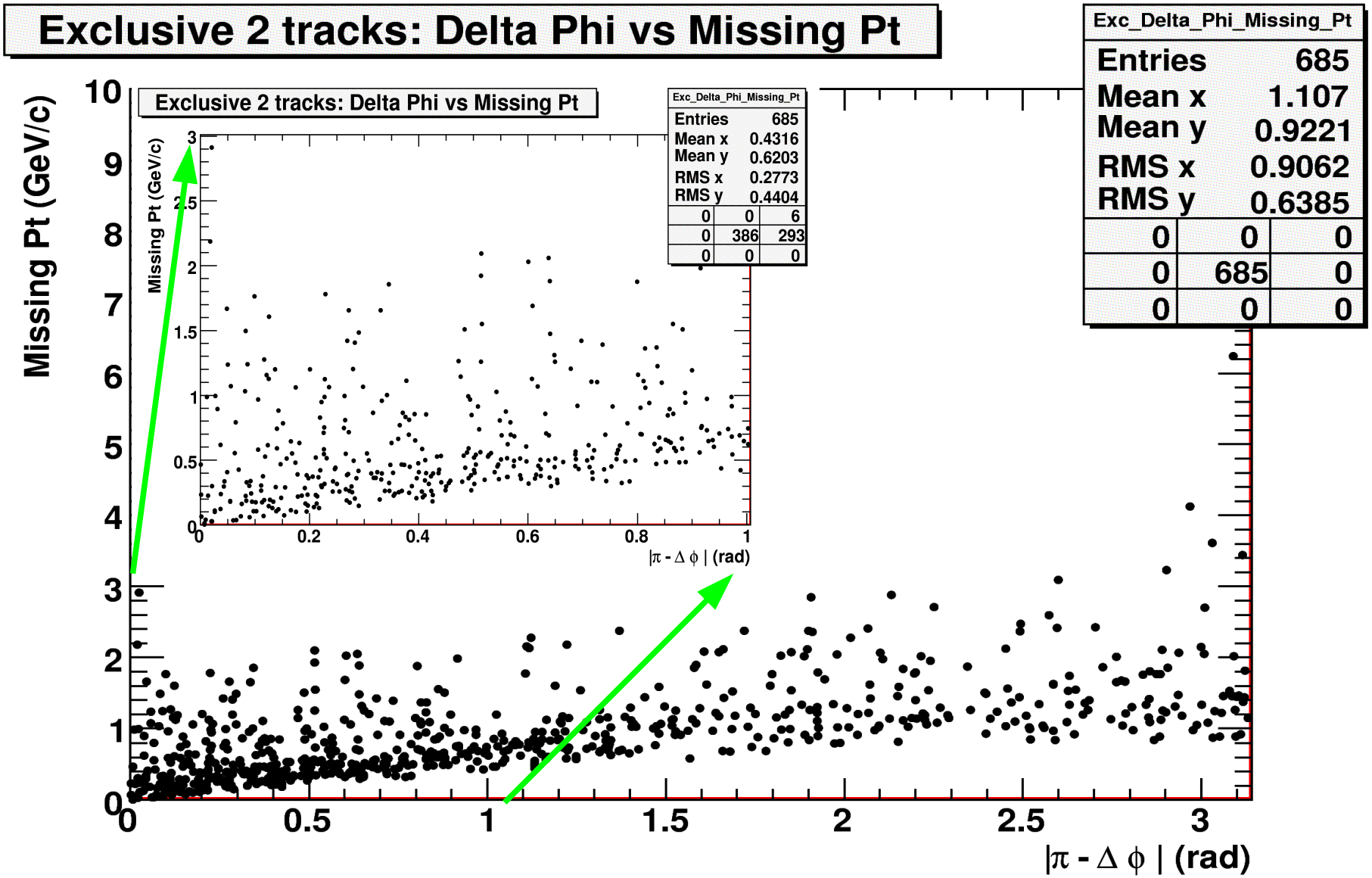


- ~20 events back to back in phi

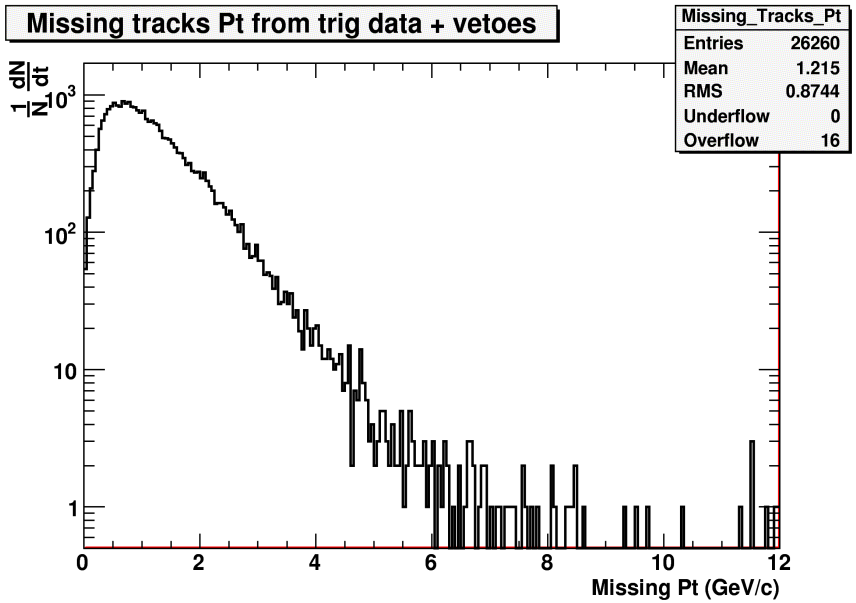


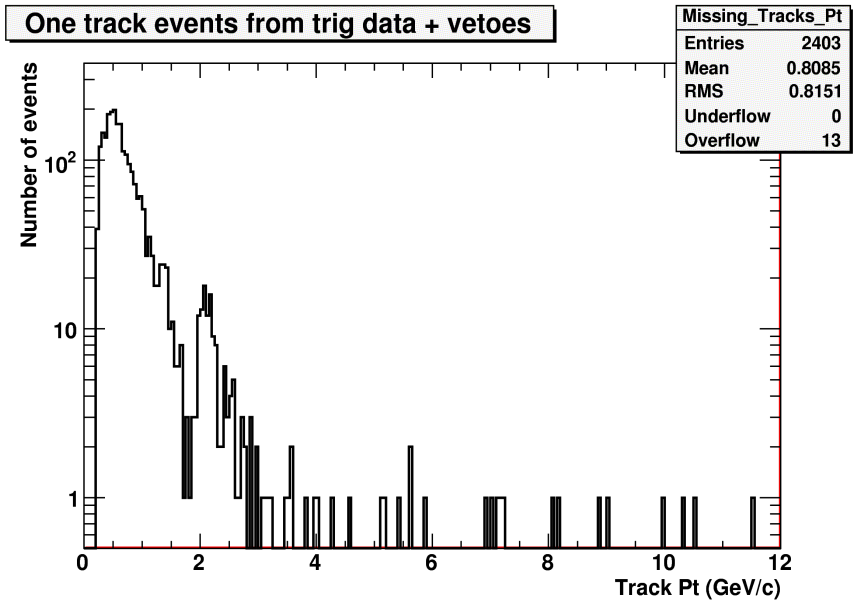
- ~90 events with equal tracks Pt

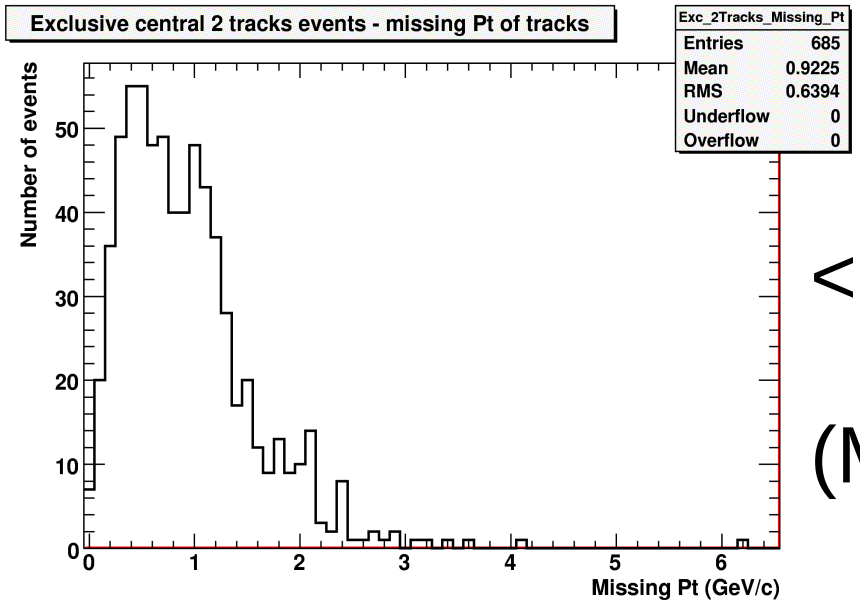
Delta phi vs missing Pt



Missing Pt



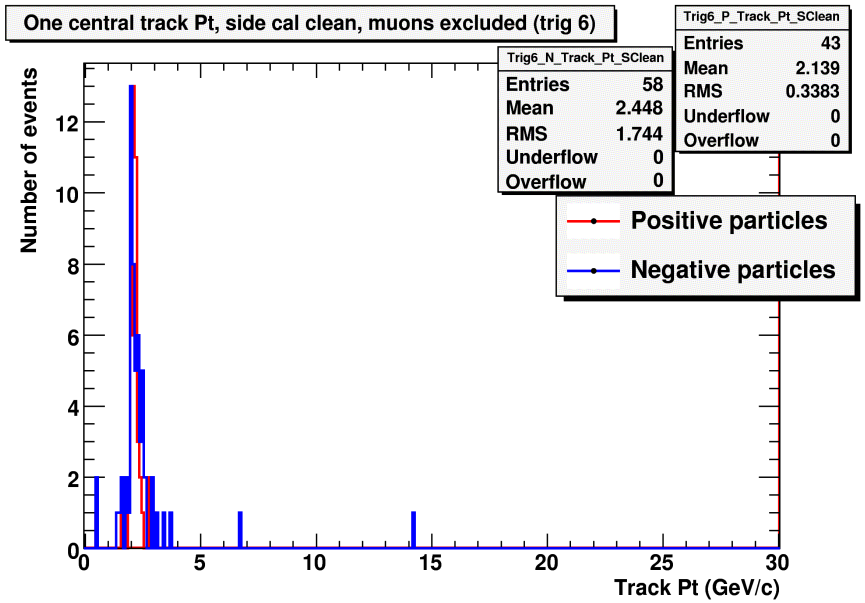


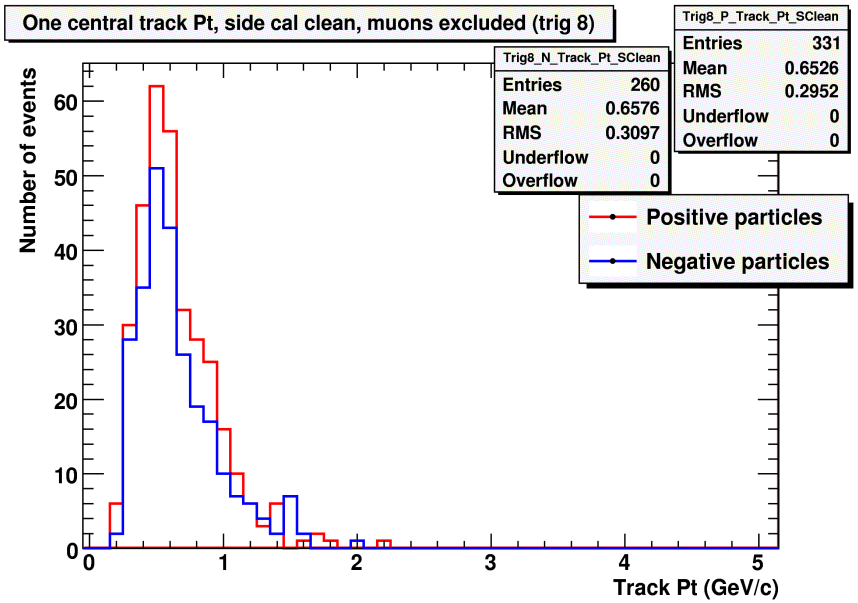


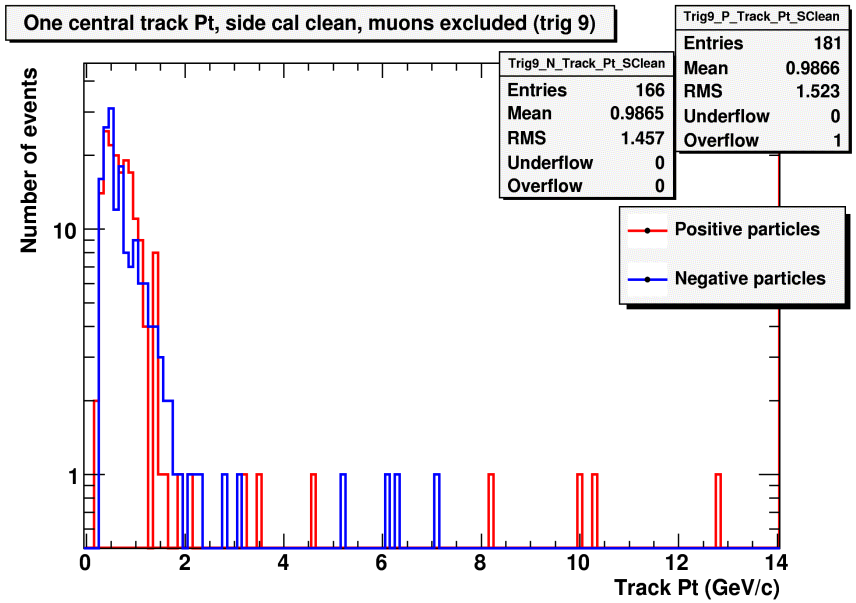
<- Exclusive 2 tracks

(Missing Pt ≡ vector sum of Pt)

One track events Pt







- One track events,
- side calorimetry clean,
- without muons.

Different triggers :

6 – L1 TRK1.5

8 - L1 2 CEM0.5

9 - L1 2 CJET0.5

(all + L2 SUMET2)

Particle Identification

Maria Żurek

- Particle separation thanks to dE/dx distribution
- Time of flight identification
- Pi+Pi- Invariant mass

dE/dx – particle separation

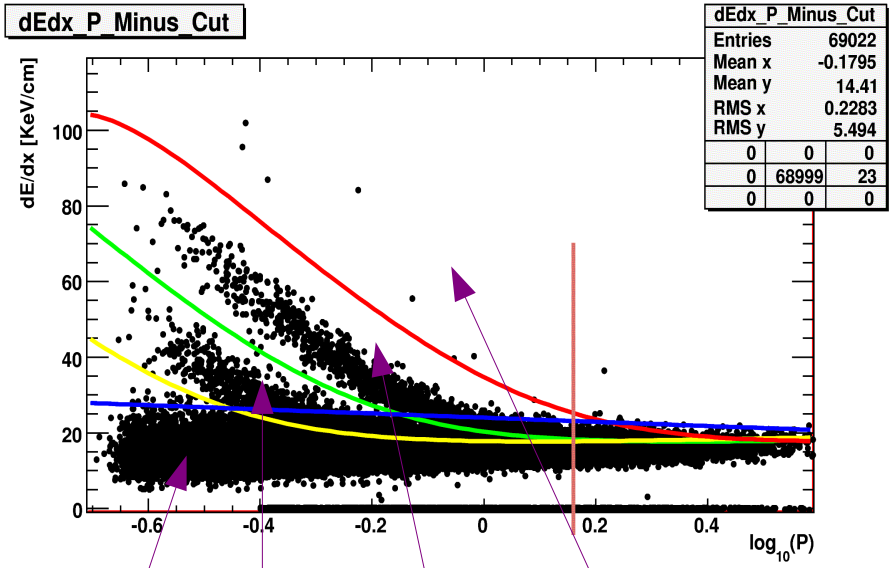
- CDF universal curve parametrization:

- (c1*log(x/(x+b)) + c0)/(t*t) + a1*(t-1) + a2*(t-1)*(t-1) + c

- x = momentum/mass;
- t - beta

dE/dx – particle separation

Negative particles



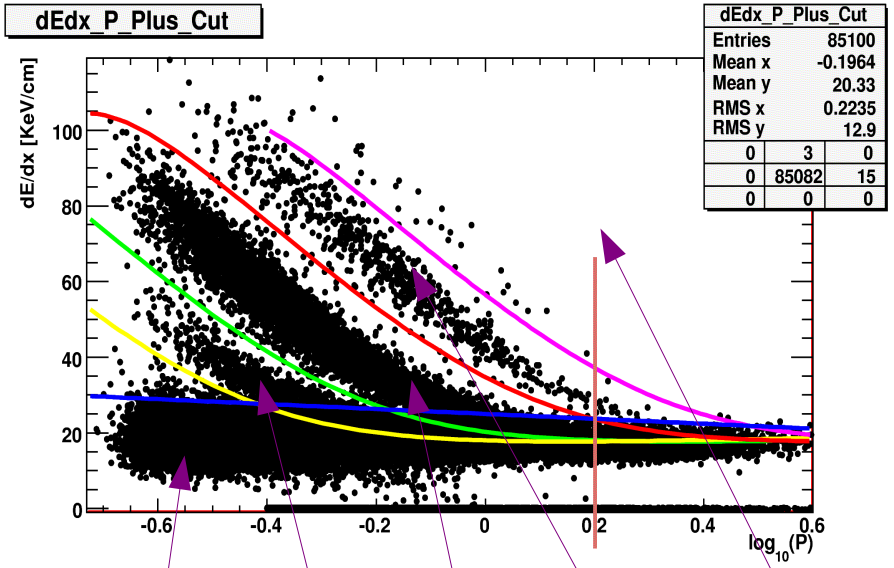
Pions-

Kaons-

Antiprotons

Antideuterons?

Positive particles



Pions+

Kaons+

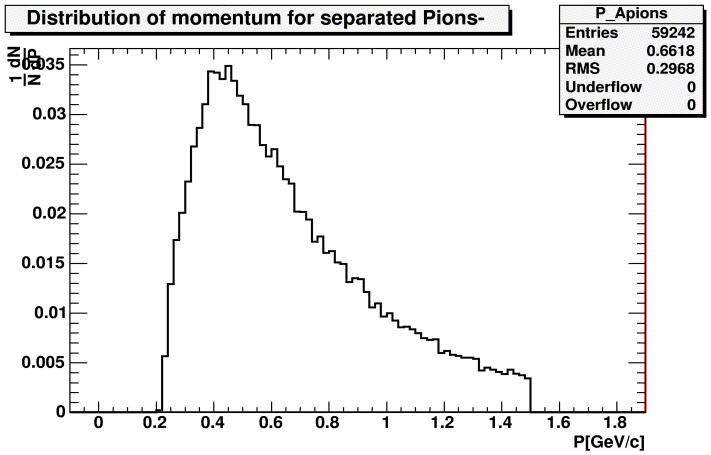
Protons

Deuterons

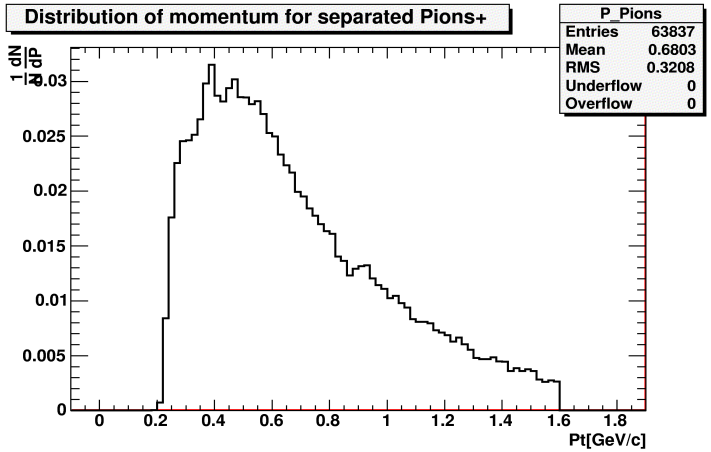
Tritons?

Momentum distribution
dEdx separation

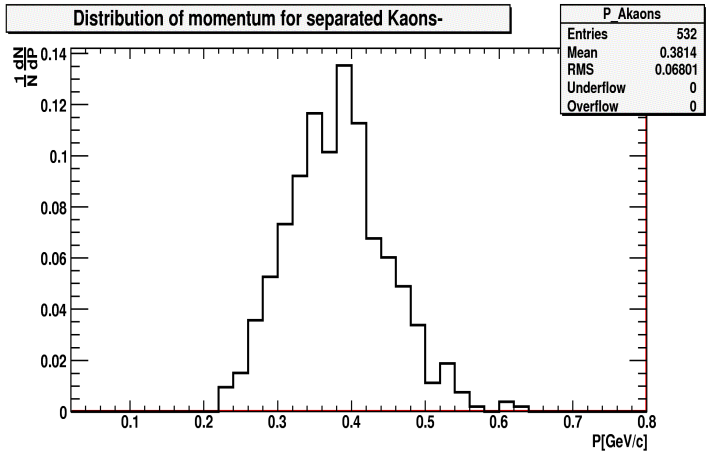
Pions-



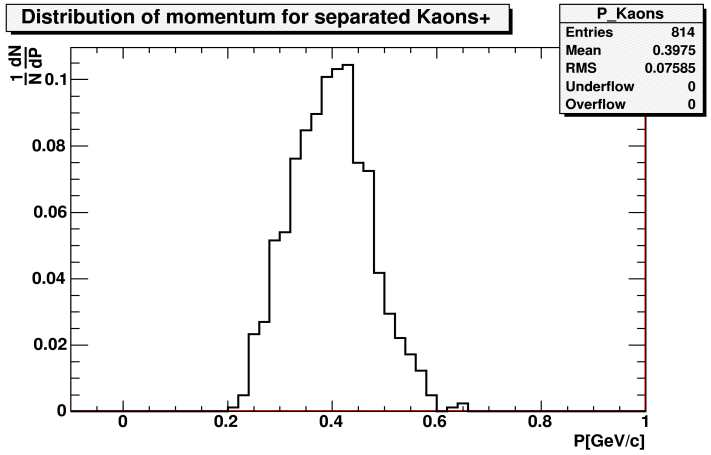
Pions+



Kaons-

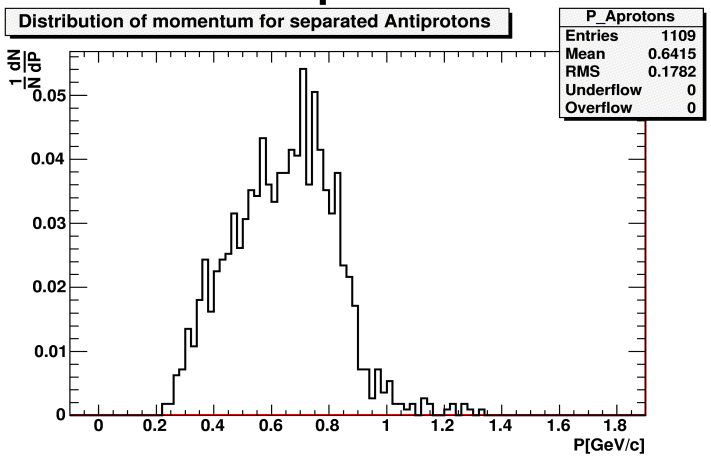


Kaons+

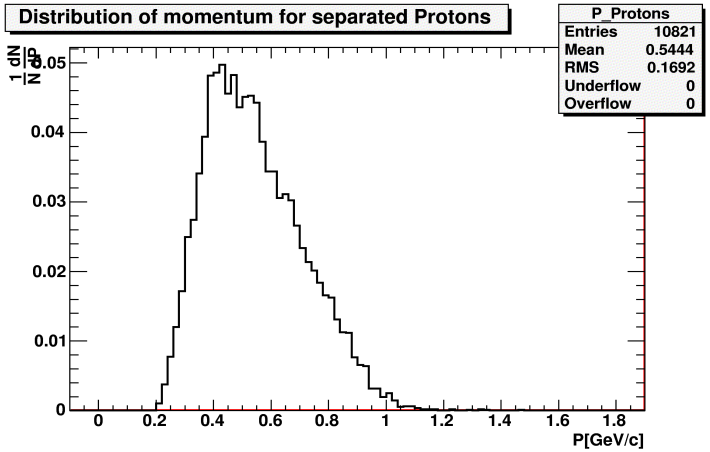


Momentum distribution
dEdx separation

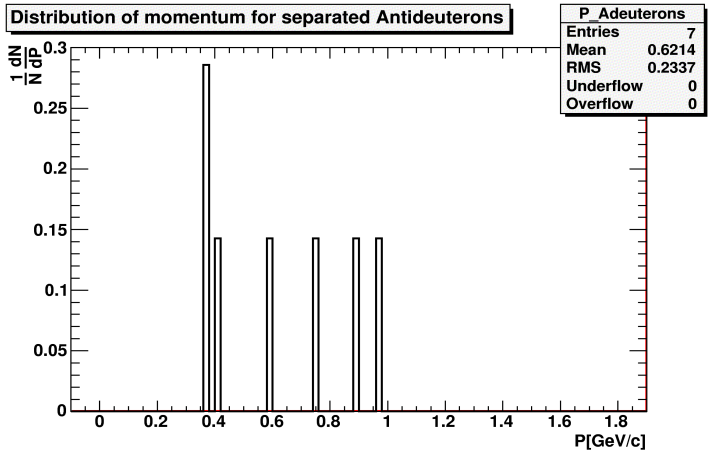
Antiprotons



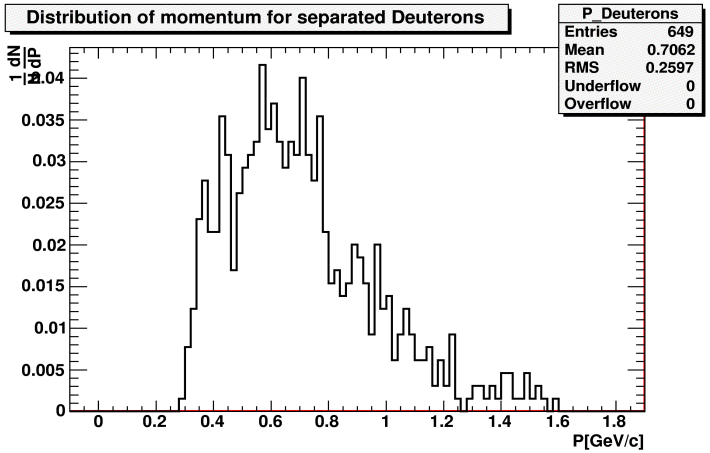
Protons



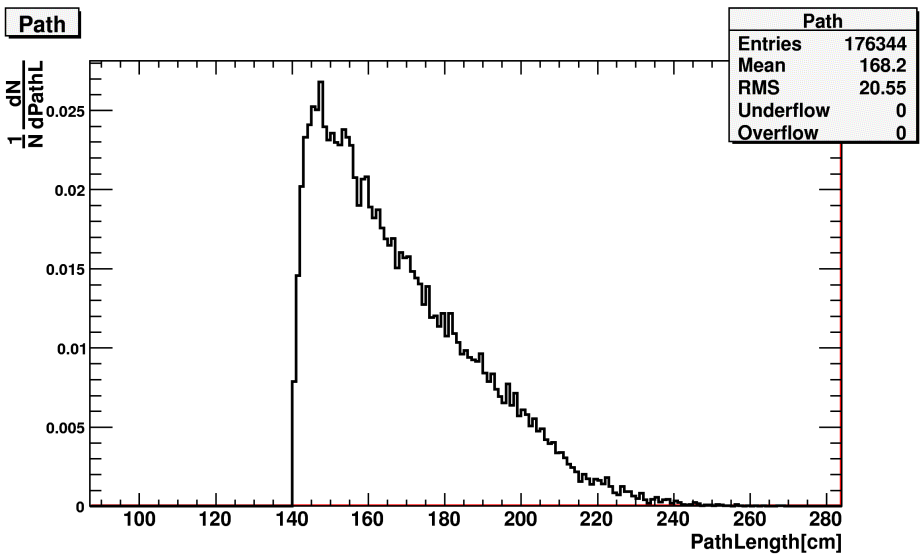
Antideuterons?



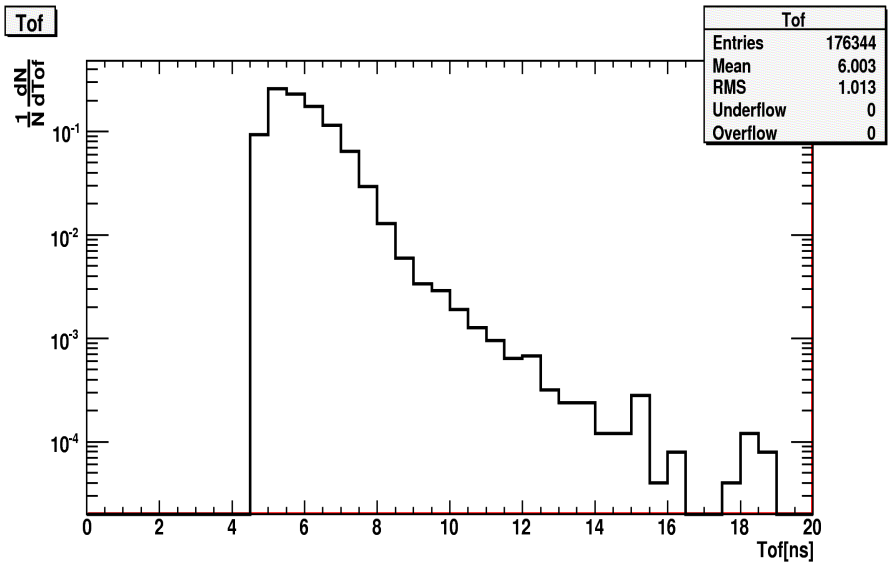
Deuterons



TOF identification – good tracks



Pathlength



Time of flight

Good track:

at least 20 COT hits

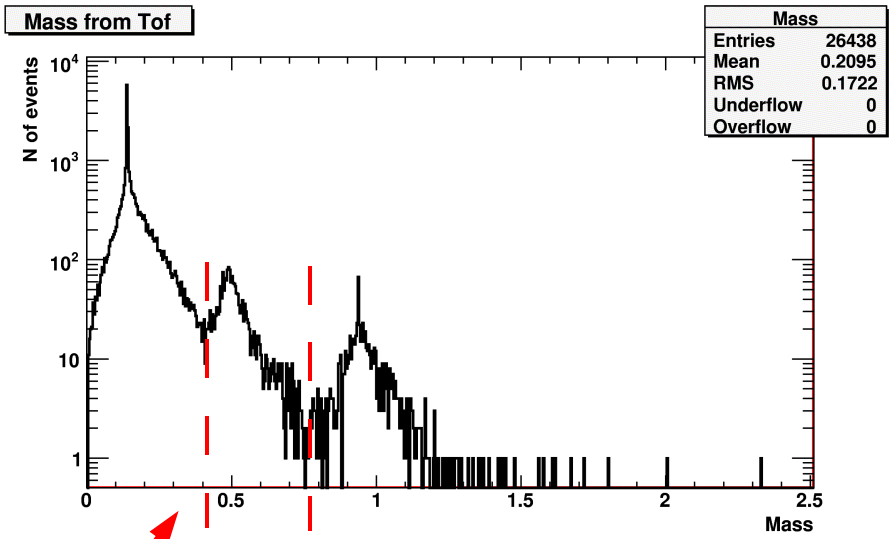
|d0|<0.5 mm

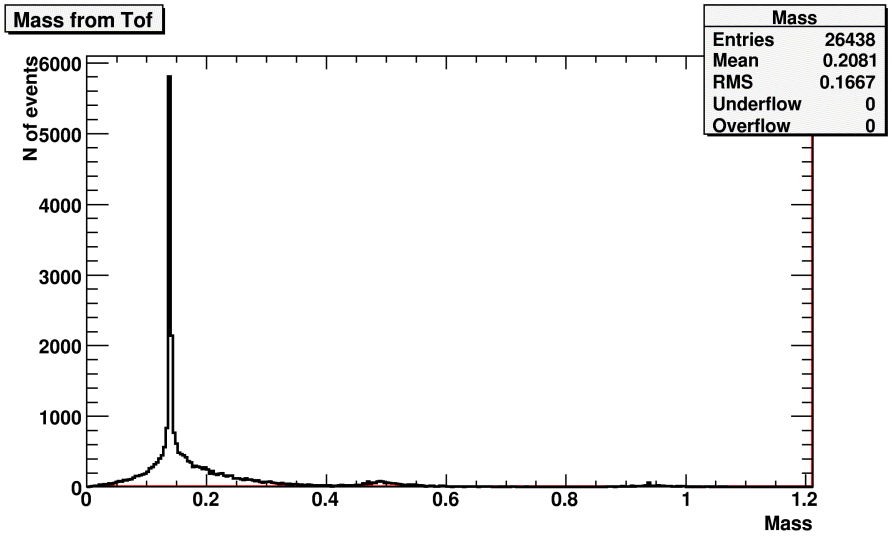
|z0|<60 cm

Arclength > 140cm

Tof > 0

TOF identifacation - mass





Mass in GeV/c^2

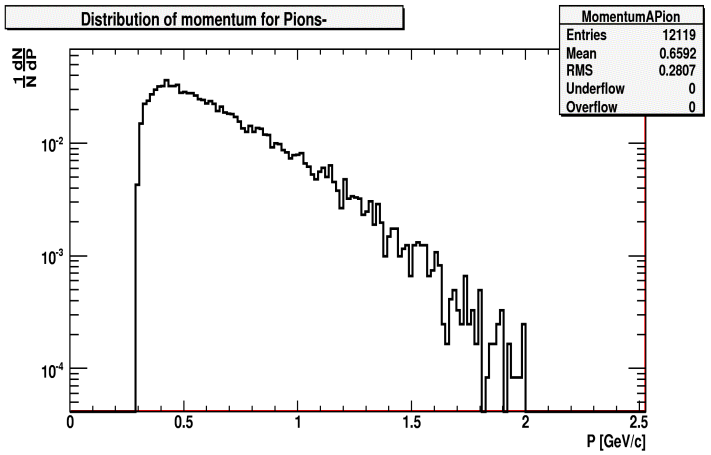
0.42 0.75

Mass = Momentum*sqrt((c/PathLength*Tof – 1)^2)

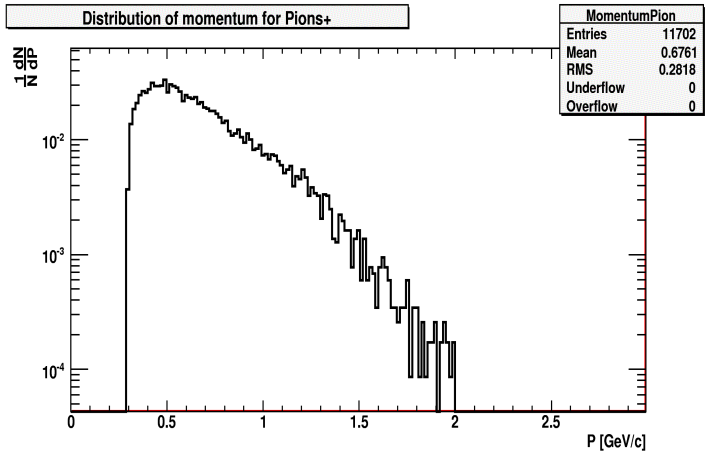
We've got very narrow peaks – TOF assumes particle ID?
To be understood.

Momentum distribution
TOF separation

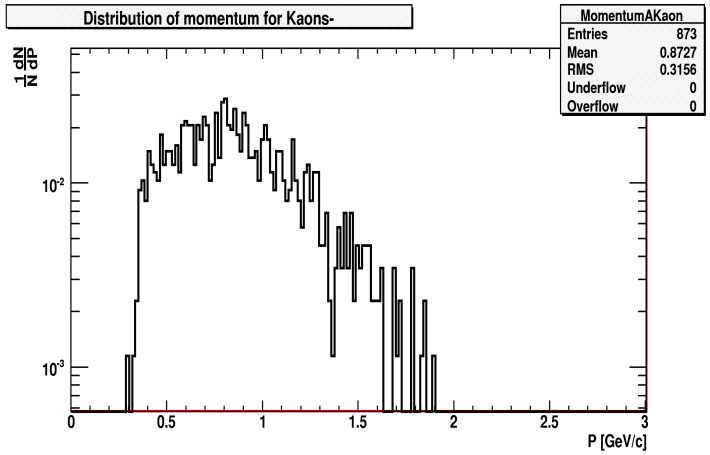
Pions-



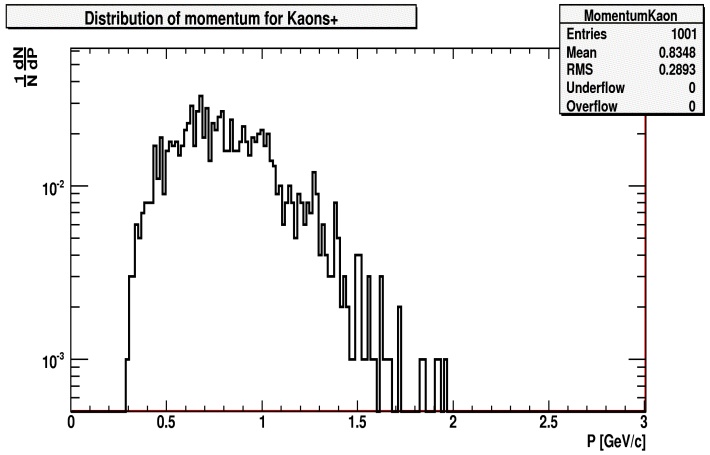
Pions+



Kaons-

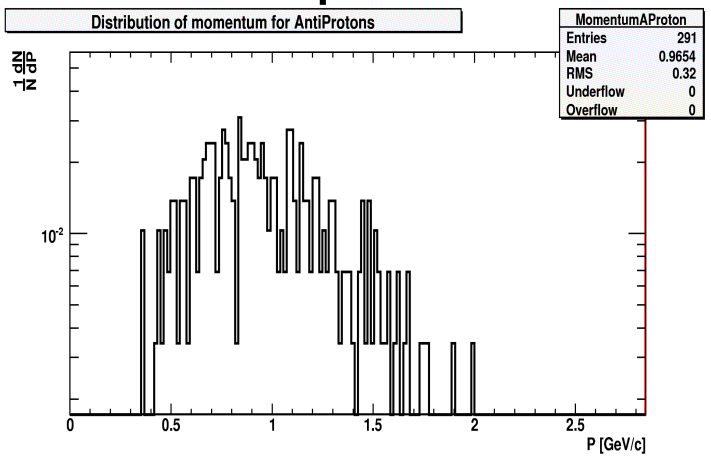


Kaons+

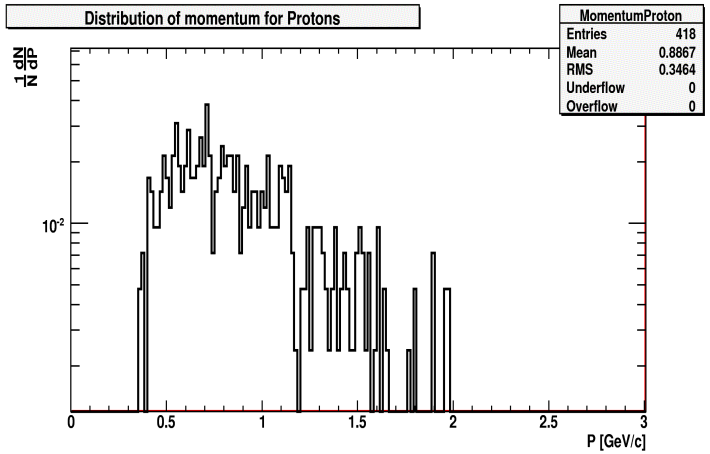


Momentum distribution
TOF separation

Antiprotons



Protons

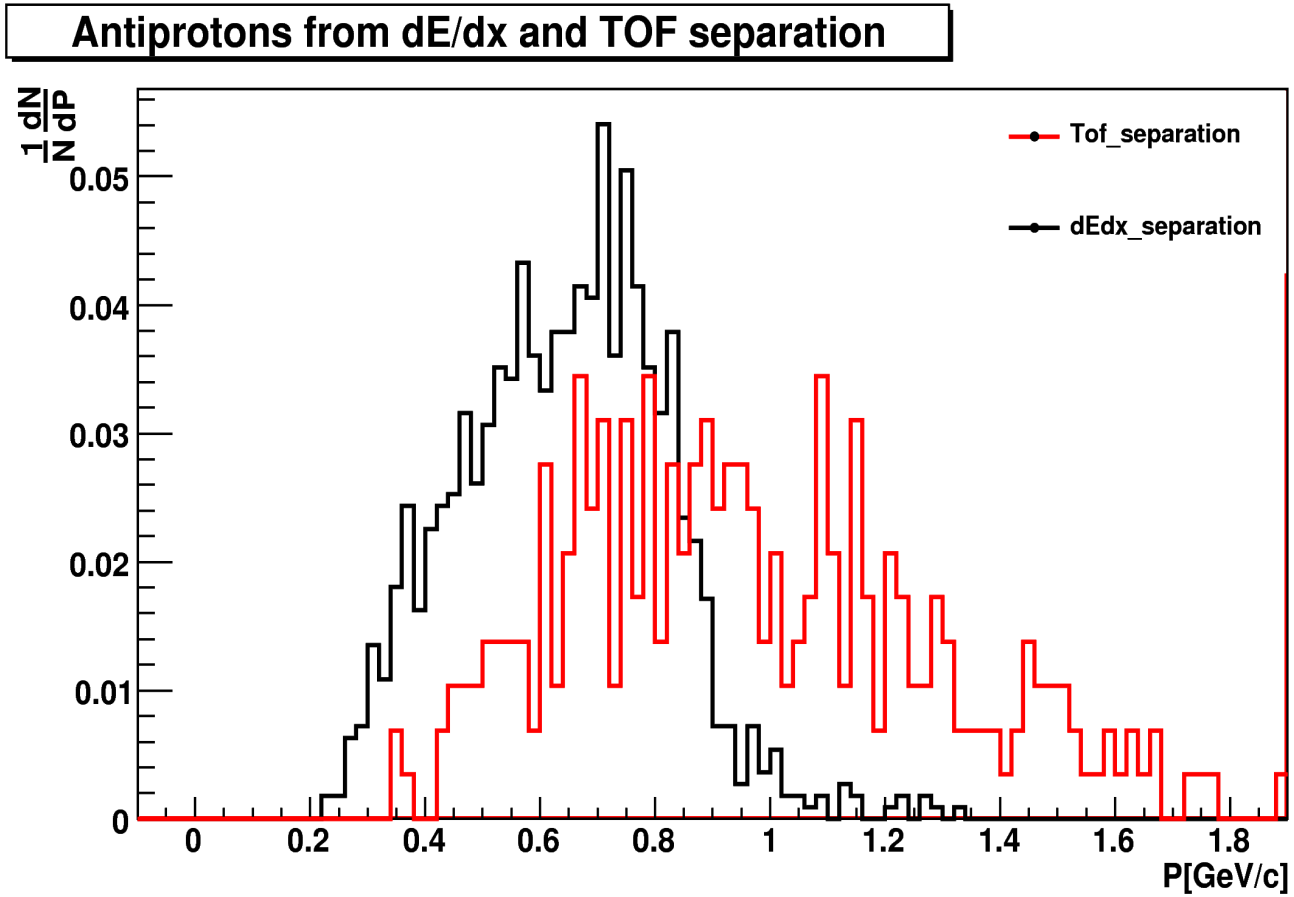


Checking TOF separation:

I did the dE/dx and Momentum plots for identified (thanks to TOF) particles.

Conclusion:
Proton separation – rather proper
Pion and kaon separation - inaccurate

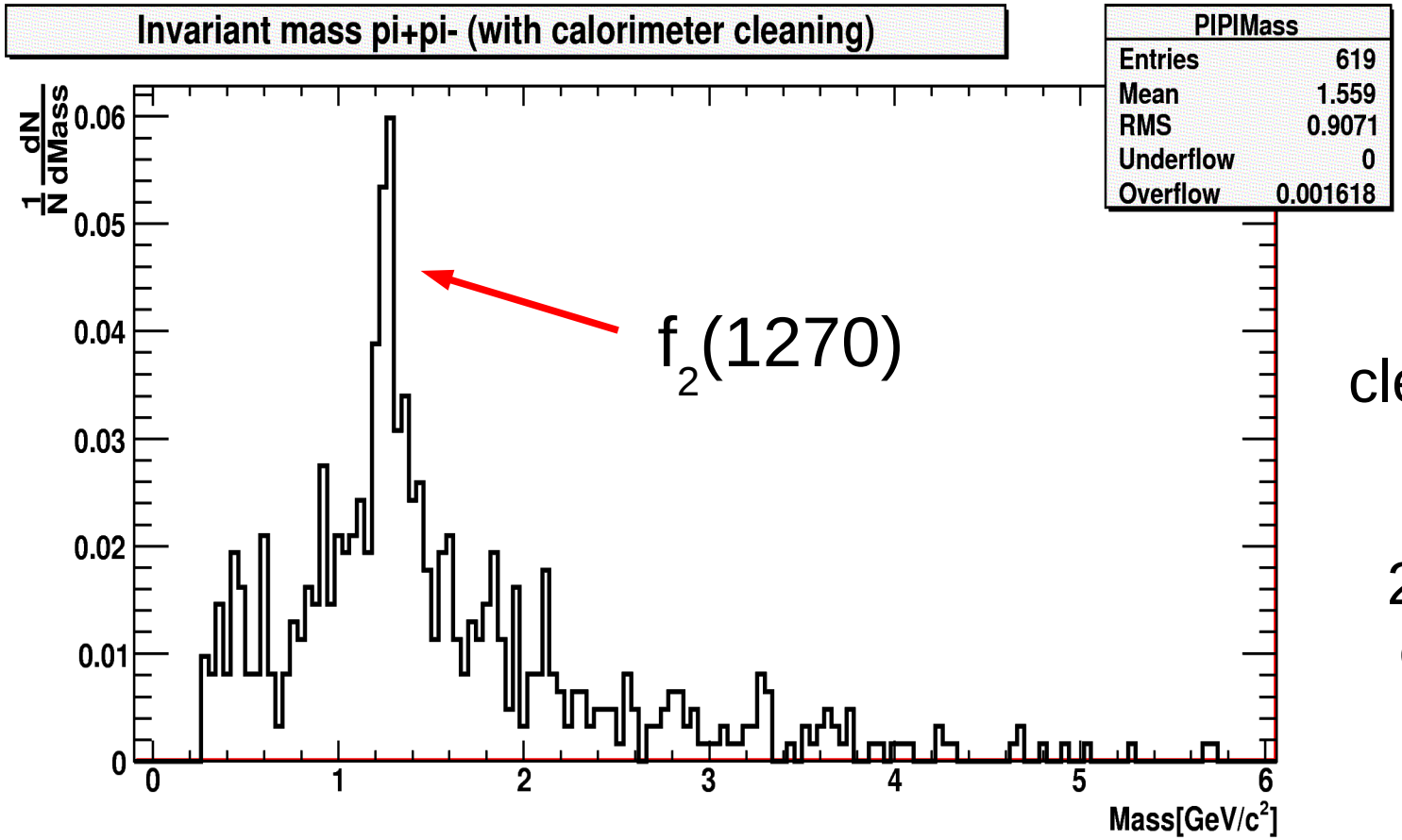
Momentum distribution
TOF and dE/dx separation



TOF helps at higher momentum but is less efficient.

Pi+Pi- Invariant Mass

2 track events - (Pion+ Pion- → **ID from dE/dx**)



All calorimeter cleaning (Dominik)

(runs 294607, 292319 – 3% of expected data)