

Offline run QA for Run 13 W
stream production [p14ia]
(day 76- day 126)

Devika and Jinlong for Run 13 W Analysis group
spin pwg 3rd April 2014

Introduction

- Produced **1010 runs** of st-W stream between day 76 and day 126 used for this analysis.
 - Luminosity: 126.6 pb^{-1} .
 - st_WB = 12203
 - st_WE = 7176
- Used offline QA macro which have used in run 2012 to produce histograms of various parameters.
 - Plot average values of variable of interest as a function of run index.
 - Plot separately for L2BW (BHT3*L2BW) triggered events & L2EW (EHT1*L2EW) triggered events.

W BTOW/ETOW Trigger

L2BW : Level 0

BHT3 threshold $E_t > 7.3 \text{ GeV}$

Level 2

seed tower $E_t > 5 \text{ GeV}$

2x2 cluster which include the seed tower $E_t > 12 \text{ GeV}$

L2EW : Level 0

EHT1 threshold $E_t > 7.3 \text{ GeV}$

Level 2

single tower $E_t > 10 \text{ GeV}$

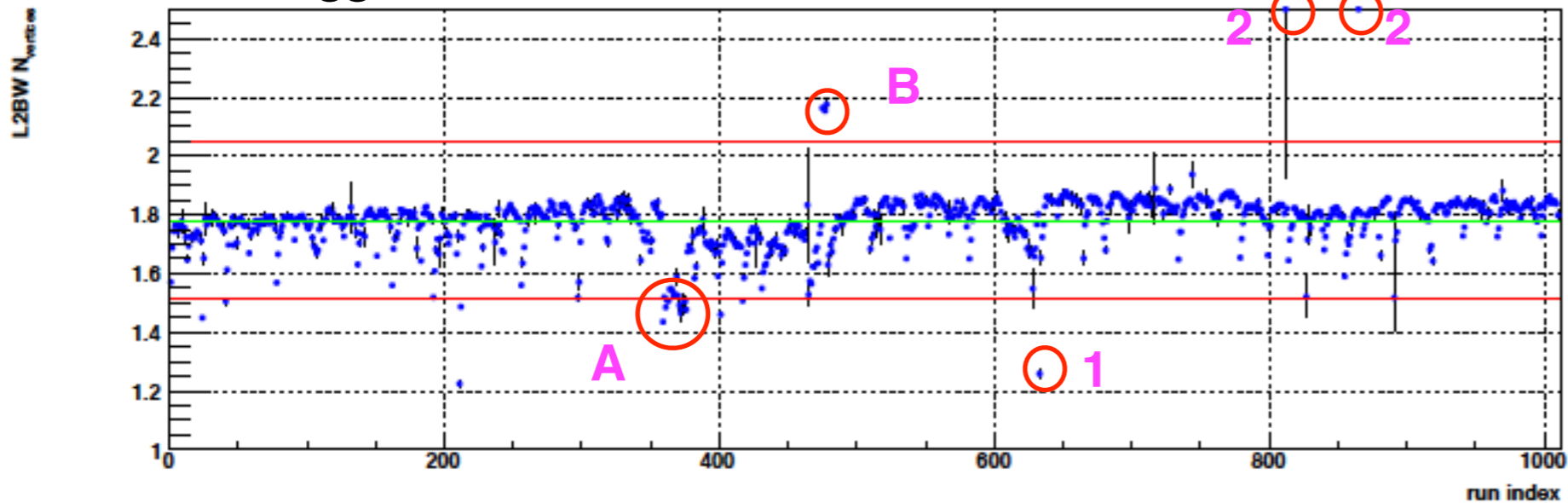
TPC Plots

Red Lines: ± 3 sigma, **Green line** : Mean

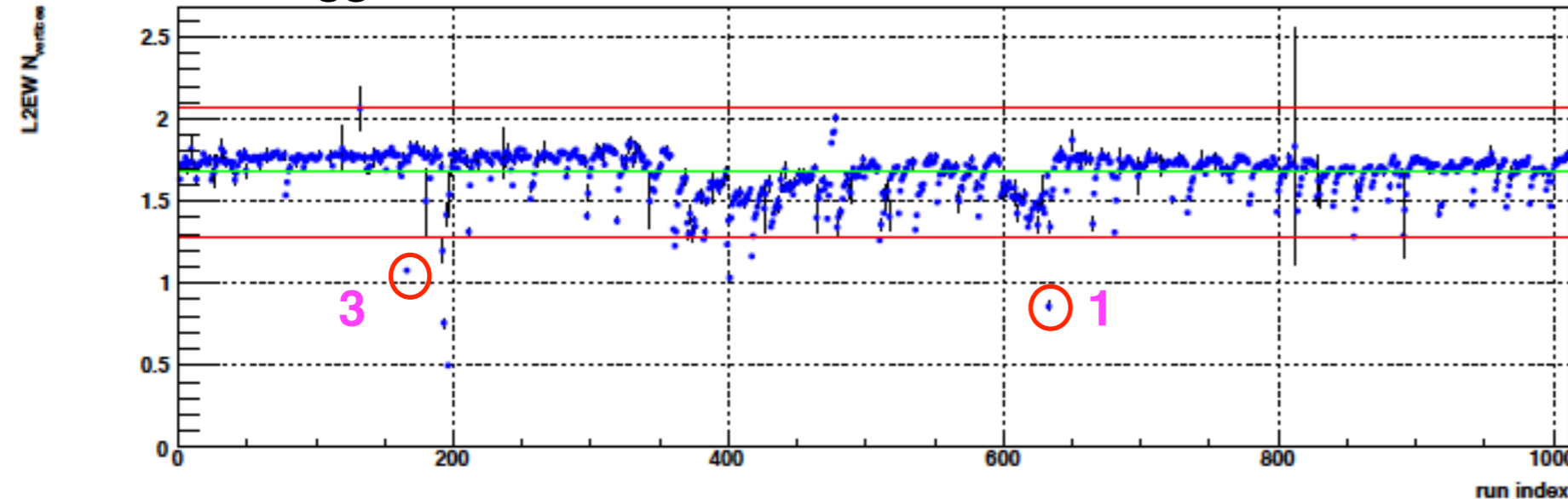
TPC Vertex - Nvertices

Parameter	Selection	Cuts
$\langle N_{\text{vertices}} \rangle$	Avg. of all the primary vertices per triggered event	<ul style="list-style-type: none"> • vertex ranking > 0 • $z < 100$ cm

L2BW triggered



L2EW triggered

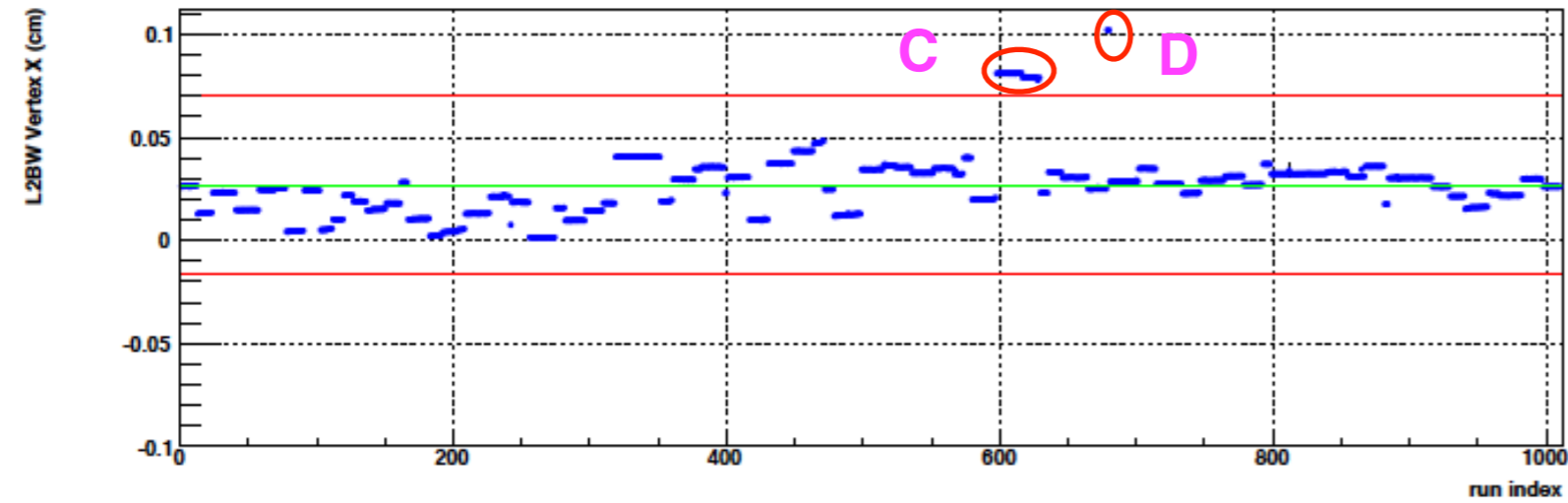


A	<ul style="list-style-type: none"> • runs from Fill 17329 • low ZDC rate compare to other fills (2 order of magnitude less) 	✓ 😊
B	<ul style="list-style-type: none"> • 4 runs from Fill 17352 • TPC channel (15-1) tripped frequently during this fill, TPC gas issue 	✓ 😊
1	• bad daq rates (100% trigger dead time)	✗ 😞
2	• negligible Lumi. EEMC hot tower	✗ 😞
3	• bad daq rates (100% dead time TPX)	✗ 😞

TPC Vertex - VerX

Parameter	Selection	Cuts
<VerX>	Avg. of X vertex position of all the primary vertices per triggered event	<ul style="list-style-type: none"> vertex ranking > 0 z < 100 cm


L2BW triggered



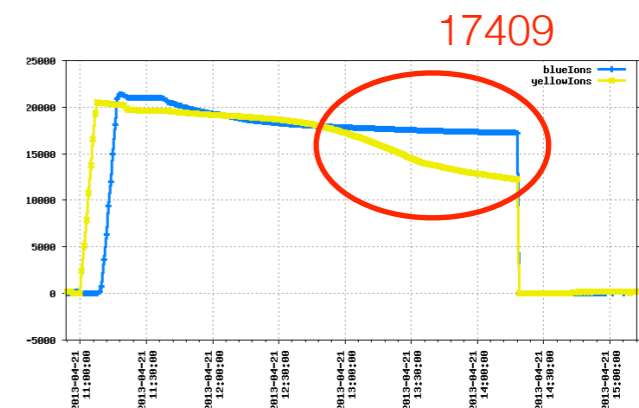
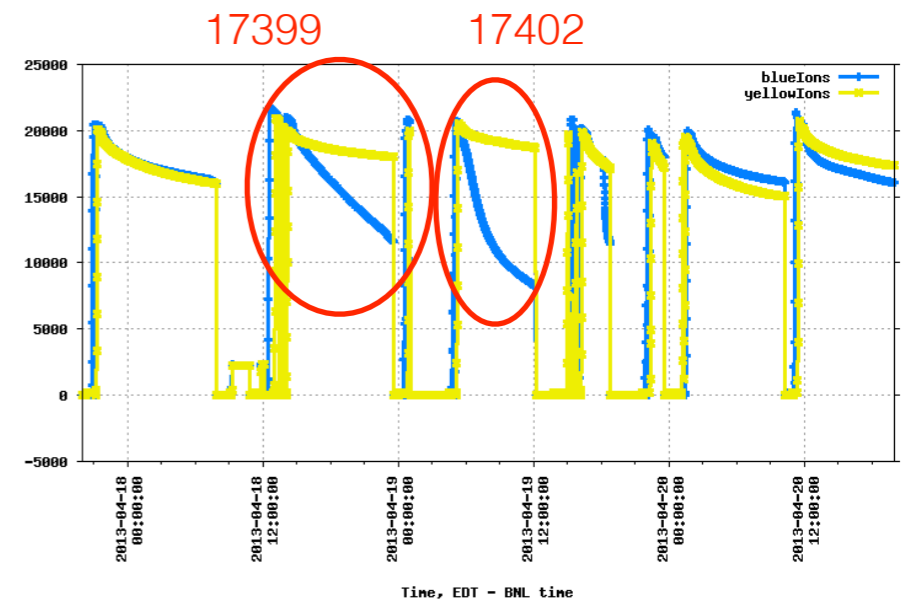
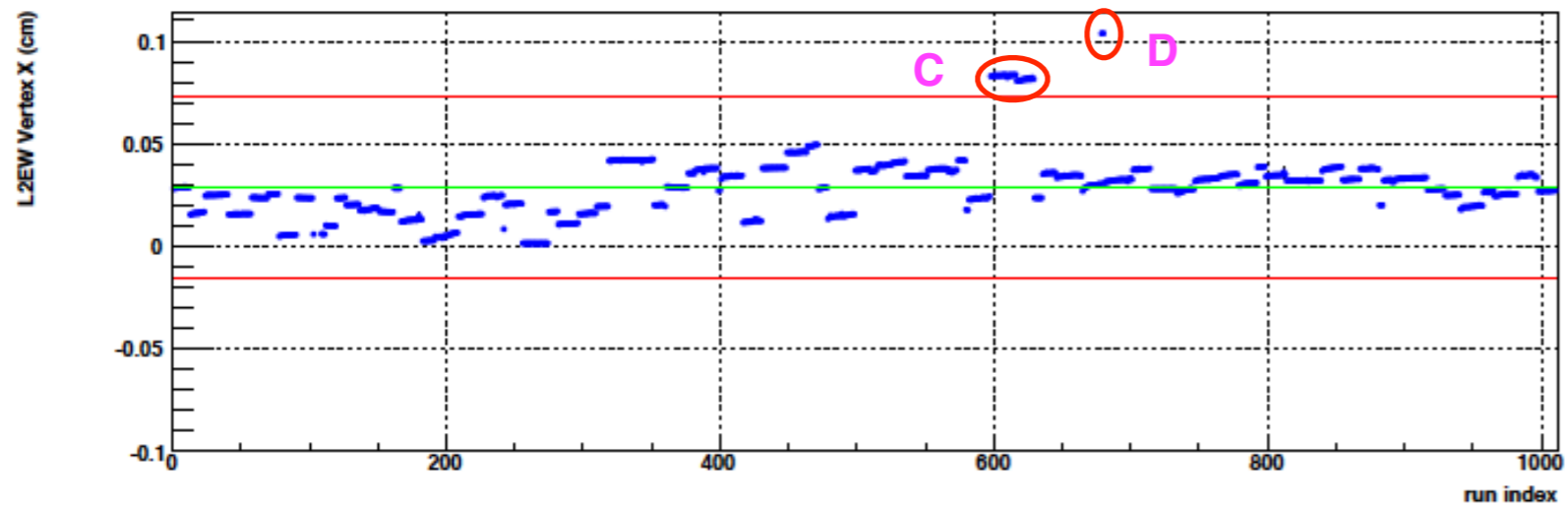
C,D

- All runs from Fill 17399 (18), Fill 17402 (13) and all runs from Fill 17409 (2)

collider shift the beams (vertical position by 5 mm) !!!



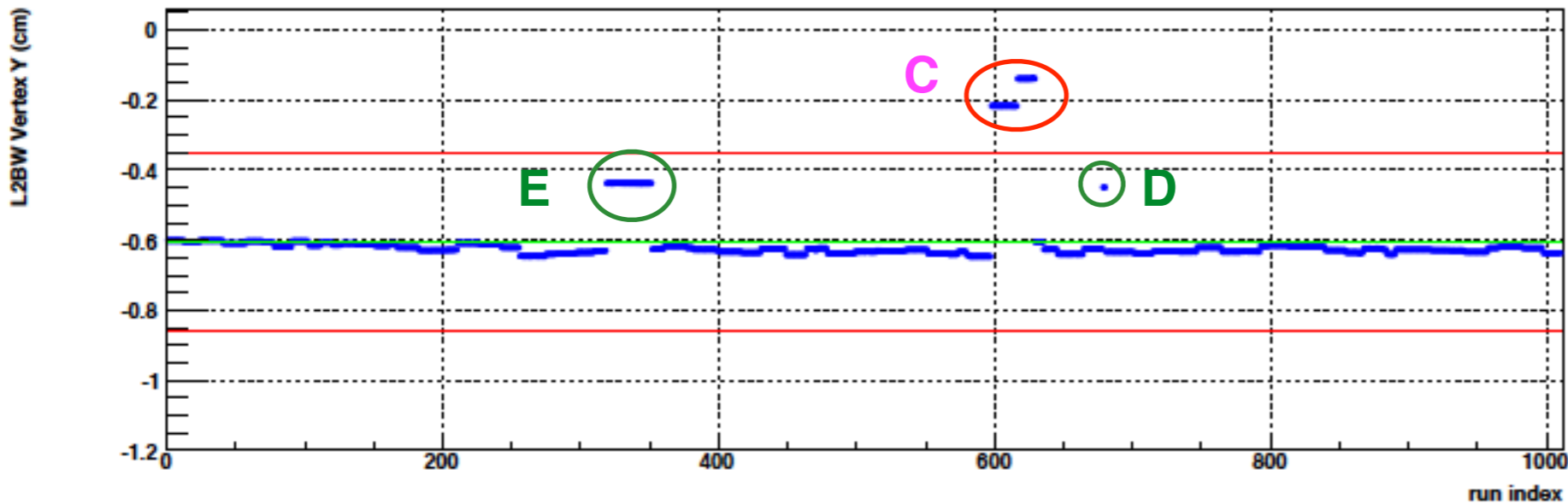
L2EW triggered



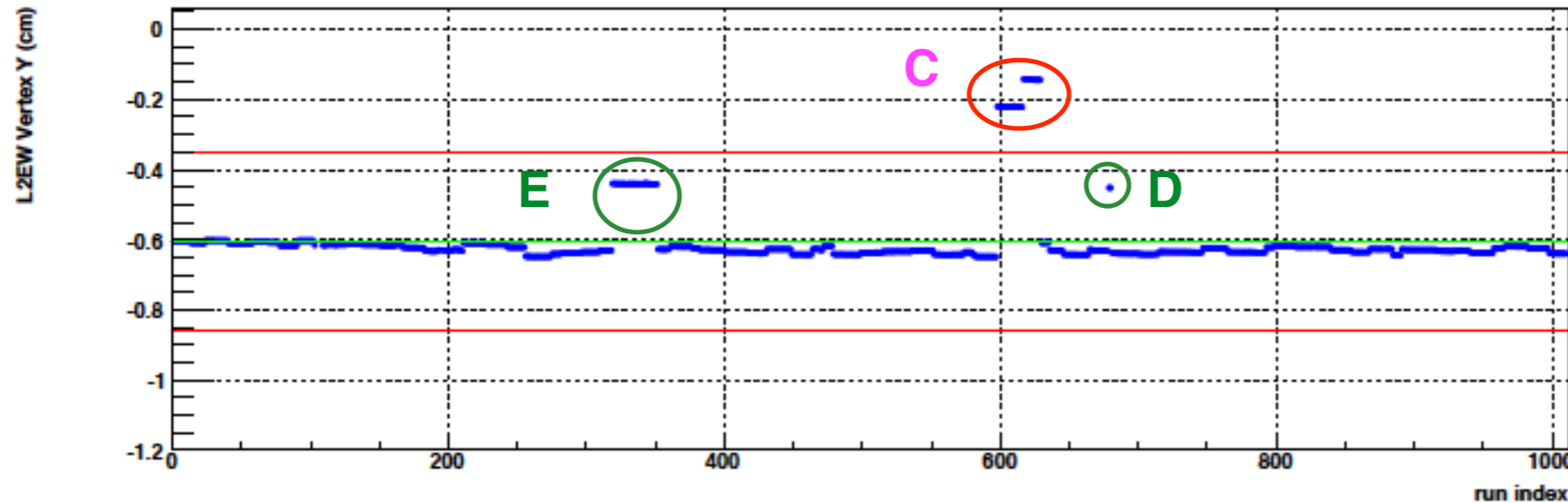
TPC Vertex - VerY

Parameter	Selection	Cuts
<VerY>	Avg. of Y vertex position of all the primary vertices per triggered event	<ul style="list-style-type: none"> • vertex ranking > 0 • z < 100 cm

L2BW triggered



L2EW triggered

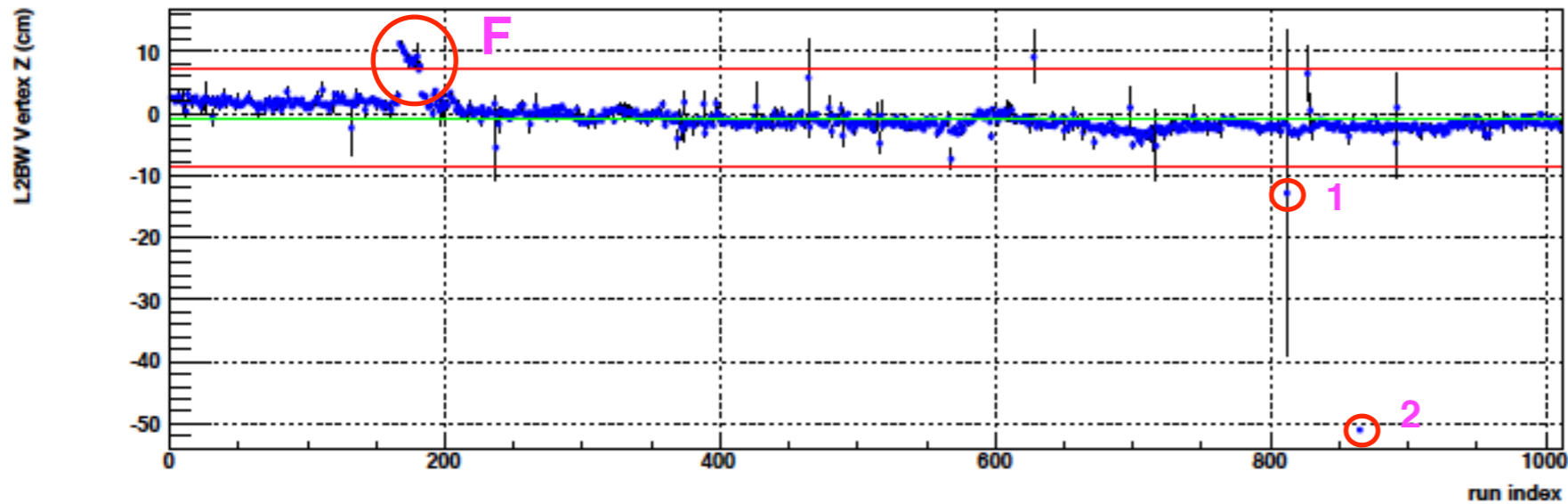


- | | | |
|----------|---|---|
| C | <ul style="list-style-type: none"> • All runs from Fill 17399 (18), Fill 17402 (13) • collider shift the beams (vertical position by 5 mm) !!! | ✓ |
| D | <ul style="list-style-type: none"> • Fill 17409, beam shift | ✓ |
| E | Fill 17318 | ✓ |

TPC Vertex - VerZ

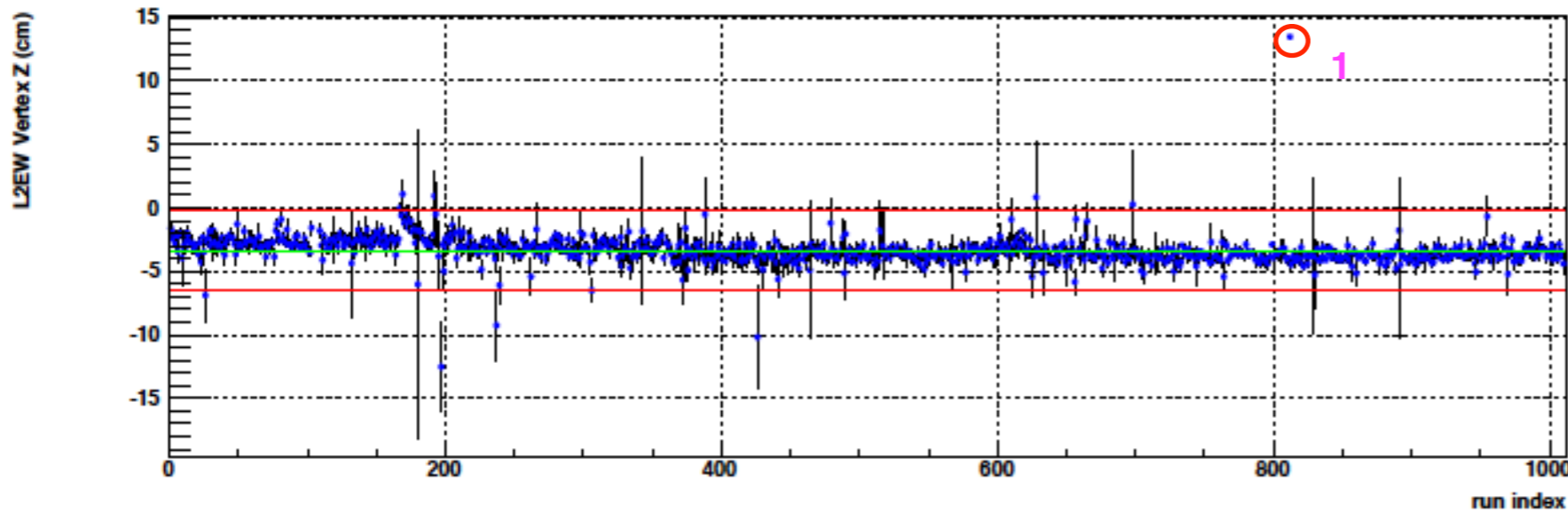
Parameter	Selection	Cuts
<VerZ>	Avg. of Z vertex position of all the primary vertices per triggered event	<ul style="list-style-type: none"> • vertex ranking > 0 • z < 100 cm

L2BW triggered

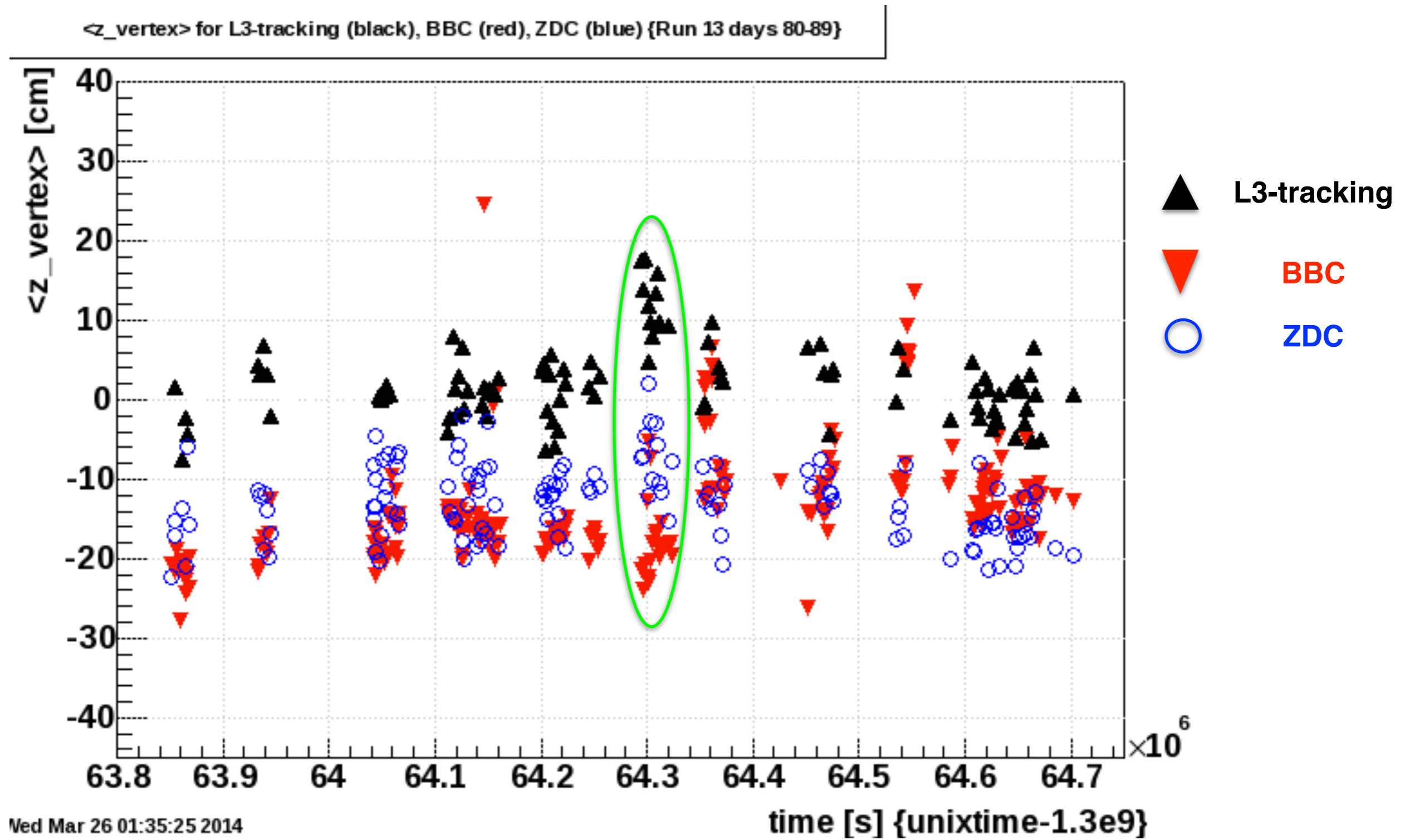


- F** • All runs from Fill 17281 (15), higher Z vertex distribution
- 1,2** • seen in Nvertices profiles

L2EW triggered



$\langle \text{Ver } Z \rangle$ from BBC/ZDC/online tracking

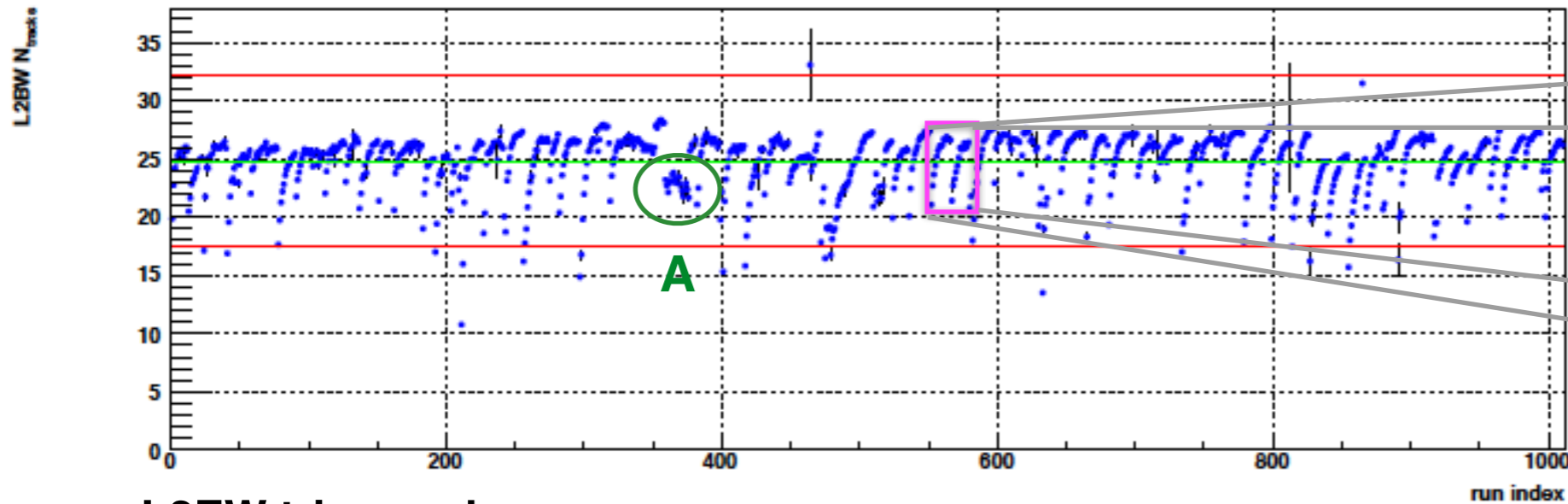


Wed Mar 26 01:35:25 2014

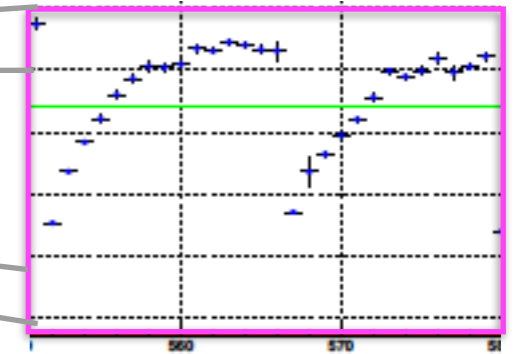
TPC Tracks - Ntracks

Parameter	Selection	Cuts
$\langle N_{\text{tracks}} \rangle$	Avg. of # of primary tracks from all the primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsP > 0.51

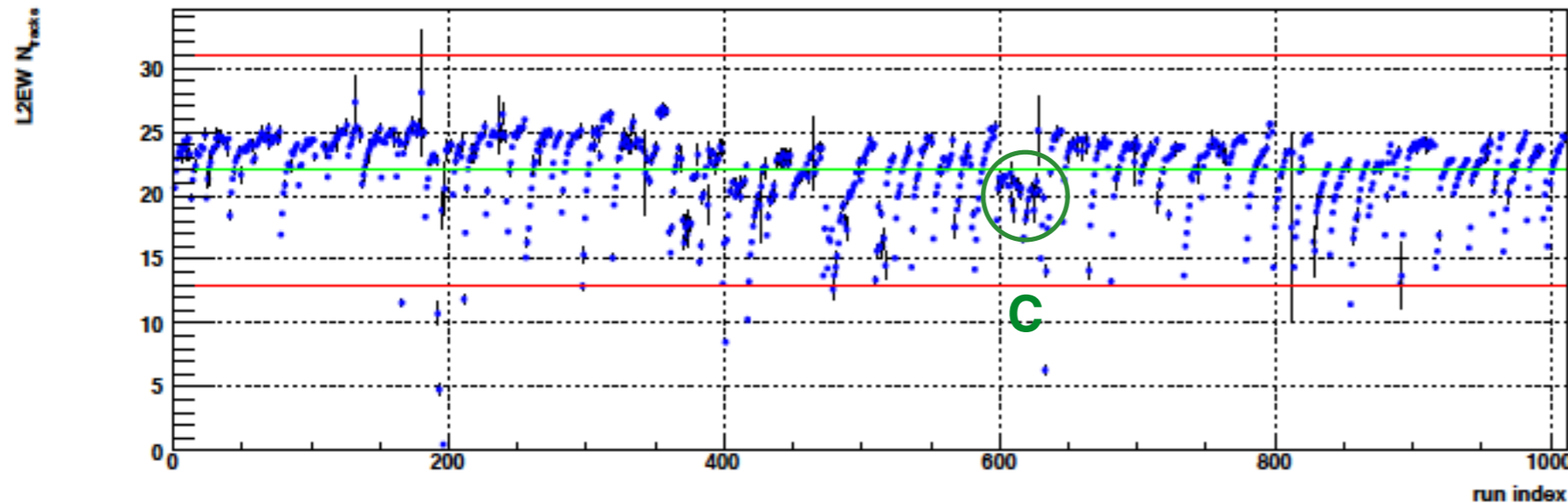
L2BW triggered



- Clear Luminosity dependence



L2EW triggered



- runs from Fill 17329 seen in Nvertices profiles
- low ZDC rate compare to other fills (2 order of magnitude less)



A

C

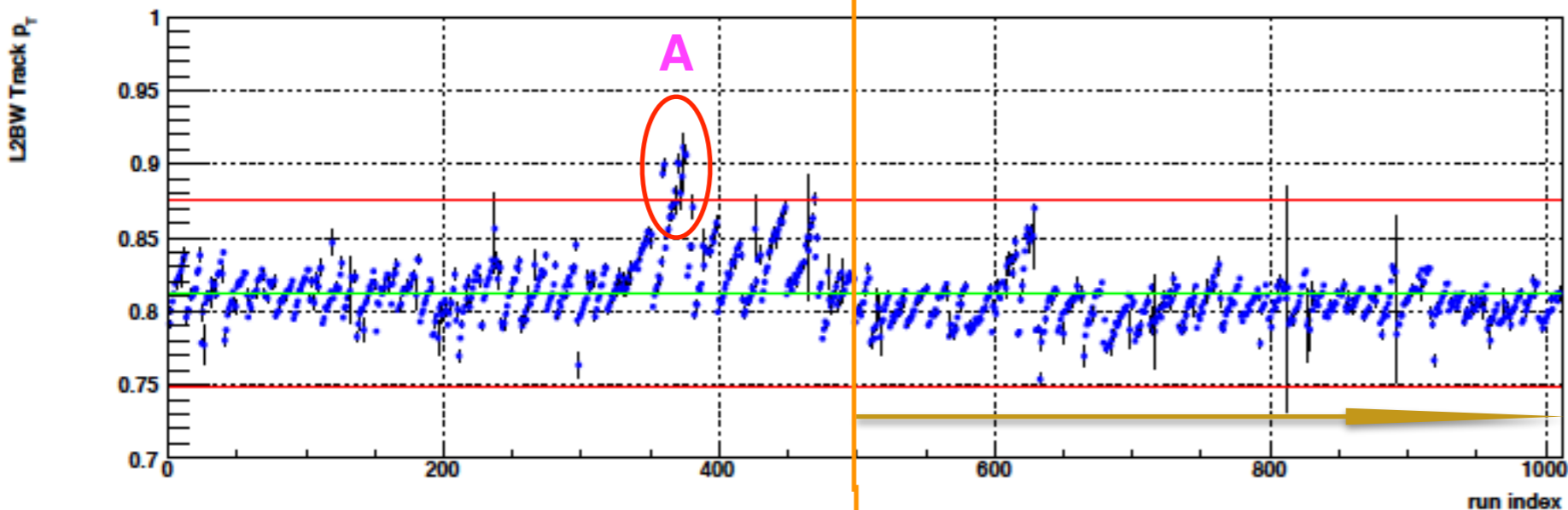
598-633, F 17399,
F17402, F17403
seen in verX and verY



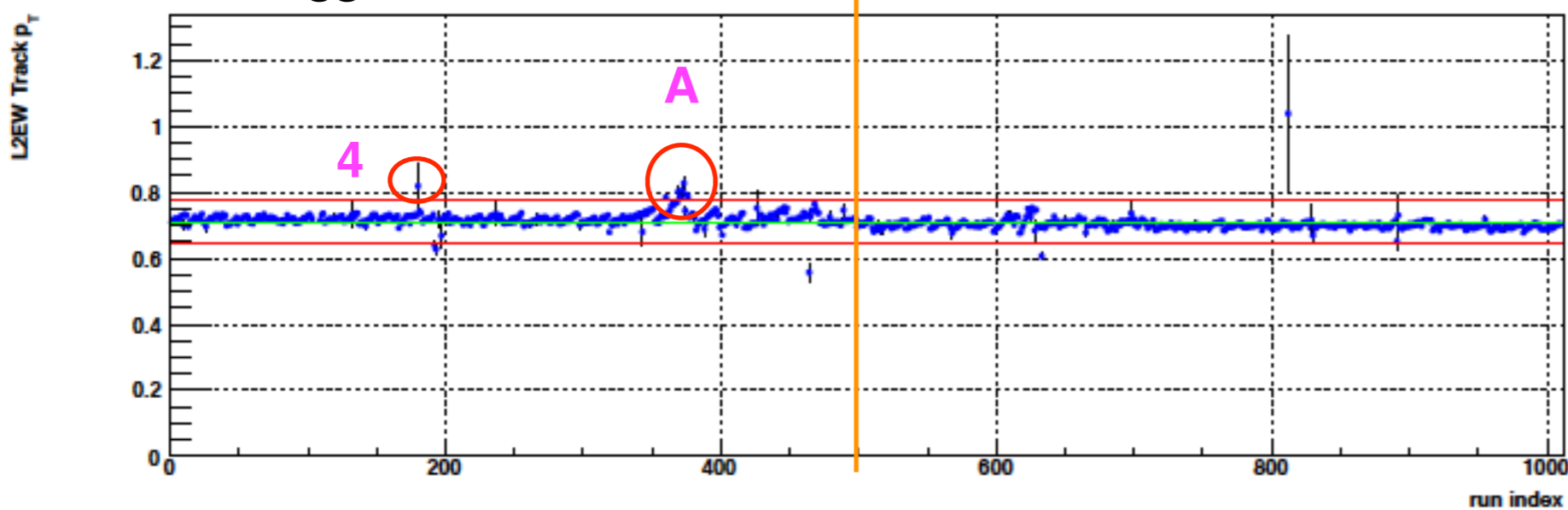
TPC Tracks- Track Pt

Parameter	Selection	Cuts	
<Track Pt>	Avg. of all the primary track Pt from all the primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.51

L2BW triggered



L2EW triggered



- runs from Fill 17329
- A** low ZDC rate compare to other fills (2 order of magnitude less) ✓😊

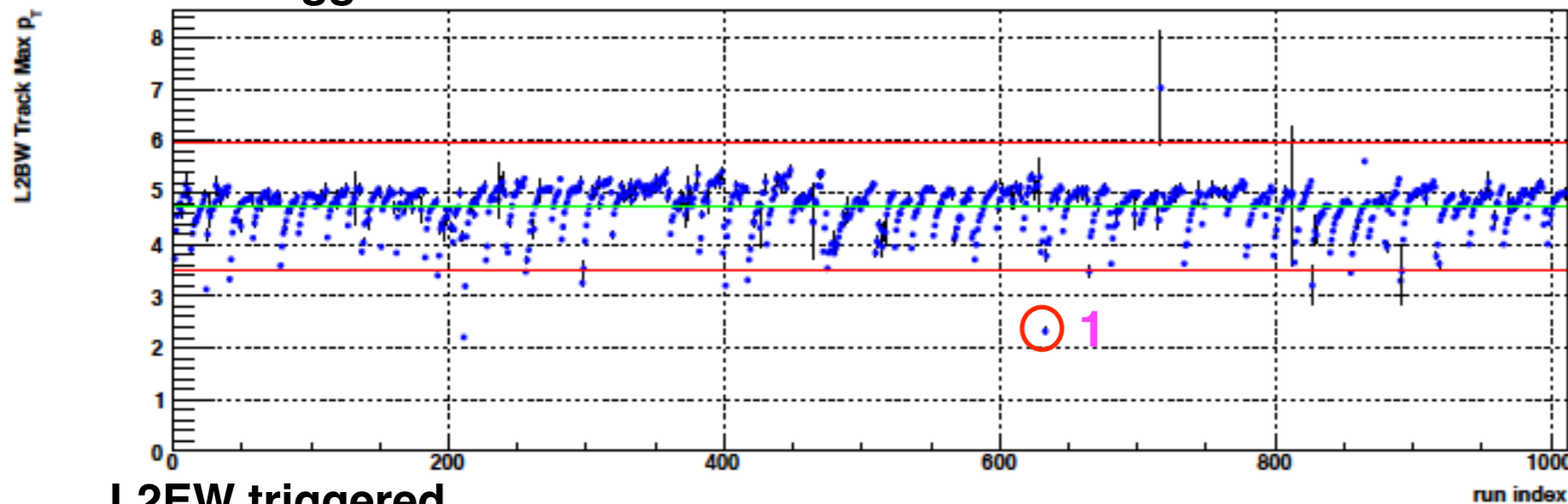
- 4** bad daq rates (100% dead time TPX) ✗😭

- TPC operation Voltages changed after day 102. (F17367)

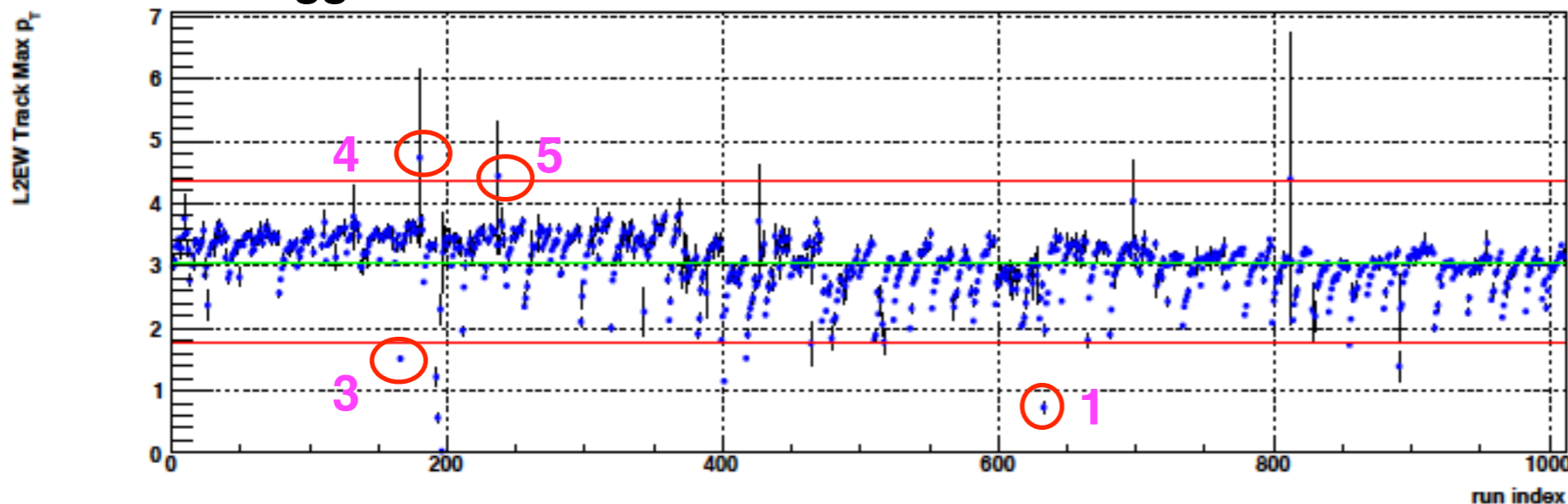
TPC Tracks - Track Max Pt

Parameter	Selection	Cuts	
<Track MaxPt>	Avg. of Max track Pt from all the primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.51

L2BW triggered



L2EW triggered



3 • bad daq rates (100% dead time TPX)

Seen in Nvertices profile

4,5

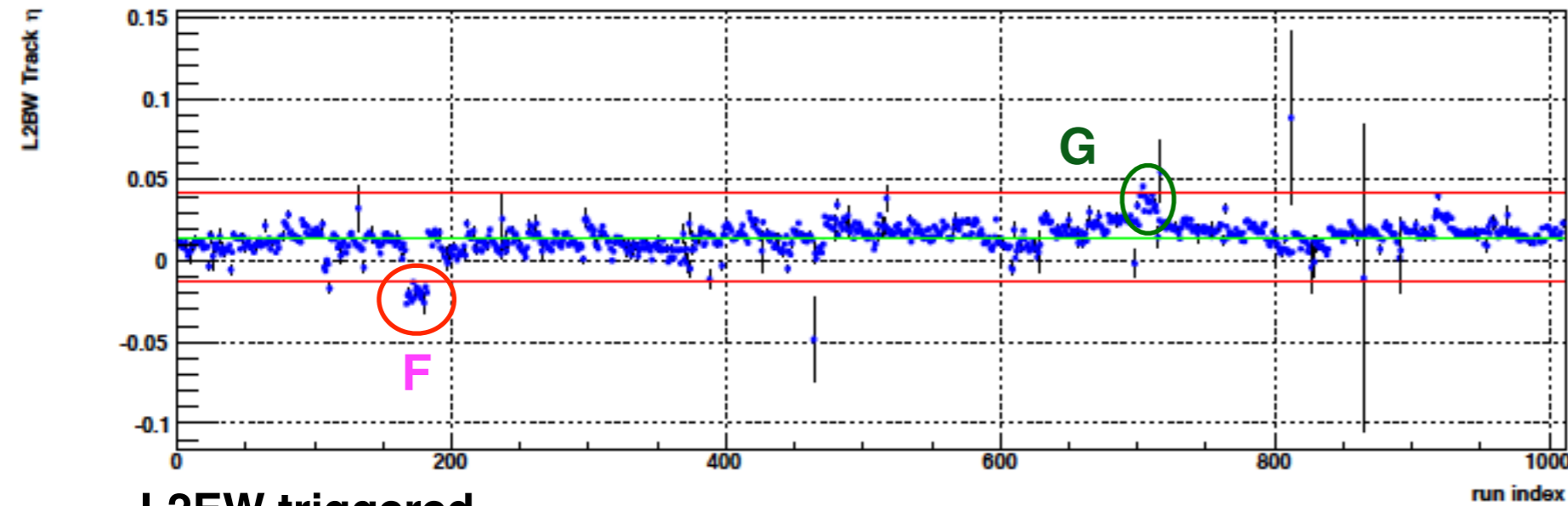
• bad daq rates (100% dead time TPX)



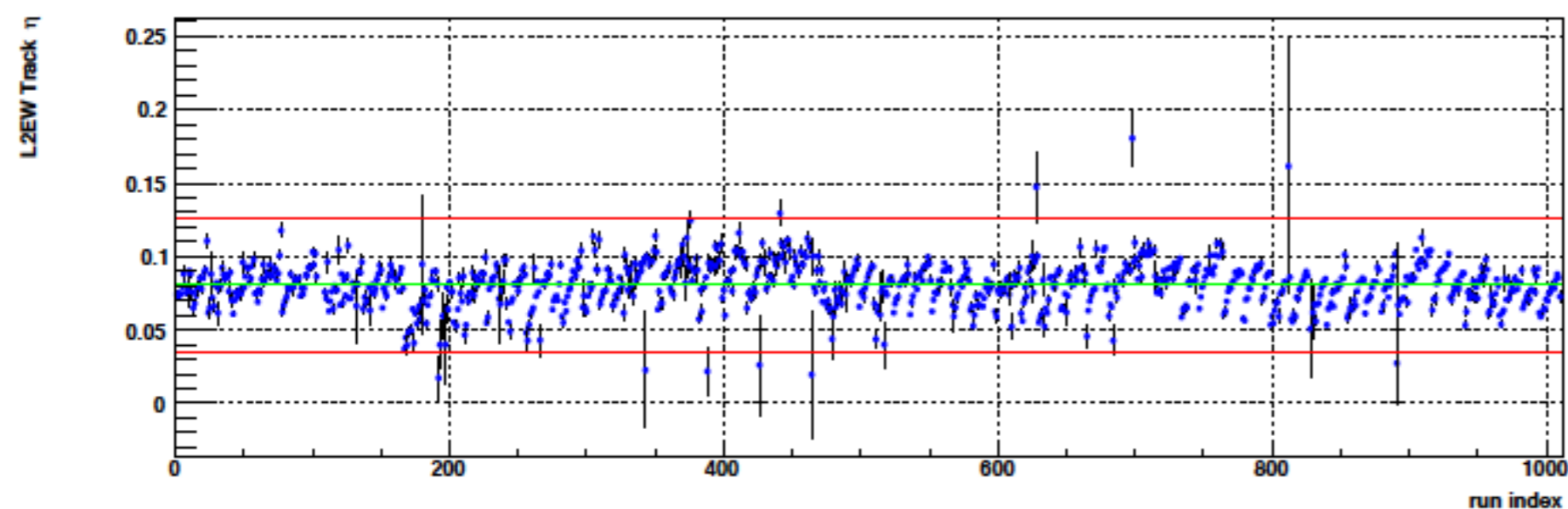
TPC Tracks - Track Eta

Parameter	Selection	Cuts	
<Track Eta>	Avg. of track Eta of all primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.51

L2BW triggered



L2EW triggered

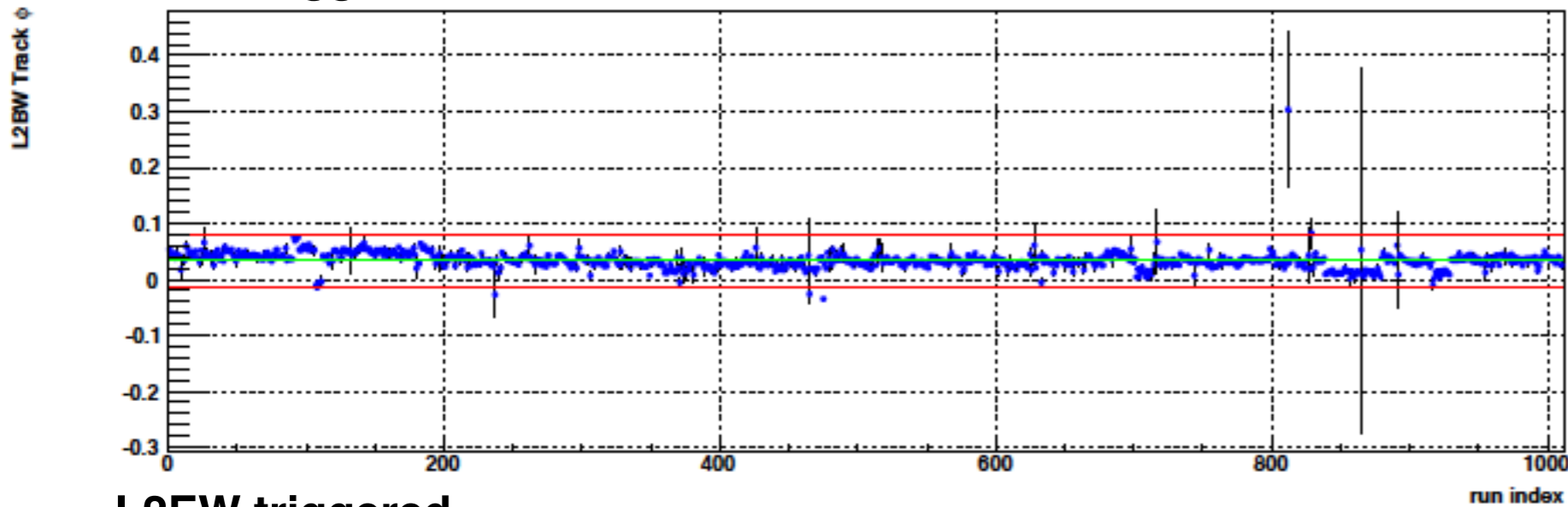


- F** • All runs from Fill 17281 (15), higher Z vertex distribution 🏁
- G** • F17414, in tpc plots sector 13 missing channels, not in fills before and after 😊

TPC Tracks - Track Phi

Parameter	Selection	Cuts
$\langle \text{Track Phi} \rangle$	Avg. of track Phi of all primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 30I or 3II Track Pt ≥ 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsP > 0.5

L2BW triggered

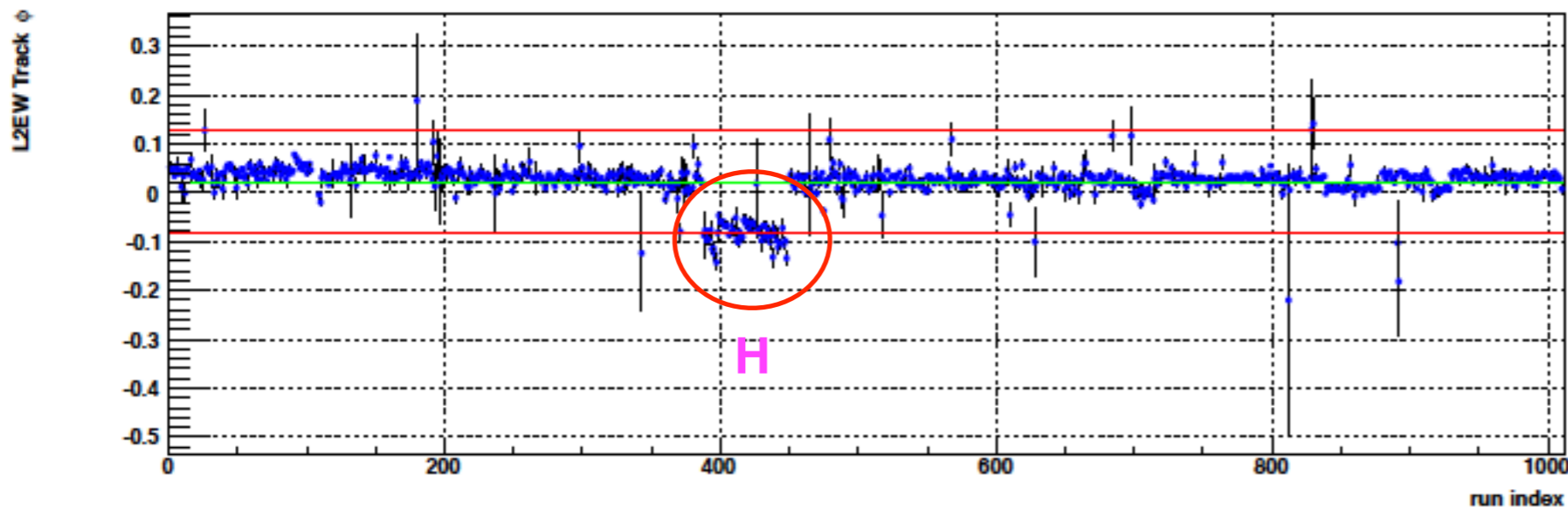


H

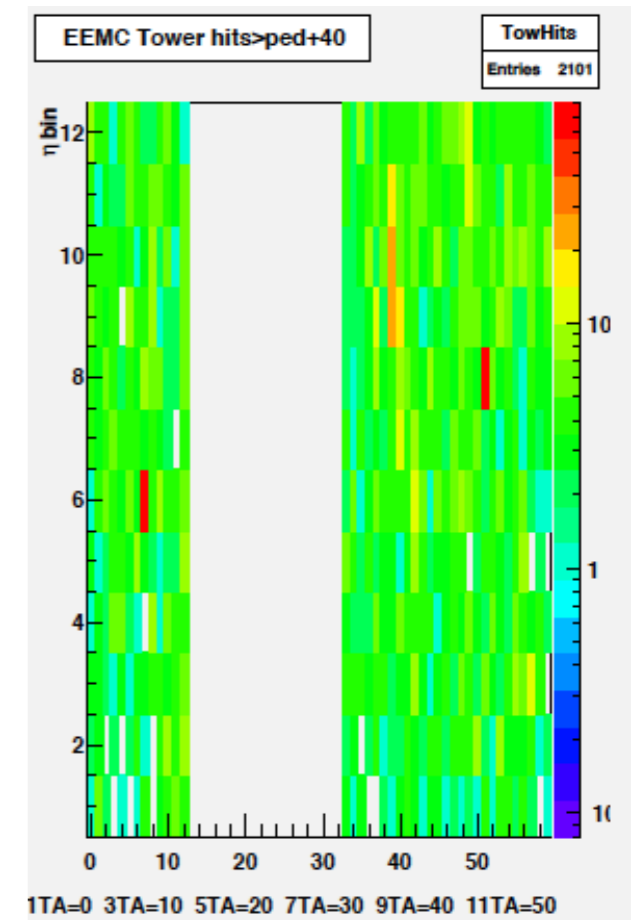
- Starting from middle of the F17333 (15), F17335, F17338, F17340, F17341 30% of EEMC crate is off.



L2EW triggered

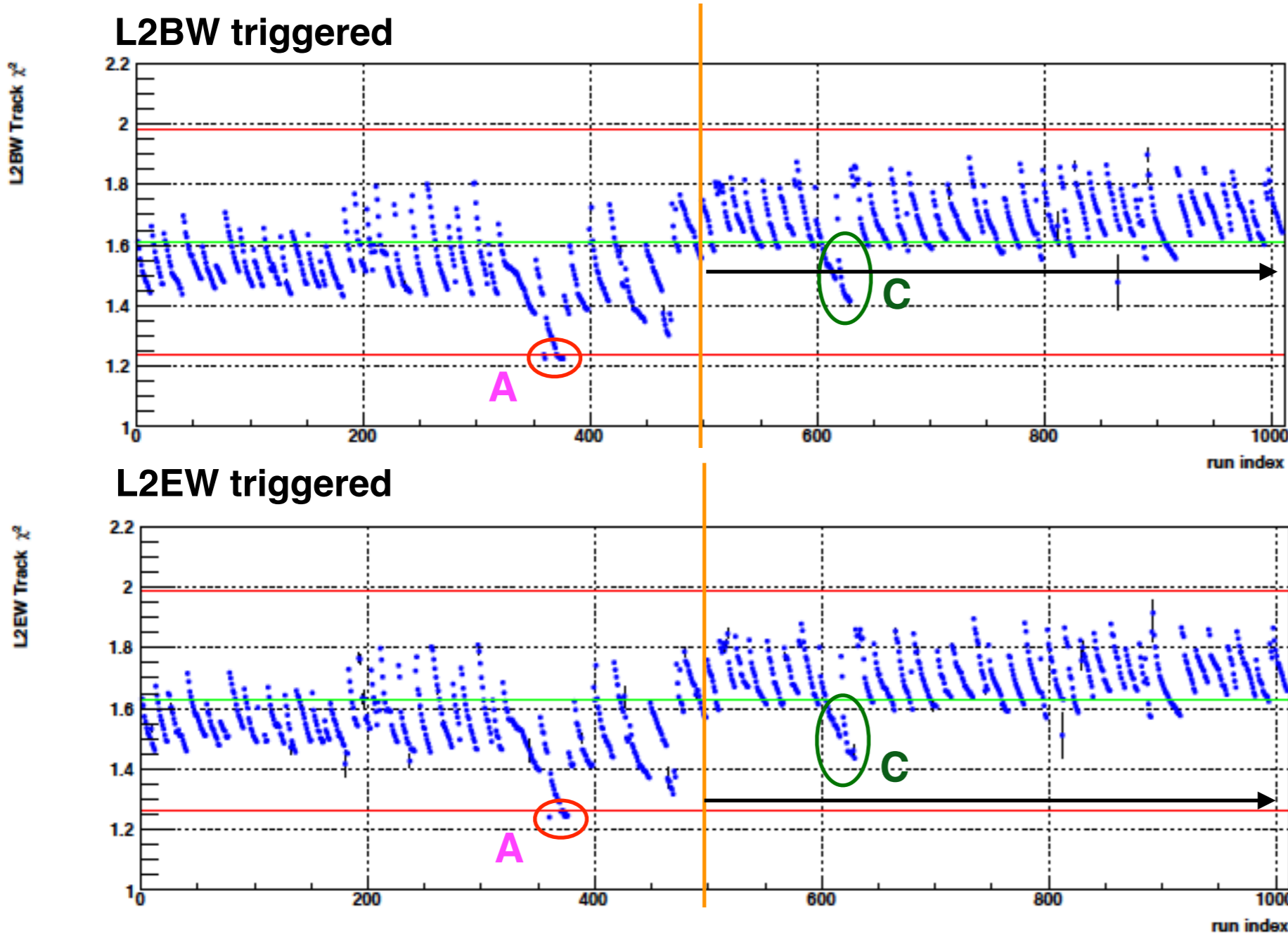


H



TPC Tracks - Track Chi2

Parameter	Selection	Cuts
<Track chi2>	Avg. of track chi2 of all primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsP > 0.51



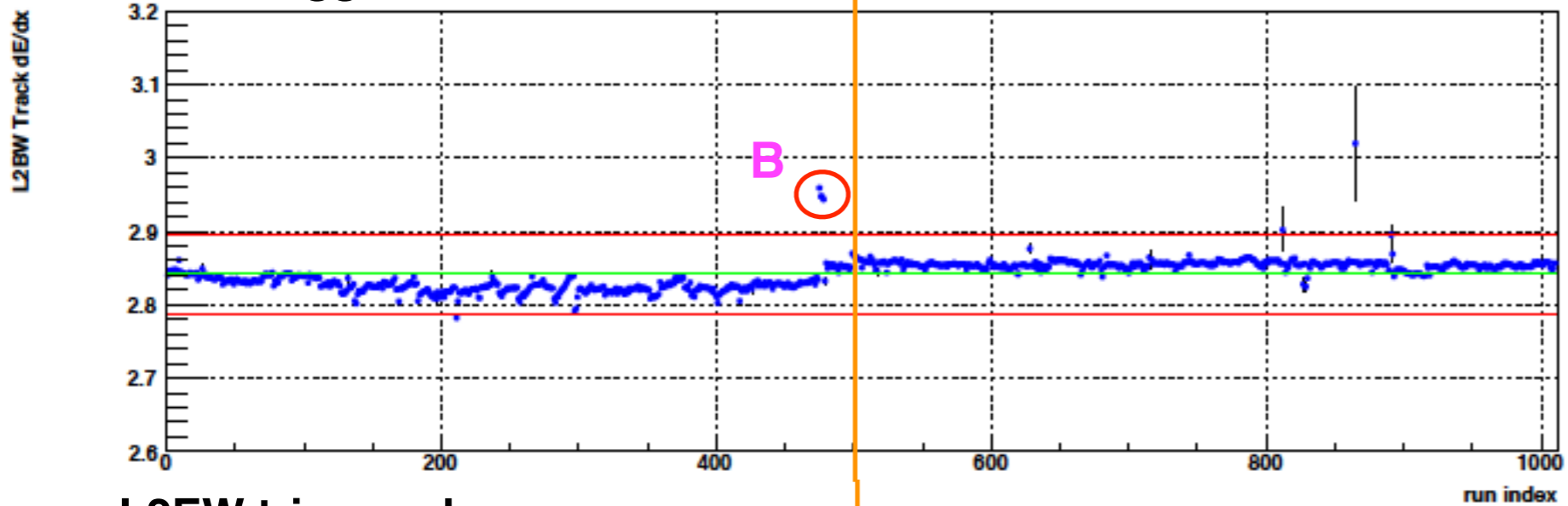
• TPC operation Voltages changed after day 102.

- runs from end of the Fill 17329
- A** • low ZDC rate compare to other fills (2 order of magnitude less) ✓ 😊
- C** 598-633, F 17399, F17402, F17403 seen in verX and verY ✓ 🏁

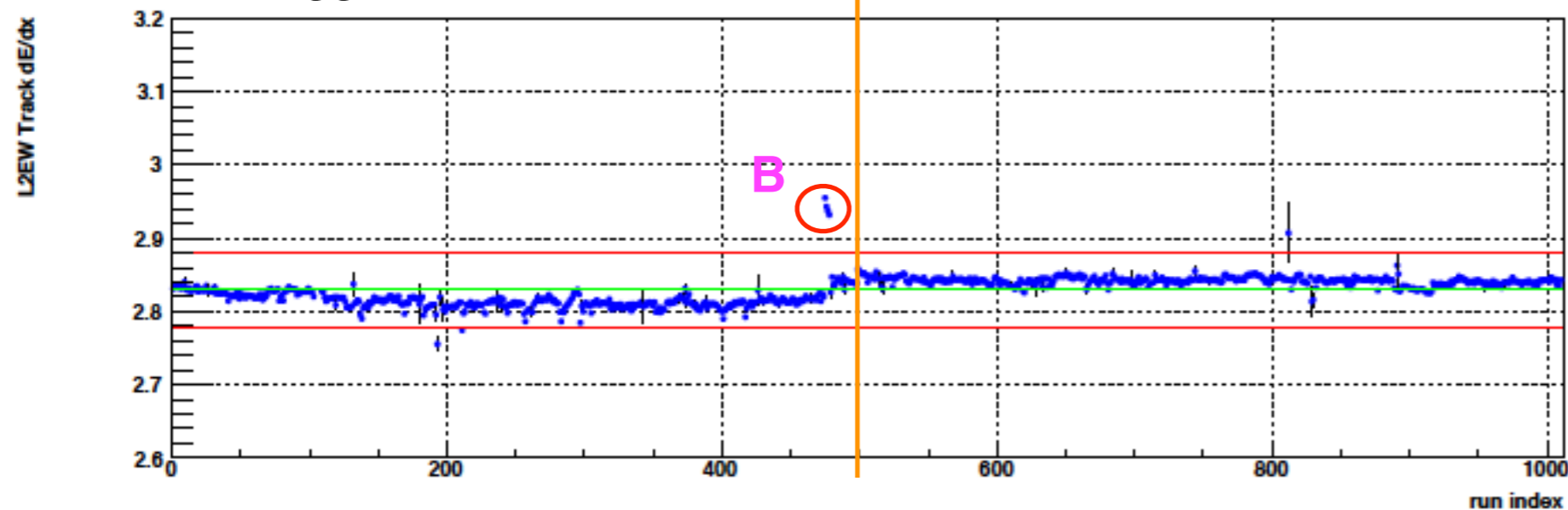
TPC Tracks - Track dE/dX

Parameter	Selection	Cuts	
<Track dE/dX>	Avg. of track chi2 of all primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 30I or 3II Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.5

L2BW triggered



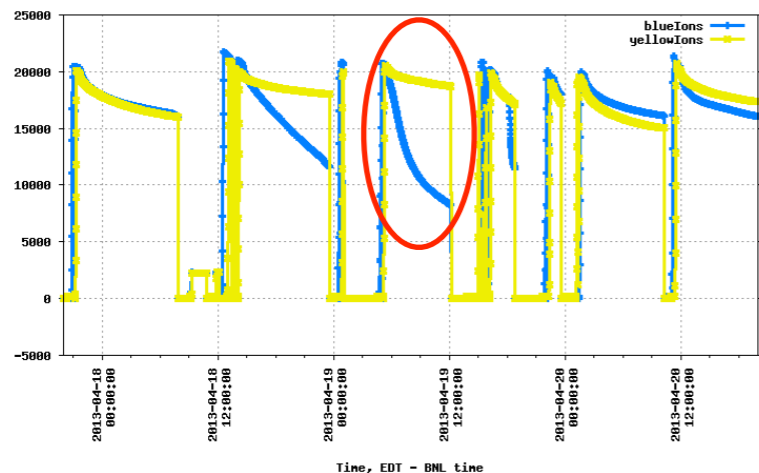
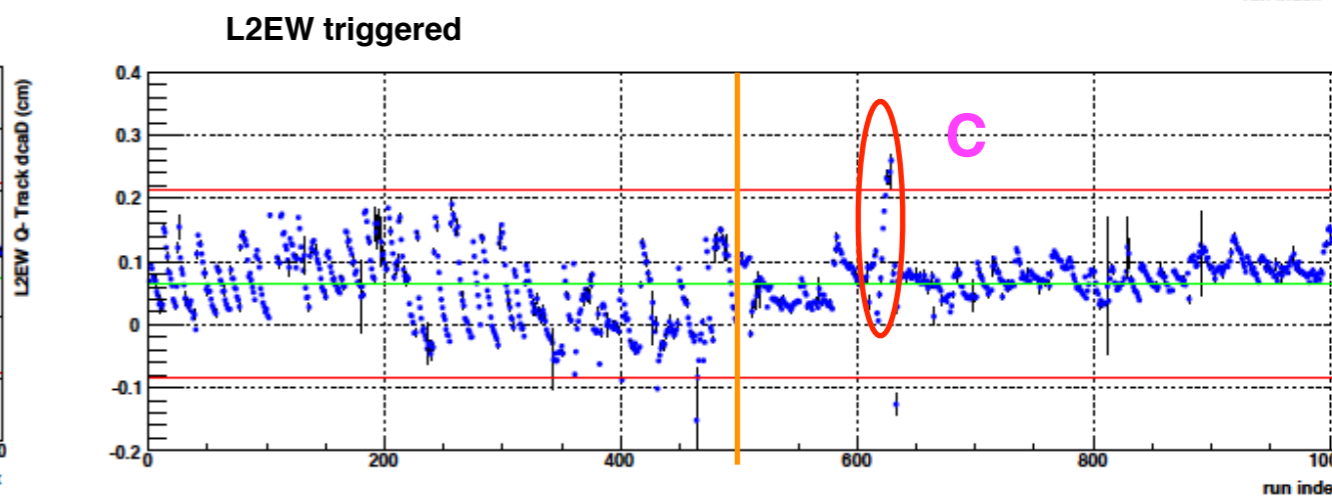
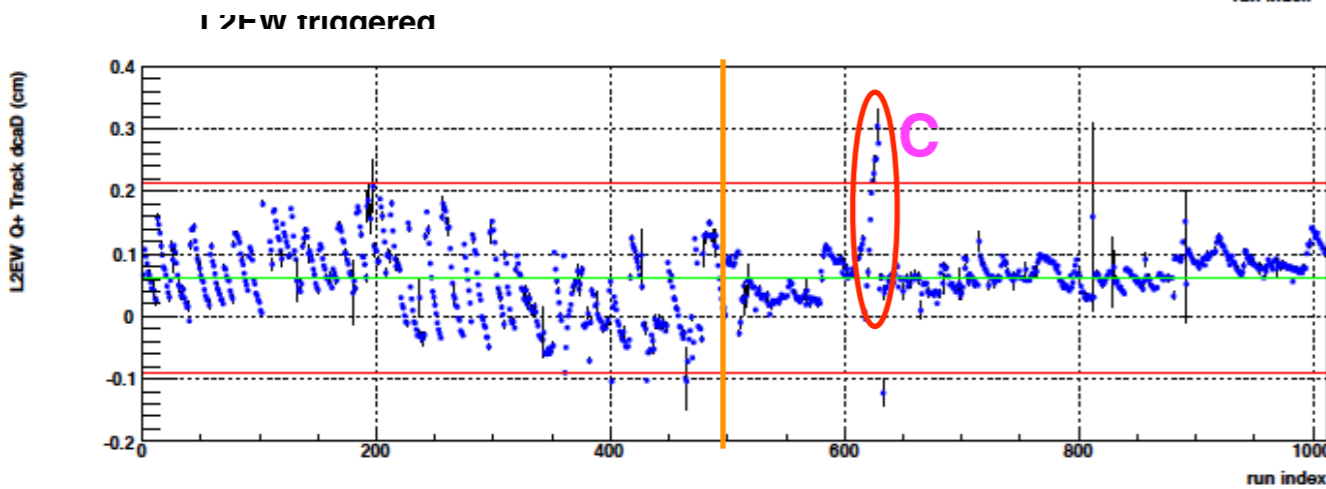
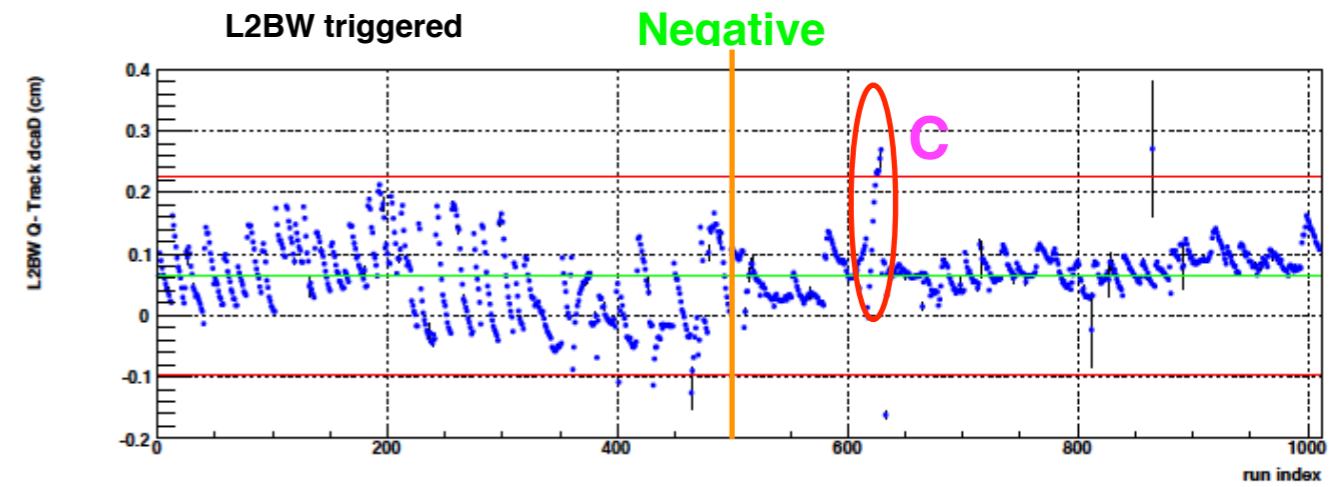
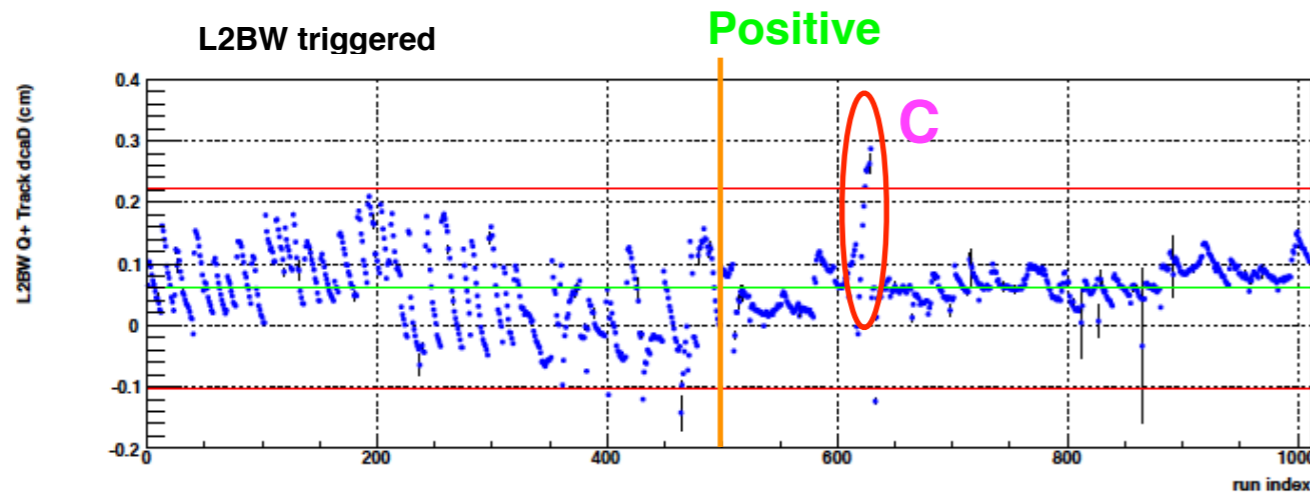
L2EW triggered



- 4 runs from Fill 17352
 - TPC channel (15-1) tripped frequently during this fill, TPC gas issue, seen in Nvertices profile
- B ✓

TPC Tracks - Pos./Neg. Track dcaD

Parameter	Selection	Cuts
$\langle \text{Pos./NegTrack dcaD} \rangle$	Avg. of signed dca of Pos. primary track from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsP > 0.51



• Fill 17402
 C Also seen in VerX, VerY profiles

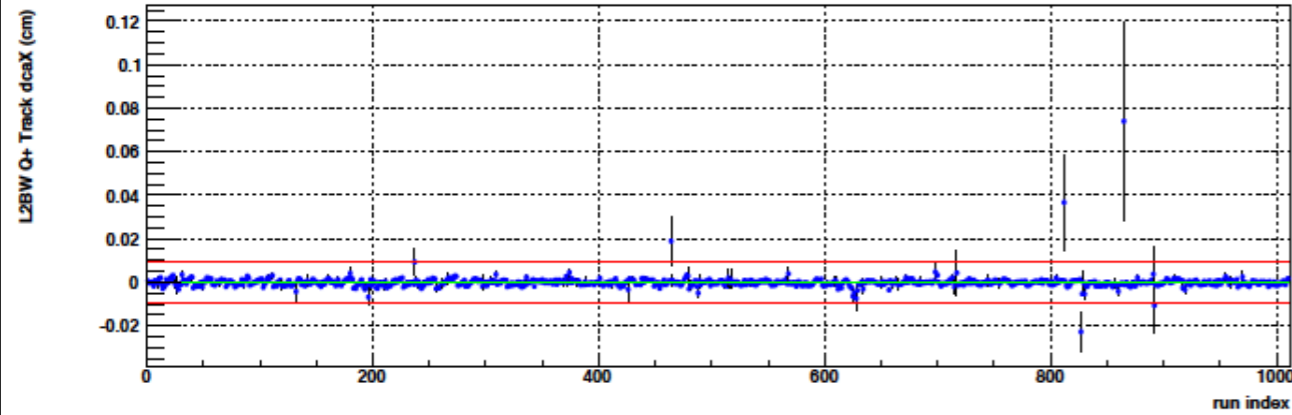


TPC Tracks - Pos./Neg. Track dcaX

Parameter	Selection	Cuts	
$\langle \text{Pos./NegTrack dcaX} \rangle$	Avg. of dca X of Pos./Neg. primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.5

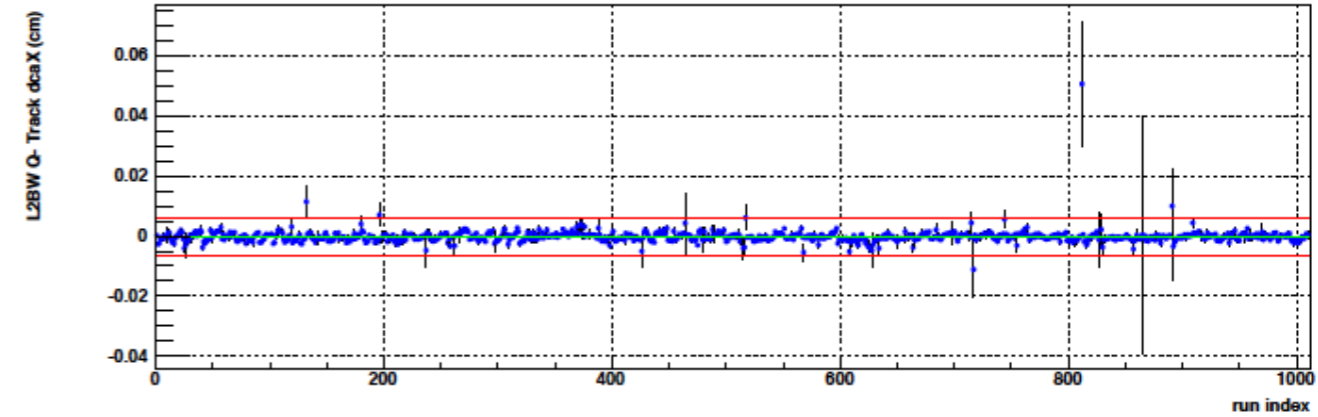
Positive

L2BW triggered

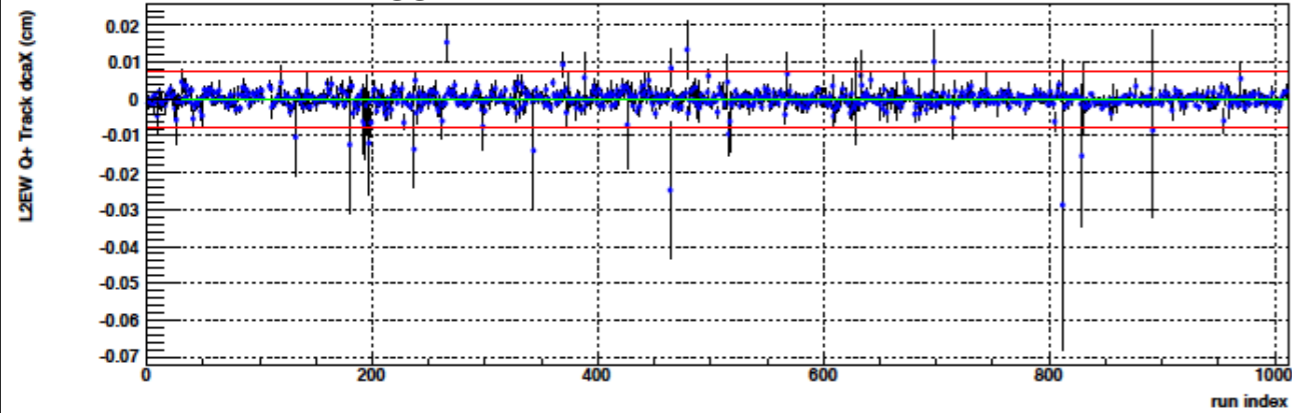


L2BW triggered

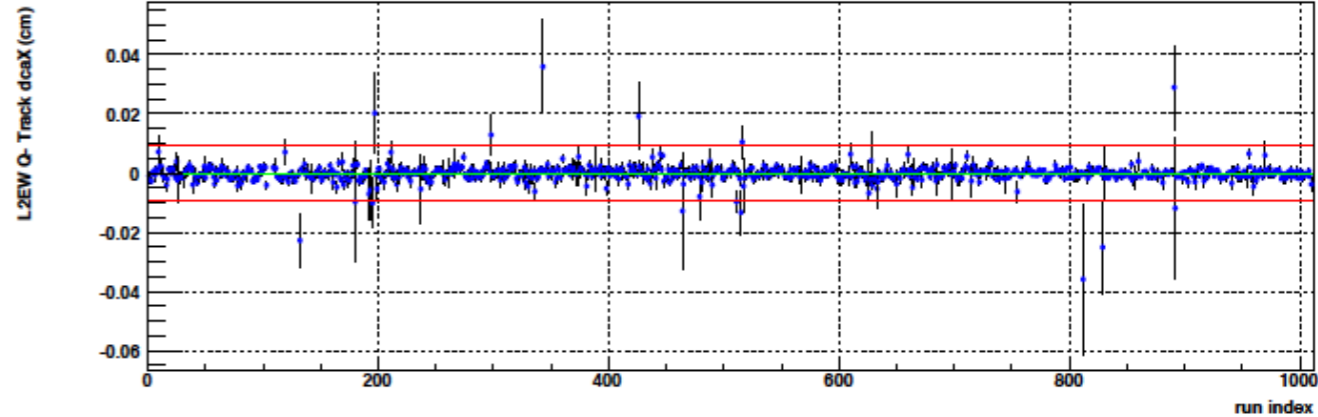
Negative



L2EW triggered



L2EW triggered



TPC Tracks - Pos./Neg. Track dcaY

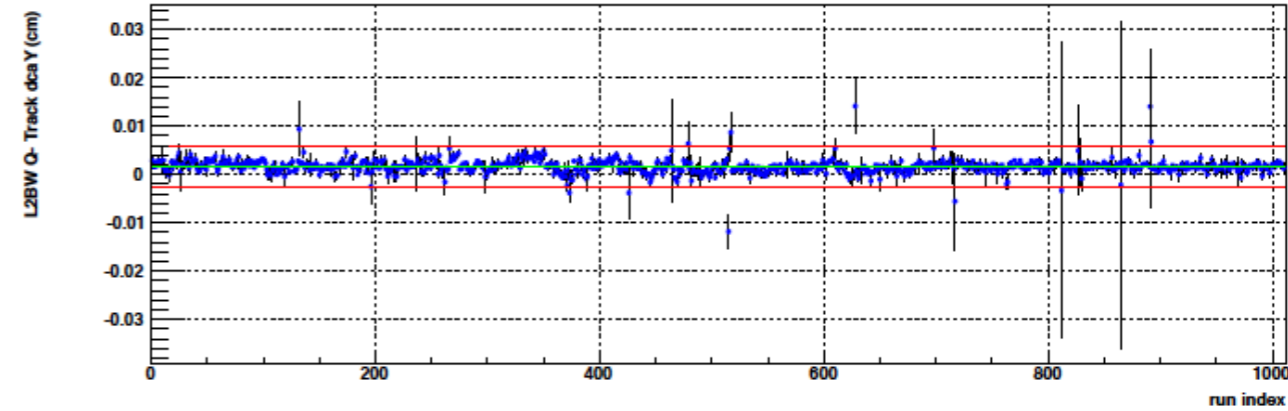
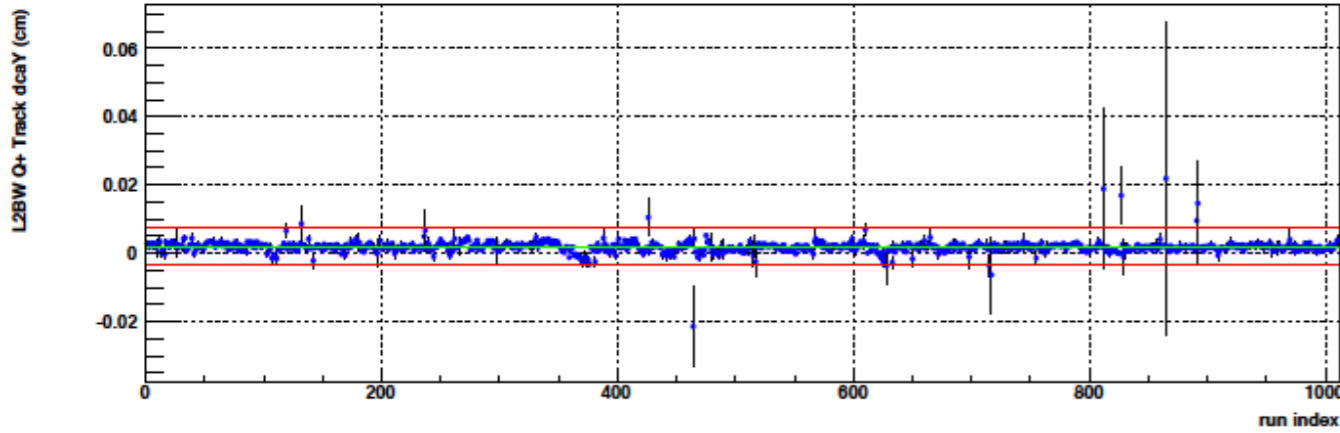
Parameter	Selection	Cuts
$\langle \text{Pos./NegTrack dcaY} \rangle$	Avg. of dcaY of Pos./Neg. primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 301 or 311 Track Pt ≥ 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsP > 0.51

Positive

Negative

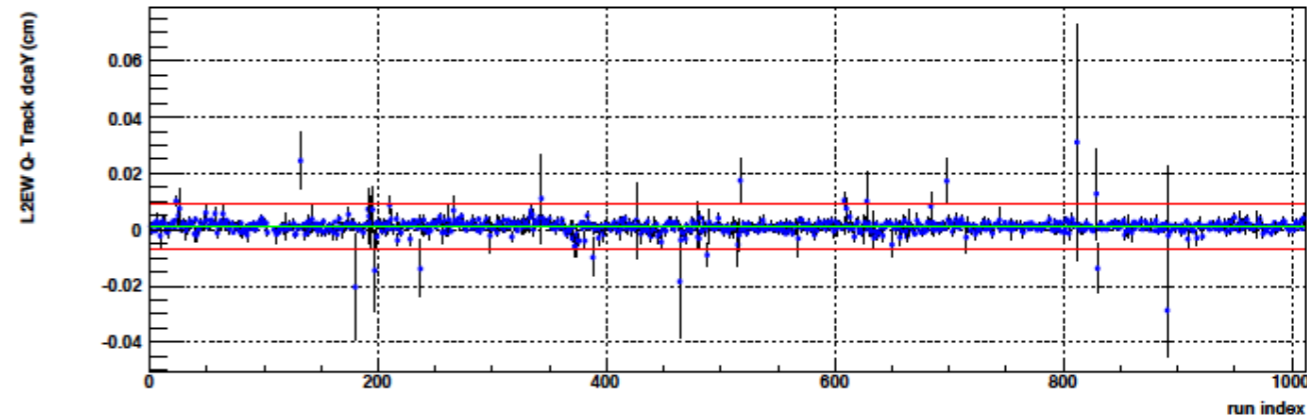
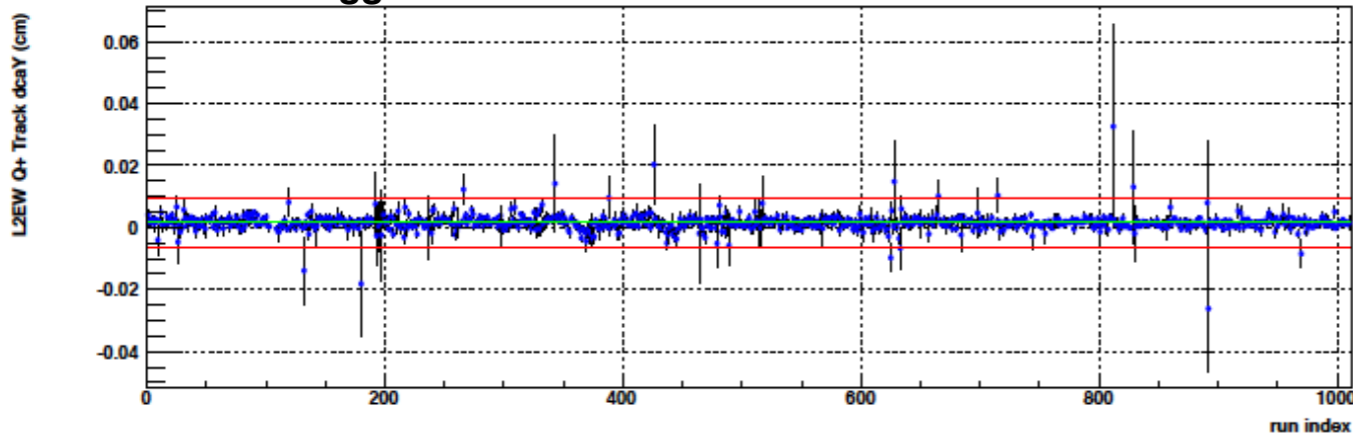
L2BW triggered

L2BW triggered



L2EW triggered

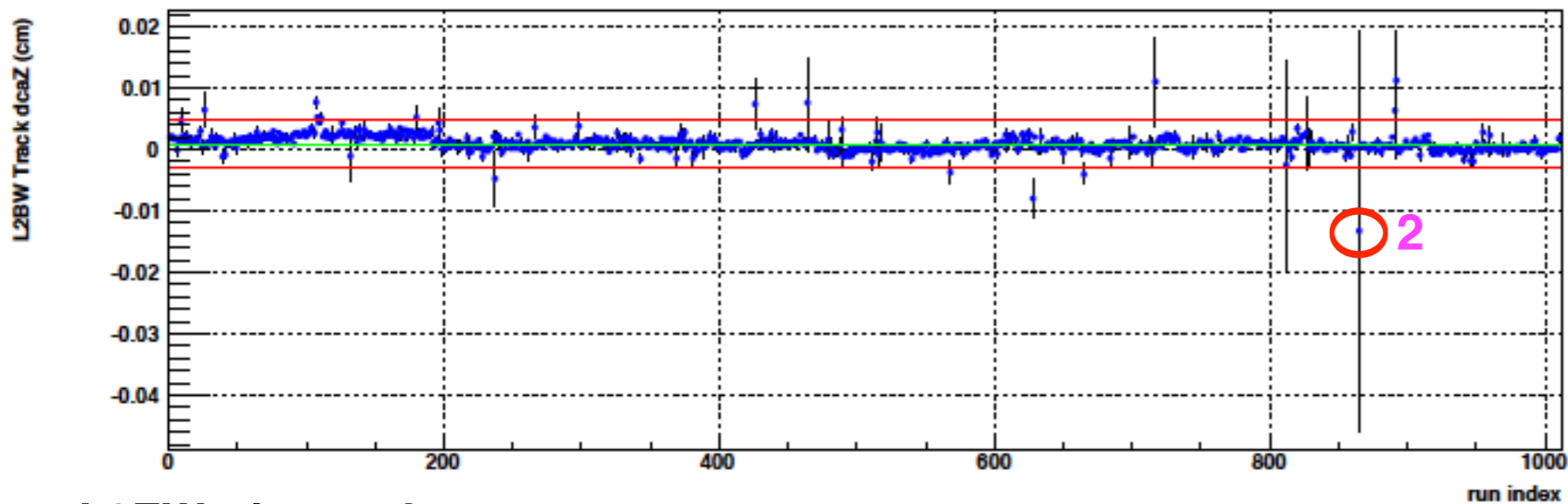
L2EW triggered



TPC Tracks - Track dcaZ

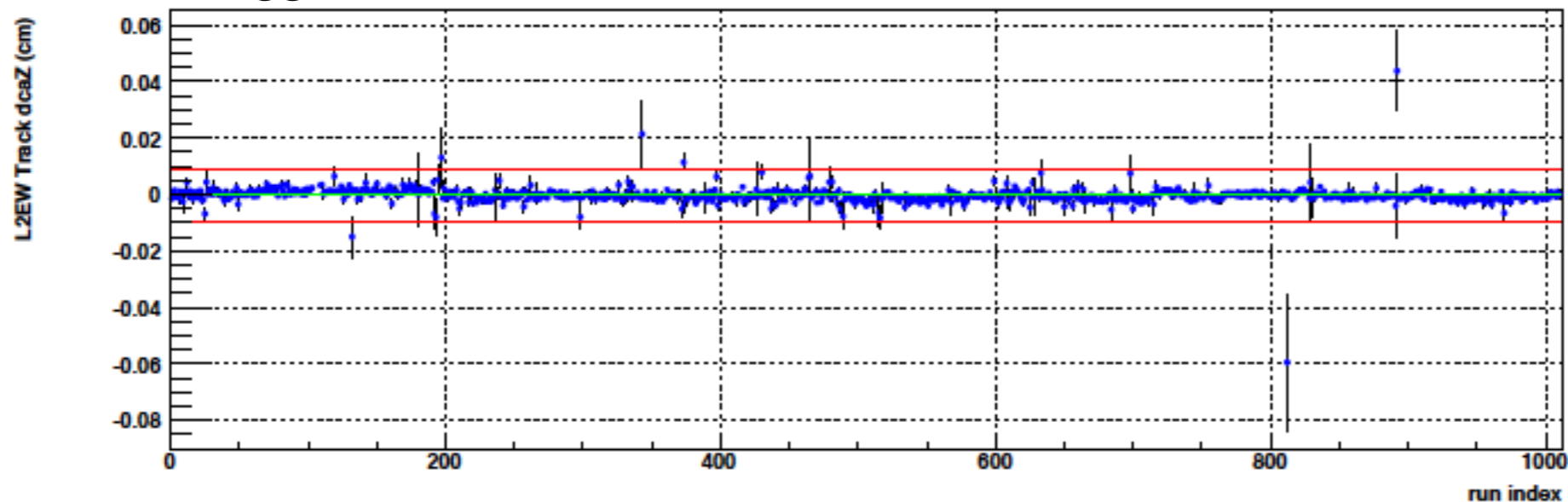
Parameter	Selection	Cuts	
<Track dcaZ>	Avg. of track dcaZ of all primary tracks from all primary vertices per triggered event	<ul style="list-style-type: none"> Track flag 30I or 31I Track Pt ≥ 0.15 GeV 	<ul style="list-style-type: none"> nHitsFits > 15 nHitsFits/ nHitsP > 0.5

L2BW triggered



2 • negligible Lumi. EEMC hot tower, shown in N vertices profile ❌😞

L2EW triggered



BEMC, EEMC, ESMD plots

Red Lines: ± 3 sigma, **Green line** : Mean

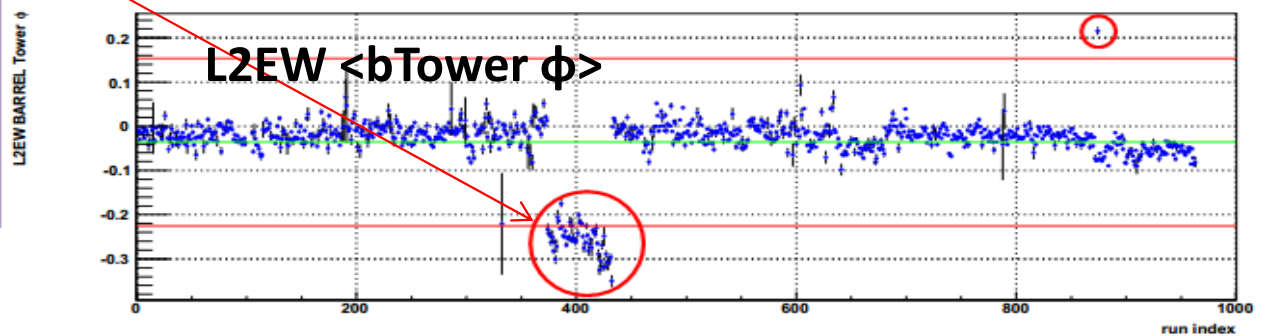
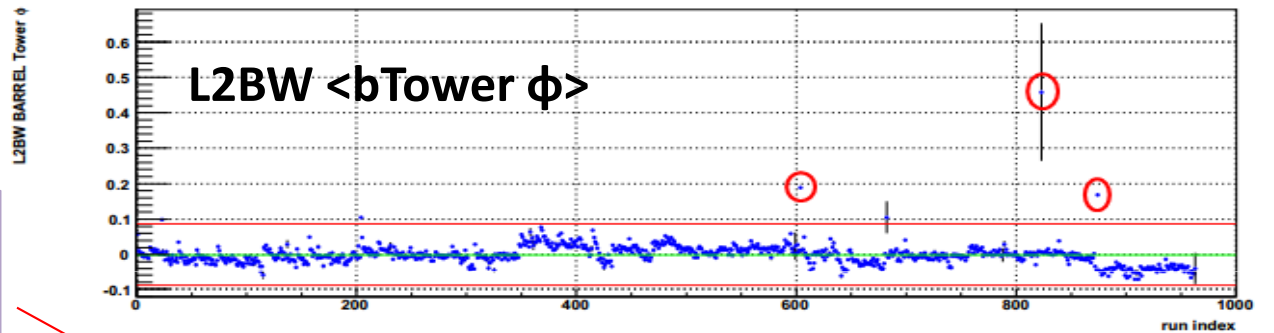
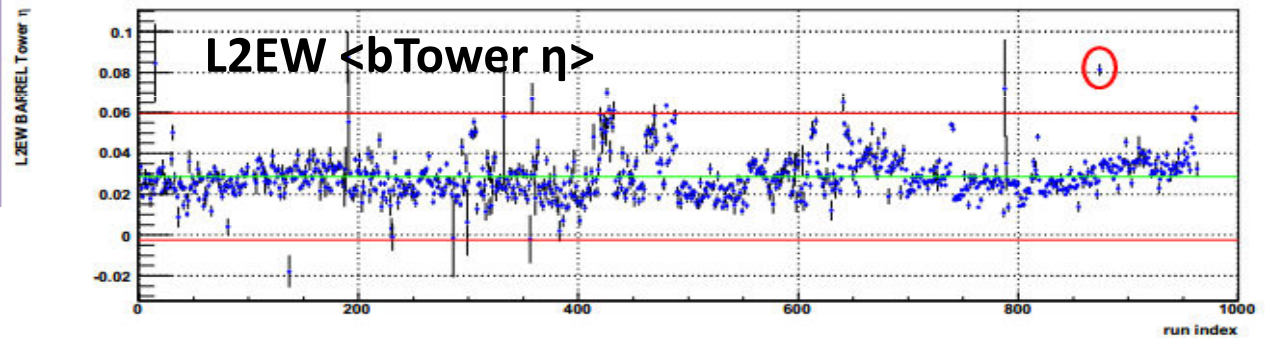
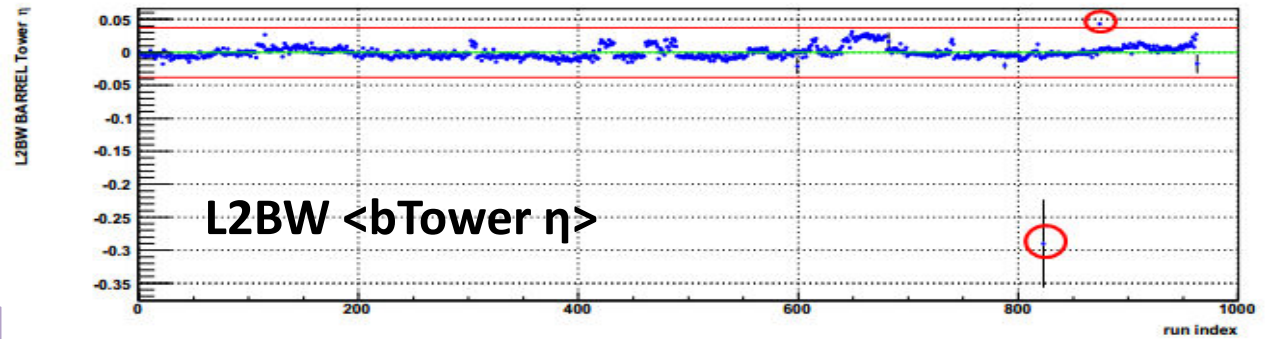
bTower

14118062, 14122009 shows outlier at ϕ , η distribution. Also mentioned in previous slide. Rejected!

Again:

14096098- 14098053

~30% eemc channels were OFF. Many variables are impacted by this issue. But those runs are still good to be used in analysis.



bTower continue

Fill 17329 have lower ZDC rate,
good runs.

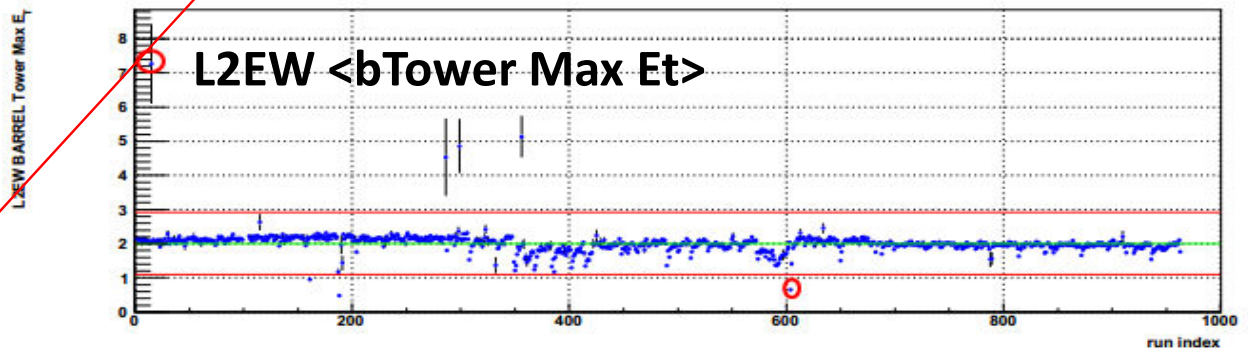
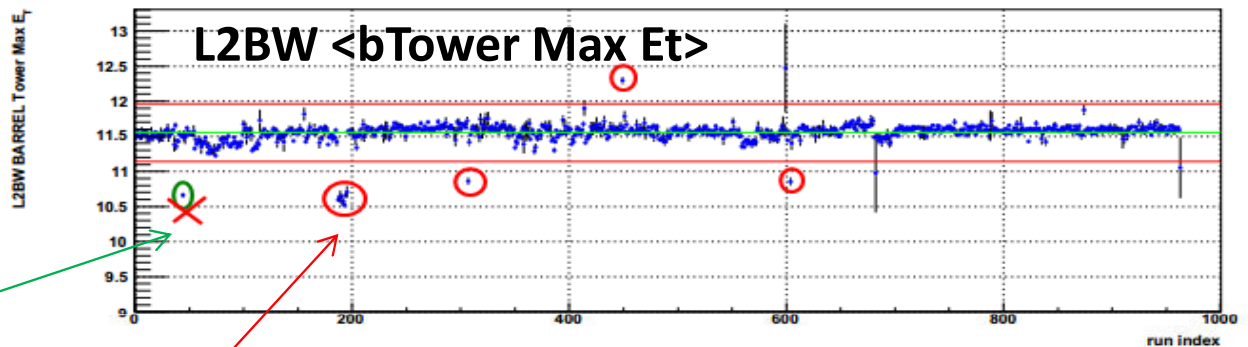
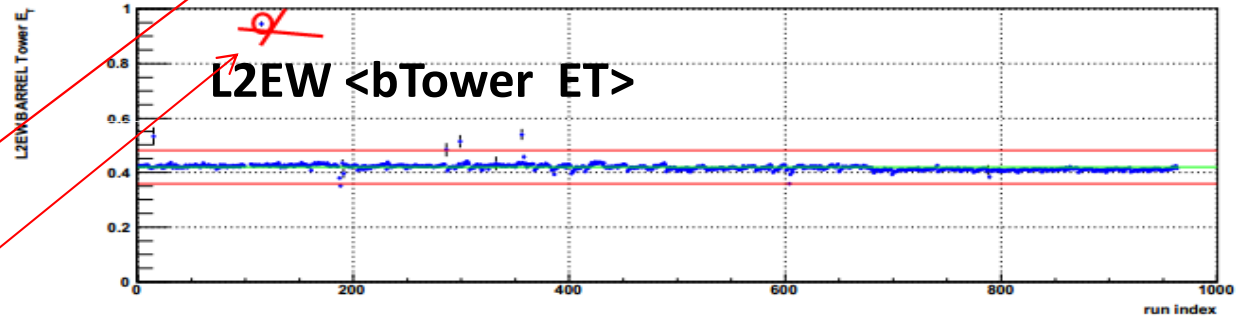
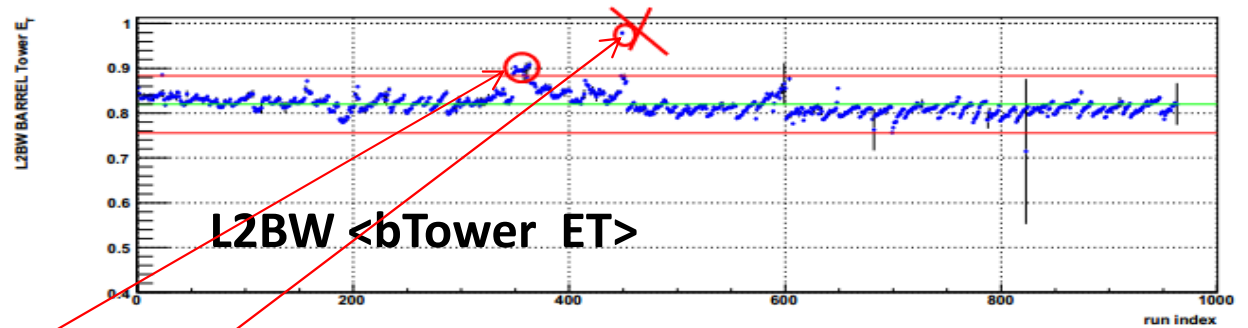
14099048 , Hot Tower in barrel

14081014 shows outlier in
bTower ET. Reject !

14077004 was taken before
physics declaration.
Shows outliers in couple of
variables. Luminosity is
negligible . Exclude it.

14087004-14087037

Lower Max ET events are
accepted, Maybe due to rigger
issue. See next slide:



bTower continue

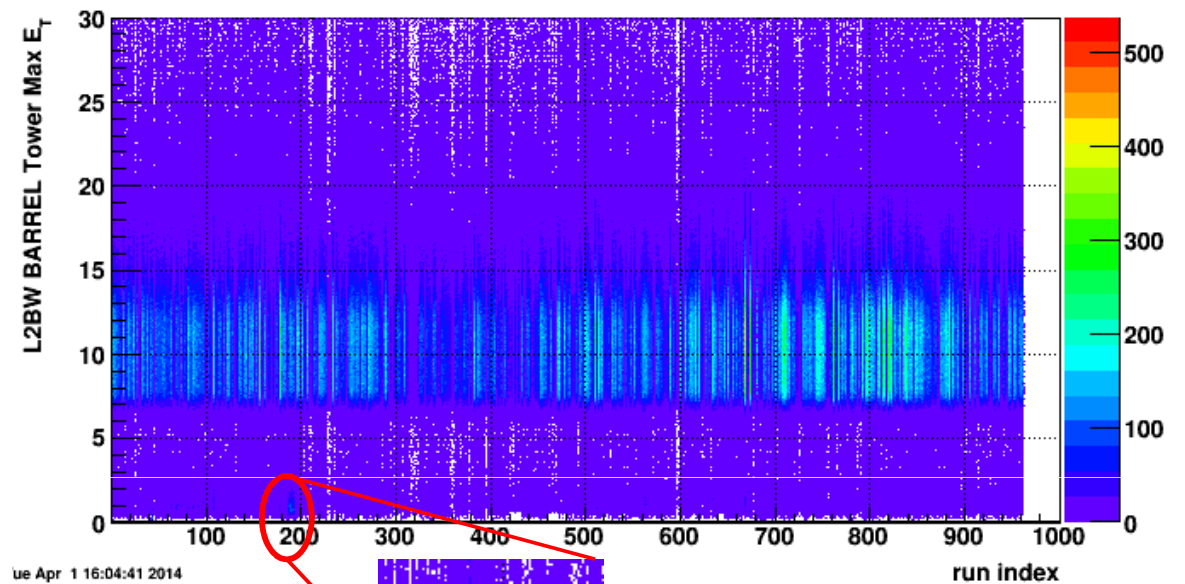
14087004-14087037

Lower Max ET events are accepted, Maybe due to trigger issue.

L0 trigger monitor, Trigger patch distribution has a hot bin. Maybe this is the reason.

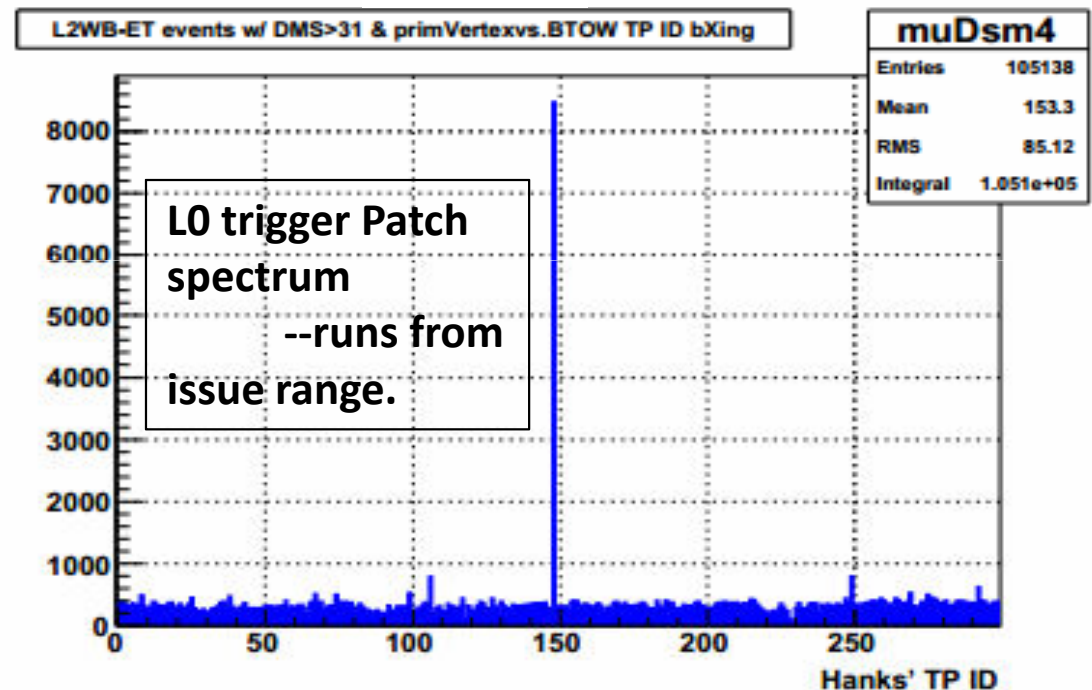
The low Pt events will be rejected in W selection, So, no impact on W analysis.

Accept !



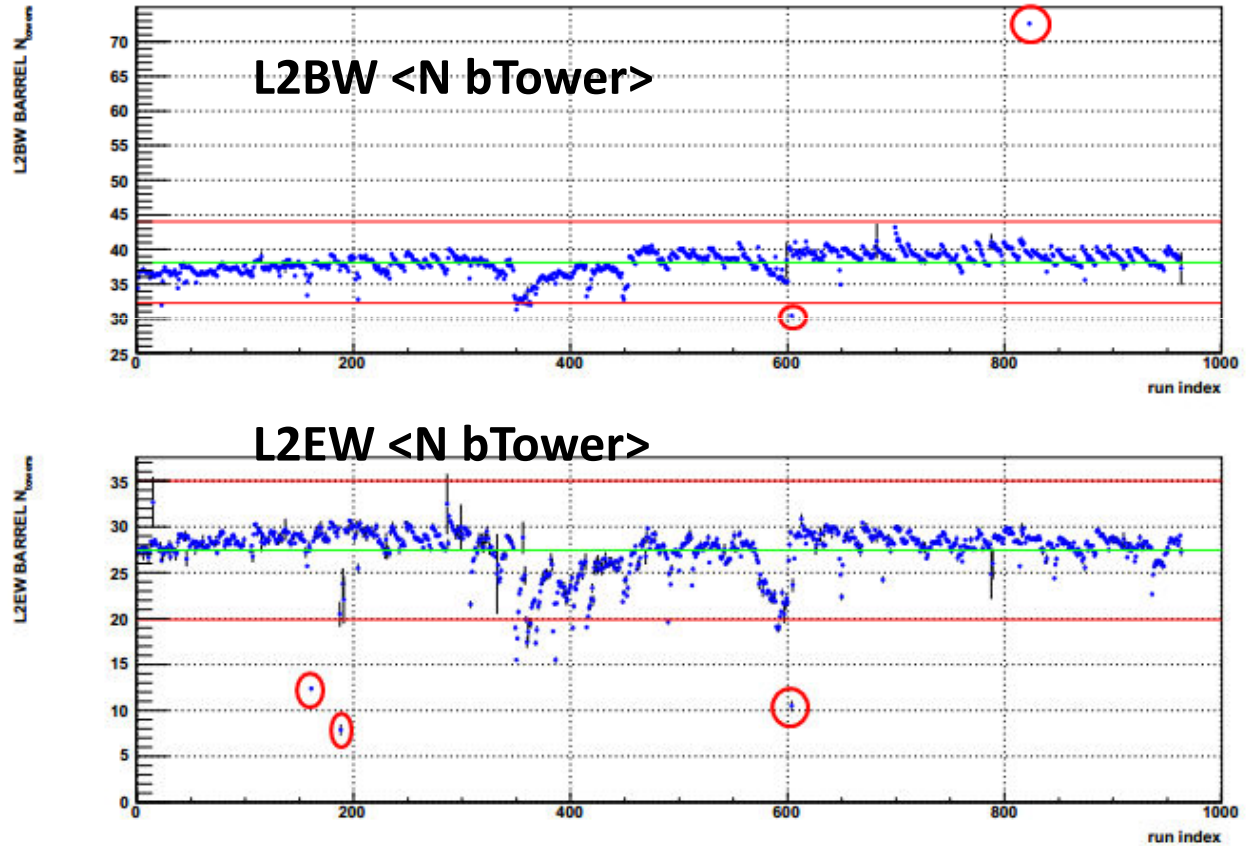
ue Apr 1 16:04:41 2014

200



bTower continue

14084062, 14087005, 14087019,
14109054 shows outlier at **N** of
bTower distribution. Also have
other issues shown in previous
slide.
Rejected !



eTower

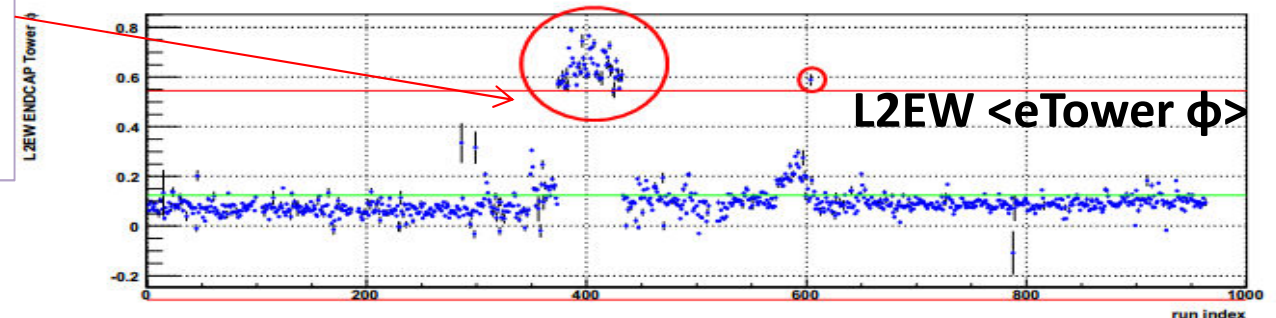
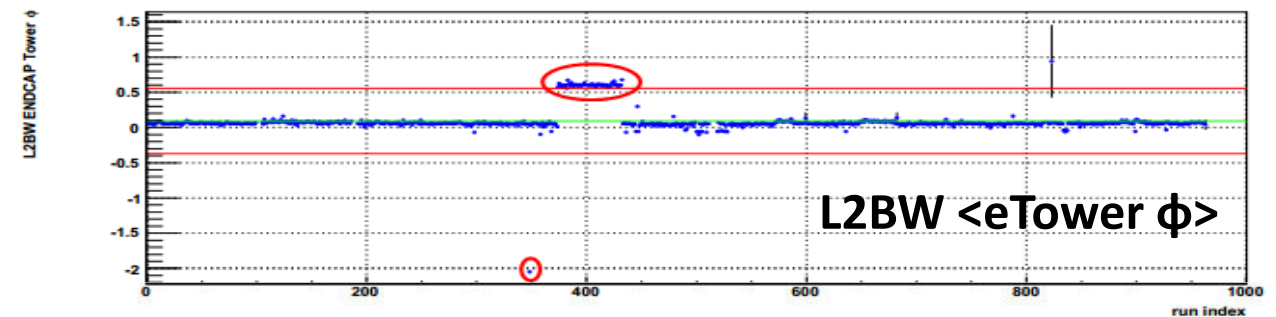
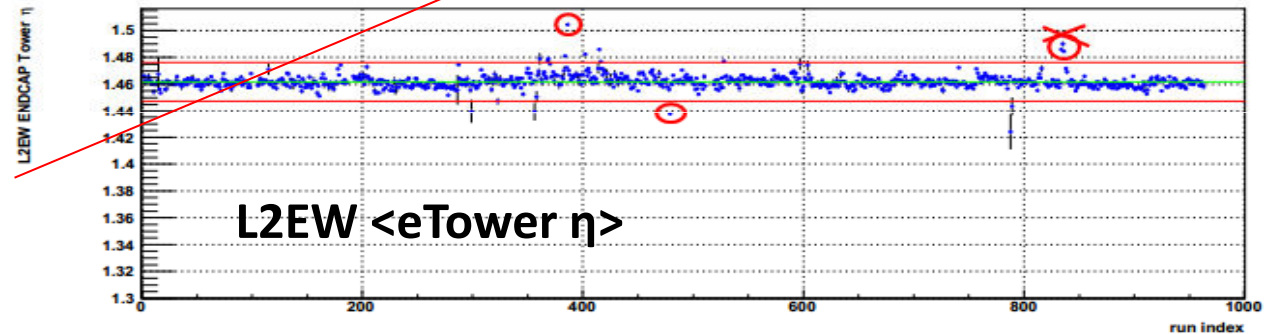
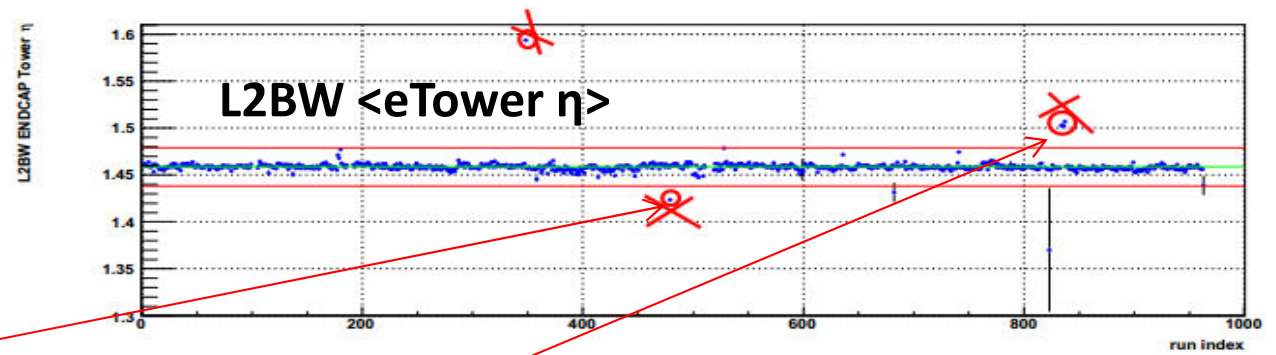
14102029 holes appear in QA plots for EEMC crate 3 and 6
No serious problem. Accept !

14119022-14119027 from Fill
17436 have a Hot tower.
Reject !

Again:

14096098- 14098053

~30% eemc channels were OFF.



eTower continue

Again:

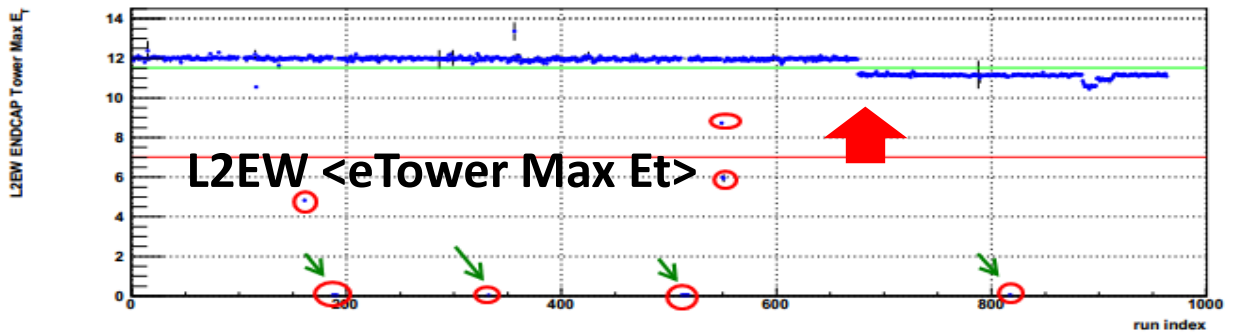
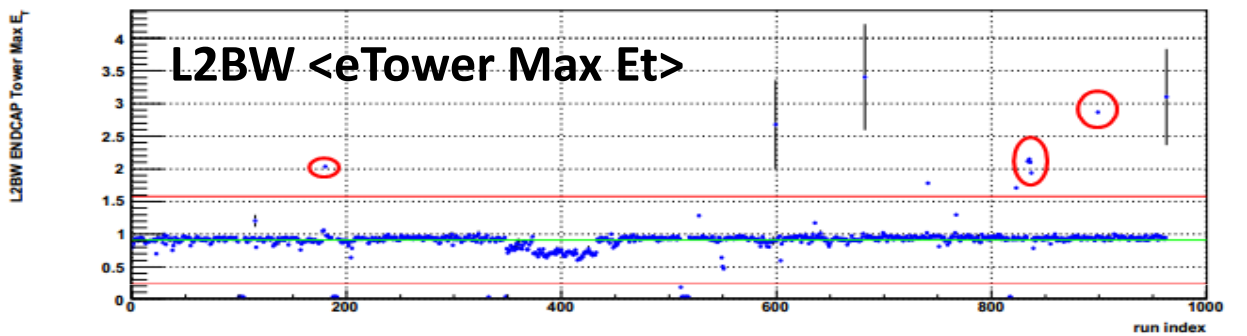
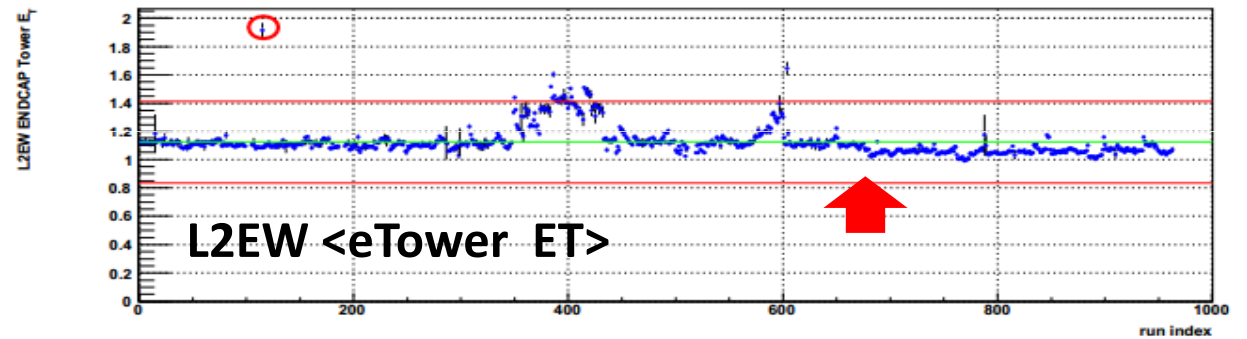
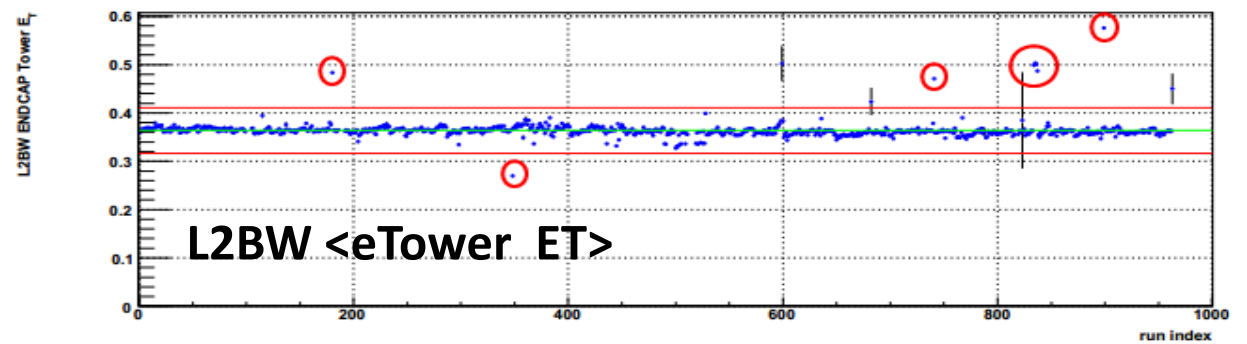
14122058-14123010

Due to hot tower, which have been masked by Mike.

Runs like 14104059-14105002,
No eTower information for those runs, luminosity < 1%
Reject ! Will show in N eTower

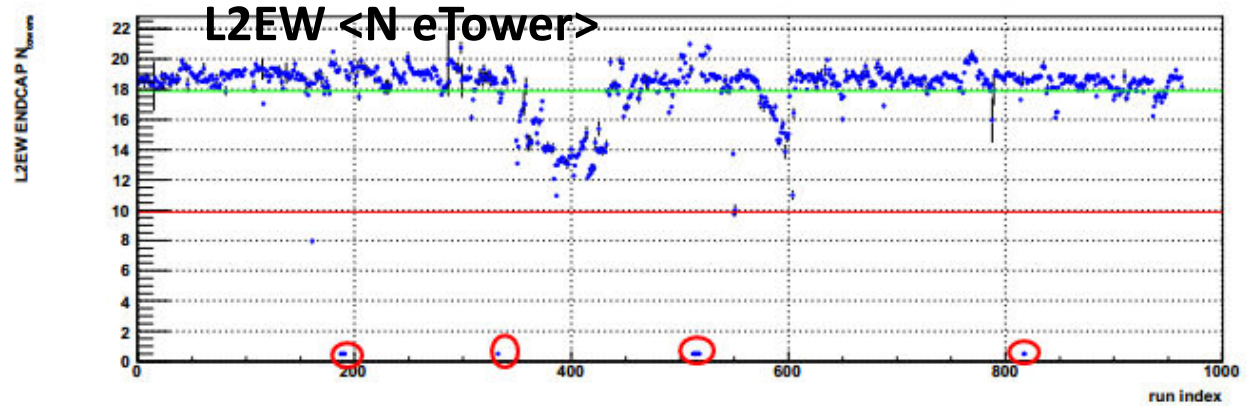
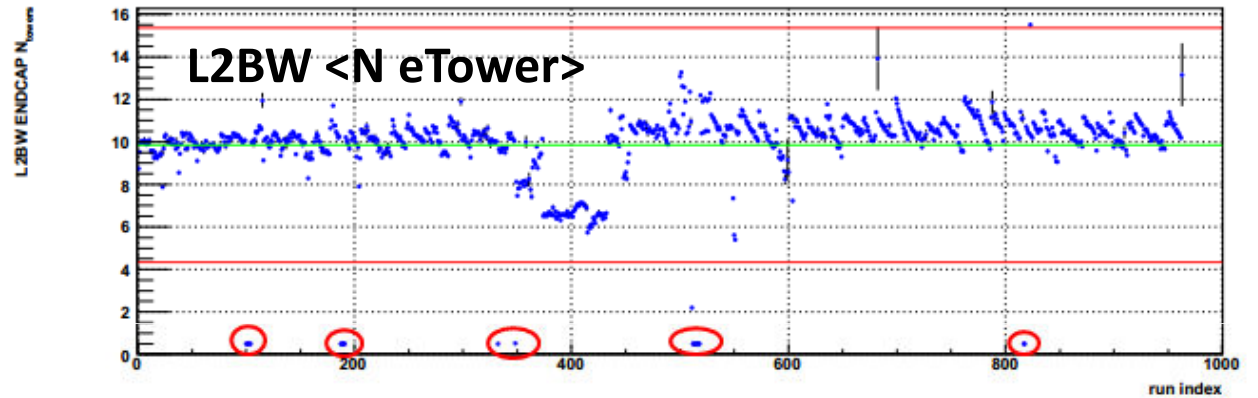
Other outliers have been rejected in previous slides.

➡ L2EW trigger threshold was modified from 10 GeV to 9.2 GeV by Jeff in day 112.
Not a serious problem!



eTower continue

Again:
Runs without eTower
information. luminosity < 1%
Reject !

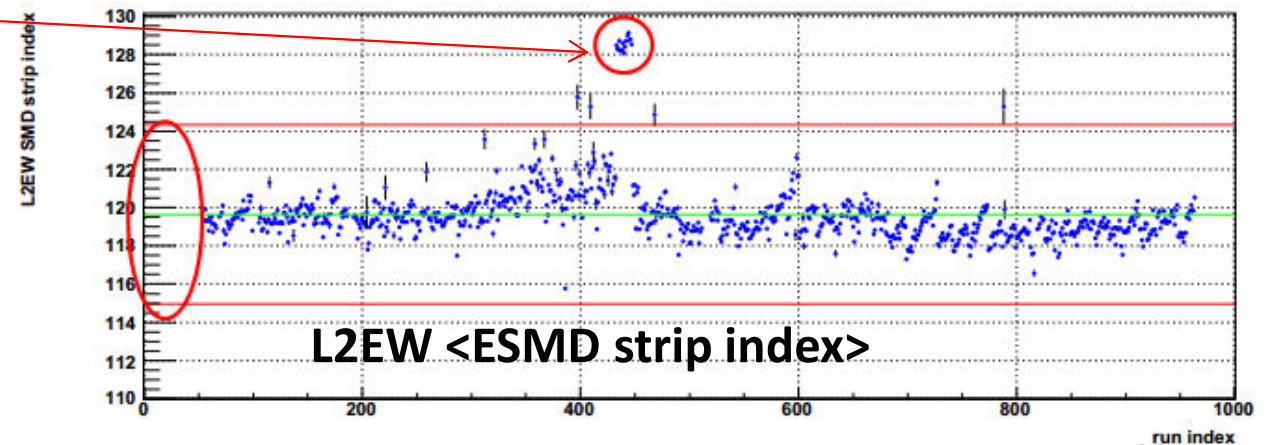
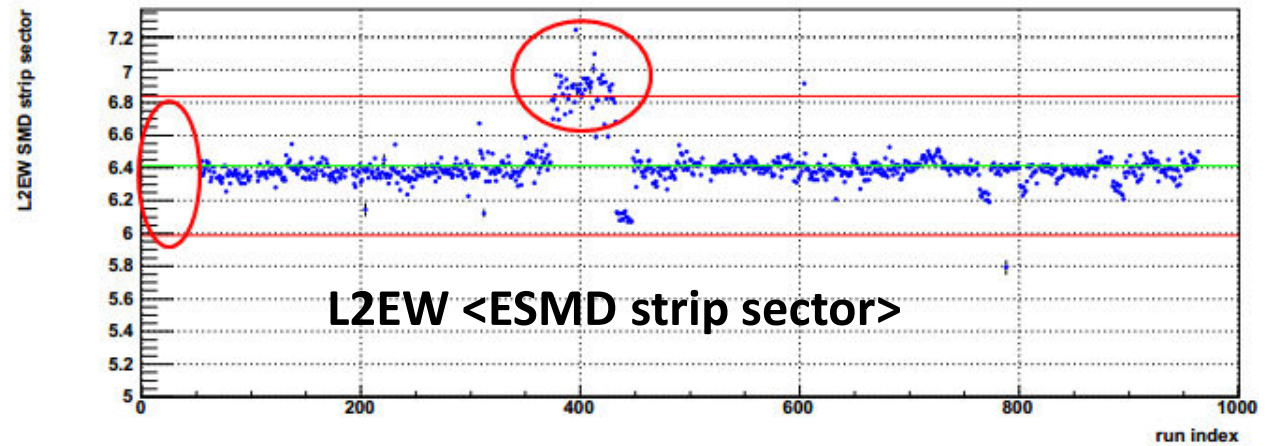
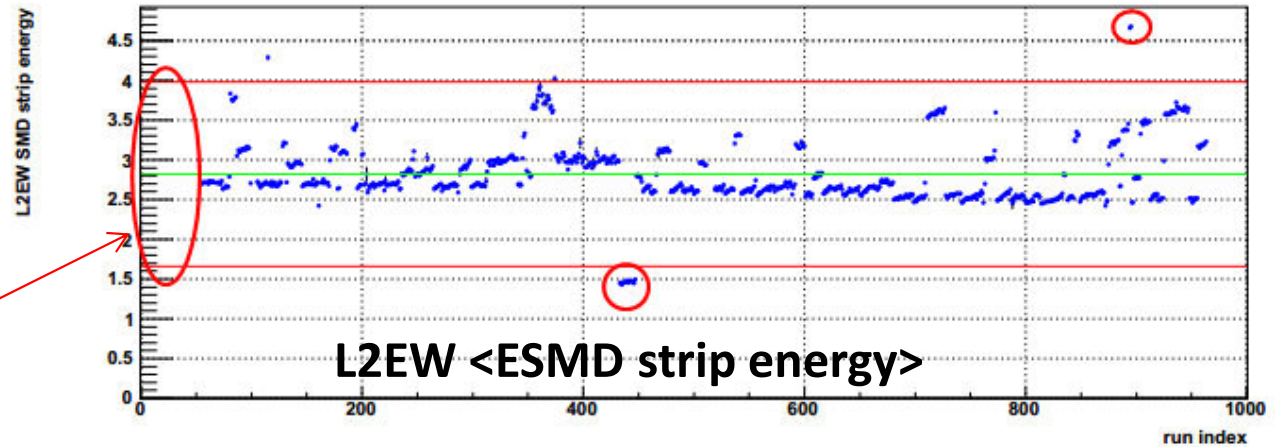


ESMD

14076009-14077021,
14078016,14078017
without ESMD information.
Luminosity $\sim 4\%$

Can be used in Barrel analysis,
but can't be used in endcap.

14099013-14099033 from fill
F17345. show outliers for
ESMD information. No other
issues found. Little impact on
W selection. Keep them.



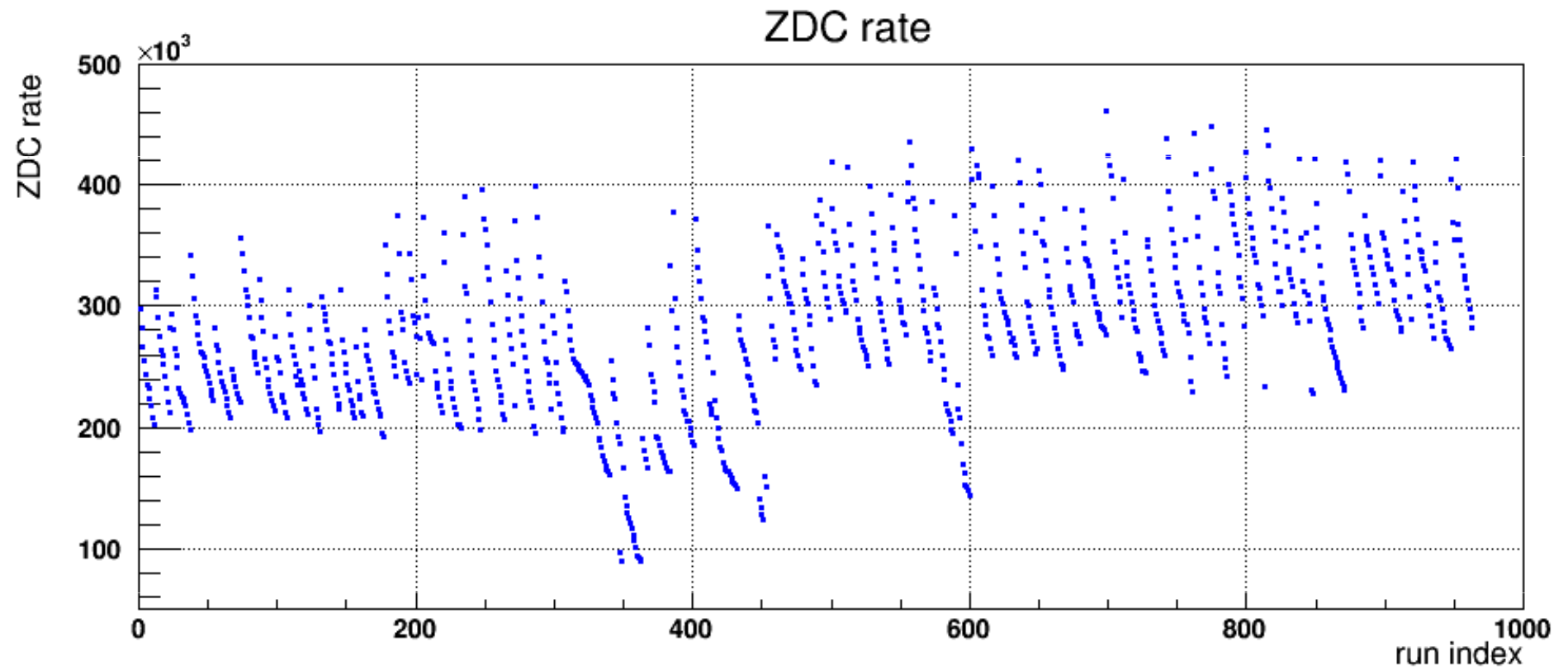
Summary

- 48 runs shorter than 3 mins are excluded.
- 46 runs, 3.5/pb (2.8%) are excluded from L2BW runlist.
89 runs, 8.4/pb (6.6%) are excluded from L2EW runlist.
- Got pre-final runlists of period 1 for preliminary result.
L2BW: 917 runs, 122.9 /pb
https://drupal.star.bnl.gov/STAR/system/files/goodlist_L2BW.csv_.txt

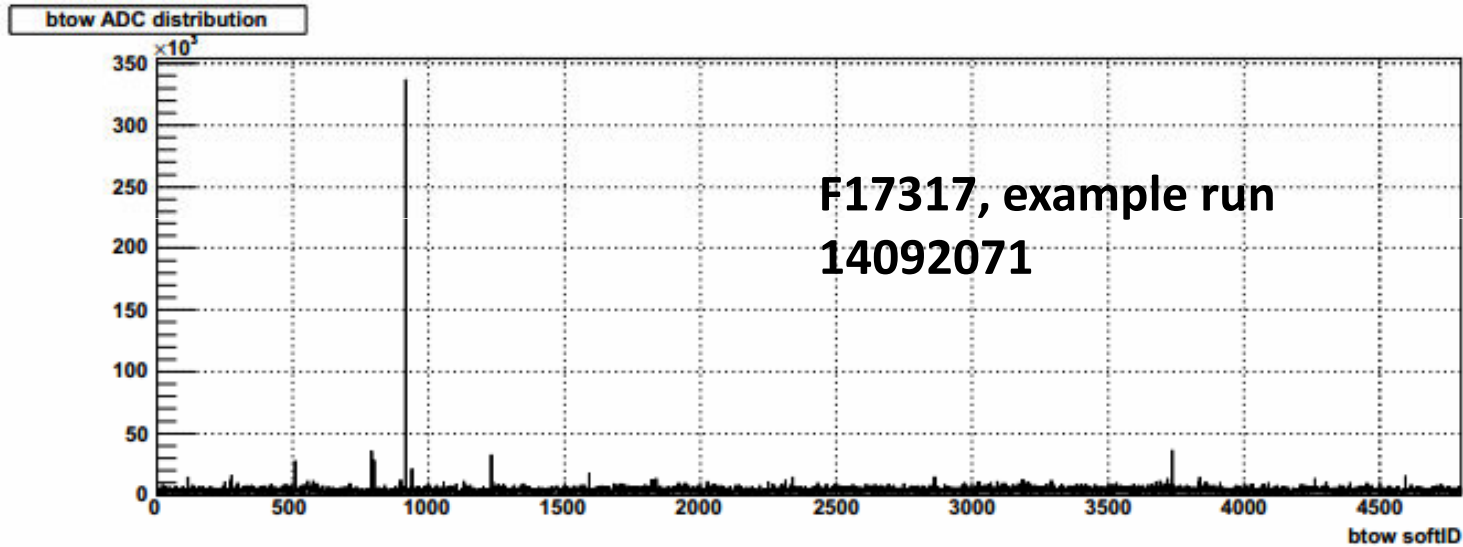
L2EW: 874 runs, 118.5 /pb
https://drupal.star.bnl.gov/STAR/system/files/goodlist_L2EW.csv_.txt

Backup

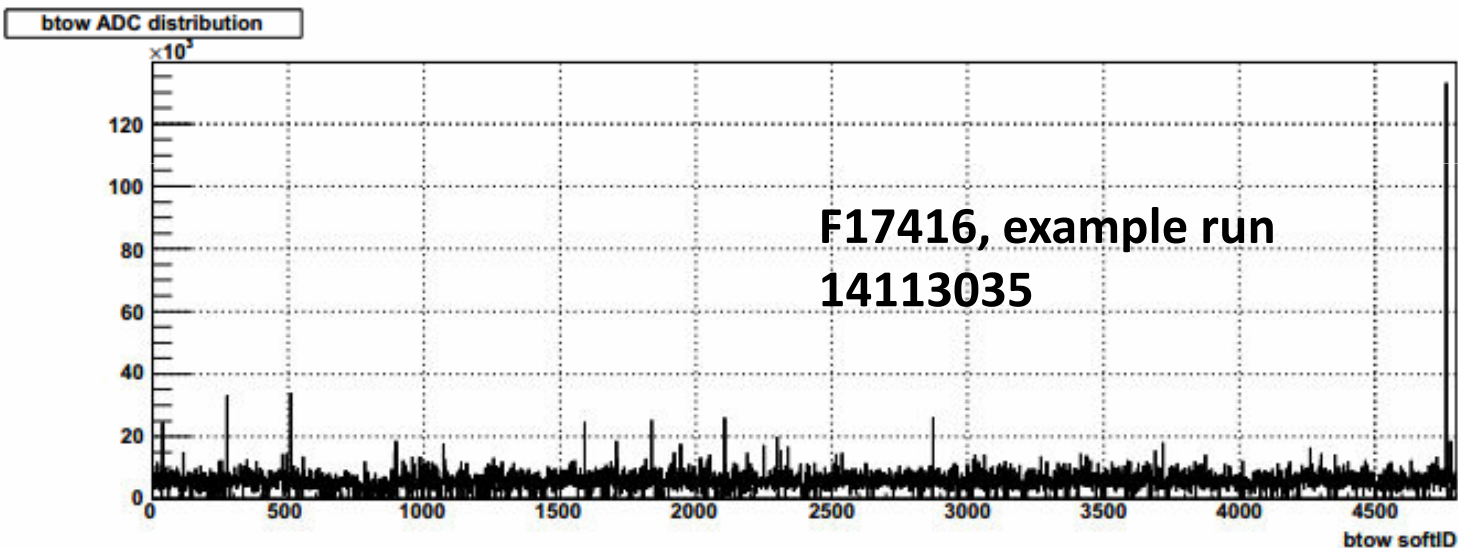
ZDC rate



Hot B tower

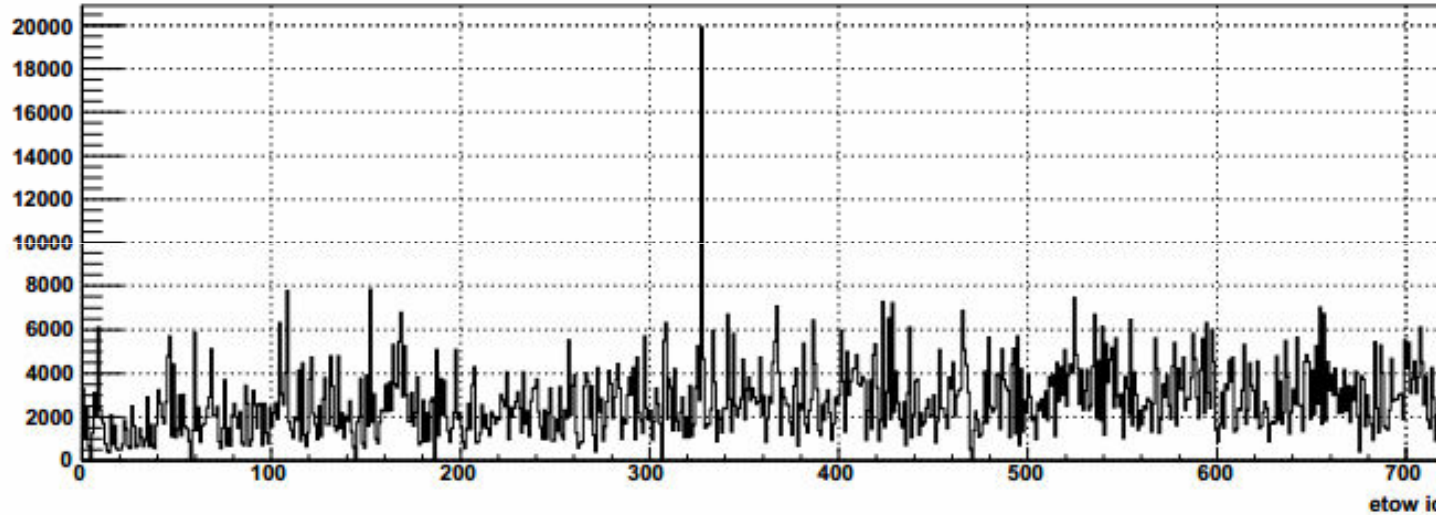


Fills with same “hot” tower :
**17317, 17341, 17359,
17367, 17394, 17406,
17408, 17423, 17434,
17453, 17466.**



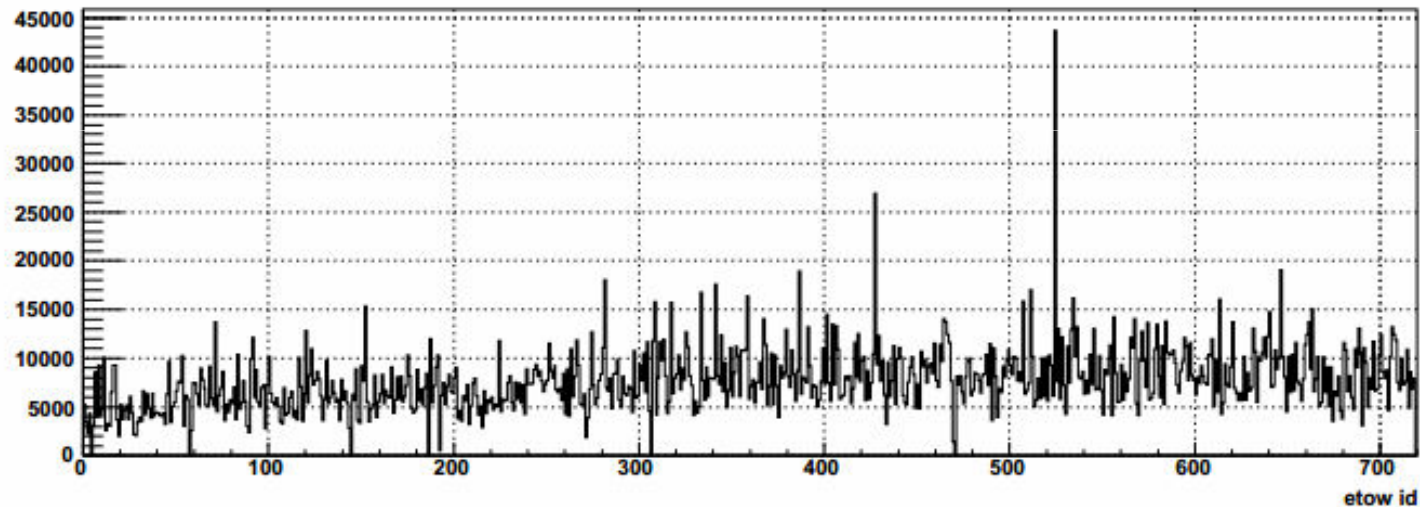
Hot Endcap tower

etow ADC distribuion



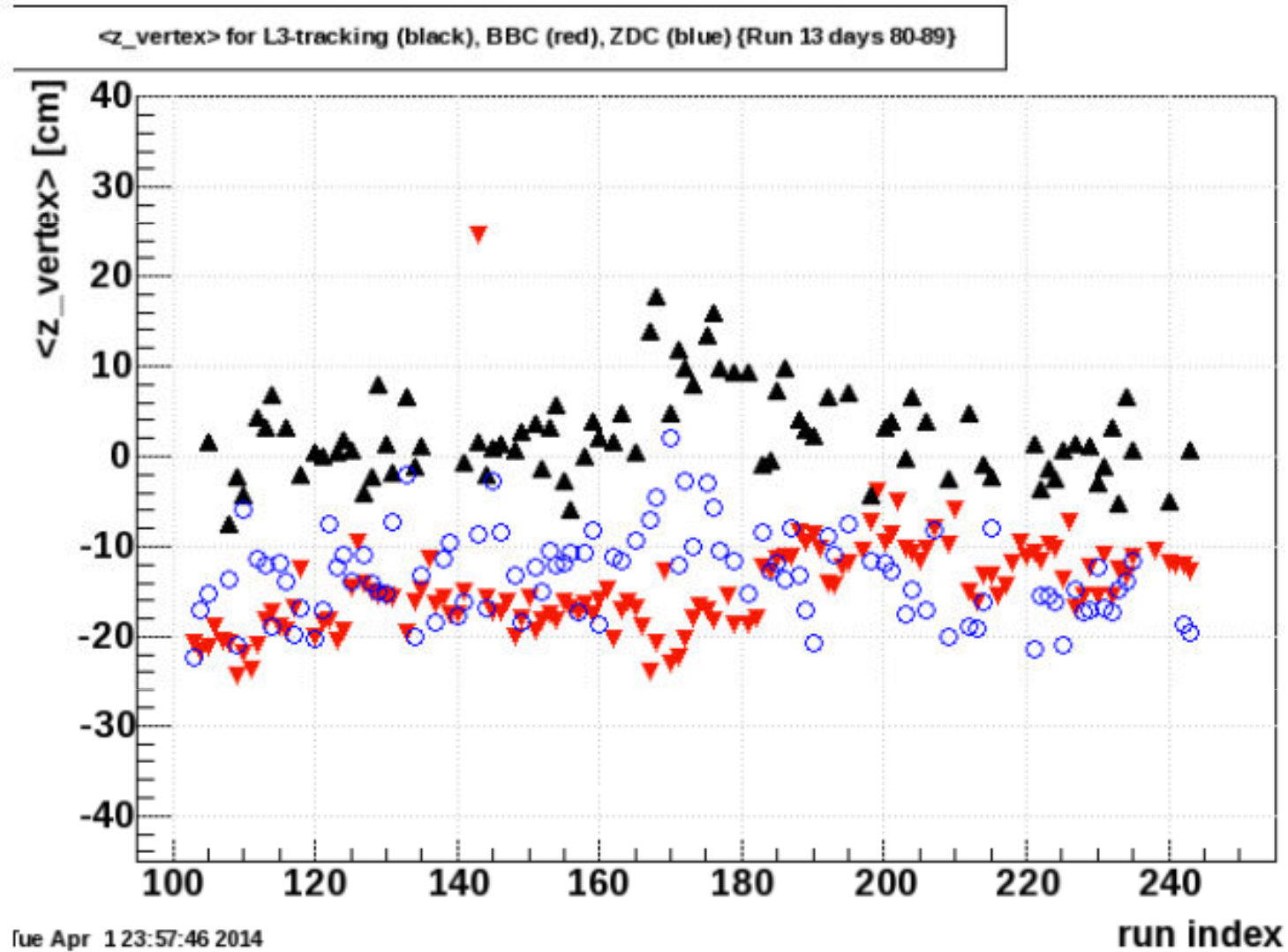
Hot tower from 14076005 to 14094024, Example run 14076005

etow ADC distribuion

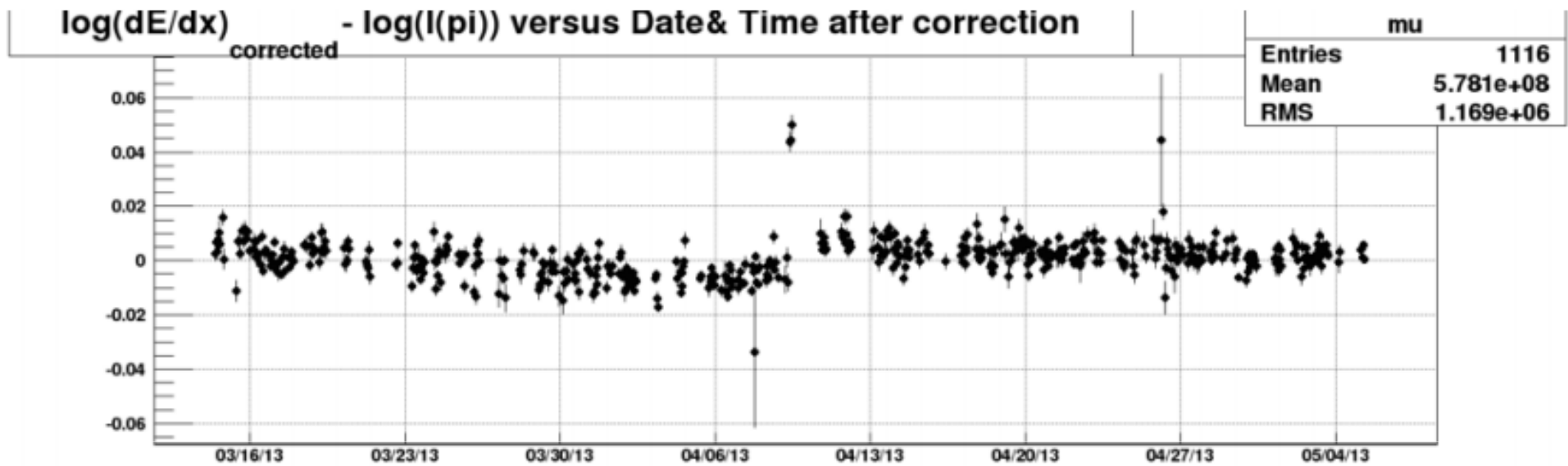


Hot tower from 14098027 to 14126015, Example run 14126015

backup



backup



Tue Apr 1 18:04:20 2014