MUDST QA

METHODOLOGY

- Take all the runs which are produced - 1010
- Consider all the st_WB and st_WE files of a given run
- Check trigger information for every event of every file

trigger L2BW	trigger L2EW
1	0
0	1
1	1

ex, R14097026
Total event : 10762
Total L2BW: Total L2EW:
1 0 : 9033
0 1 : 1681
1 1 : 48

- Plot observable for L2BW ==1 and L2EW ==1
- All the distribution shown in the plots are the Avg. values of each variables within ±3 sigma. (green line: mean, red lines: ±3 sigma)

MID & FORWARD RAPIDITY W TRIGGER

L2BW : Level 0

BHT3 threshold Et > 7.3 GeV

Level 2

seed tower Et > 5 GeV

2x2 cluster which include the seed tower Et > 12 GeV

L2EW : Level 0

EHT1 threshold Et > 7.3 GeV

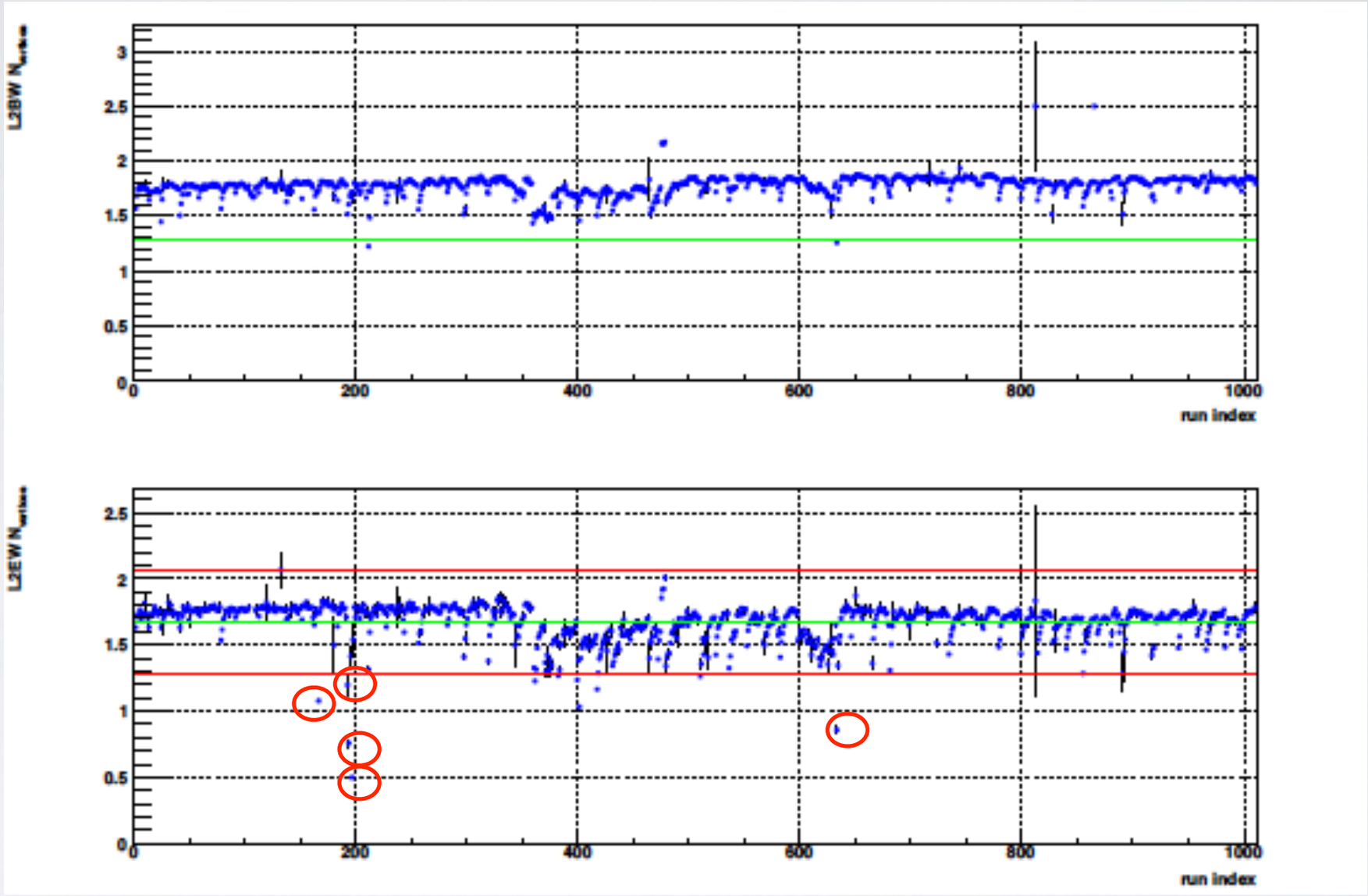
Level 2

single tower Et > 10 GeV

TPC VERTEX

Variable		L2BW=1	L2EW=1
Nvertices	all the primary vertices per event	vertex ranking > 0 |z| < 100 cm	vertex ranking > 0 |z| < 100 cm
vertex X	Avg of all the primary vertices per event	vertex ranking > 0 |z| < 100 cm	vertex ranking > 0 |z| < 100 cm
vertex Y	Avg of all the primary vertices per event	vertex ranking > 0 |z| < 100 cm	vertex ranking > 0 |z| < 100 cm
vertex Z	Avg of all the primary vertices per event	vertex ranking > 0 |z| < 100 cm	vertex ranking > 0 |z| < 100 cm

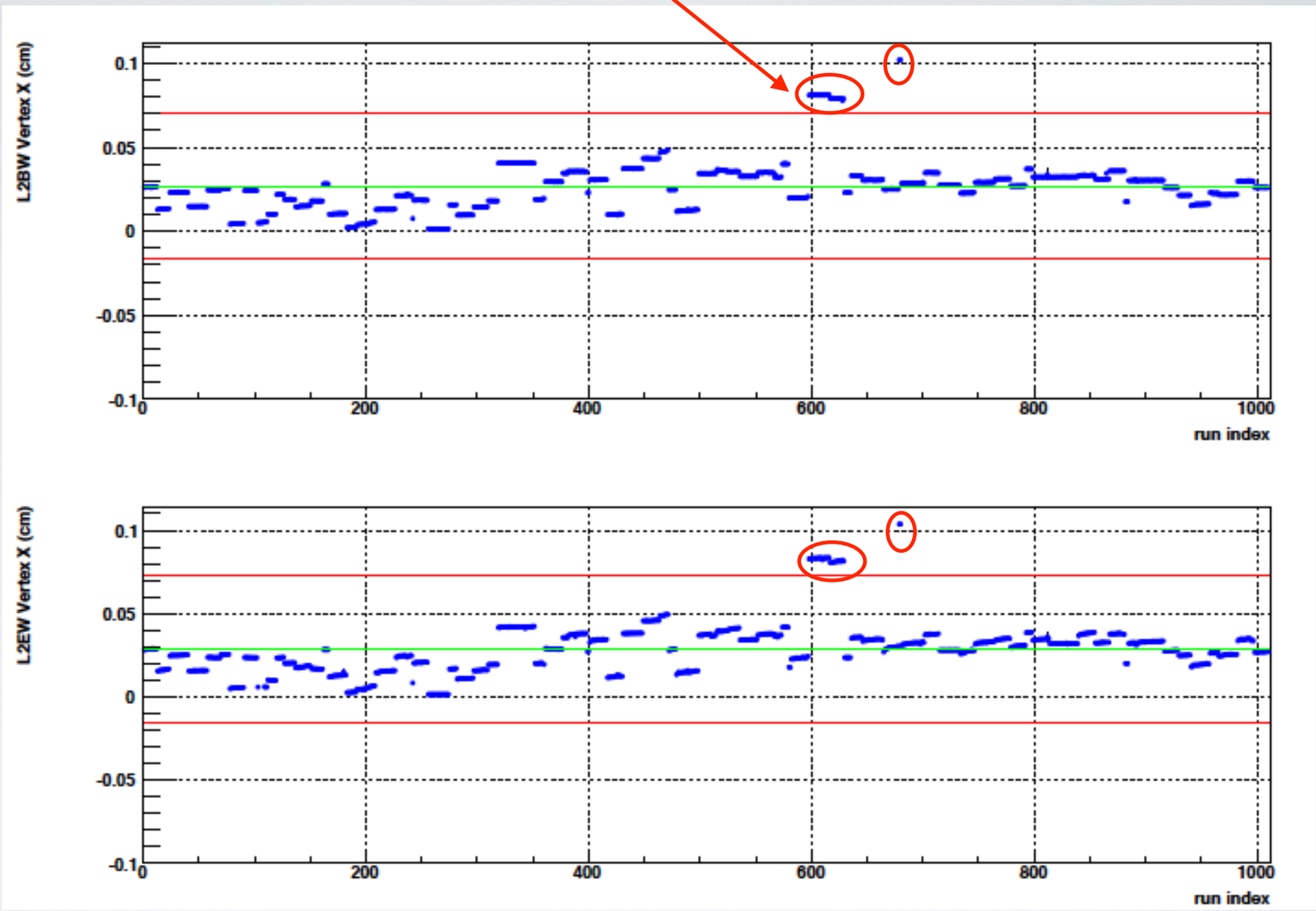
Nvertices



- **Avg. N vertices are in between 1.5-2 for both triggers**

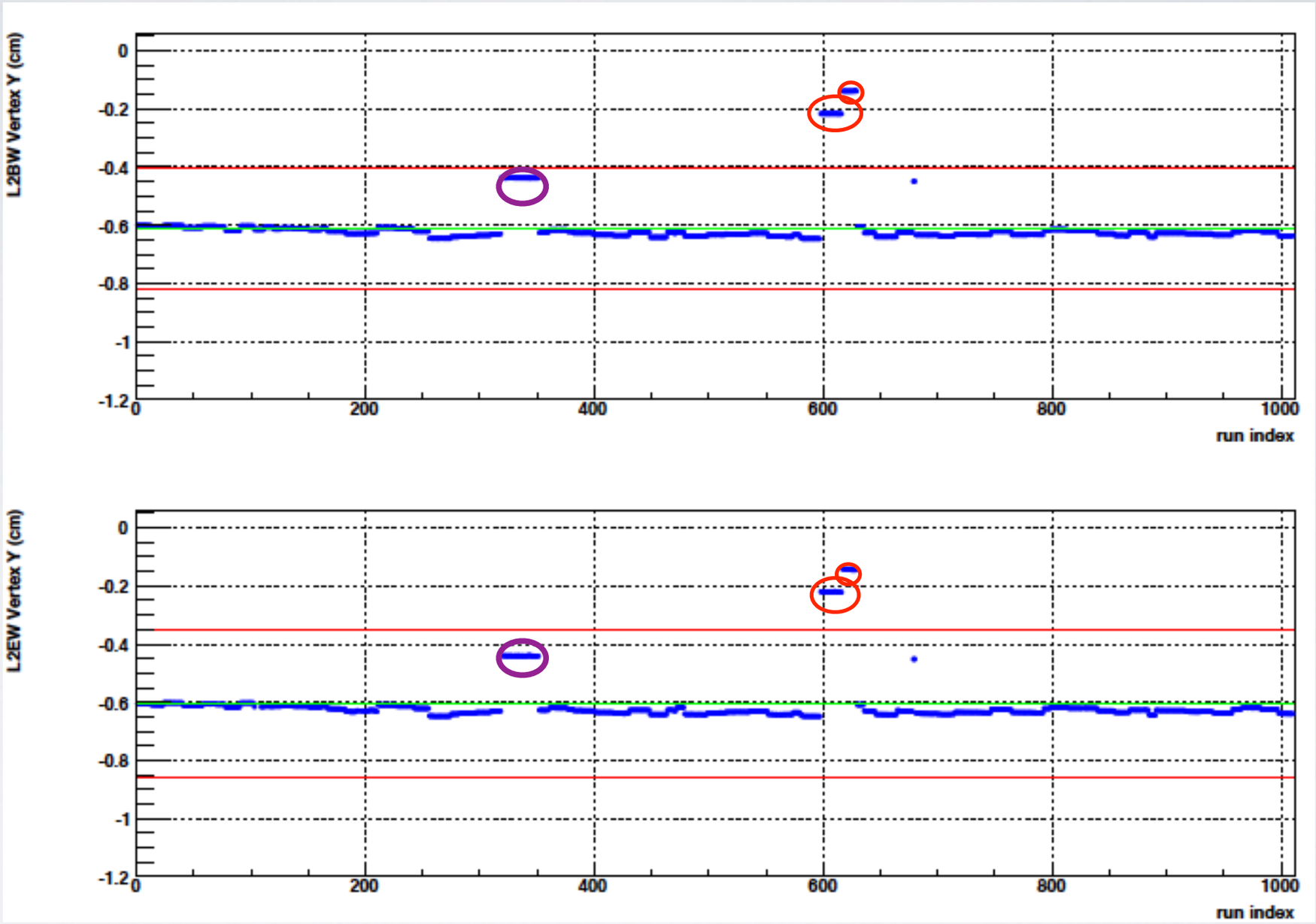
Vertex X

check if this belongs to the same fill??



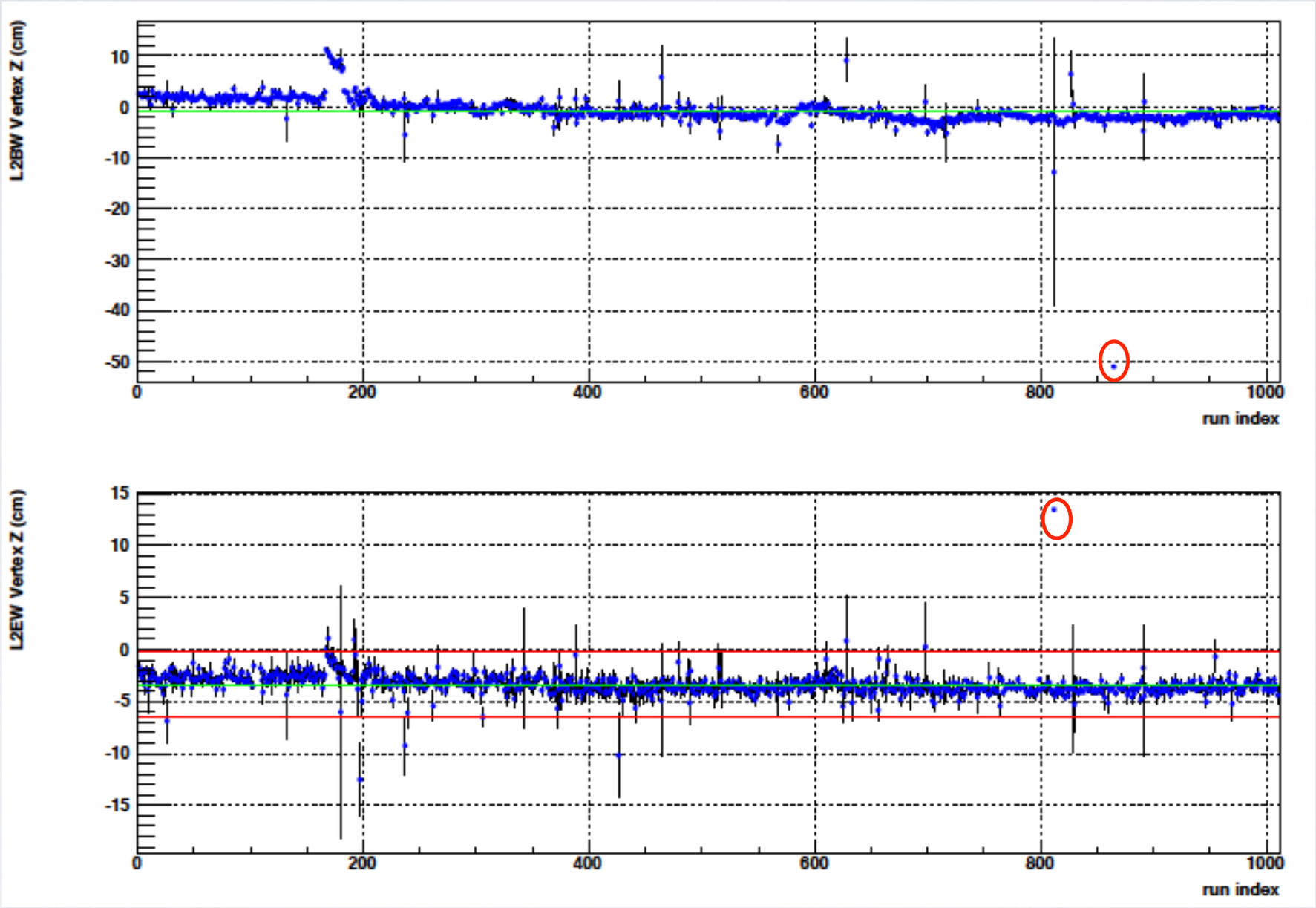
- **Avg. vertex X position of primary vertices is ~ 0.8 cm**

Vertex Y



- **Avg. vertex Y position of primary vertices is ~ 0.6 cm**

Vertex Z



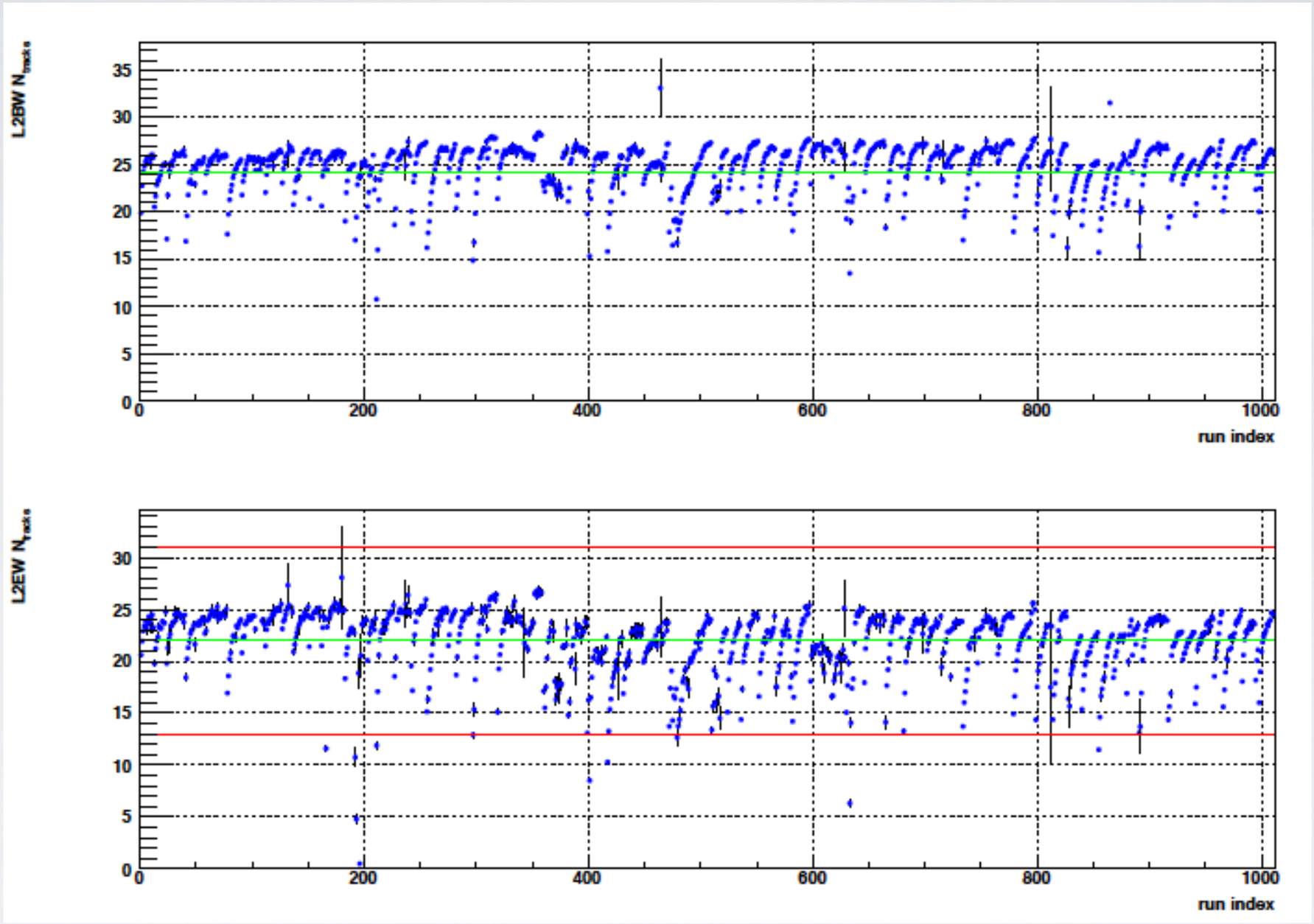
- **Avg. vertex Z position of primary vertices for L2BW is 0 as expected**
- **Avg. vertex Z position of primary vertices for L2EW is ~ -0.3 cm , why???????**

TPC VERTEX SUMMARY

TPC TRACKS

Variable		L2BW=1	L2EW=1
Ntracks	Avg of all the primary tracks per primary vertex per event	track flag : 301 or 311 track Pt >= 0.15 GeV nHitsFits > 15 nHitsFits/ nHitsPoss > 0.51	
Track Pt	Avg of all primary tracks Pt per vertex per event		
Track Max Pt	Avg of max. Pt per vertex per event		
Track Eta	Avg of all tracks η per vertex per event		
Track Phi	Avg of all tracks ϕ per vertex per event		
Track Chi2	Avg of all tracks Chi2 per vertex per event		
Track dE/dX	Avg of all tracks dE/dX *1e6 per vertex per event		

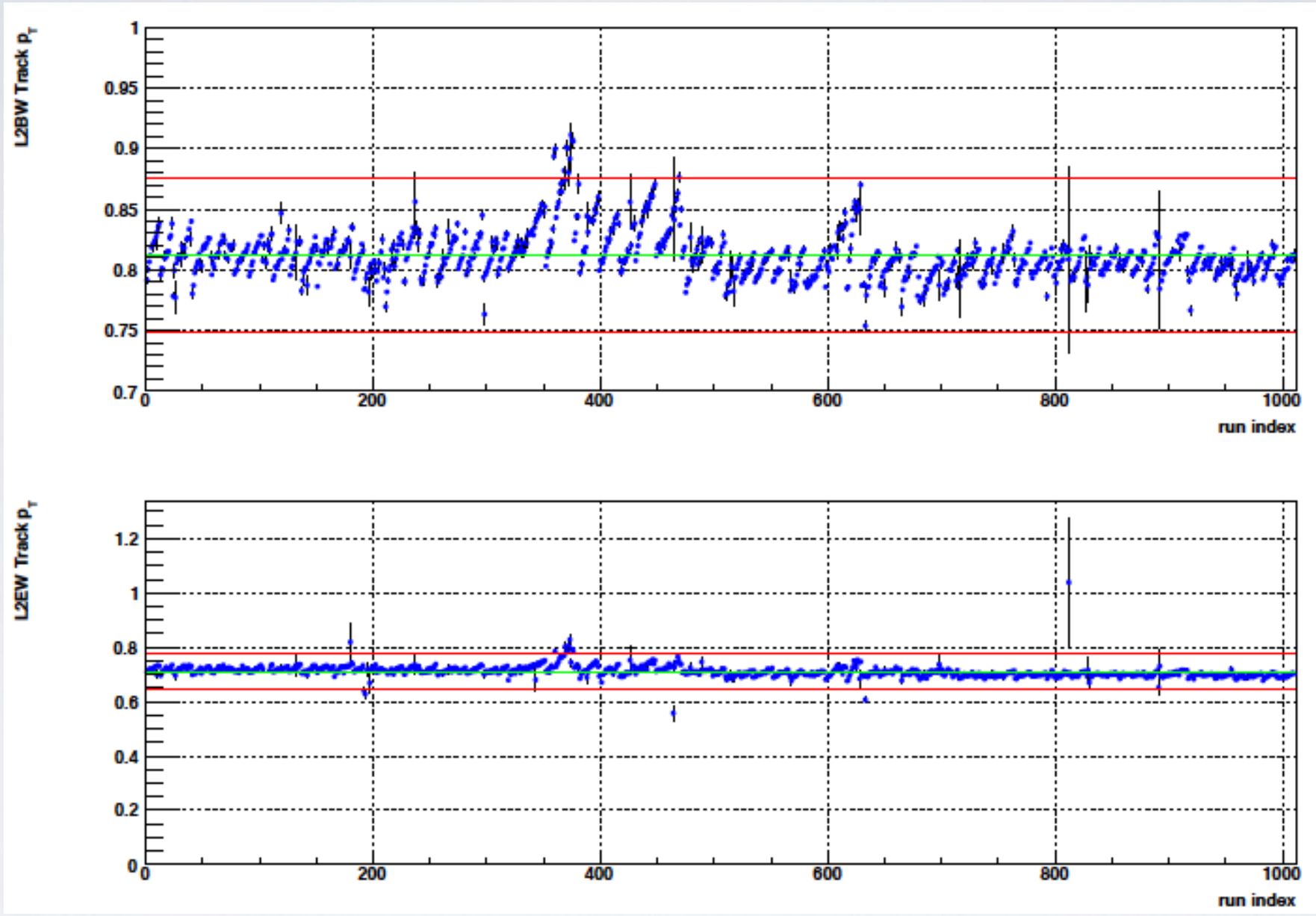
N tracks



- **Avg. N primary tracks for L2BW ~24**
- **Avg. N primary tracks for L2EW ~22**

EVen though actual values should have larger difference but avg values are close.

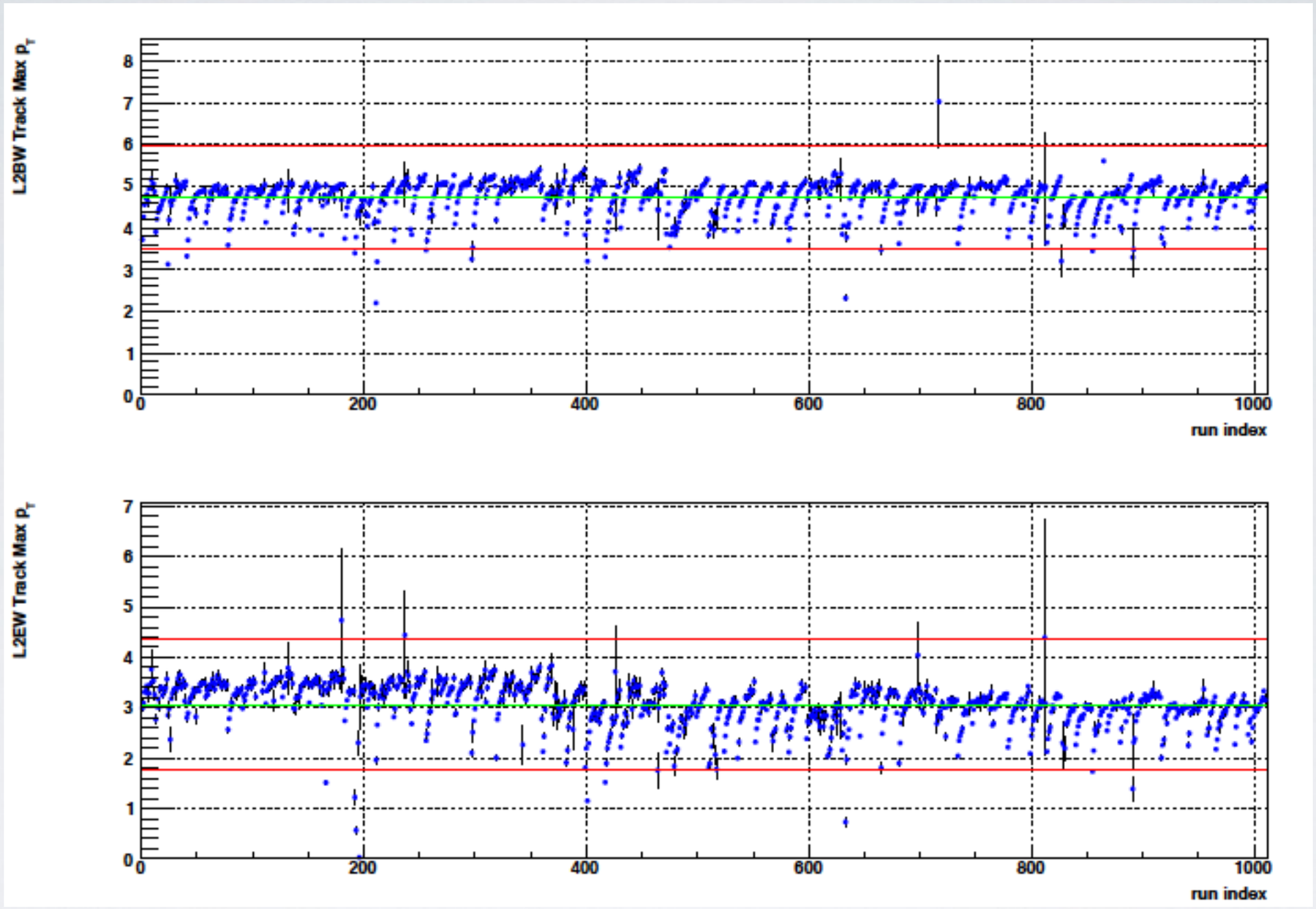
Track Pt



- **Avg. tracks Pt for L2BW ~0.8 GeV**
- **Avg. tracks Pt for L2BW ~0.7 GeV**

due to very Low Pt minimum cut (.15 GeV) avg values are smaller

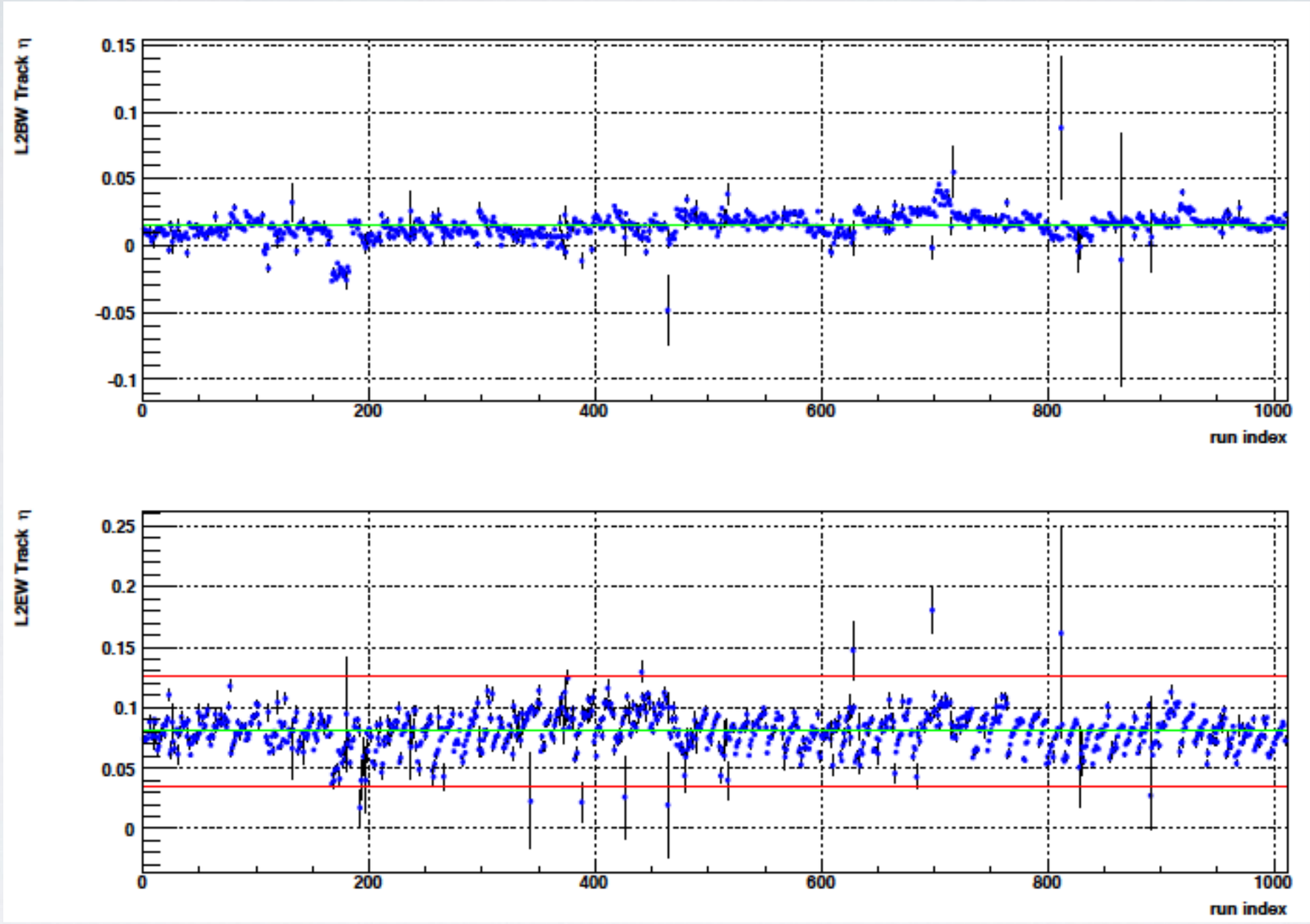
Track MaxPt



- **Avg. tracks MaxPt for L2BW ~5 GeV**
- **Avg. tracks MaxPt for L2EW ~3 GeV**

due to high Pt W events are low in multiplicity, embedded in large pile up avg. Max Pt values are smaller

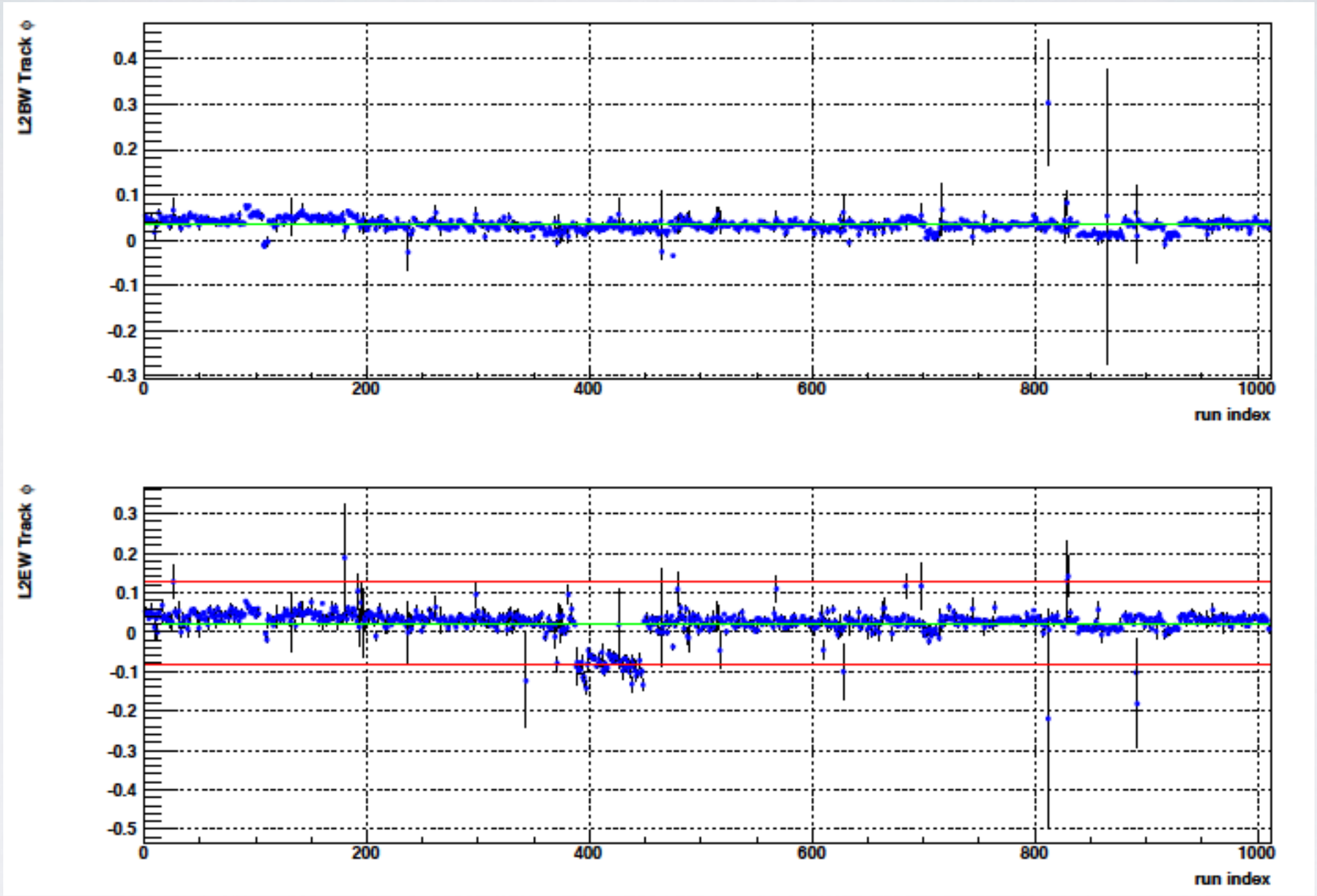
Track Eta



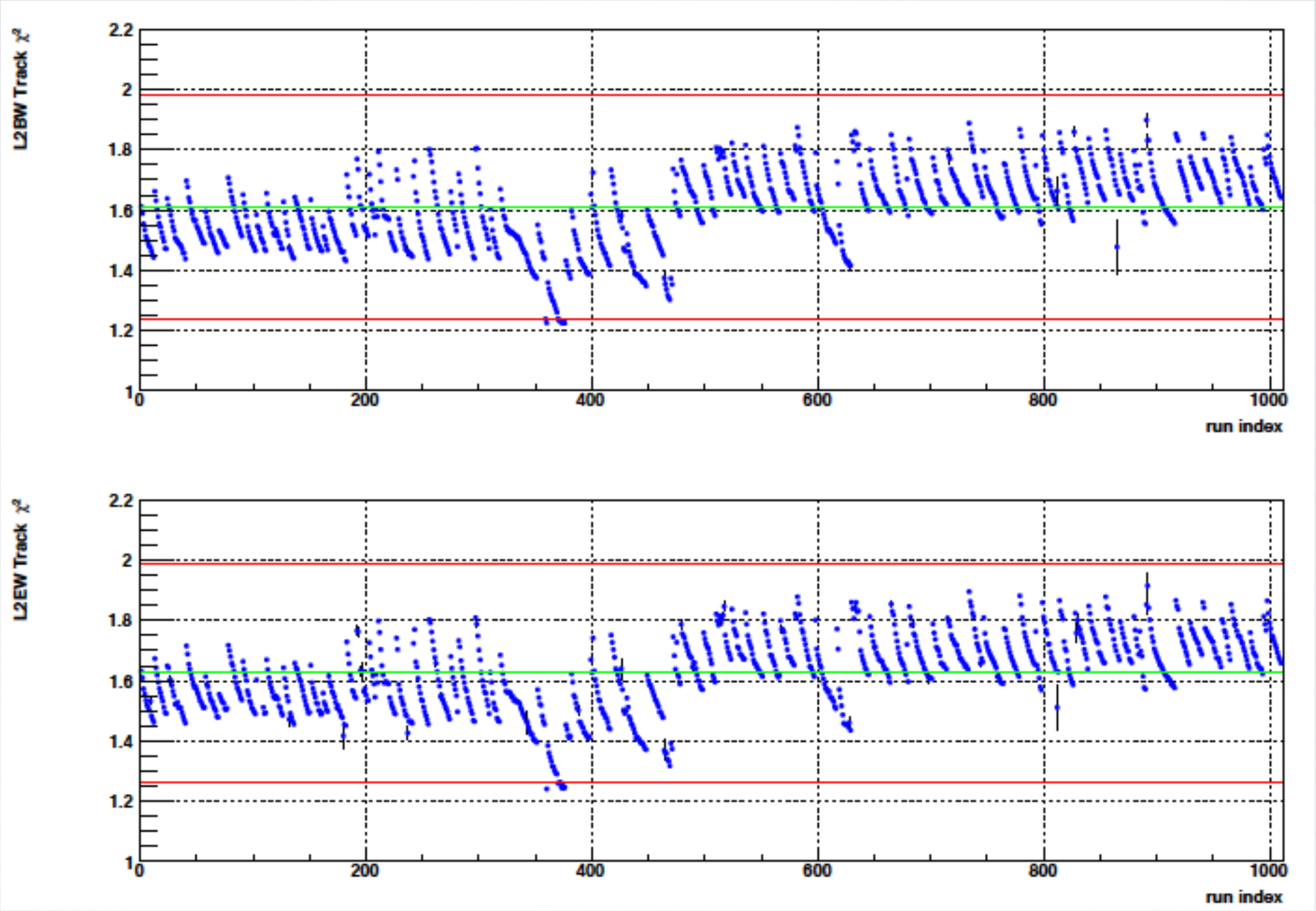
- **Avg. tracks Eta for L2BW ~0**
- **Avg. tracks Eta for L2EW ~0.8**

Why for L2EW it is not between 1- 1.4 : W are low multiplicity events

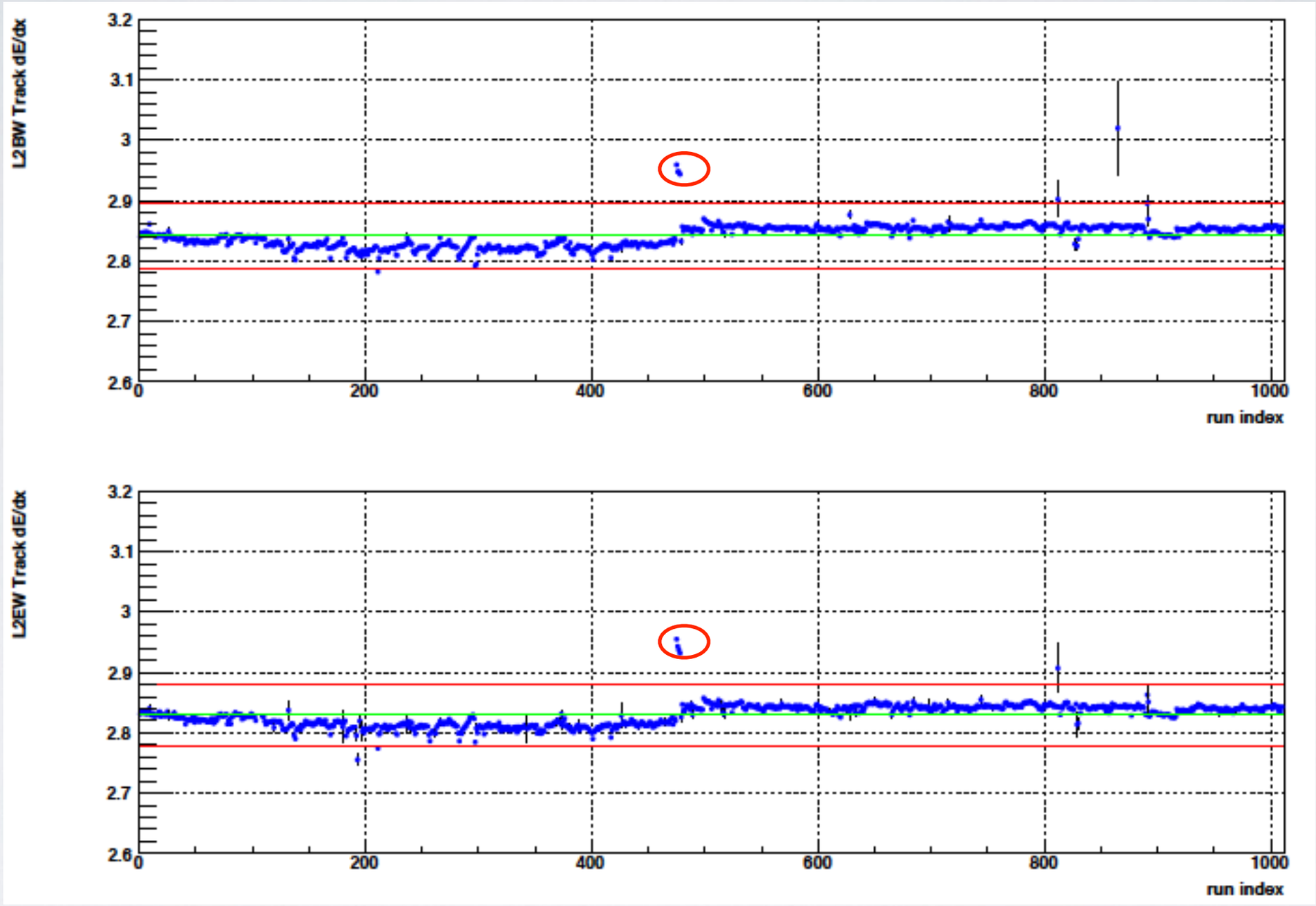
Track Phi


L2BW Track φ
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
0
200
400
600
800
1000
run index
L2EW Track φ
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
0
200
400
600
800
1000
run index

Track Chi2


L2BW Track χ²
2.2
2
1.8
1.6
1.4
1.2
1
0
200
400
600
800
1000
run index
L2EW Track χ²
2.2
2
1.8
1.6
1.4
1.2
1
0
200
400
600
800
1000
run index

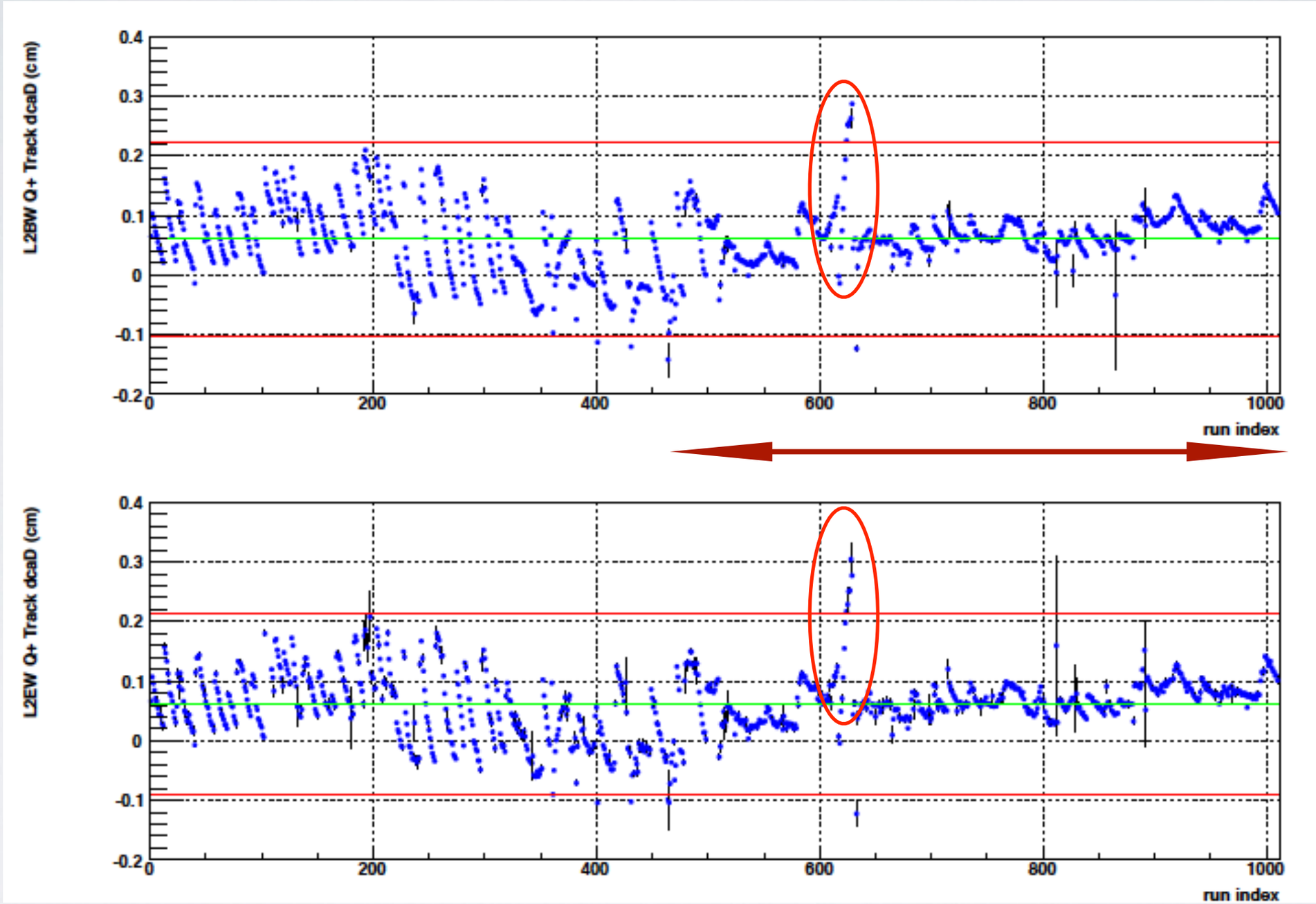
Track dE/dX


L2BW Track dE/dx
3.2
3.1
3
2.9
2.8
2.7
2.6
0
200
400
600
800
1000
run index
L2EW Track dE/dx
3.2
3.1
3
2.9
2.8
2.7
2.6
0
200
400
600
800
1000
run index

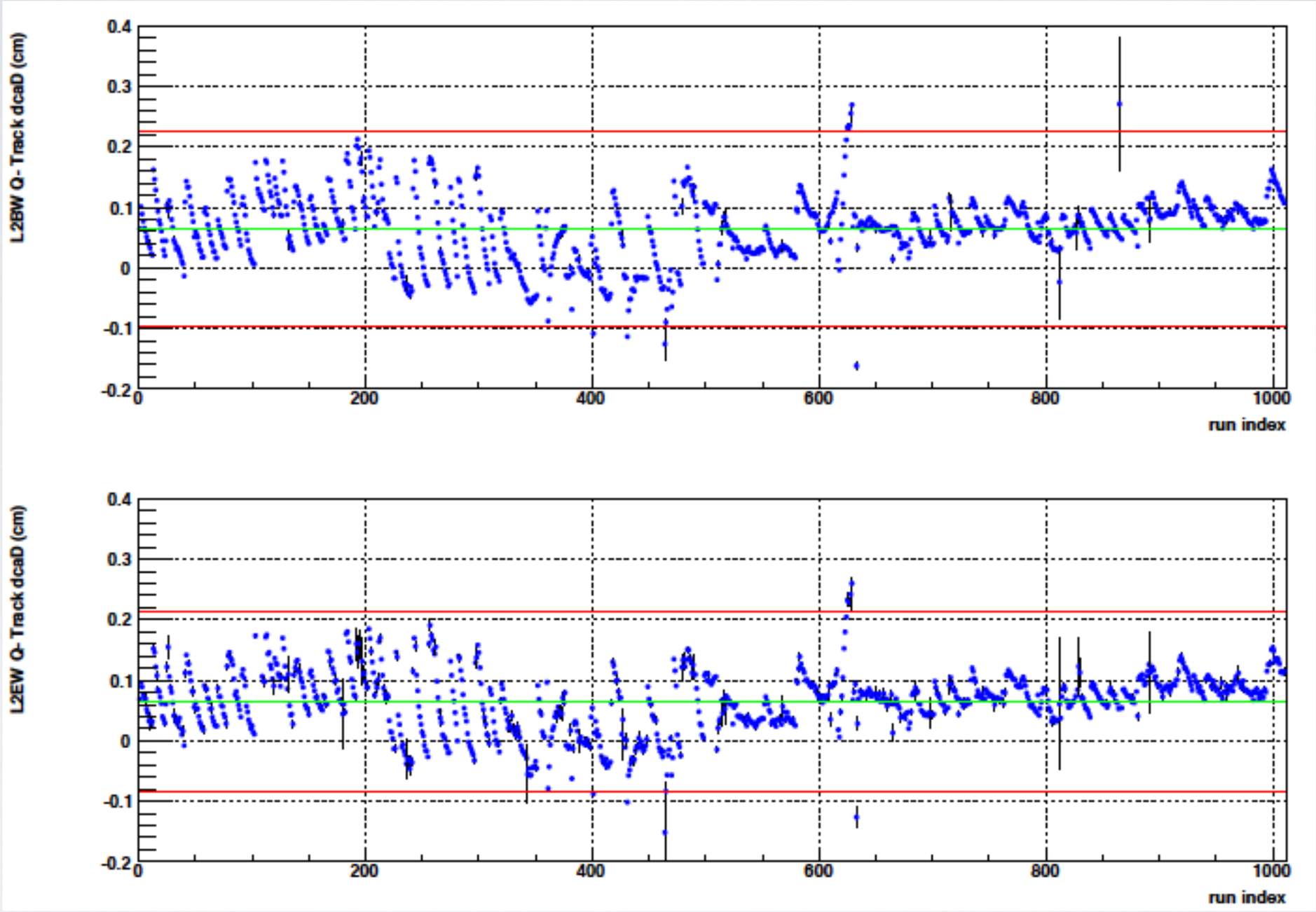
TPC DCA

Variable		L2BW=1	L2EW=1
Positive Track dca D (signed dca component)	Avg of signed DCA component of all the primary vertices per event	Charge > 0	
Positive Track dca X	Avg of DCA X of all the primary vertices per event		
Positive Track dca Y	Avg of DCA Y of all the primary vertices per event		
Negative Track dca D	Avg of signed DCA component of all the primary vertices per event	Charge < 0	
Negative Track dca X	Avg of DCA X of all the primary vertices per event		
Negative Track dca Y	Avg of DCA Y of all the primary vertices per event		

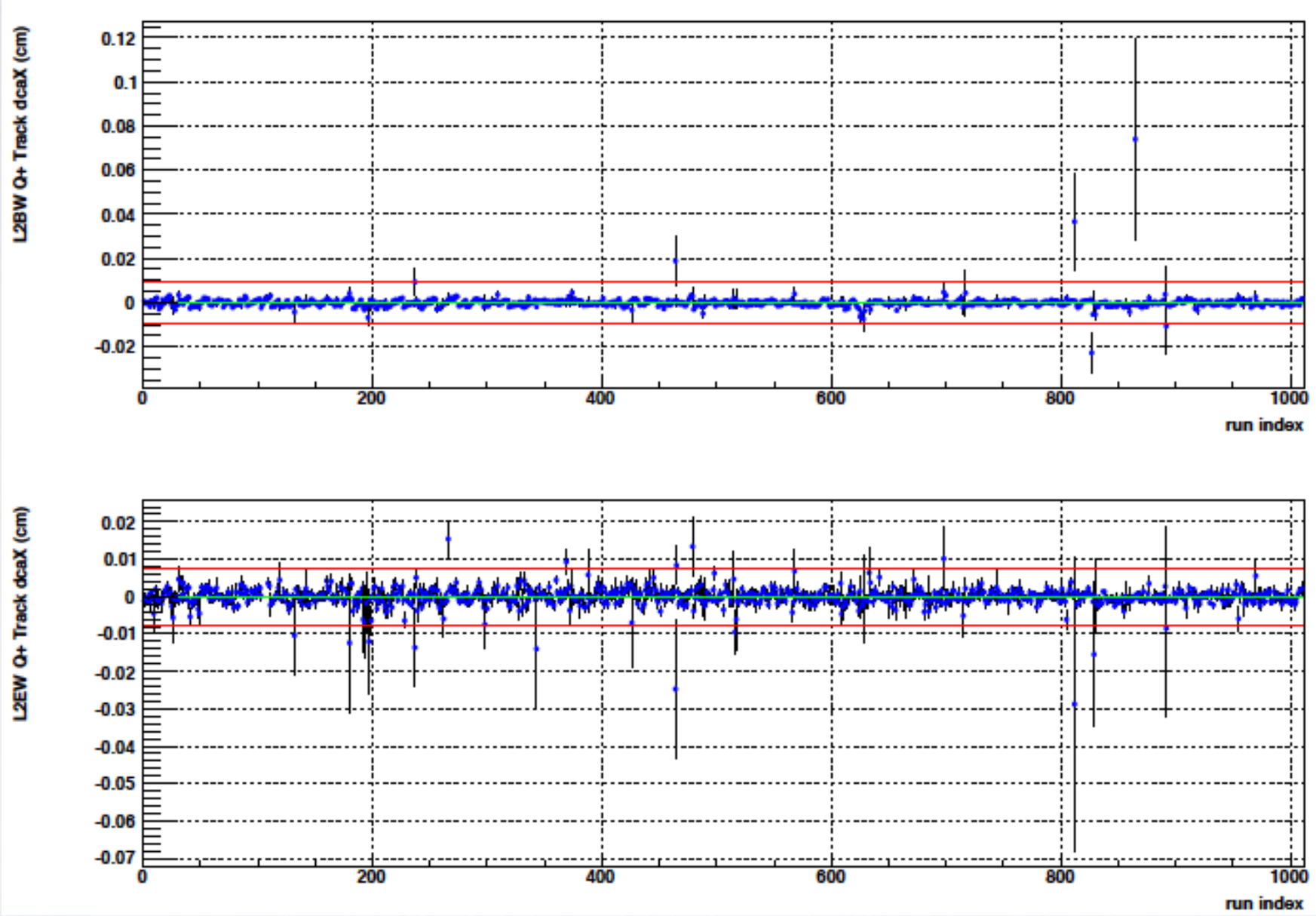
Positive Track DCA D



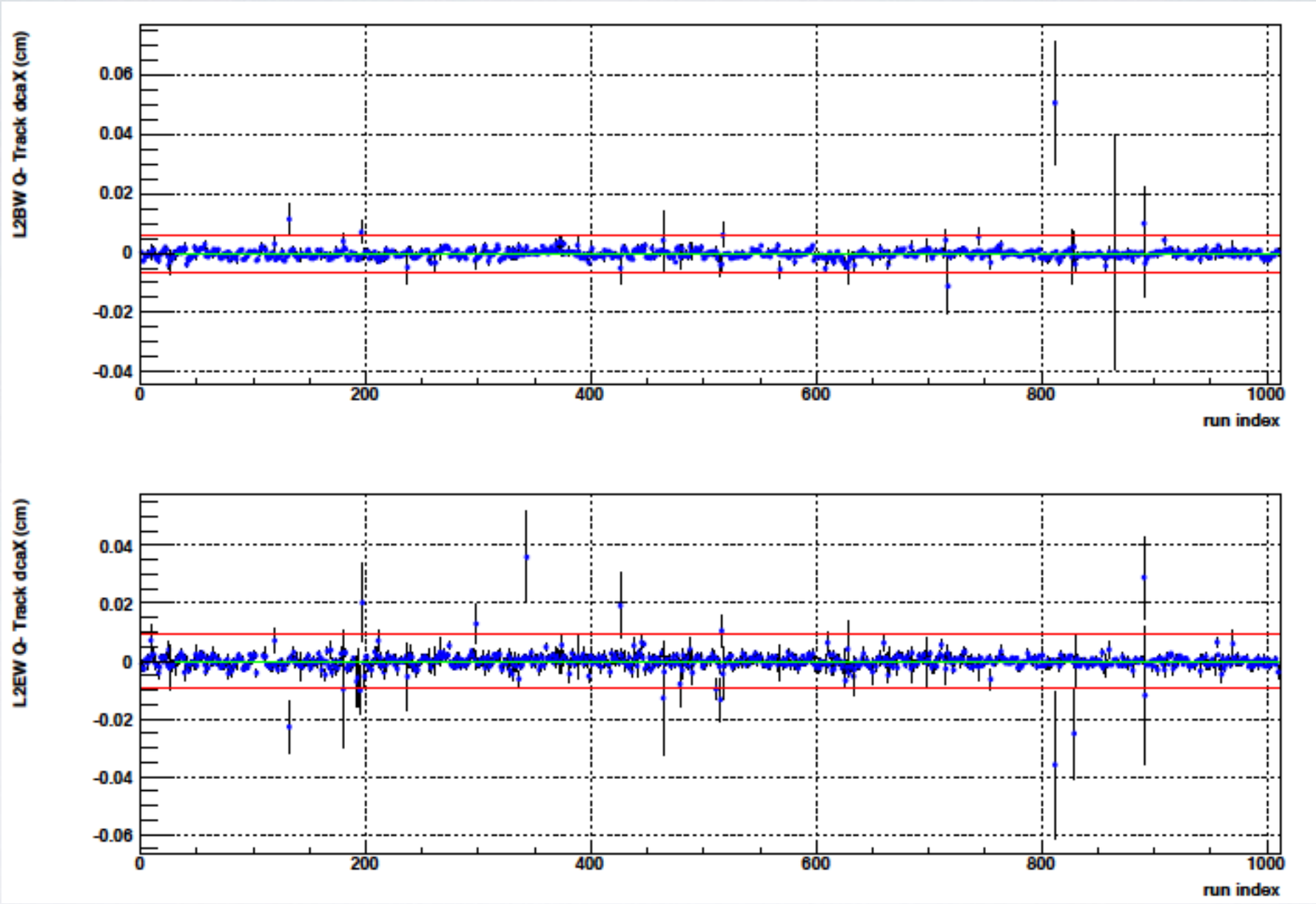
Negative Track DCA D



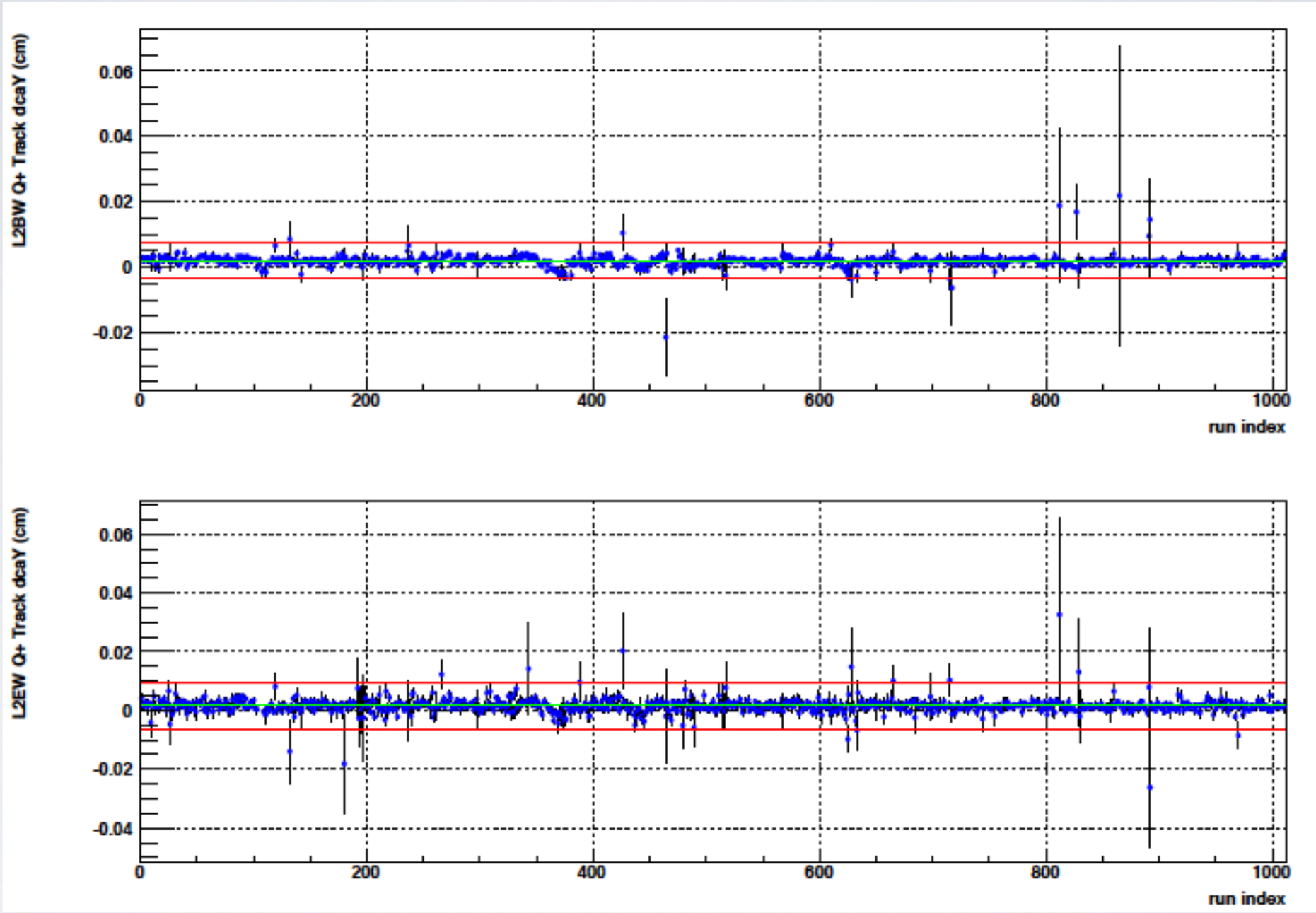
Positive Track DCA X



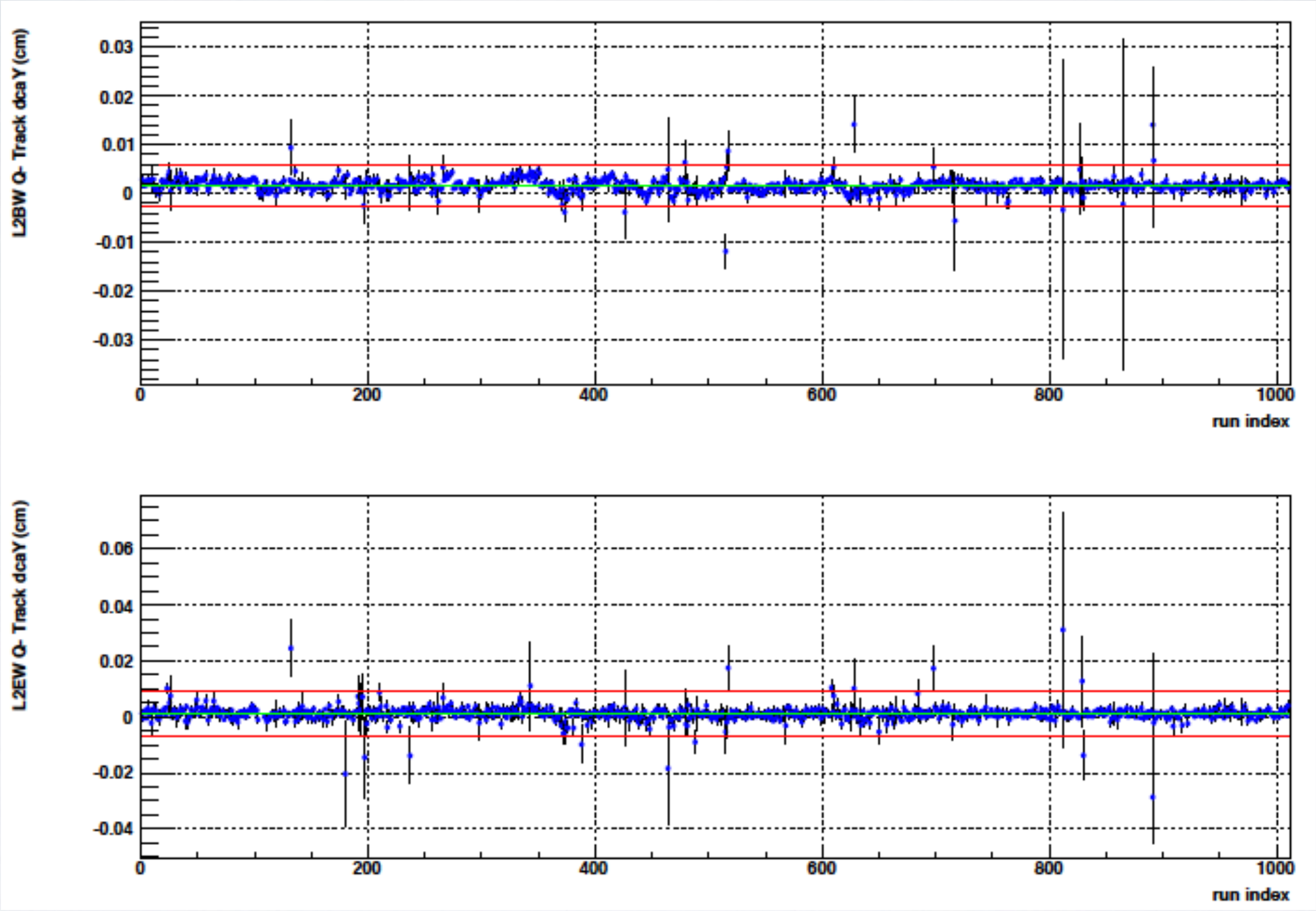
Negative Track DCA X



Positive Track DCA X



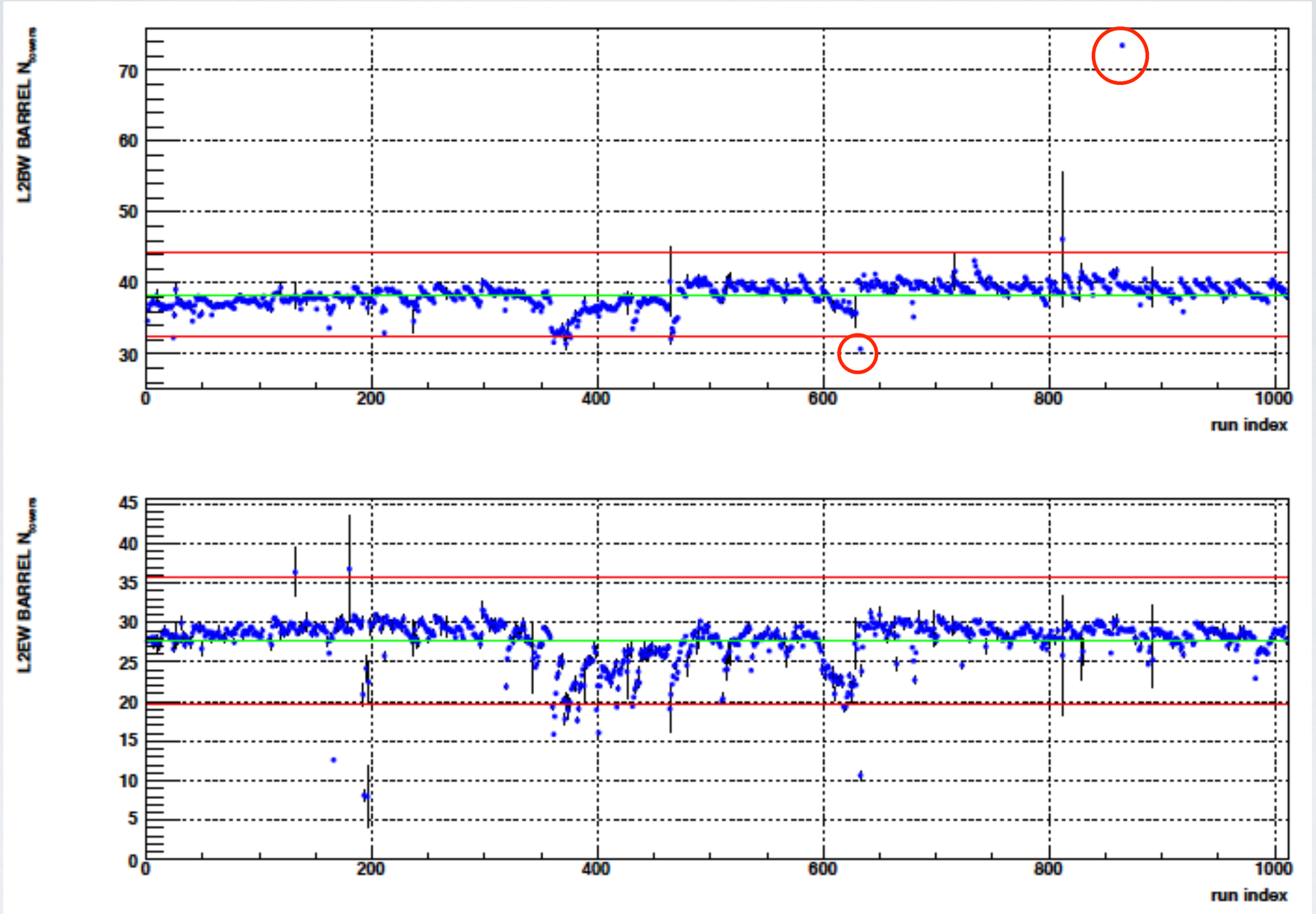
Negative Track DCA Y



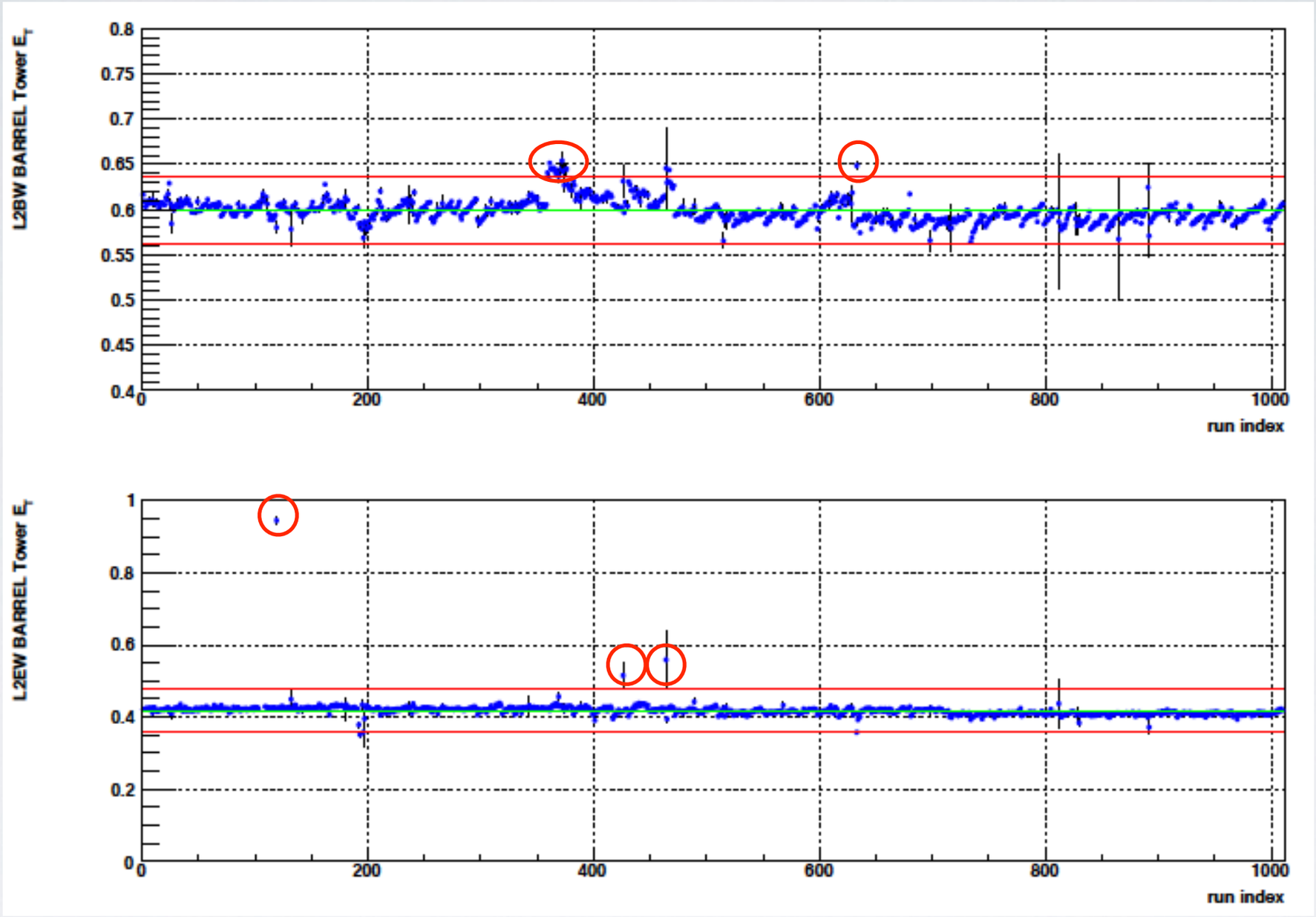
BTOW

Variable		L2BW=1	L2EW=1
Ntowers	Avg. of all rawHits if Et > 0.15 per module (120) per tower ID per event	• Et > 0.15 GeV (Et = (rawHit/cosh(tower_eta))) • pedestal > 0 • adc-pedestal > 2*rms • status ==1	
Tower Et	Avg of rawHit (Et) per module of every tower per event		
Tower Max Et	Avg of Max rawHit per module per tower per event		
Tower Eta	Avg of all rawHits Eta per module per tower per event		
Tower Phi	Avg of all rawHits Phi per module per tower per event		

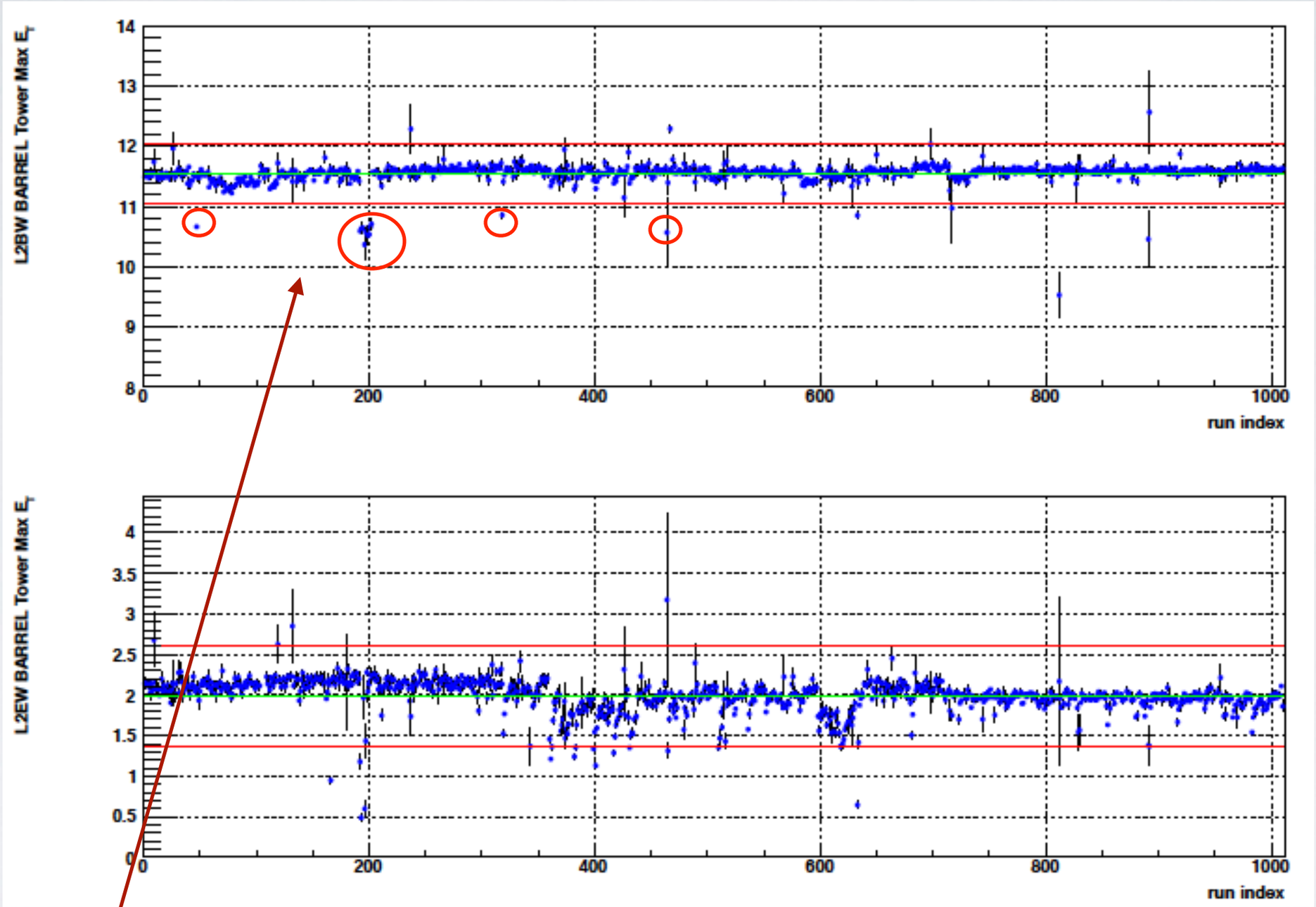
N Towers


L2BW BARREL N_towers
70
60
50
40
30
0
200
400
600
800
1000
run index
L2EW BARREL N_towers
45
40
35
30
25
20
15
10
5
0
0
200
400
600
800
1000
run index

Tower Et

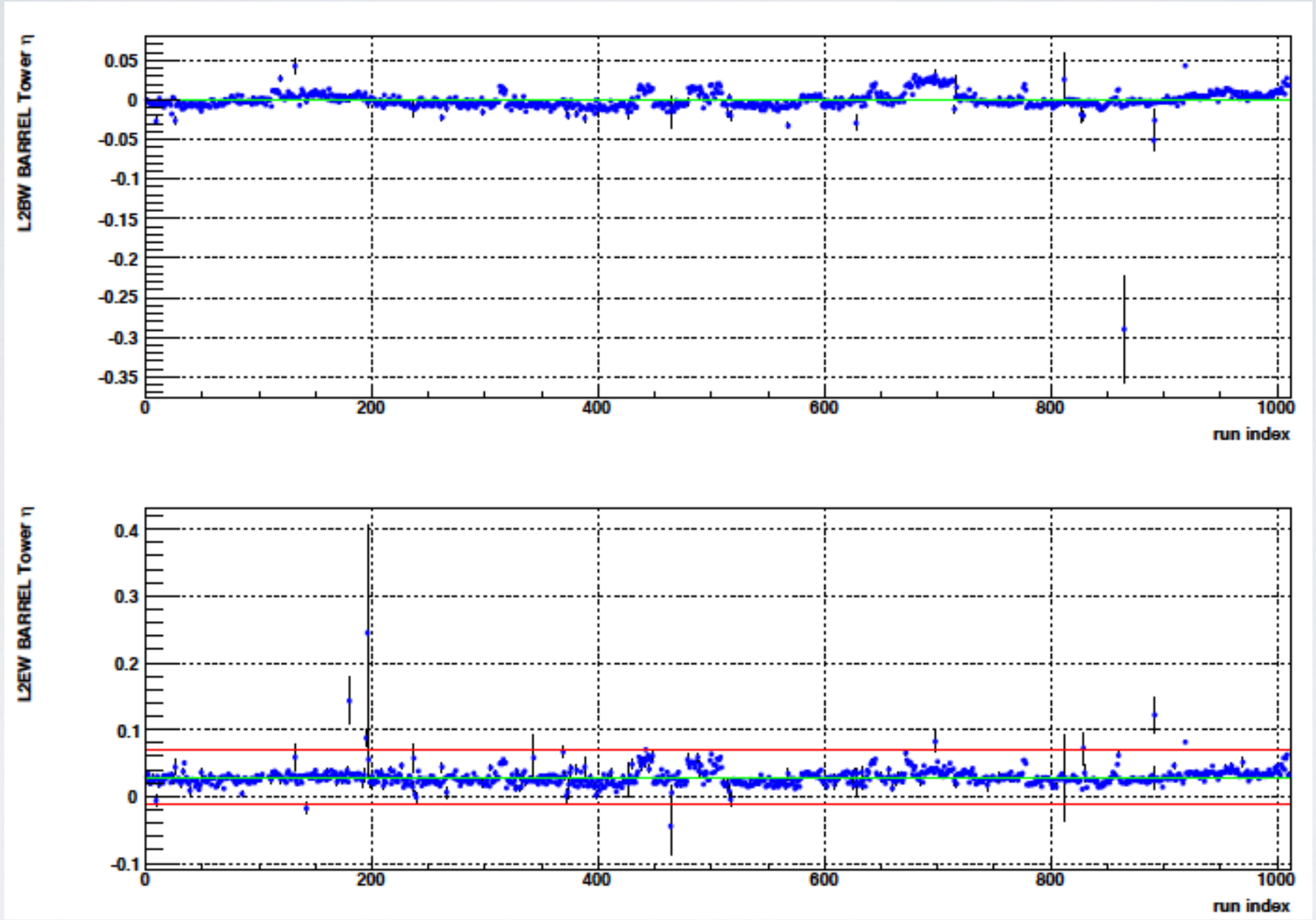

L2BW BARREL Tower E_T
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0
200
400
600
800
1000
run index
L2EW BARREL Tower E_T
1
0.8
0.6
0.4
0.2
0
0
200
400
600
800
1000
run index

Tower Max Et

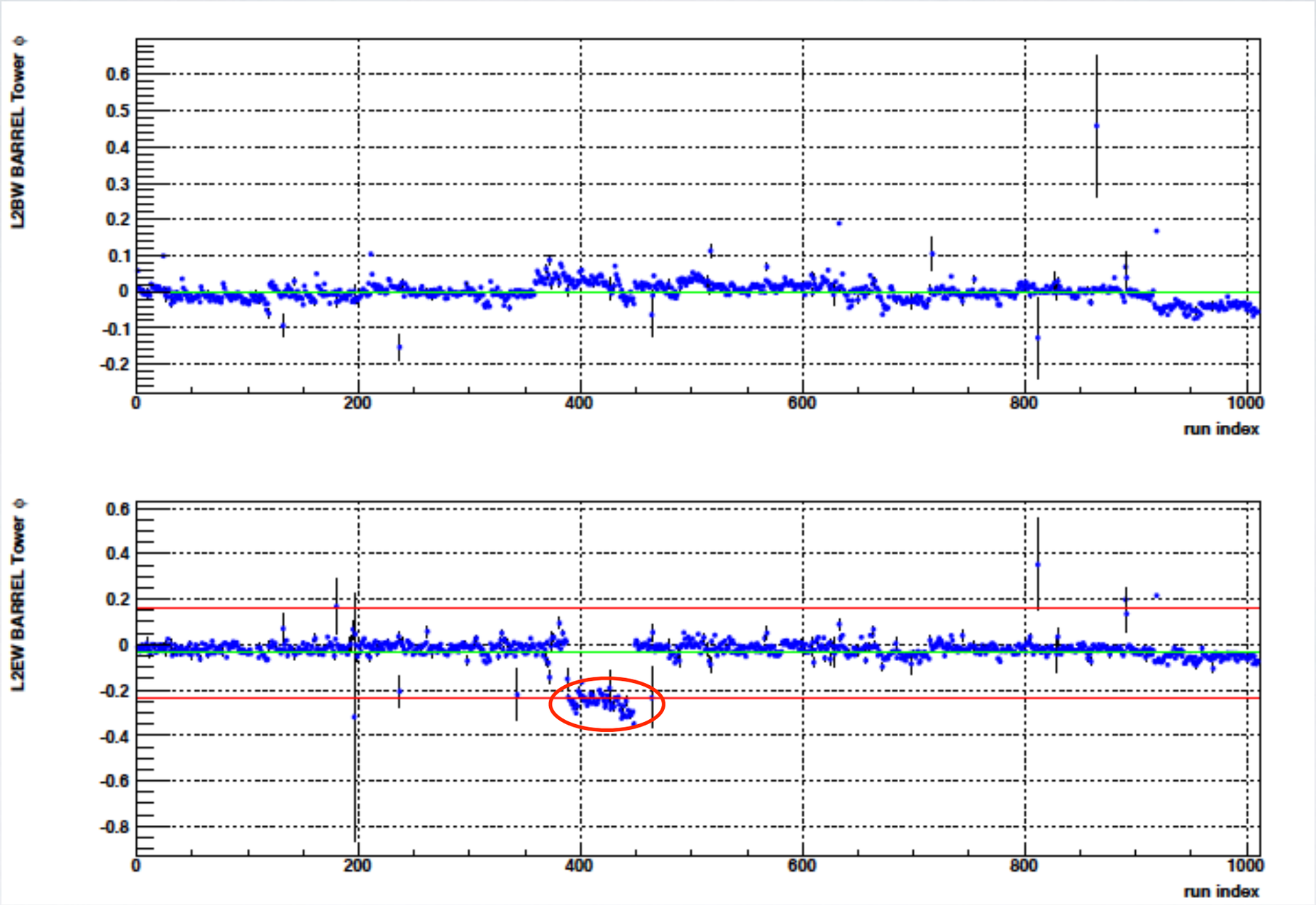


one fill : F17293

Tower Eta


L2BW BARREL Tower η
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
0
200
400
600
800
1000
run index
L2EW BARREL Tower η
0.4
0.3
0.2
0.1
0
-0.1
0
200
400
600
800
1000
run index

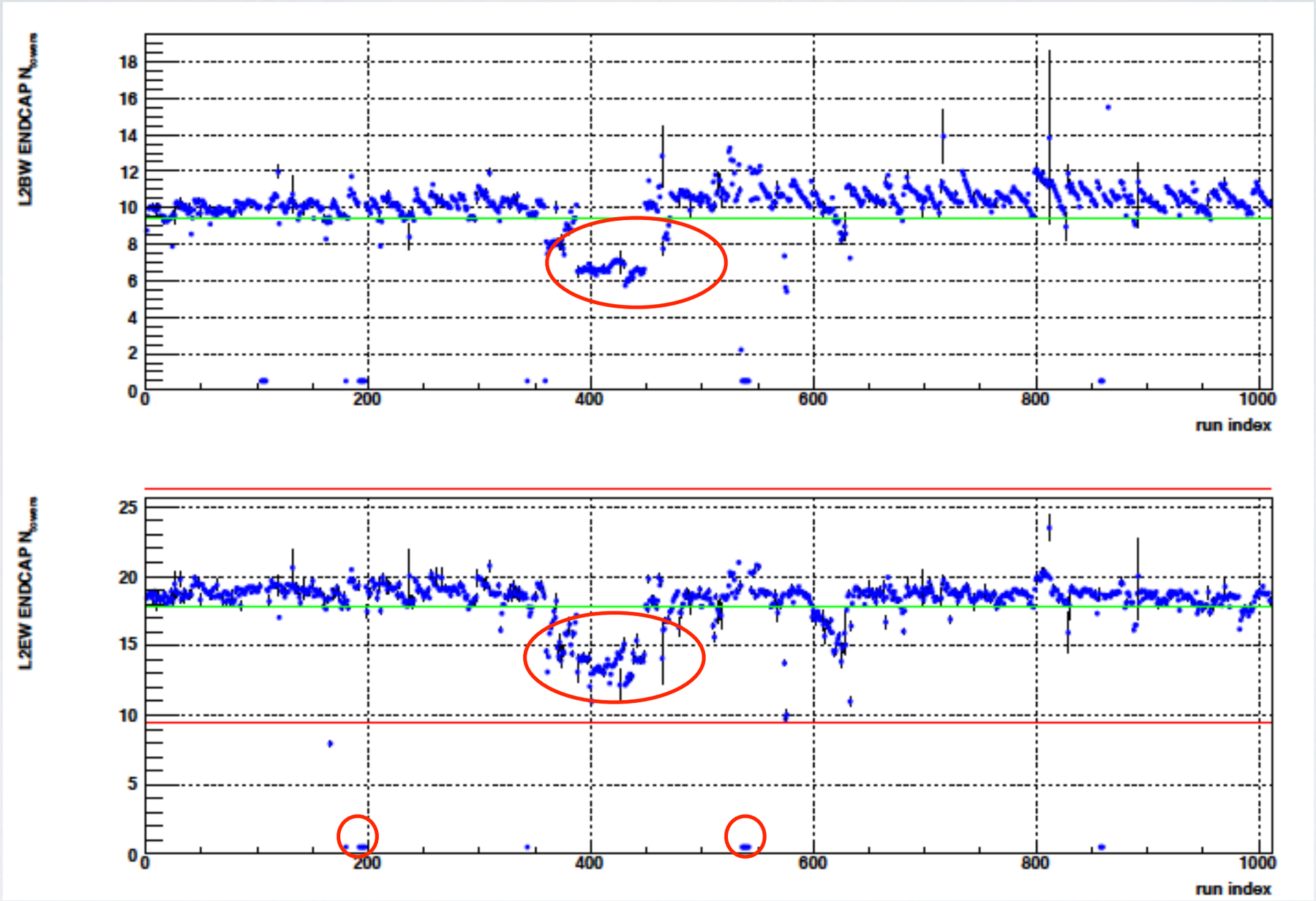
Tower Phi


L2BW BARREL Tower φ
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
0
200
400
600
800
1000
run index
L2EW BARREL Tower φ
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
0
200
400
600
800
1000
run index

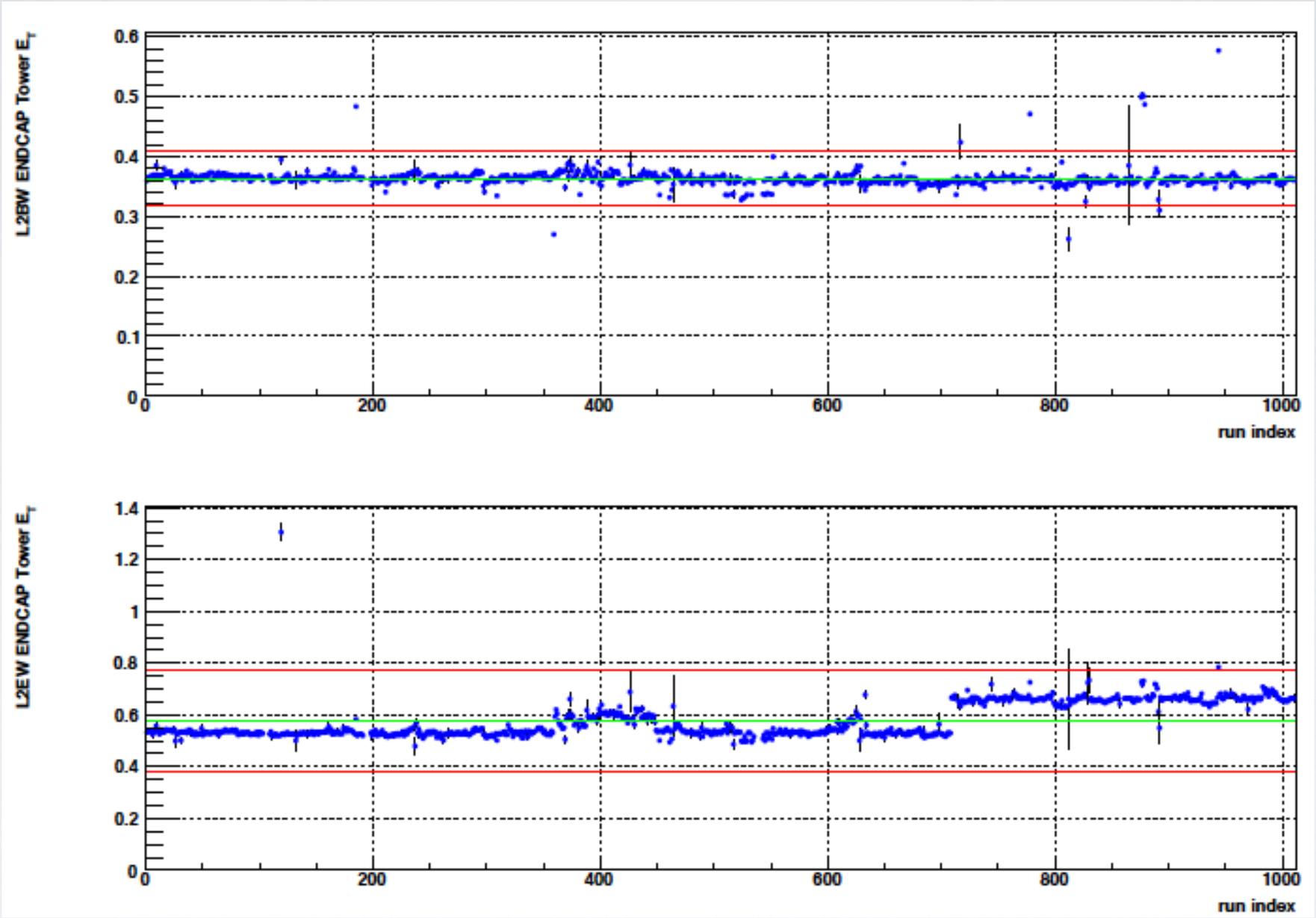
ETOW

Variable		L2BW=1	L2EW=1
Ntowers	Avg of N towers with tower ADC > 0.15 per event	Et > 0.15 GeV ADC > etow Threshold gain > 0	
Tower Et	Avg of tower ADC Et = (adc -ped +0.5) / etow Gain		
Tower Max Pt			
Tower Eta			
Tower Phi			

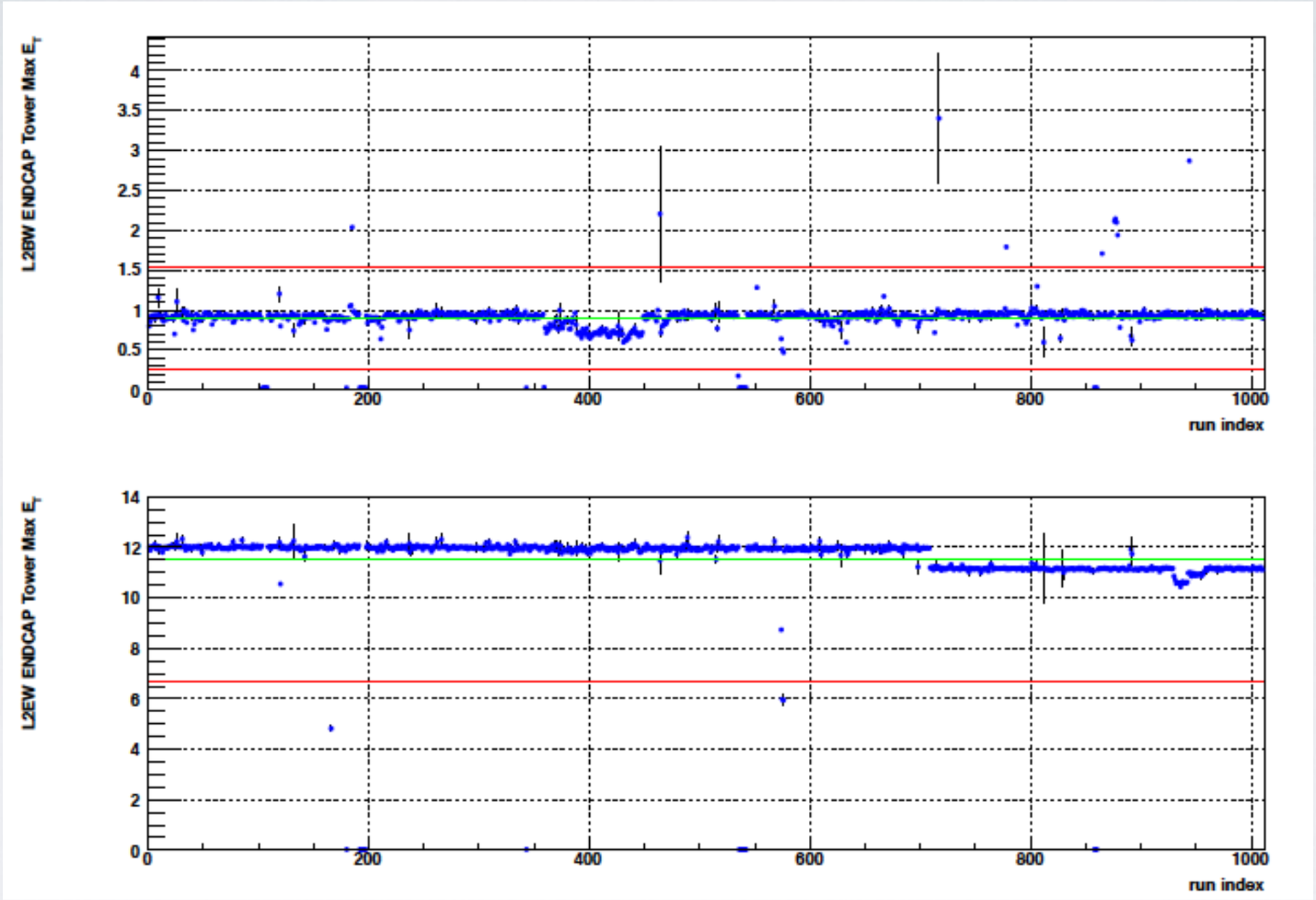
N Towers


L2BW ENDCAP N_towers
18
16
14
12
10
8
6
4
2
0
0
200
400
600
800
1000
run index
L2EW ENDCAP N_towers
25
20
15
10
5
0
0
200
400
600
800
1000
run index

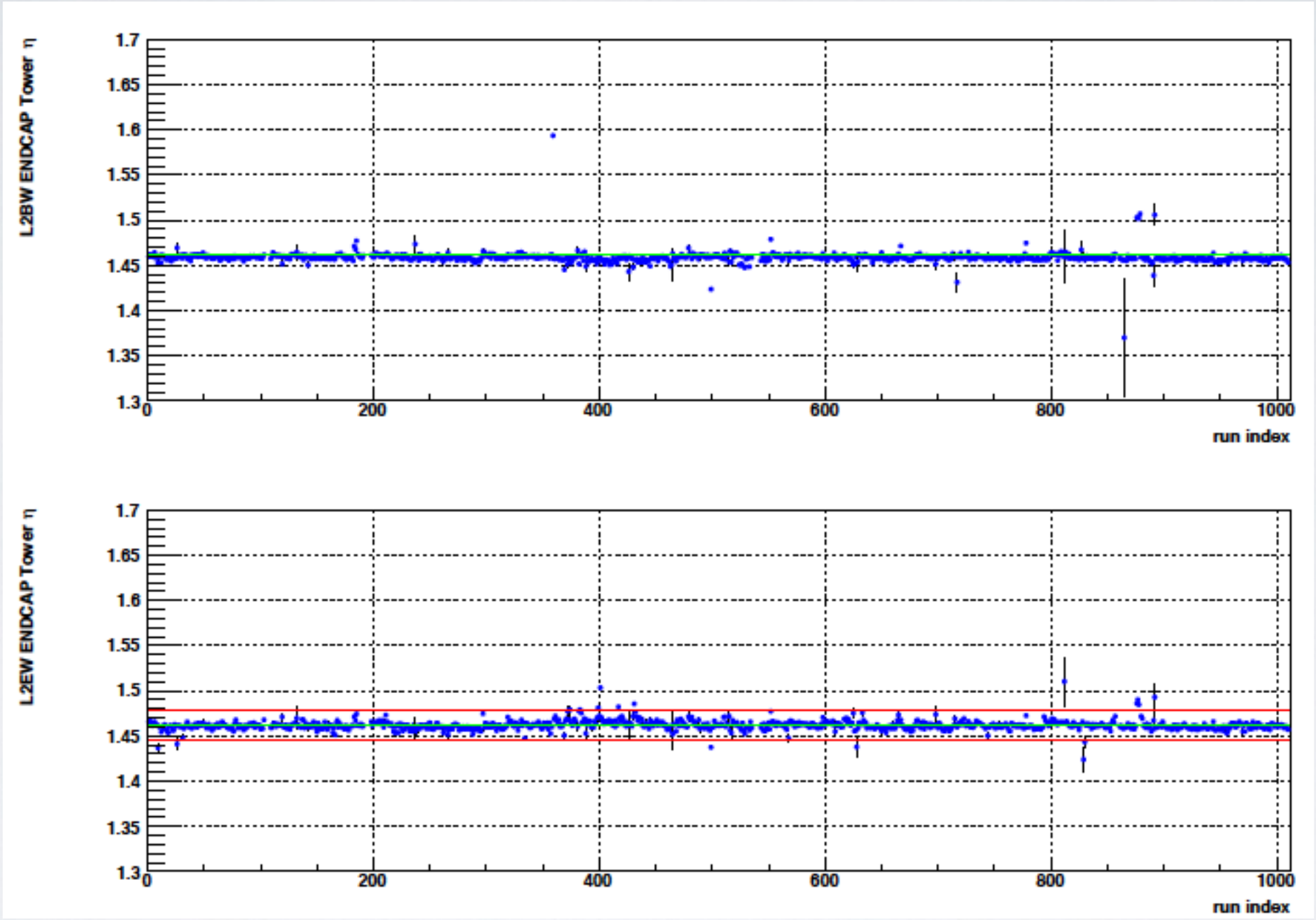
Tower Et


L2BW ENDCAP Tower E_T
0.6
0.5
0.4
0.3
0.2
0.1
0
0
200
400
600
800
1000
run index
L2EW ENDCAP Tower E_T
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
200
400
600
800
1000
run index

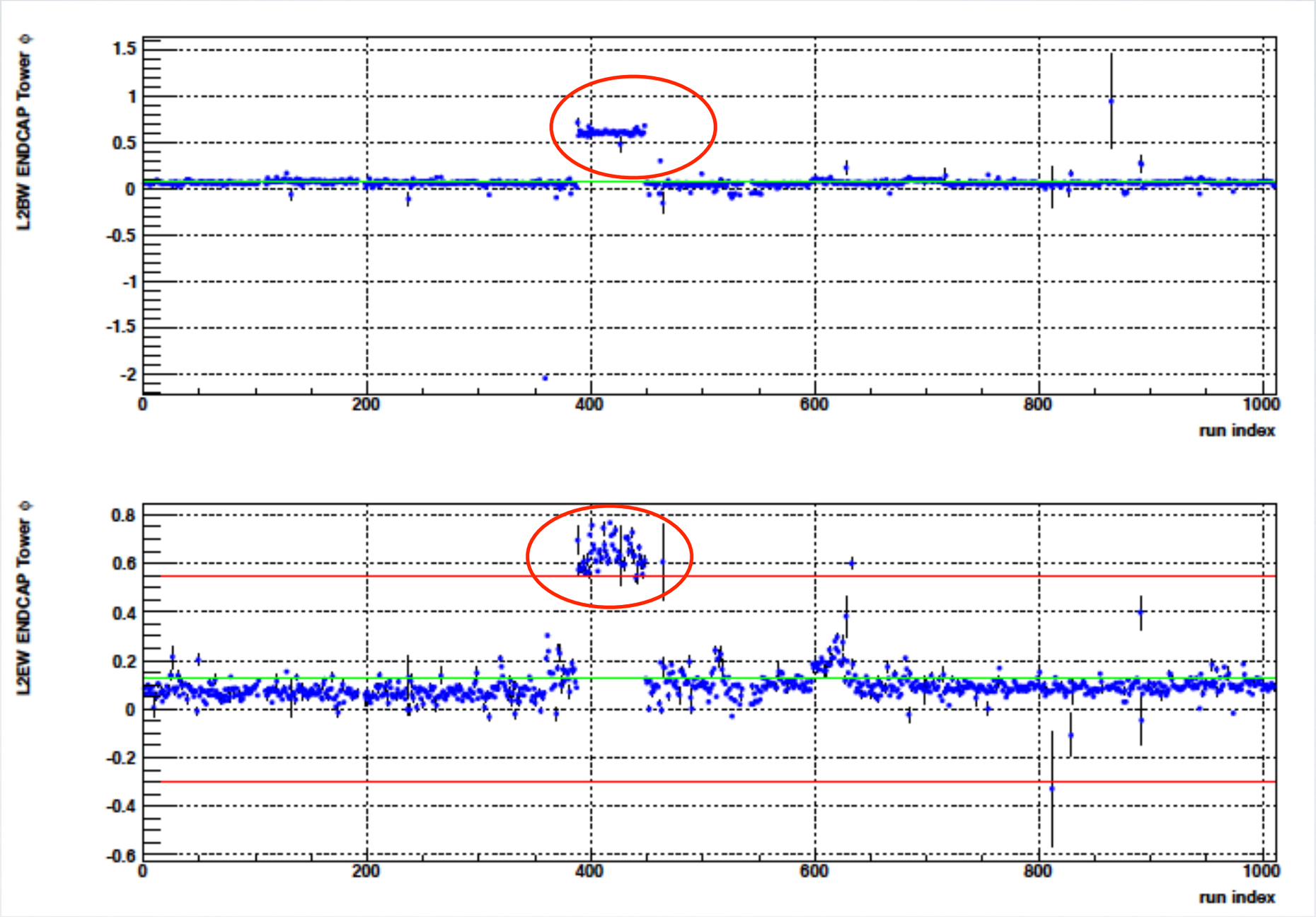
Tower Max Et


L2BW ENDCAP Tower Max E_T
0
0.5
1
1.5
2
2.5
3
3.5
4
0
200
400
600
800
1000
run index
L2EW ENDCAP Tower Max E_T
0
2
4
6
8
10
12
14
0
200
400
600
800
1000
run index

Tower Eta


L2BW ENDCAP Tower η
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
0
200
400
600
800
1000
run index
L2EW ENDCAP Tower η
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
0
200
400
600
800
1000
run index

Tower Phi


L2BW ENDCAP Tower φ
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0
200
400
600
800
1000
run index
L2EW ENDCAP Tower φ
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
0
200
400
600
800
1000
run index

ESMD

Variable		L2BW=1	L2EW=1
Et			
Strip			
Sector			