ECAL

25.01.2021

BmnRawDataDecoder modification to store ADC timestamps

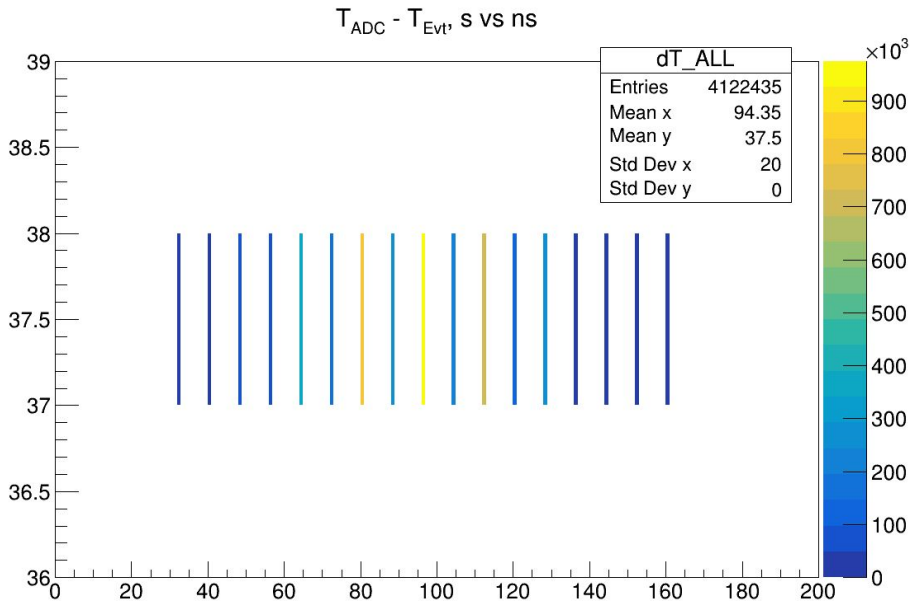
BmnRawDataDecoder.cxx

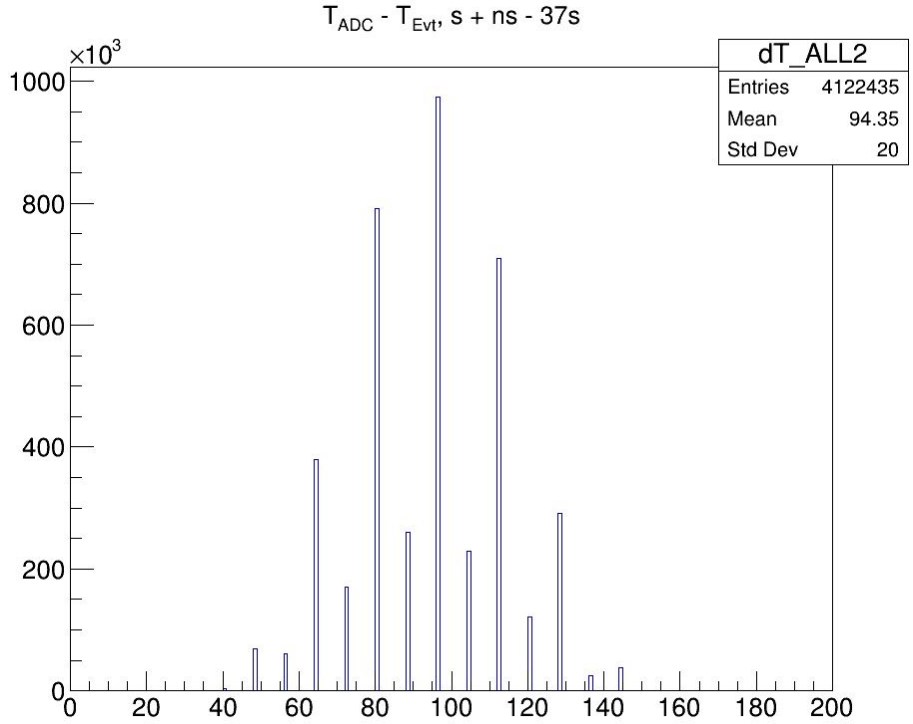
Источник | History

```
589     while (i < len) {
590         UInt_t subType = d[i] & 0x3;
591         if (subType == 0) {
592             i += 5; //skip unused words
593             UInt_t iCh = 0;
594             while (iCh < kNCH - 1 && i < len) {
595                 iCh = d[i] >> 24;
596                 ns = (d[i] & 0xFFF) / 2 - 4;
597                 //                printf("WR serial %08X ns = %d\n", serial, ns);
598                 Int_t sec = d[i+1];
599                 Int_t nsec = d[i+2];
600                 i += 3; // skip two timestamp words (they are empty)
601                 for (Int_t iWord = 0; iWord < ns / 2; ++iWord) {
602                     val[2 * iWord + 1] = d[i + iWord] & 0xFFFF; //take 16 lower bits and put them into corre
603                     val[2 * iWord] = (d[i + iWord] >> 16) & 0xFFFF; //take 16 higher bits and put them into
604                 }
605
606                 TClonesArray& ar_adc = *arr;
607                 if (iCh >= 0 && iCh < kNCH) {
608                     //                  printf("ns == %d, serial == 0x%0x, chan == %d\n", ns, serial, iCh);
609                     BmnADCData * p = new(ar_adc[arr->GetEntriesFast()]) BmnADCData(serial, iCh, ns, val);
610                     p->GetTimeStamp()->SetSec(sec);
611                     p->GetTimeStamp()->SetNanoSec(nsec);
612                     p->Print();
613                 }
614                 i += (ns / 2); //skip words (we've processed them)
615             }
616         } else break;
617     }
618     return kBMNSUCCESS;
619 }
```

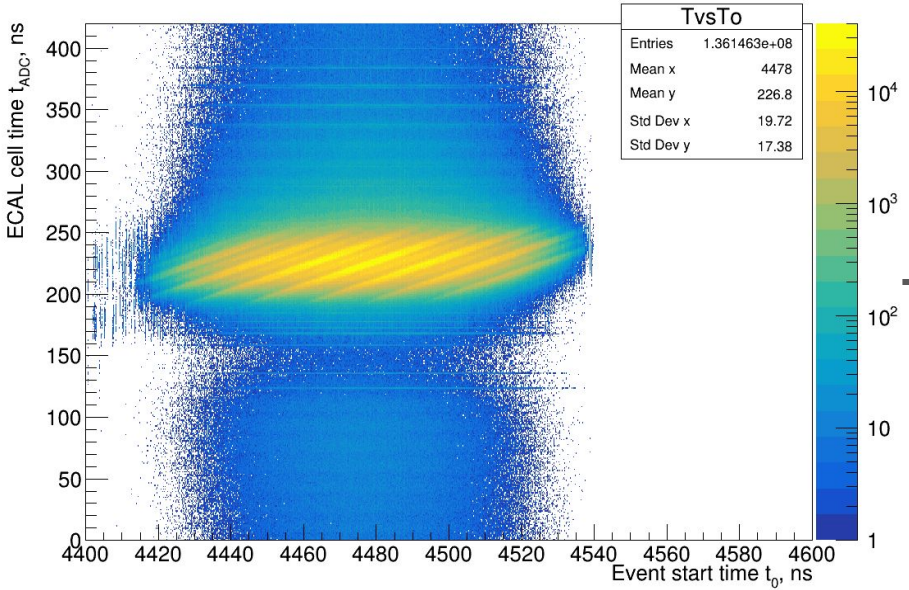
- BmnADCData class is a modification of BmnADCDigit class with timestamp added
- All these are my local changes, not in the repository

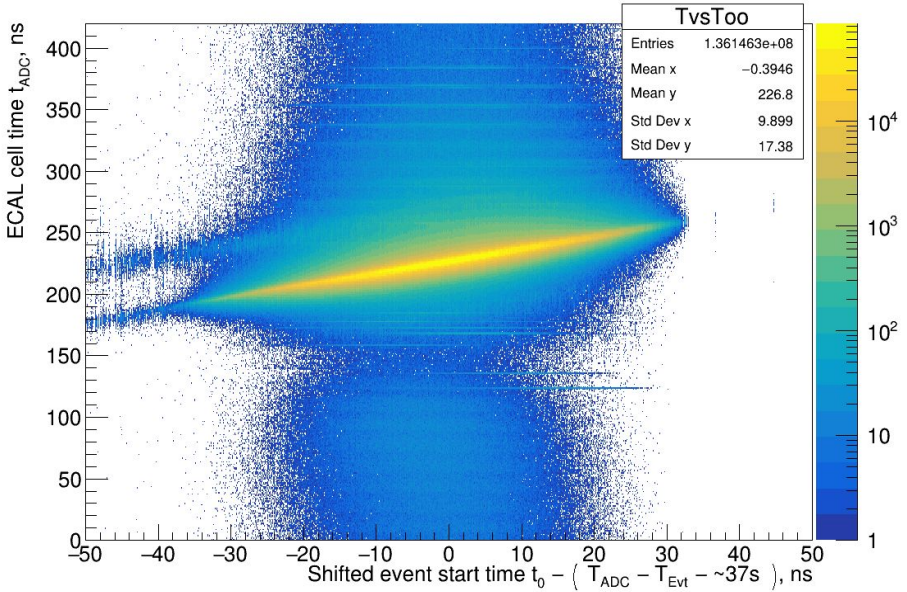
Timestamps difference between ECAL and Event header





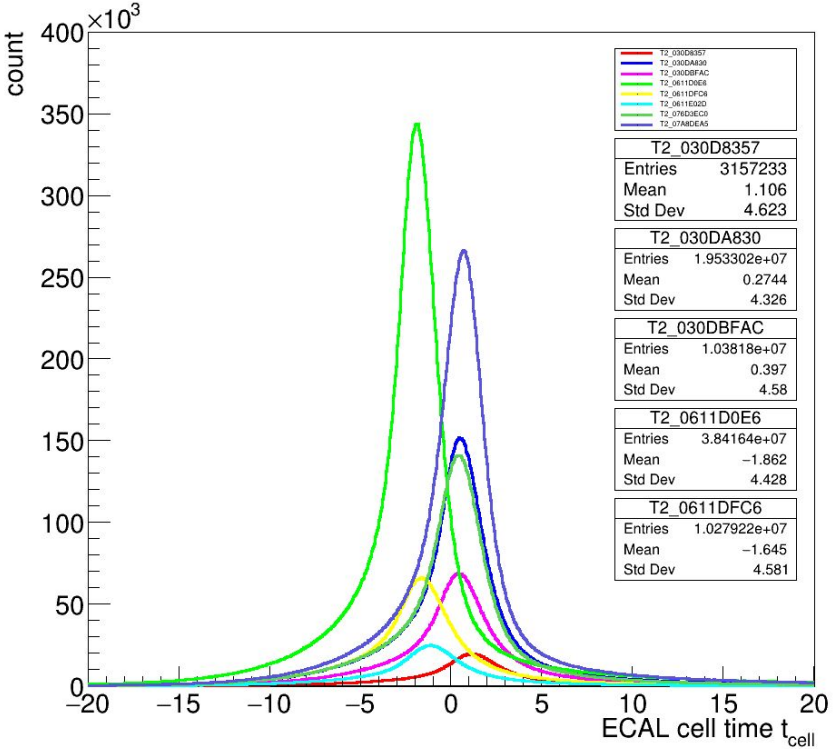
Shift event start time t_0 by timestamps difference

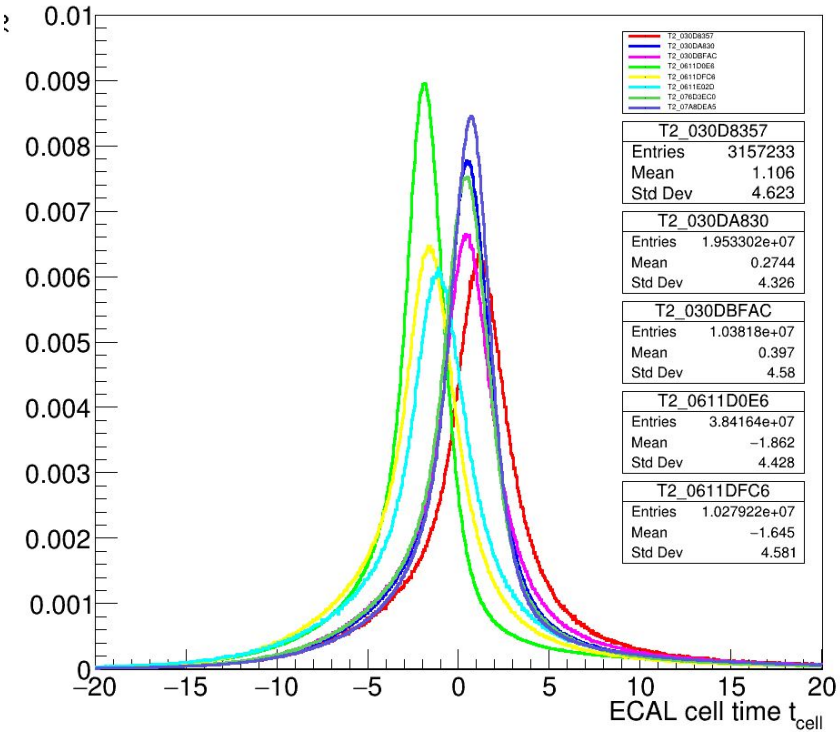




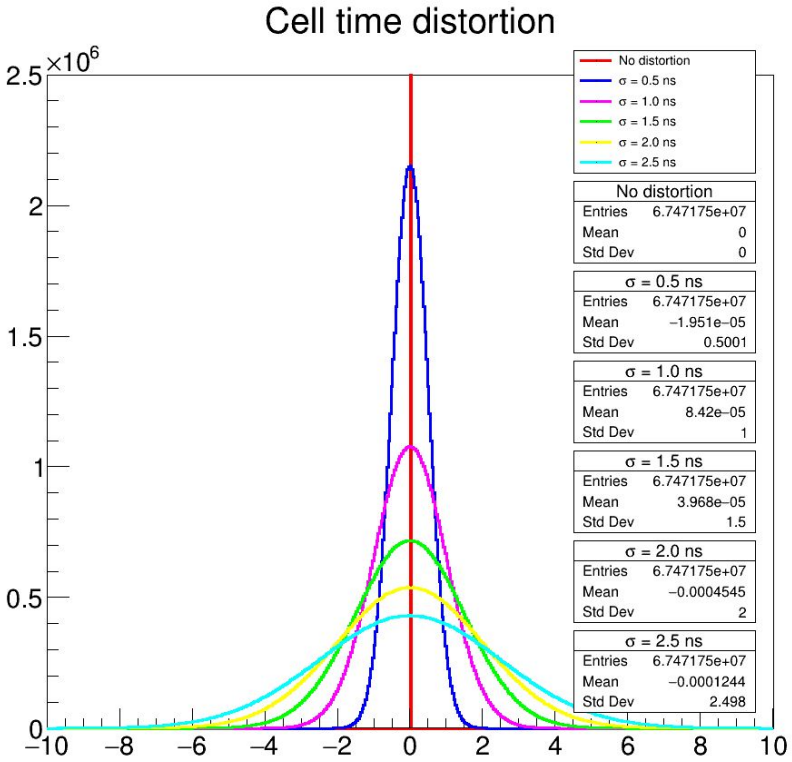
~37s is 37s and 4384ns

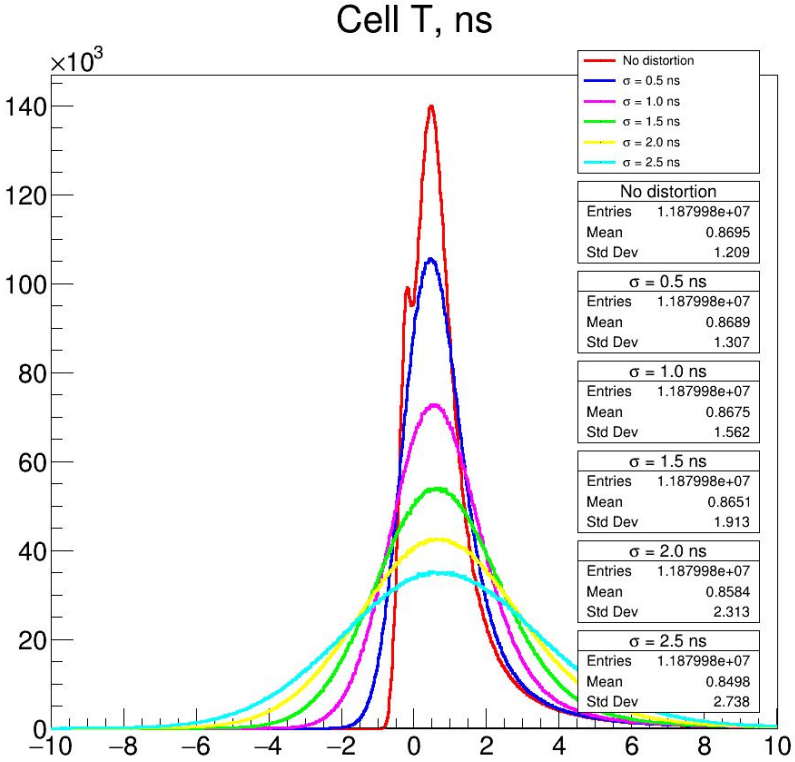
Cell time corrected by shifted event start time grouped by ADC board address



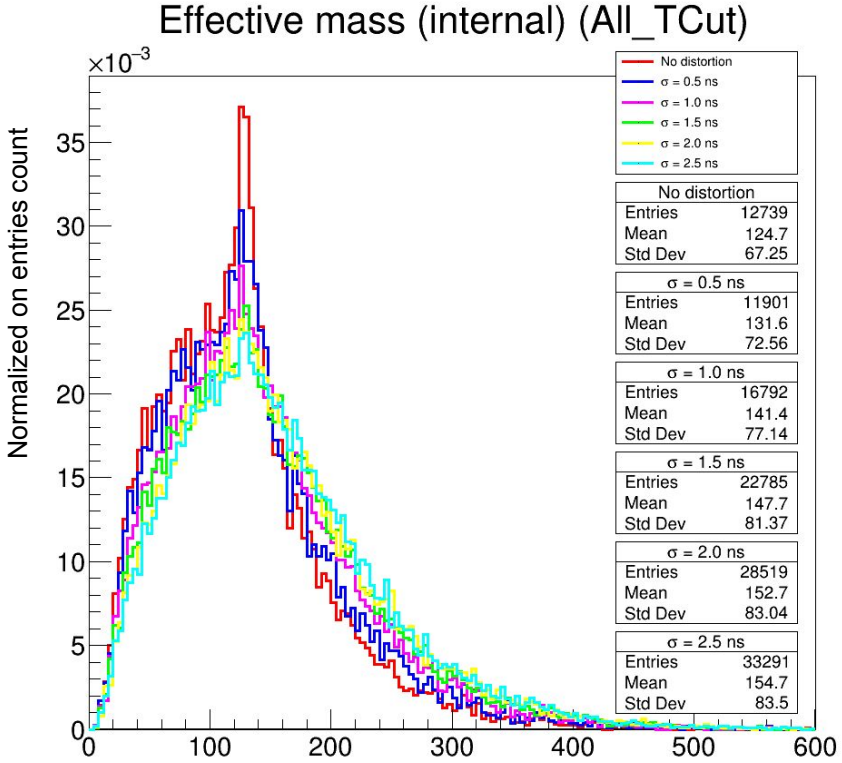


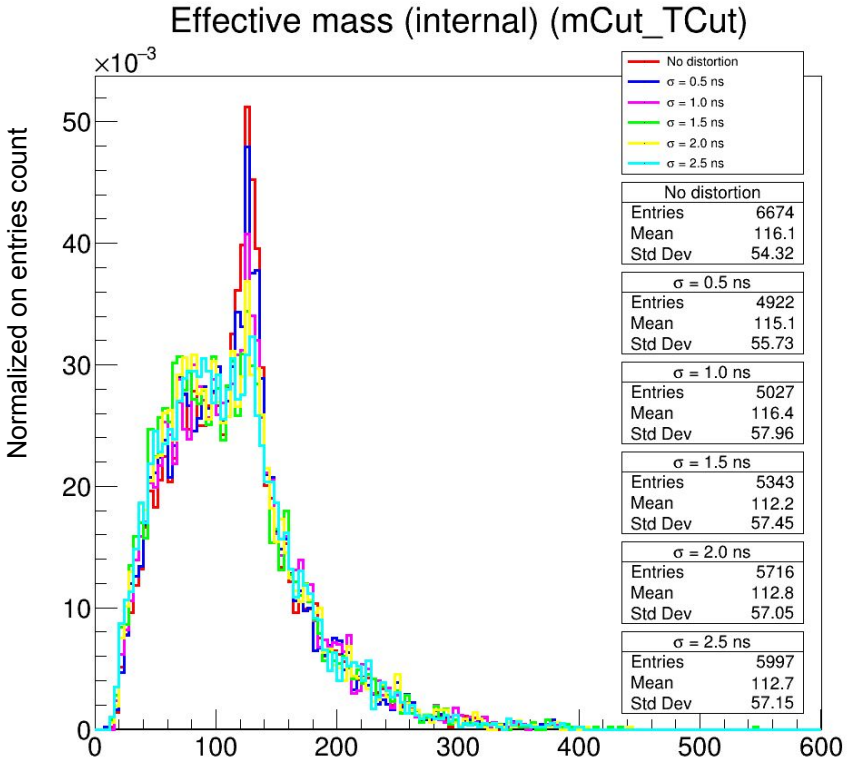
Distortion of the cells signal time of the ECAL in MC





Distortion of the cells signal time of the ECAL in MC





ZDC

25.01.2021

Run set **Ar → Al**

4421 - Test run for T0

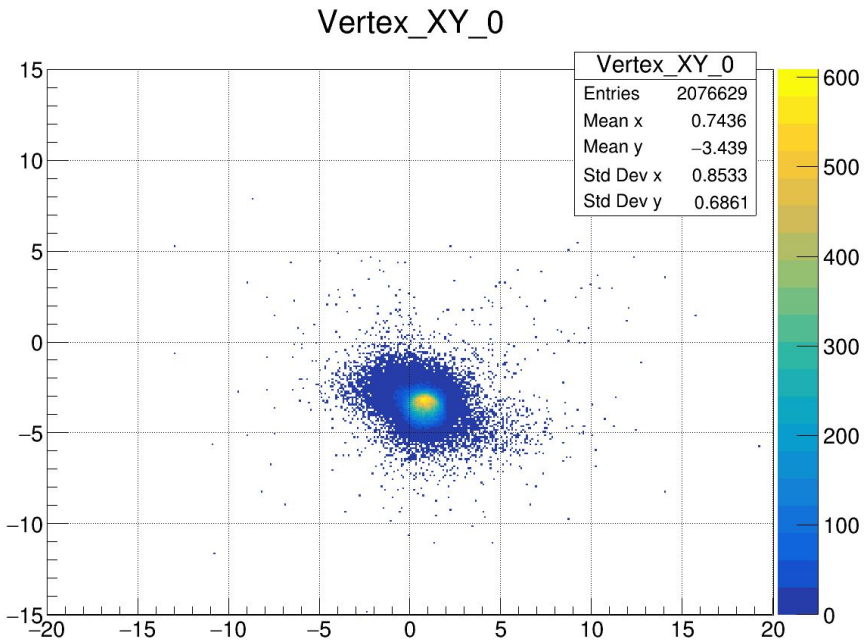
- Beam Trigger (BC1+BC2+T0+Veto)
- SP-41: 1250 A
- SP-57: 10 A
- VKM2: 240 A
- Beam: Ar 3.2 AGeV
- Target: Al (3.33 mm)

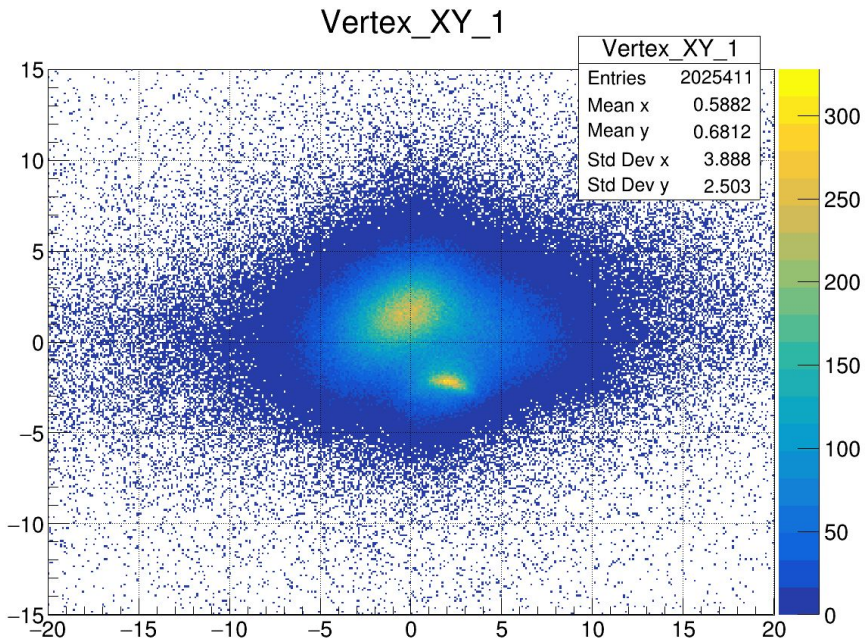
4519, 4520, 4521, 4522, 4524, 4525,
4649, 4651, 4652, 4653, 4654

- Beam Trigger + BD(>1) and Si(>2)
- SP-41: 1250 A
- SP-57: 0 A
- VKM2: 160 A, 140 A
- Beam: Ar 3.2 AGeV
- Target: Al (3.3 mm)

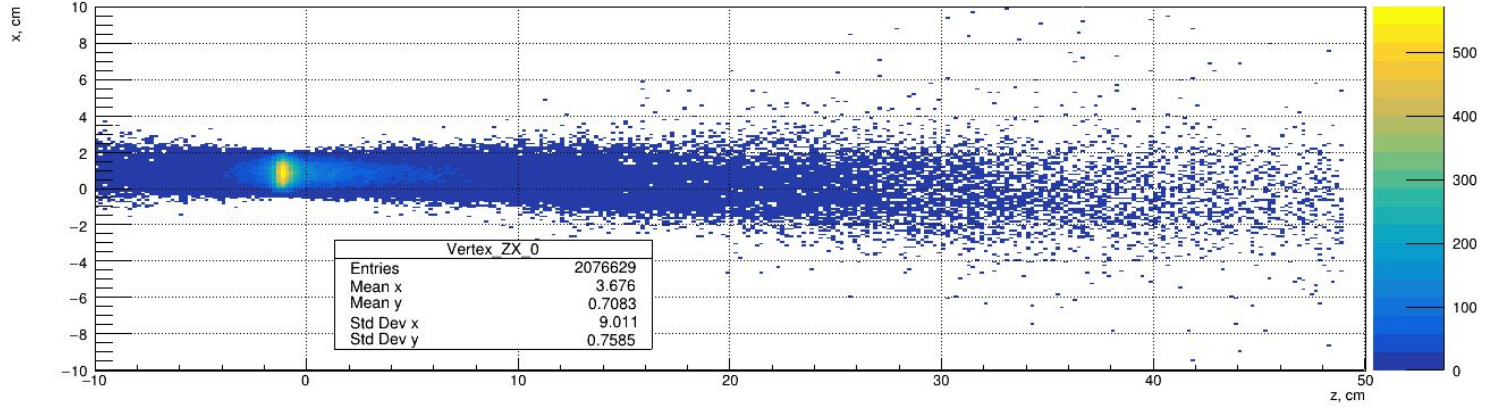
- ~2M events

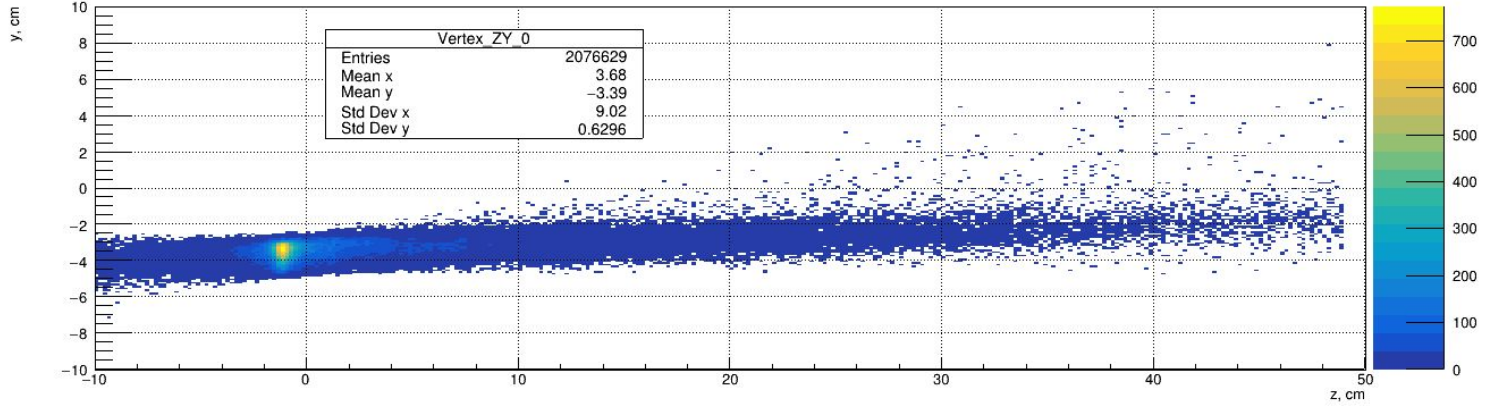
Vertex


Vertex_XY_0
Vertex_XY_0
Entries 2076629
Mean x 0.7436
Mean y −3.439
Std Dev x 0.8533
Std Dev y 0.6861
15
10
5
0
−5
−10
−15
−20
−15
−10
−5
0
5
10
15
20
600
500
400
300
200
100
0

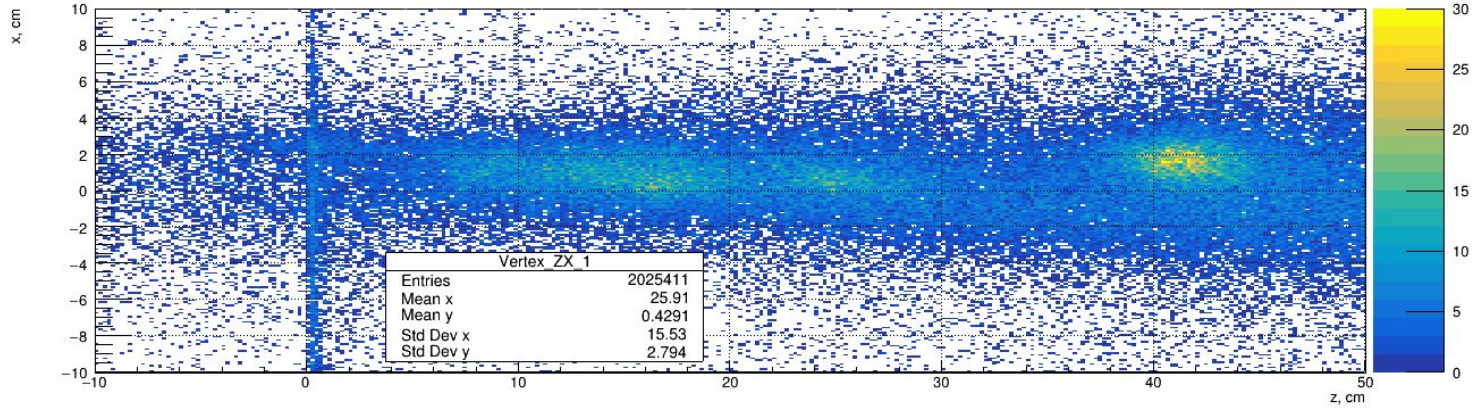

Vertex_XY_1
Vertex_XY_1
Entries 2025411
Mean x 0.5882
Mean y 0.6812
Std Dev x 3.888
Std Dev y 2.503
15
10
5
0
−5
−10
−15
−20
−15
−10
−5
0
5
10
15
20
300
250
200
150
100
50
0

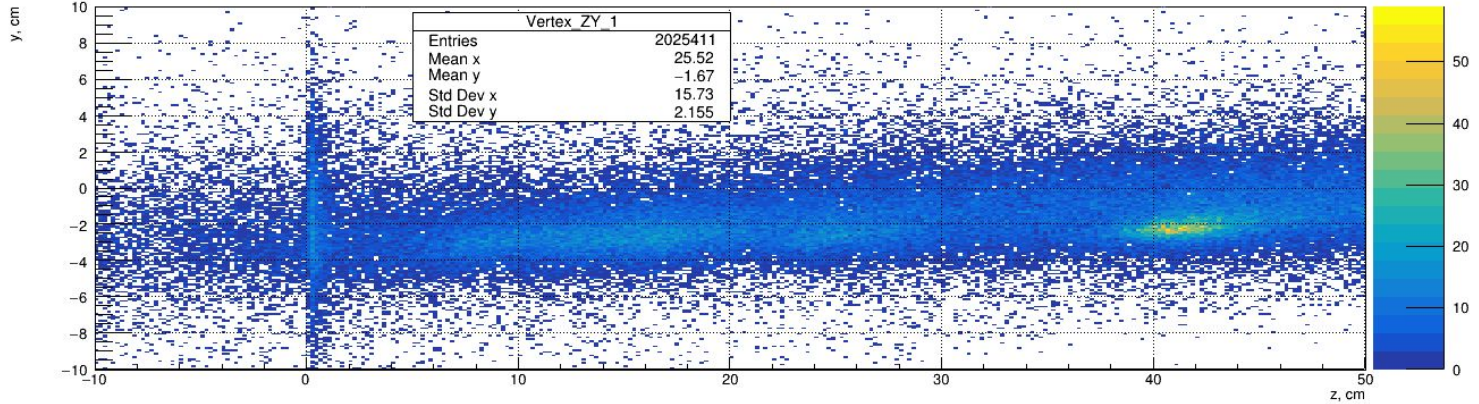
BmnVertex[0]


x, cm
z, cm
Vertex_ZX_0
Entries 2076629
Mean x 3.676
Mean y 0.7083
Std Dev x 9.011
Std Dev y 0.7585

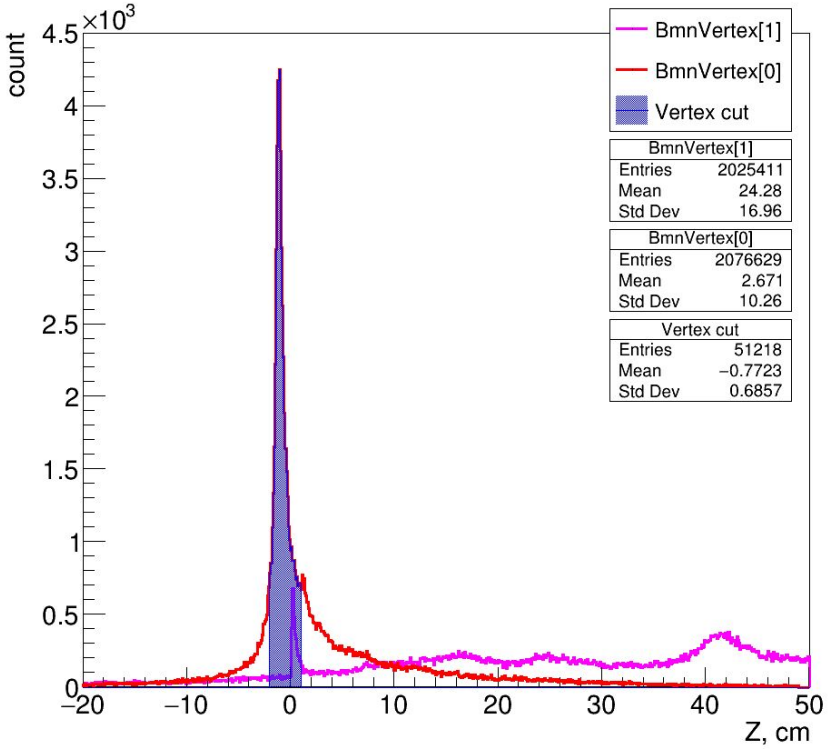

y, cm
z, cm
Vertex_ZY_0
Entries 2076629
Mean x 3.68
Mean y −3.39
Std Dev x 9.02
Std Dev y 0.6296

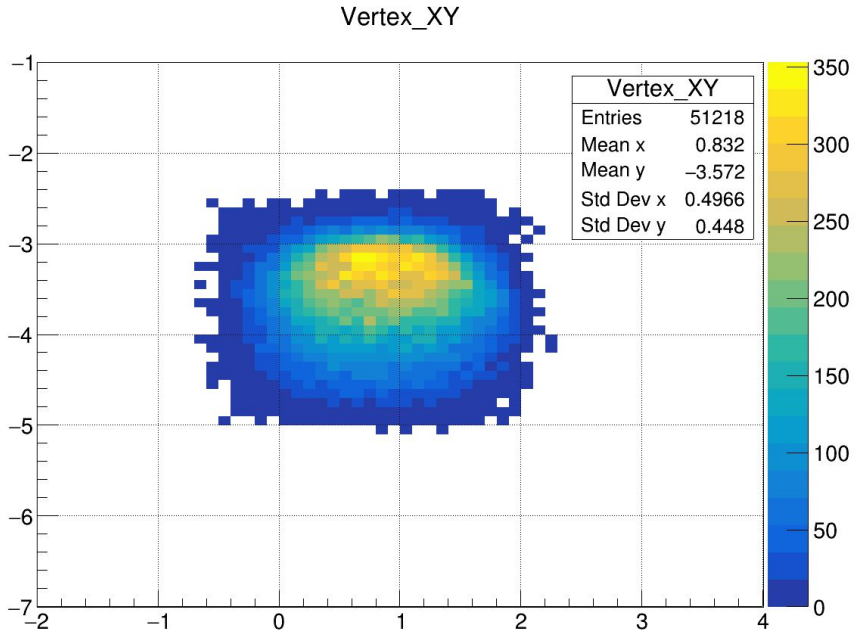
BmnVertex[1]

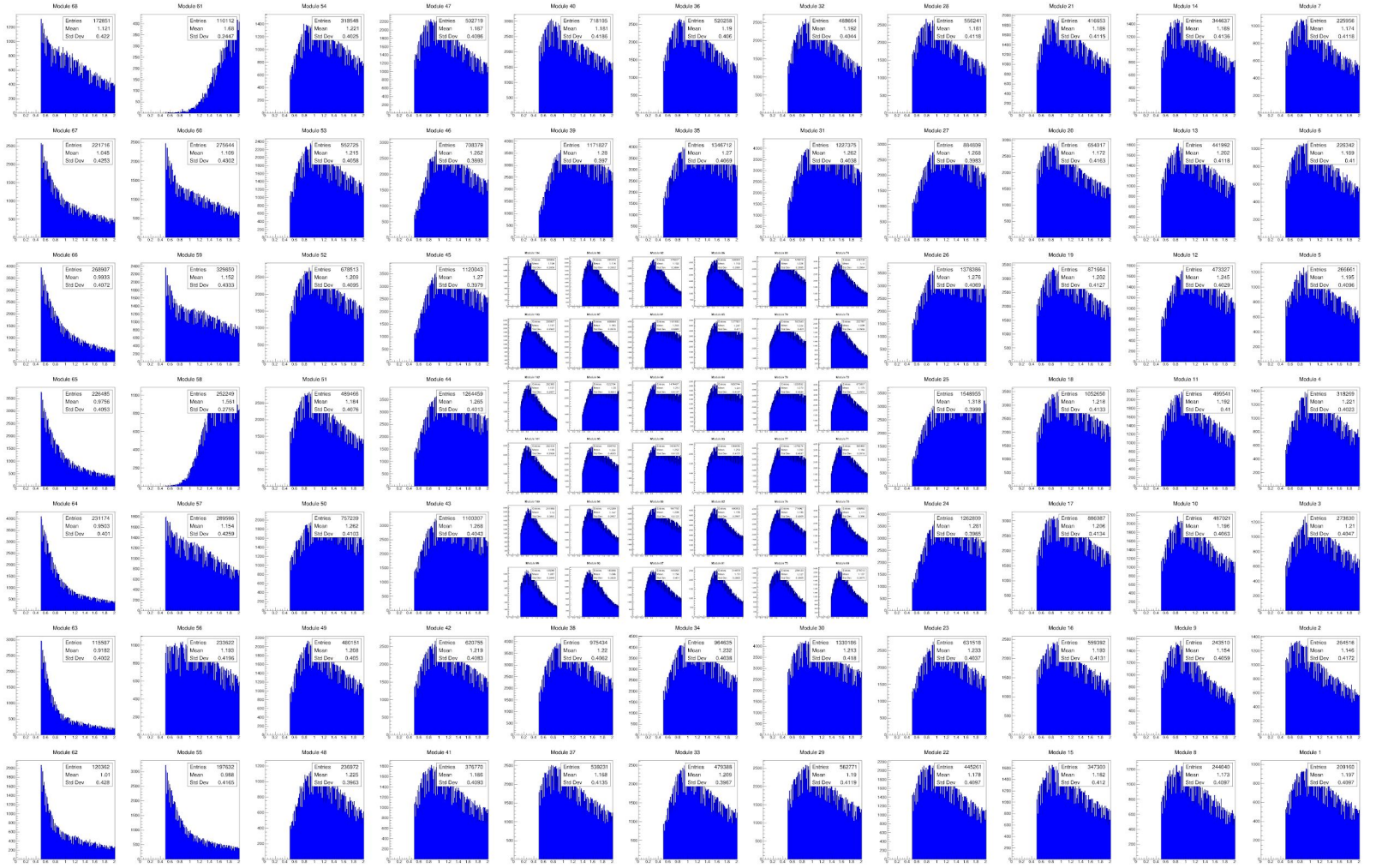

x, cm
z, cm
Vertex_ZX_1
Entries 2025411
Mean x 25.91
Mean y 0.4291
Std Dev x 15.53
Std Dev y 2.794


y, cm
z, cm
Vertex_ZY_1
Entries 2025411
Mean x 25.52
Mean y −1.67
Std Dev x 15.73
Std Dev y 2.155

Vertex cut: -2 cm < z < 1 cm






Module 68
Entries 172851
Mean 1.121
Std Dev 0.422
Module 61
Entries 110112
Mean 1.68
Std Dev 0.2447
Module 54
Entries 318548
Mean 1.221
Std Dev 0.4625
Module 47
Entries 502719
Mean 1.167
Std Dev 0.4086
Module 40
Entries 718105
Mean 1.181
Std Dev 0.4186
Module 36
Entries 520258
Mean 1.19
Std Dev 0.406
Module 32
Entries 488664
Mean 1.182
Std Dev 0.4344
Module 28
Entries 556241
Mean 1.181
Std Dev 0.4118
Module 21
Entries 416653
Mean 1.188
Std Dev 0.4115
Module 14
Entries 344637
Mean 1.188
Std Dev 0.4136
Module 7
Entries 225956
Mean 1.174
Std Dev 0.4118
Module 67
Entries 221716
Mean 1.645
Std Dev 0.4253
Module 60
Entries 275644
Mean 1.159
Std Dev 0.4302
Module 53
Entries 557225
Mean 1.215
Std Dev 0.4658
Module 46
Entries 708378
Mean 1.262
Std Dev 0.3893
Module 39
Entries 1171627
Mean 1.28
Std Dev 0.397
Module 35
Entries 1346712
Mean 1.27
Std Dev 0.4059
Module 31
Entries 1227375
Mean 1.262
Std Dev 0.4038
Module 27
Entries 884936
Mean 1.268
Std Dev 0.3983
Module 20
Entries 664017
Mean 1.172
Std Dev 0.4163
Module 13
Entries 441982
Mean 1.262
Std Dev 0.4118
Module 6
Entries 226342
Mean 1.169
Std Dev 0.41
Module 66
Entries 268907
Mean 0.9933
Std Dev 0.4072
Module 59
Entries 329850
Mean 1.152
Std Dev 0.4333
Module 52
Entries 678513
Mean 1.269
Std Dev 0.4095
Module 45
Entries 1120043
Mean 1.27
Std Dev 0.3979
Module 26
Entries 1378386
Mean 1.276
Std Dev 0.4069
Module 19
Entries 871654
Mean 1.232
Std Dev 0.4127
Module 12
Entries 473327
Mean 1.245
Std Dev 0.4029
Module 5
Entries 266661
Mean 1.195
Std Dev 0.4096
Module 65
Entries 226485
Mean 0.9756
Std Dev 0.4053
Module 58
Entries 252249
Mean 1.581
Std Dev 0.2755
Module 51
Entries 489466
Mean 1.184
Std Dev 0.4076
Module 44
Entries 1264459
Mean 1.265
Std Dev 0.4013
Module 25
Entries 1548955
Mean 1.318
Std Dev 0.3999
Module 18
Entries 1052656
Mean 1.218
Std Dev 0.4133
Module 11
Entries 499541
Mean 1.192
Std Dev 0.41
Module 4
Entries 318209
Mean 1.221
Std Dev 0.4023
Module 64
Entries 231174
Mean 0.9903
Std Dev 0.401
Module 57
Entries 289586
Mean 1.154
Std Dev 0.4259
Module 50
Entries 757239
Mean 1.262
Std Dev 0.4112
Module 43
Entries 1160307
Mean 1.268
Std Dev 0.4043
Module 24
Entries 1262809
Mean 1.281
Std Dev 0.3965
Module 17
Entries 886087
Mean 1.206
Std Dev 0.4134
Module 10
Entries 467021
Mean 1.196
Std Dev 0.4053
Module 3
Entries 273830
Mean 1.21
Std Dev 0.4047
Module 63
Entries 115587
Mean 0.9182
Std Dev 0.4002
Module 56
Entries 233622
Mean 1.193
Std Dev 0.4196
Module 49
Entries 460151
Mean 1.268
Std Dev 0.405
Module 42
Entries 620785
Mean 1.219
Std Dev 0.4083
Module 38
Entries 975434
Mean 1.22
Std Dev 0.4062
Module 34
Entries 964635
Mean 1.232
Std Dev 0.4038
Module 30
Entries 1330186
Mean 1.213
Std Dev 0.418
Module 23
Entries 631518
Mean 1.233
Std Dev 0.4037
Module 16
Entries 559392
Mean 1.193
Std Dev 0.4131
Module 9
Entries 243510
Mean 1.154
Std Dev 0.4059
Module 2
Entries 264516
Mean 1.146
Std Dev 0.4172
Module 62
Entries 126362
Mean 1.01
Std Dev 0.428
Module 55
Entries 187632
Mean 0.988
Std Dev 0.4165
Module 48
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Std Dev 0.3963
Module 41
Entries 376770
Mean 1.186
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Module 37
Entries 538231
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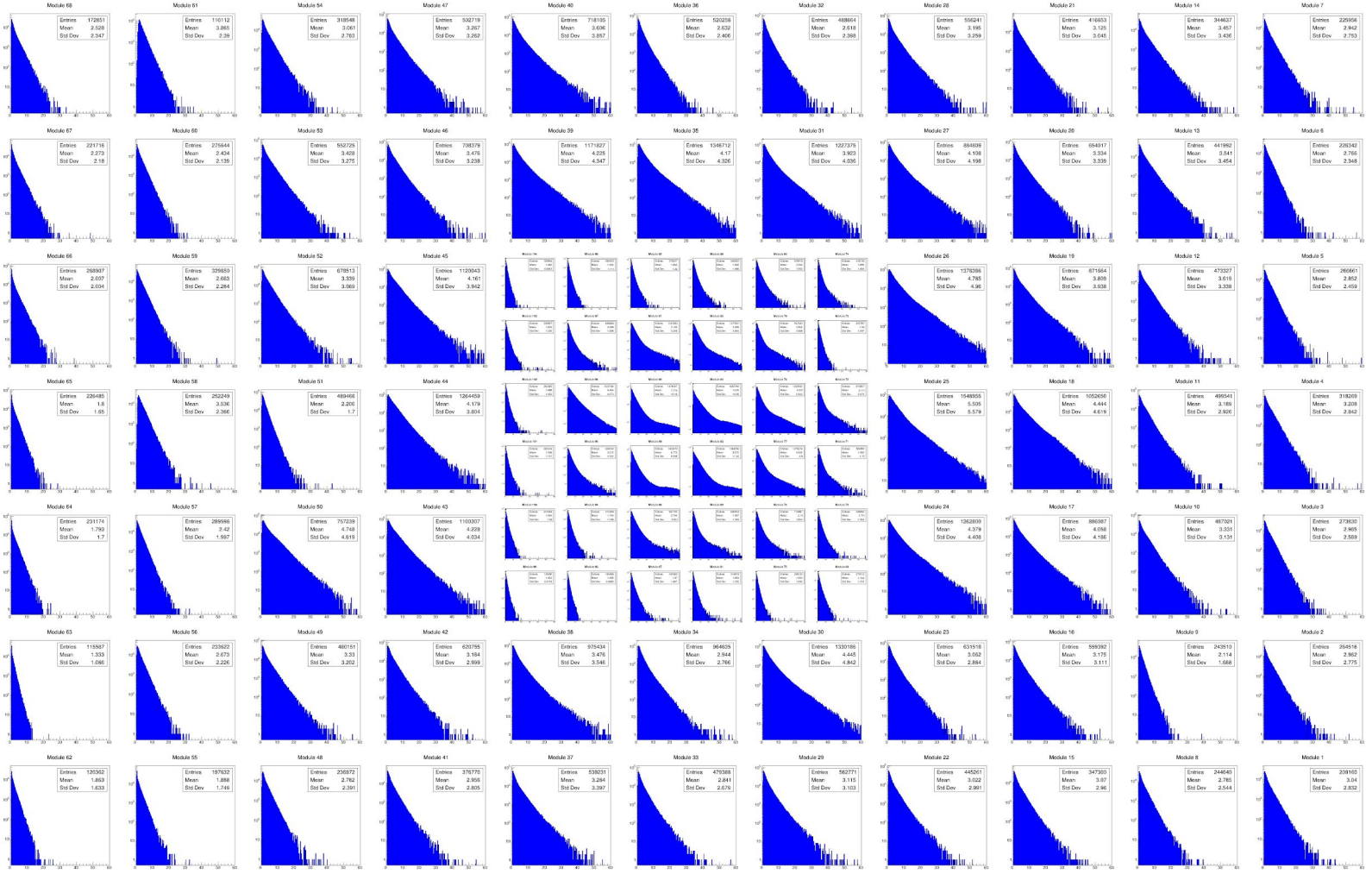
Module 33
Entries 479388
Mean 1.209
Std Dev 0.3967
Module 29
Entries 582771
Mean 1.19
Std Dev 0.4119
Module 22
Entries 445261
Mean 1.178
Std Dev 0.4097
Module 15
Entries 347300
Mean 1.192
Std Dev 0.412
Module 8
Entries 244640
Mean 1.173
Std Dev 0.4097
Module 1
Entries 208162
Mean 1.197
Std Dev 0.4097


Module 68
Entries 172851
Mean 2.528
Std Dev 2.347
Module 61
Entries 110112
Mean 3.865
Std Dev 2.39
Module 54
Entries 318548
Mean 3.061
Std Dev 2.783
Module 47
Entries 502719
Mean 3.267
Std Dev 3.262
Module 40
Entries 718185
Mean 3.696
Std Dev 3.857
Module 36
Entries 520258
Mean 2.632
Std Dev 2.406
Module 32
Entries 488664
Mean 2.618
Std Dev 2.398
Module 28
Entries 556241
Mean 3.195
Std Dev 3.259
Module 21
Entries 416933
Mean 3.125
Std Dev 3.045
Module 14
Entries 344637
Mean 3.457
Std Dev 3.436
Module 7
Entries 225956
Mean 2.942
Std Dev 2.753
Module 67
Entries 221716
Mean 2.273
Std Dev 2.18
Module 60
Entries 275644
Mean 3.434
Std Dev 2.139
Module 53
Entries 557725
Mean 3.409
Std Dev 3.275
Module 46
Entries 708379
Mean 3.476
Std Dev 3.238
Module 39
Entries 1171827
Mean 4.225
Std Dev 4.347
Module 35
Entries 1346712
Mean 4.17
Std Dev 4.326
Module 31
Entries 1227375
Mean 3.923
Std Dev 4.036
Module 27
Entries 884698
Mean 4.108
Std Dev 4.198
Module 20
Entries 664917
Mean 3.534
Std Dev 3.339
Module 13
Entries 441952
Mean 3.541
Std Dev 3.454
Module 6
Entries 228342
Mean 2.766
Std Dev 2.348
Module 66
Entries 268907
Mean 2.057
Std Dev 2.034
Module 59
Entries 329850
Mean 2.683
Std Dev 2.264
Module 52
Entries 678513
Mean 3.339
Std Dev 3.069
Module 45
Entries 1120043
Mean 4.161
Std Dev 3.942
Module 26
Entries 1378386
Mean 4.785
Std Dev 4.36
Module 19
Entries 871664
Mean 3.859
Std Dev 3.938
Module 12
Entries 473327
Mean 3.618
Std Dev 3.338
Module 5
Entries 266661
Mean 2.852
Std Dev 2.459
Module 65
Entries 226485
Mean 1.6
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Module 58
Entries 252249
Mean 3.036
Std Dev 2.366
Module 51
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Module 44
Entries 1264459
Mean 4.179
Std Dev 3.804
Module 25
Entries 1548855
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Std Dev 5.579
Module 18
Entries 1052656
Mean 4.444
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Mean 3.189
Std Dev 2.926
Module 4
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Mean 3.208
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Module 64
Entries 231174
Mean 1.793
Std Dev 1.7
Module 57
Entries 289986
Mean 2.42
Std Dev 1.997
Module 50
Entries 757239
Mean 4.749
Std Dev 4.619
Module 43
Entries 1103307
Mean 4.209
Std Dev 4.034
Module 24
Entries 1262809
Mean 4.379
Std Dev 4.408
Module 17
Entries 886087
Mean 4.098
Std Dev 4.186
Module 10
Entries 467921
Mean 3.331
Std Dev 3.131
Module 3
Entries 273630
Mean 2.965
Std Dev 2.589
Module 63
Entries 115587
Mean 1.333
Std Dev 1.086
Module 56
Entries 233622
Mean 2.673
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Module 49
Entries 460151
Mean 3.33
Std Dev 3.202
Module 42
Entries 620785
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Module 38
Entries 975434
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Std Dev 3.546
Module 34
Entries 964635
Mean 2.944
Std Dev 2.766
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Entries 1330186
Mean 4.445
Std Dev 4.842
Module 23
Entries 631518
Mean 3.052
Std Dev 2.884
Module 16
Entries 599392
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Std Dev 3.111
Module 9
Entries 243510
Mean 2.114
Std Dev 1.668
Module 2
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Mean 2.962
Std Dev 2.775
Module 62
Entries 120362
Mean 1.863
Std Dev 1.633
Module 55
Entries 197632
Mean 1.886
Std Dev 1.749
Module 48
Entries 236972
Mean 2.762
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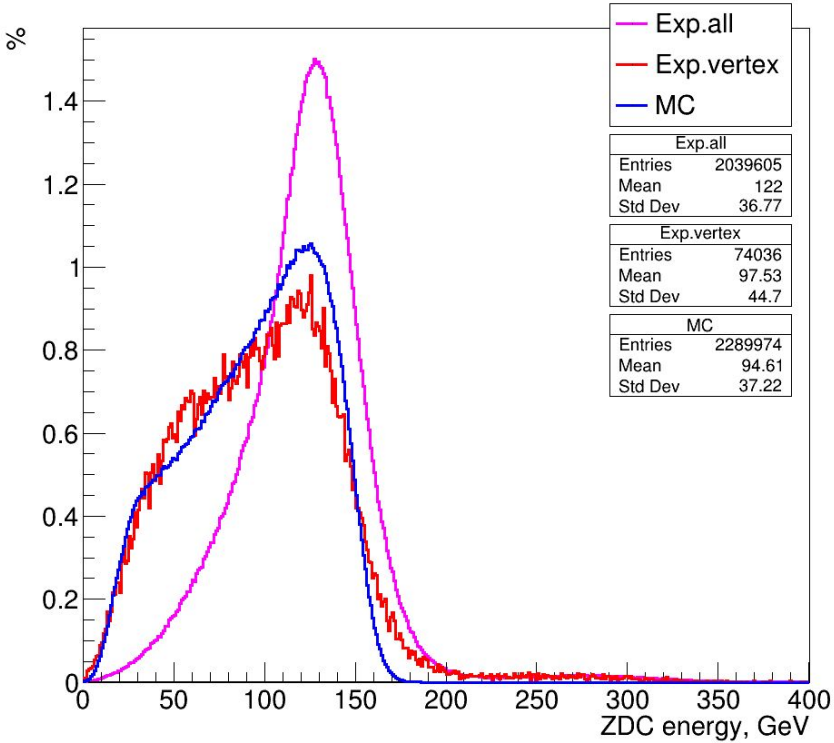
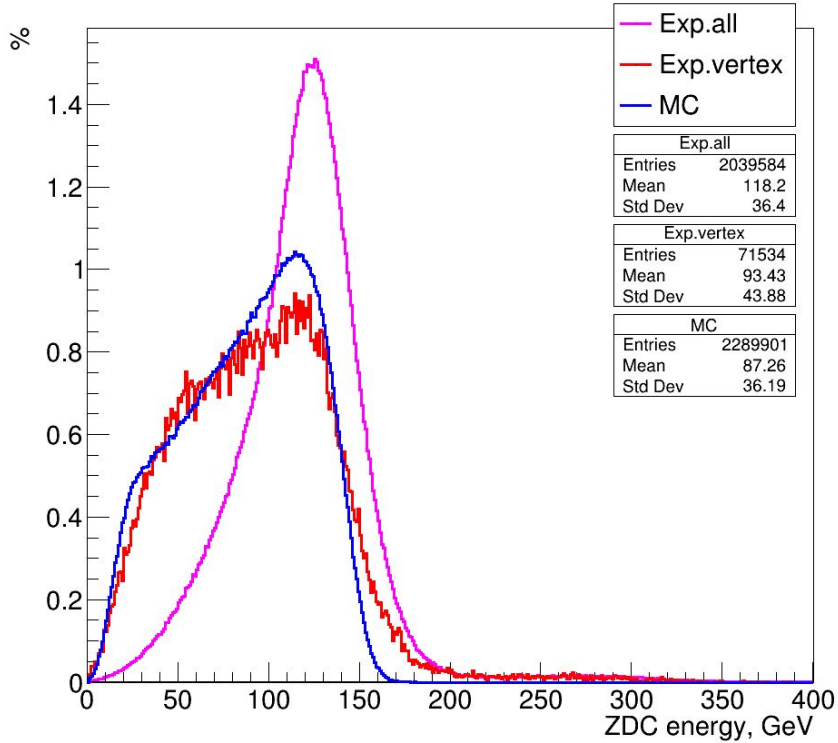
Module 41
Entries 376770
Mean 2.956
Std Dev 2.805
Module 37
Entries 538231
Mean 3.284
Std Dev 3.397
Module 33
Entries 479368
Mean 2.841
Std Dev 2.679
Module 29
Entries 582771
Mean 3.115
Std Dev 3.103
Module 22
Entries 445261
Mean 3.022
Std Dev 2.991
Module 15
Entries 347300
Mean 3.07
Std Dev 2.96
Module 8
Entries 244640
Mean 2.785
Std Dev 2.544
Module 1
Entries 208160
Mean 3.04
Std Dev 2.832

ZDC total energy (all modules)

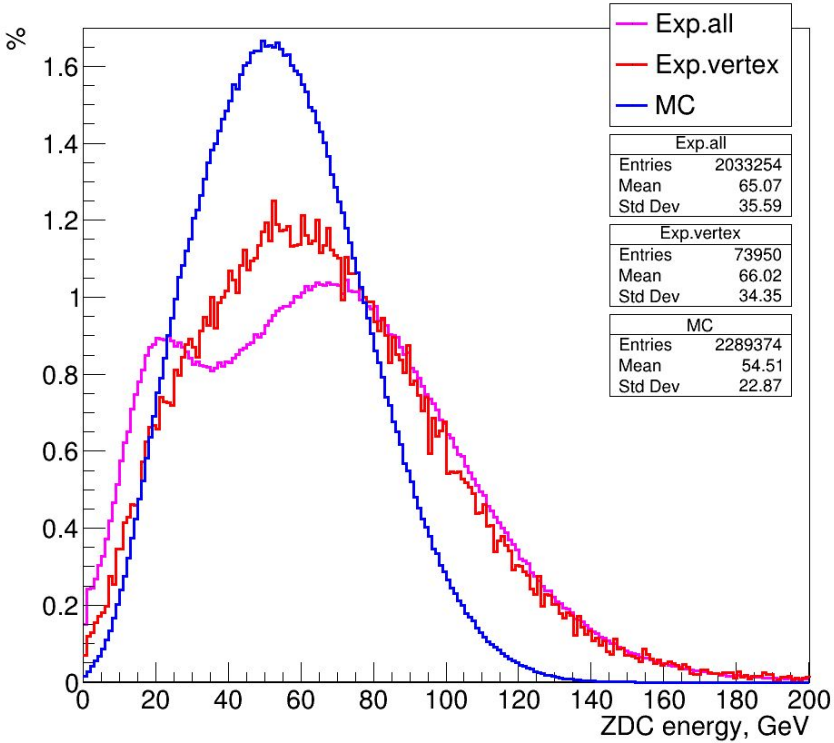


threshold 0.5 GeV

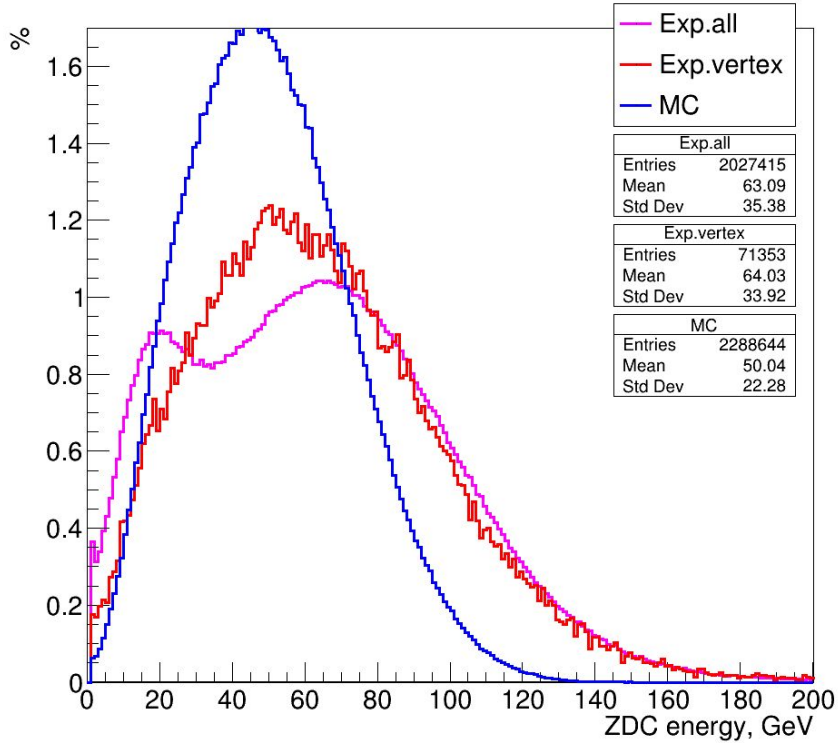


threshold 1 GeV

ZDC energy (large modules only)

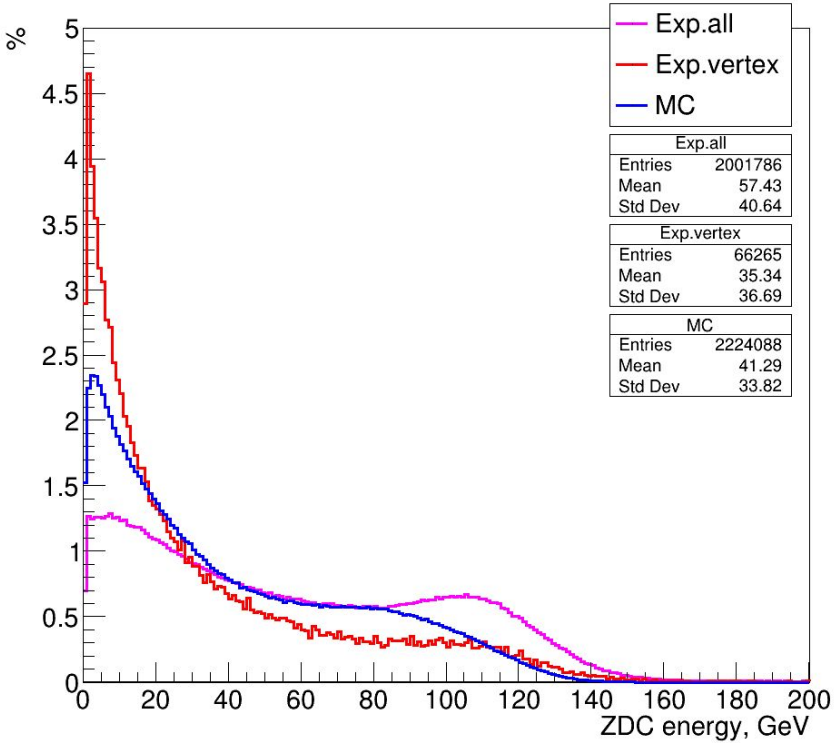


threshold 0.5 GeV

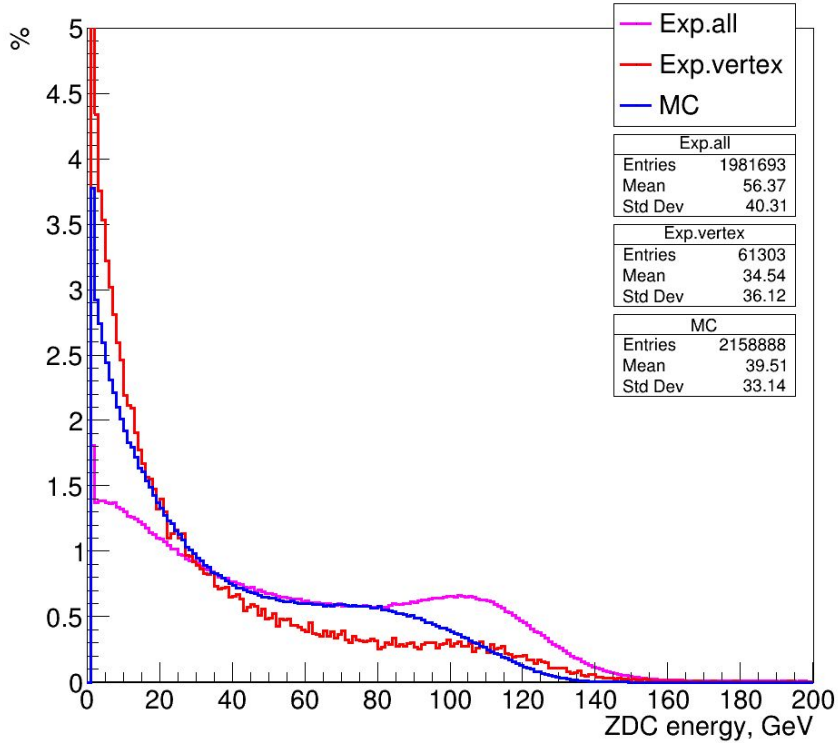


threshold 1 GeV

ZDC energy (small modules only)

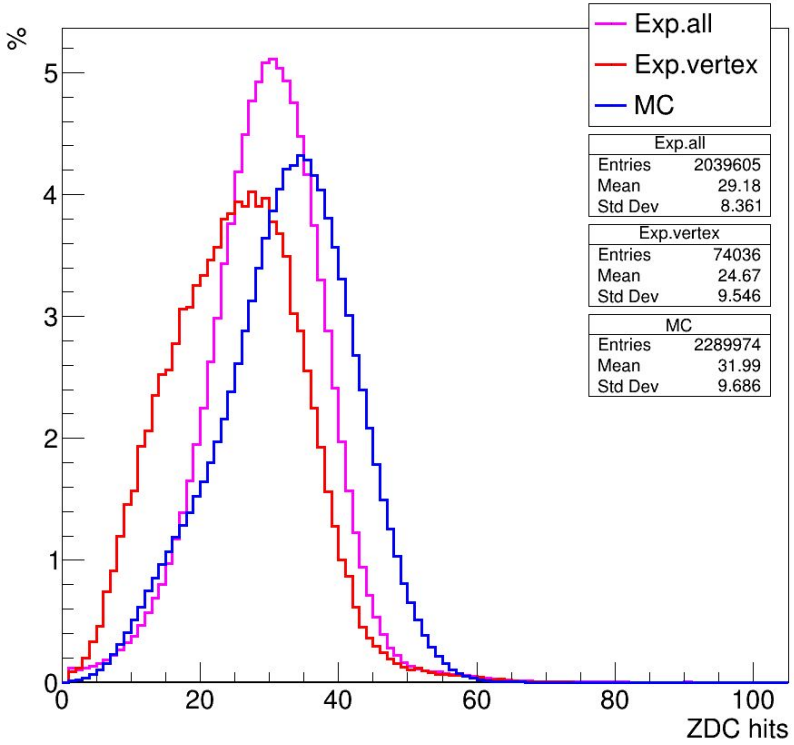


threshold 0.5 GeV

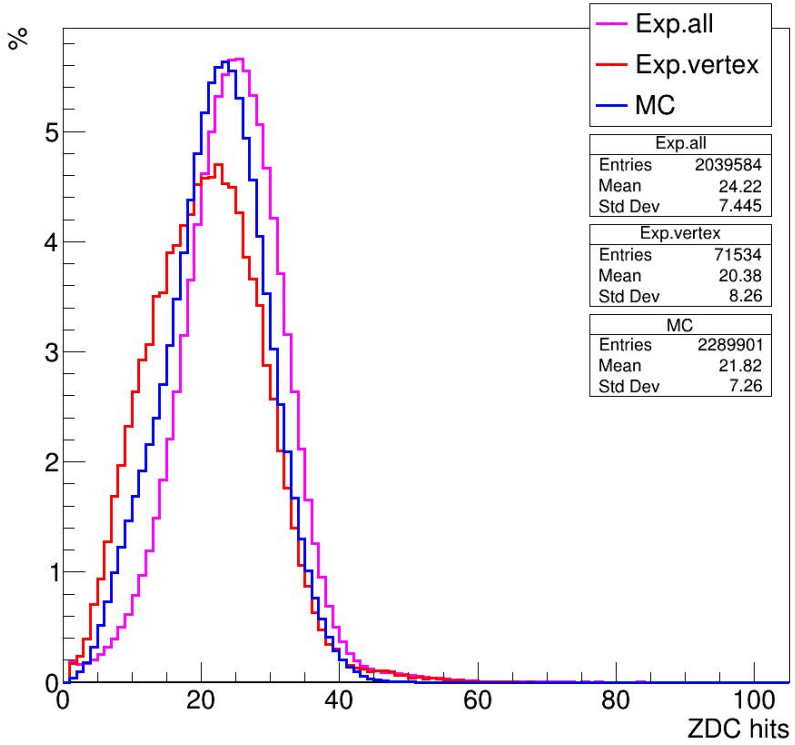


threshold 1 GeV

ZDC multiplicity (all modules)

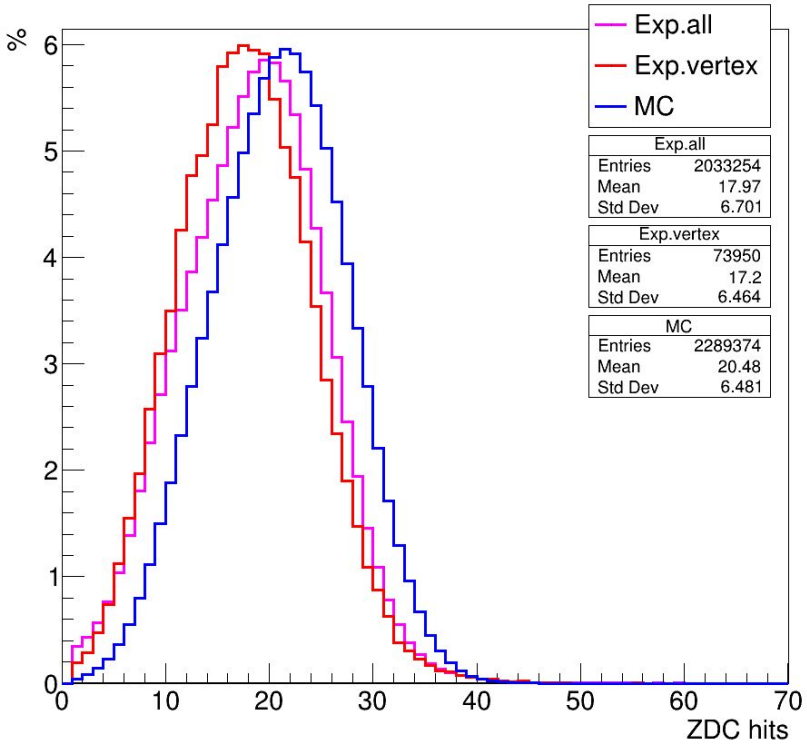


threshold 0.5 GeV

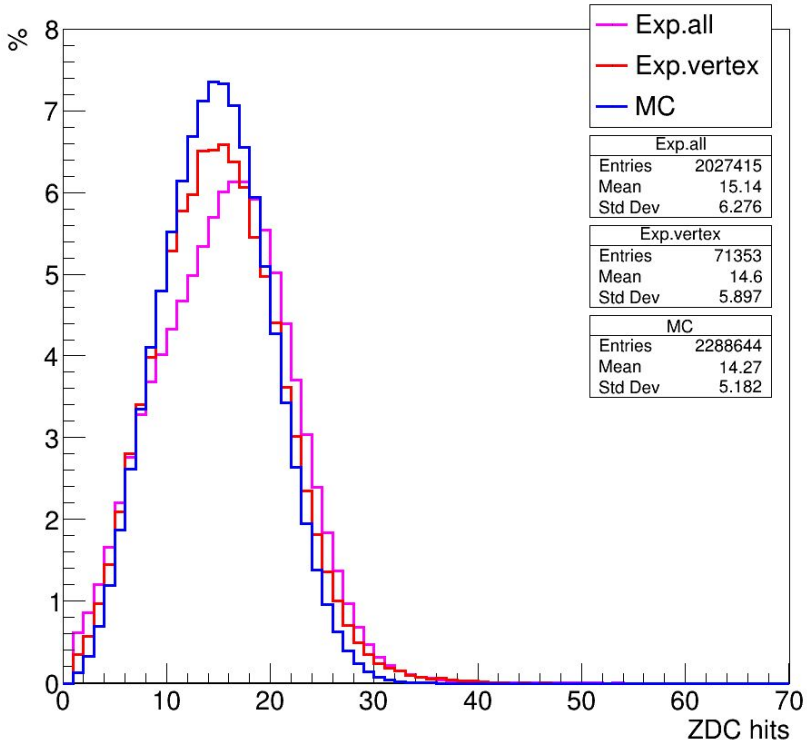


threshold 1 GeV

ZDC multiplicity (large modules only)

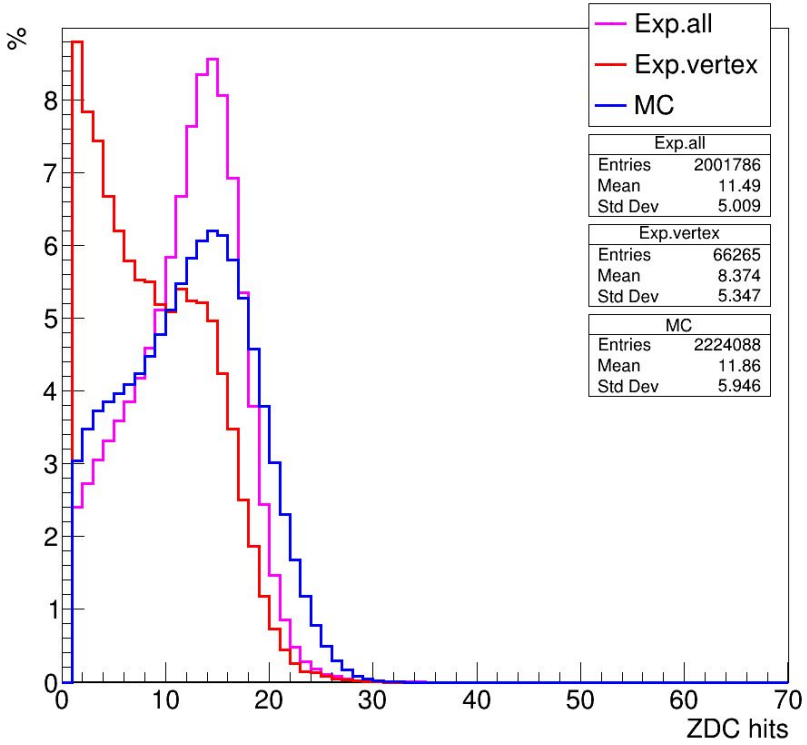


threshold 0.5 GeV

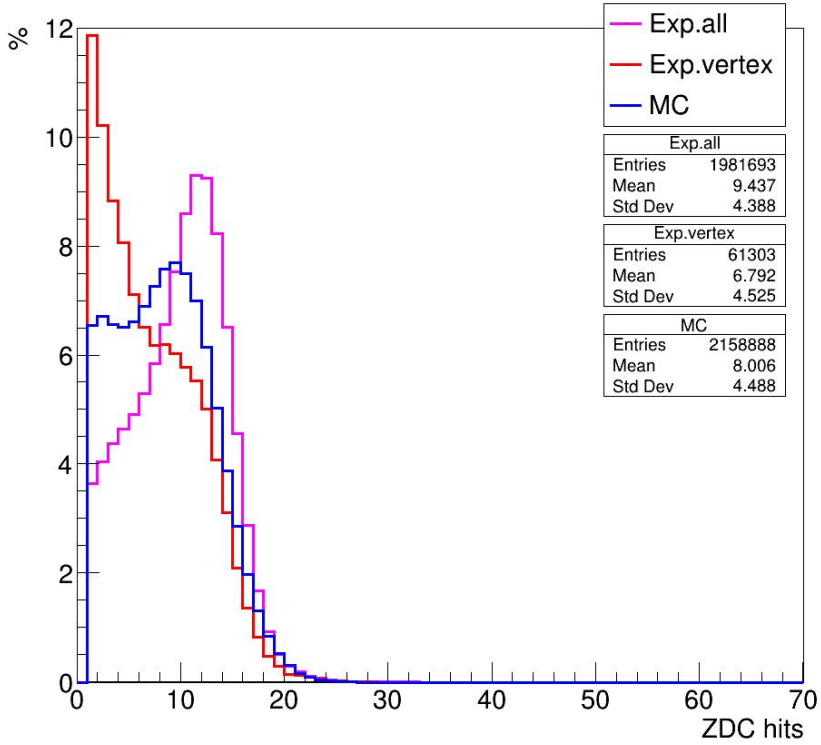


threshold 1 GeV

ZDC multiplicity (small modules only)

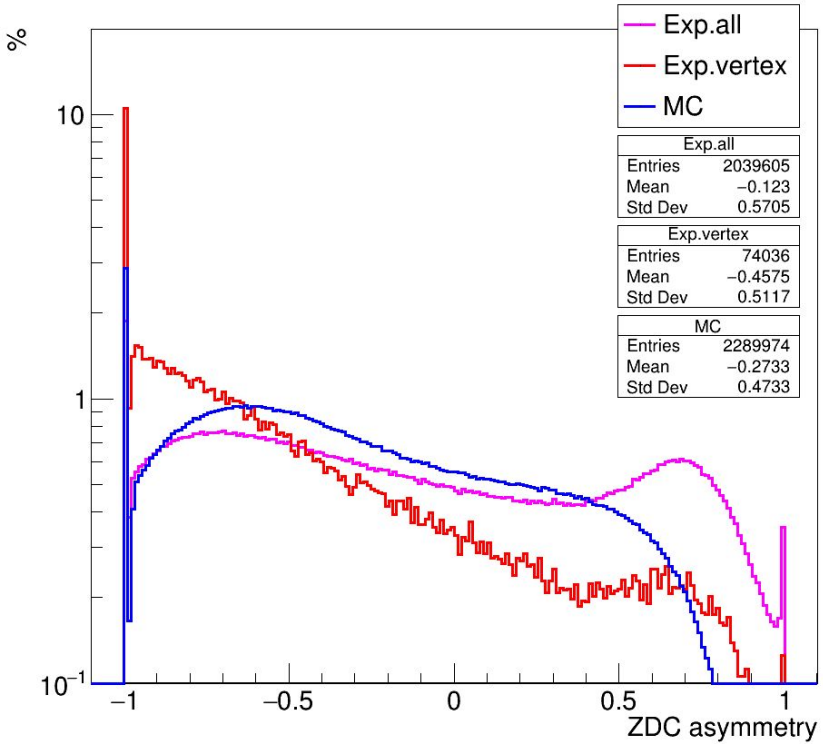


threshold 0.5 GeV

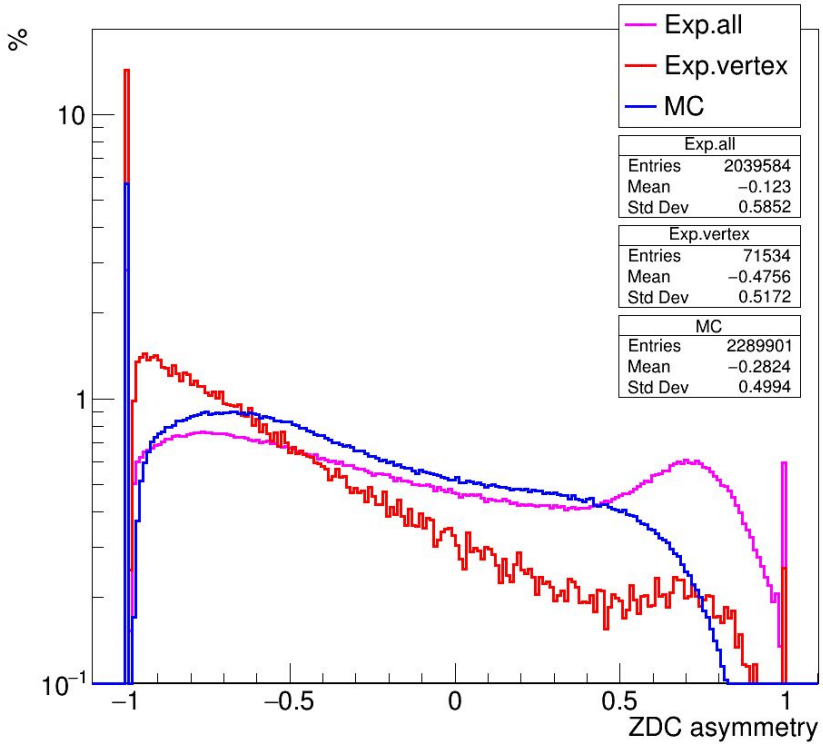


threshold 1 GeV

ZDC multiplicity (small modules only)

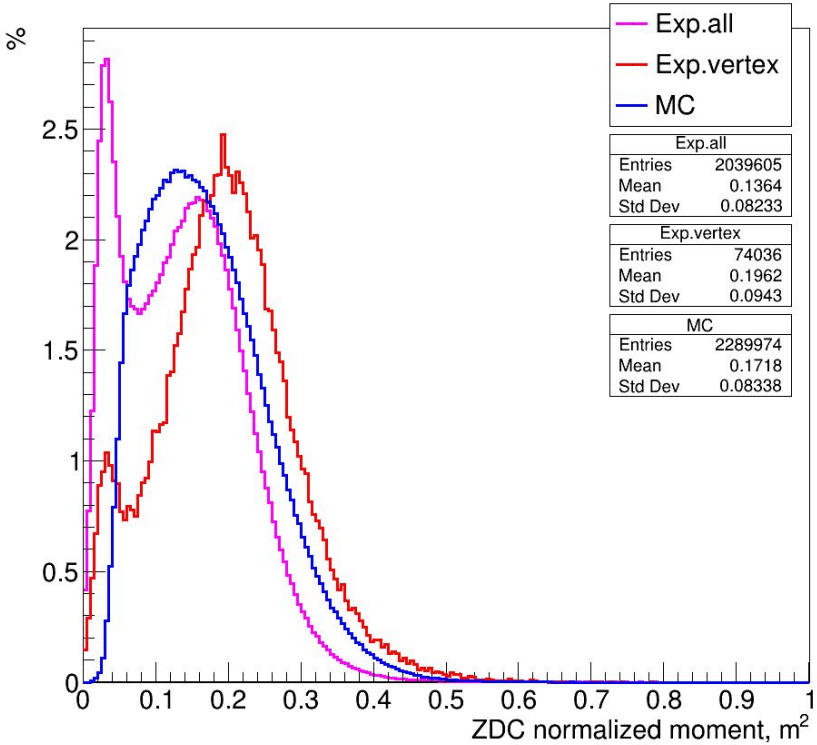


threshold 0.5 GeV

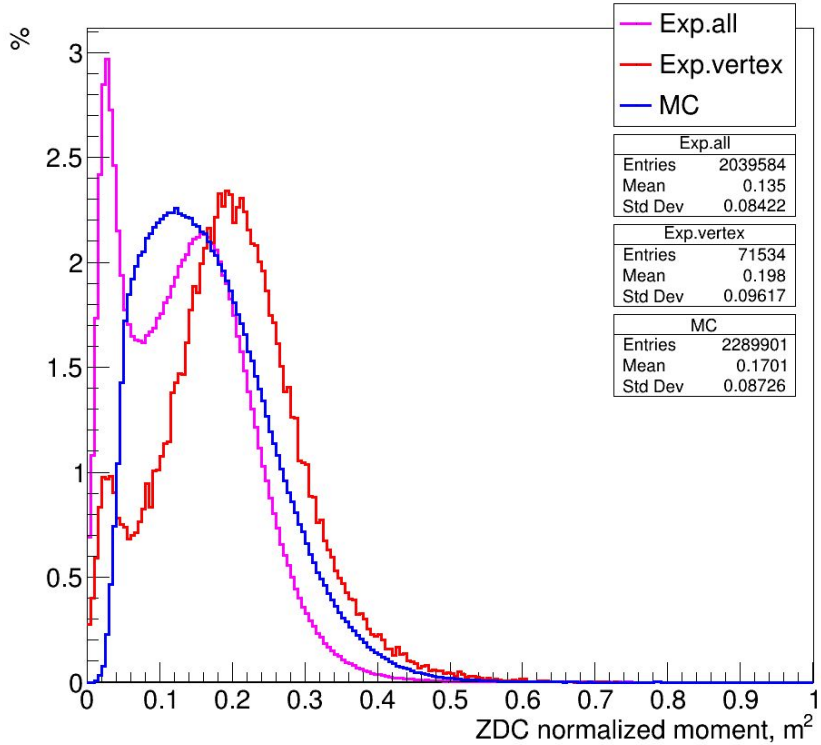


threshold 1 GeV

ZDC multiplicity (small modules only)



threshold 0.5 GeV



threshold 1 GeV