TPC Padrow Time Offsets

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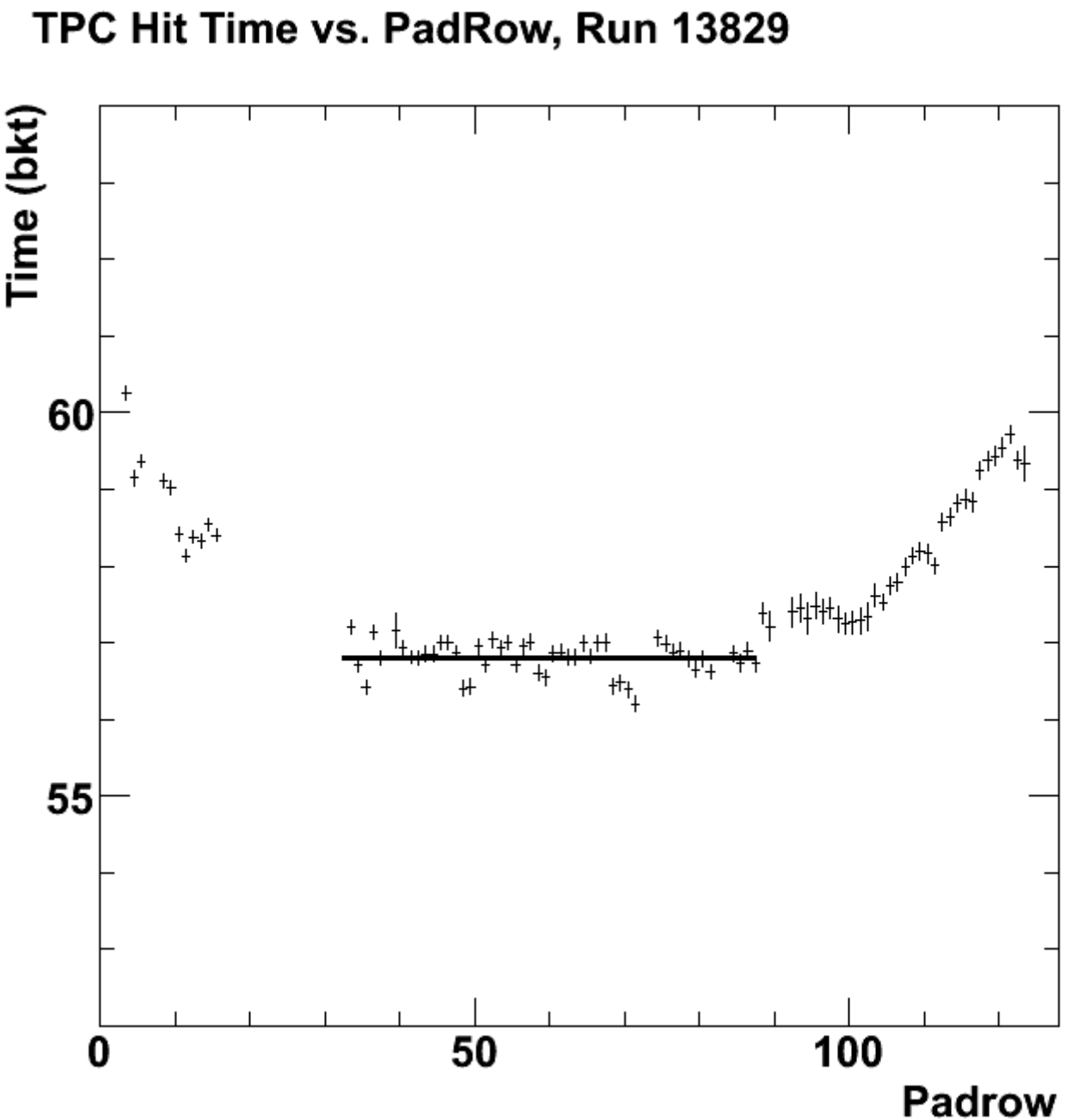
Reminder of Approach

- We select "straight" beam-like tracks in the TPC, and plot the average hit time in each pad row.
- The central pad rows are fit to a constant, and differentials w.r.t. the fit are determined for each pad row.

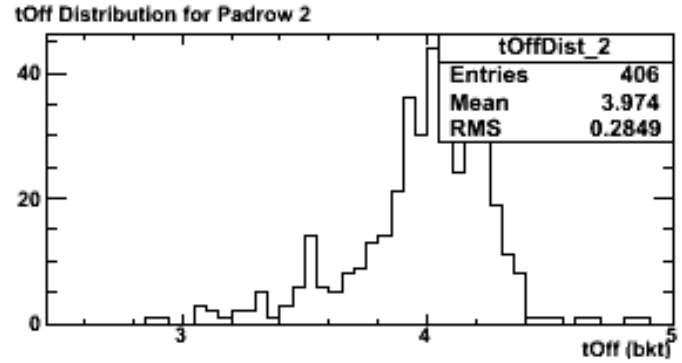


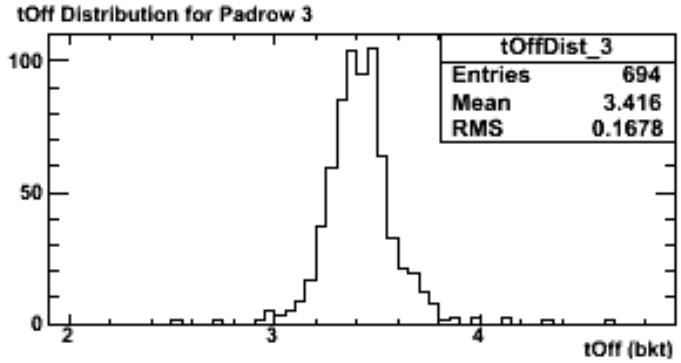
Some Observations

- The first set of plots below are the distributions of time-offsets for each pad row over all runs. Typical widths are < 0.2 buckets or 20 ns.
- The second set of plots below are time-offsets vs. run. These look pretty flat, although there is something strange going on for padrows 40-44.
- I haven't had a chance to make the plots of time-offsets vs. anode voltage.

Suggested Plan
(that is, what we are now doing)

- For the central pad rows (32-88), use the time-offsets measured for each group of runs (average group size is ~3 runs/offset). Uncertainties for each time-offset will be available from the dB table, so we can use that to estimate the uncertainty in the applied correction. Typical uncertainties are seen in the plot on slide 2.
- For all other padrows, where ExB effects are large, use the field-off values and assign an uncertainty equal to the RMS of the distribution across all field-on runs. These uncertainties would typically be < 25 ns, or < 0.2 cm.


tOff Distribution for Padrow 2
tOffDist_2
Entries 406
Mean 3.974
RMS 0.2849
tOff (bkt)


tOff Distribution for Padrow 3
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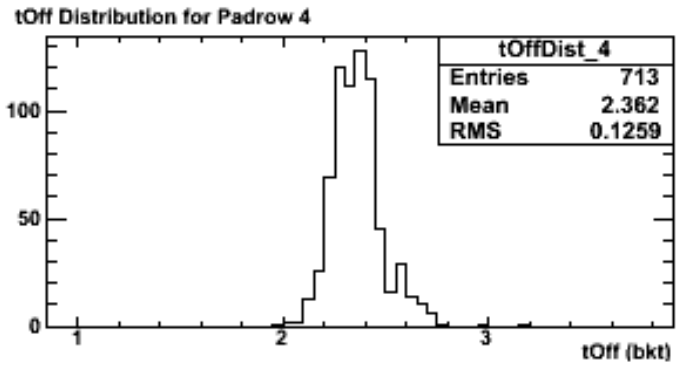
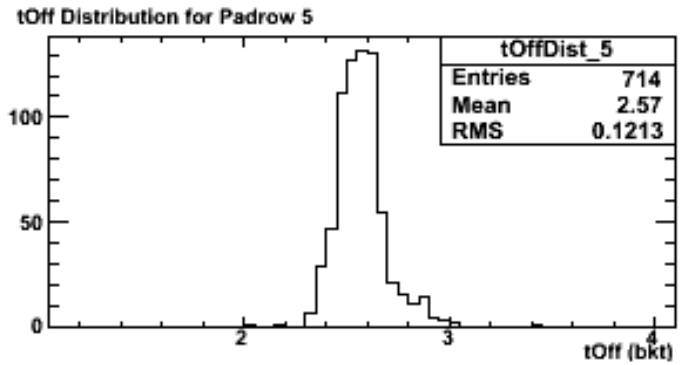
Entries 694
Mean 3.416
RMS 0.1678
tOff (bkt)


tOff Distribution for Padrow 4
tOffDist_4
Entries 713
Mean 2.362
RMS 0.1259
tOff (bkt)


tOff Distribution for Padrow 5
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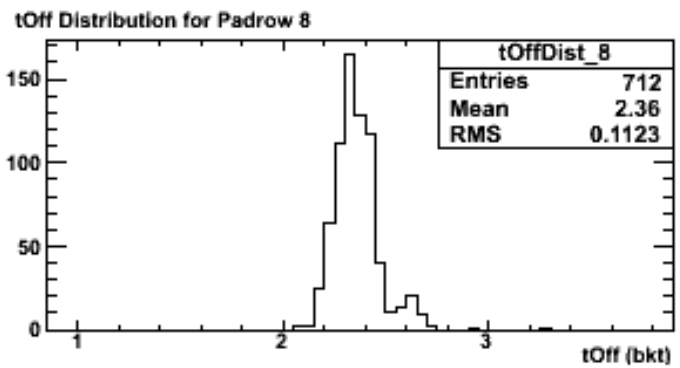
Entries 714
Mean 2.57
RMS 0.1213
tOff (bkt)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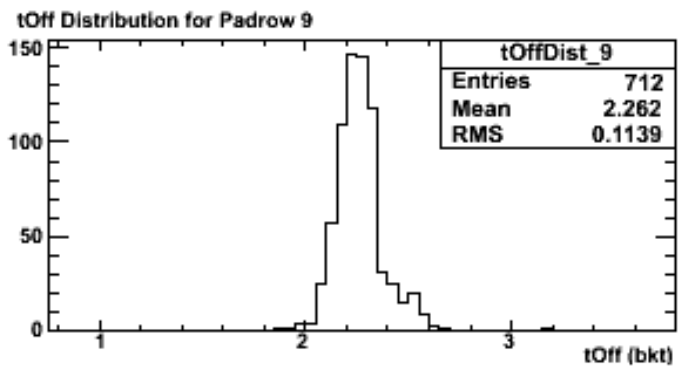
tOffDist_8
Entries 712
Mean 2.36
RMS 0.1123
tOff (bkt)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Mean 2.262
RMS 0.1139
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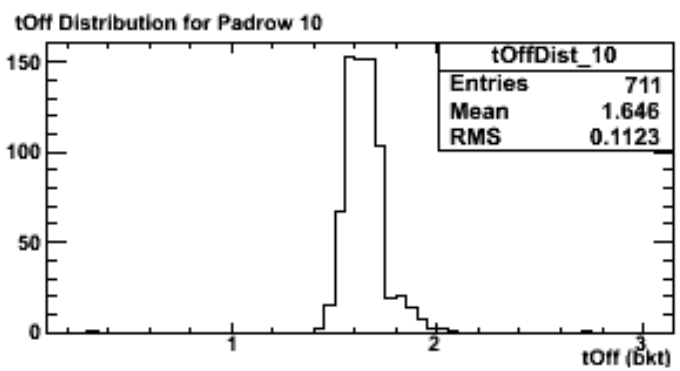
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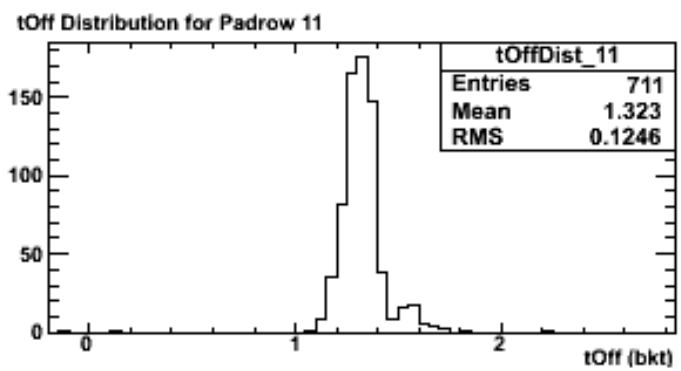
Entries 711
Mean 1.646
RMS 0.1123
tOff (bkt)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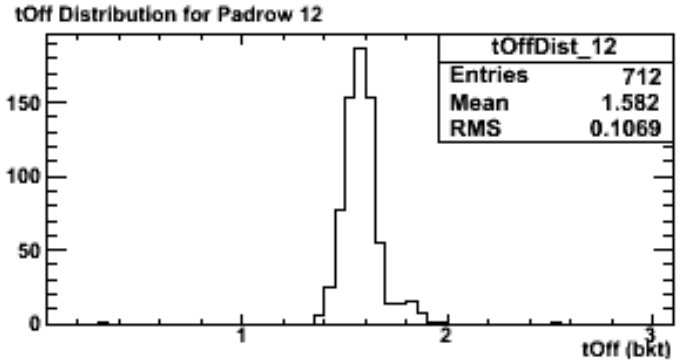
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Mean 1.582
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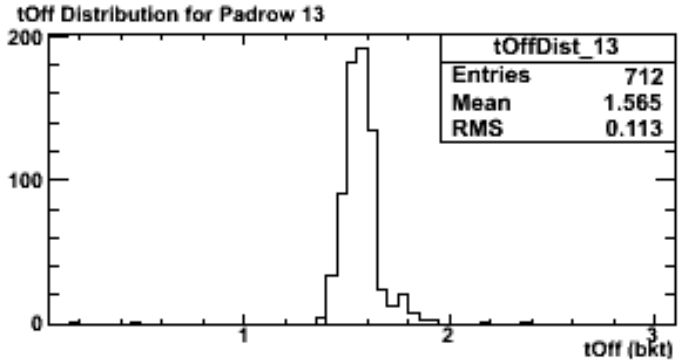
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Mean 1.565
RMS 0.113
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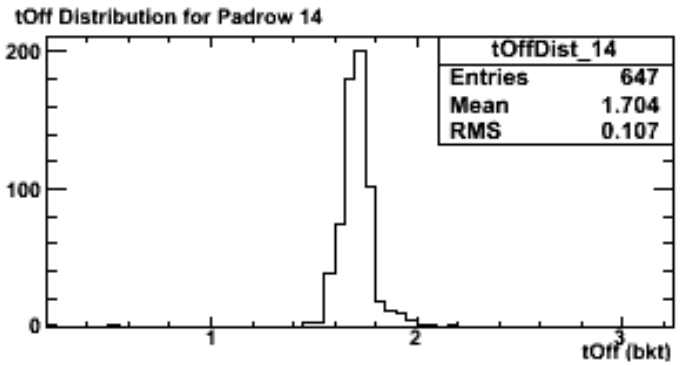
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Entries 647
Mean 1.704
RMS 0.107
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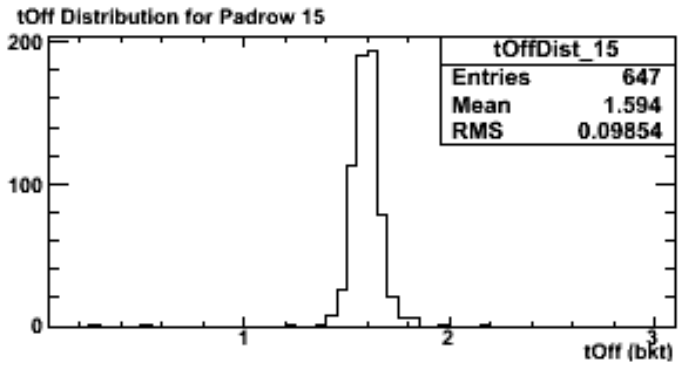
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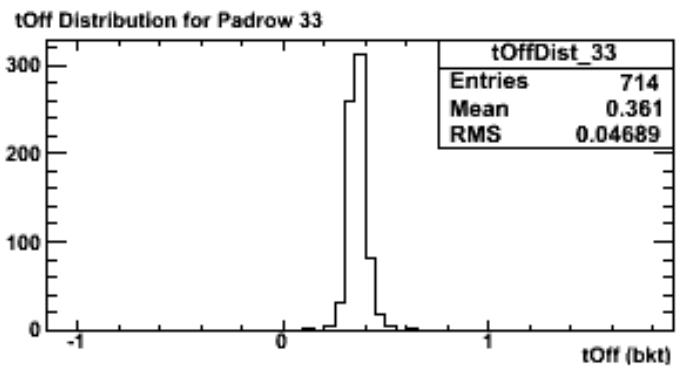
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Entries 714
Mean 0.361
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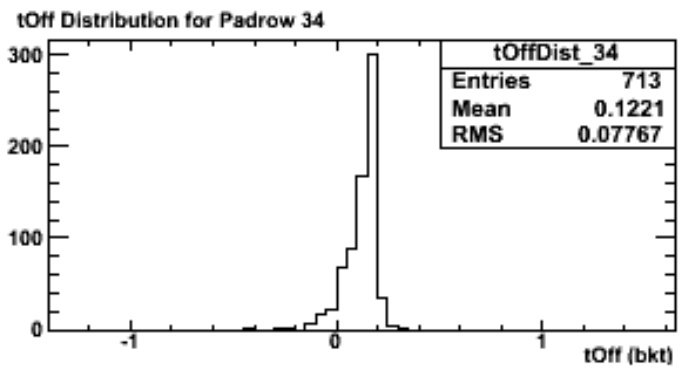
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Entries 713
Mean 0.1221
RMS 0.07767
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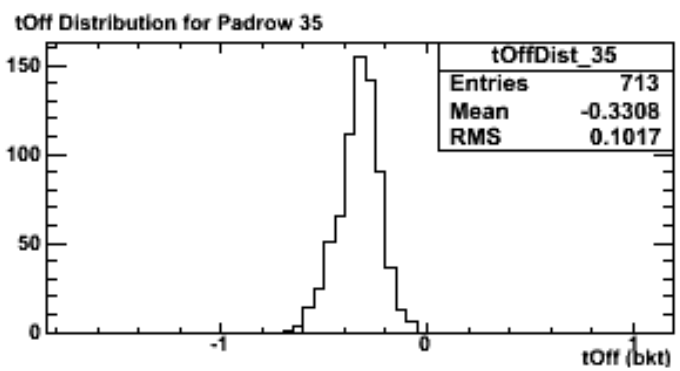
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tOffDist_35
Entries 713
Mean -0.3308
RMS 0.1017
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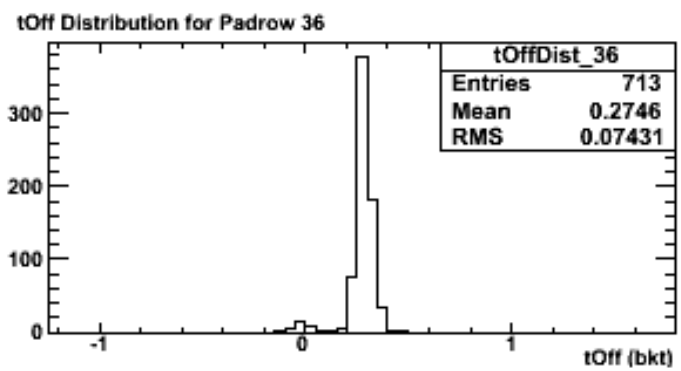
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Entries 713
Mean 0.2746
RMS 0.07431
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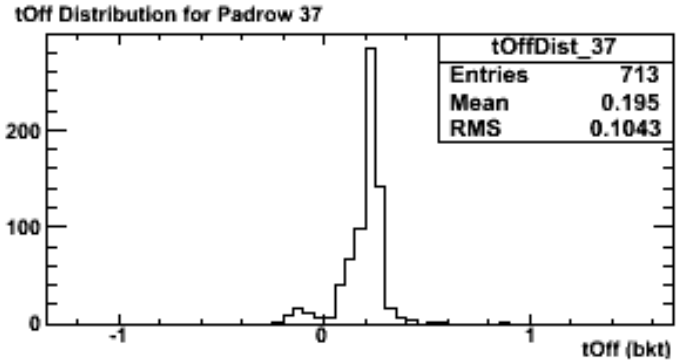
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Entries 713
Mean 0.195
RMS 0.1043
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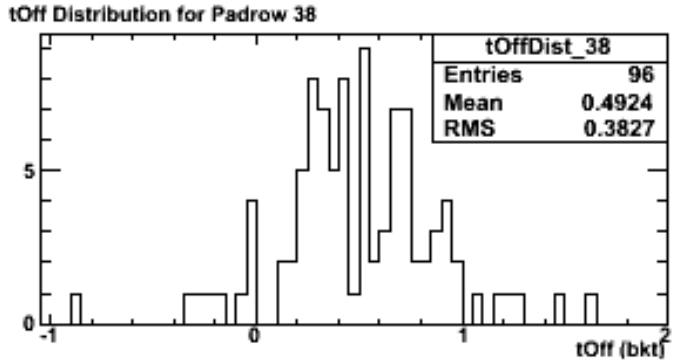
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Entries 96
Mean 0.4924
RMS 0.3827
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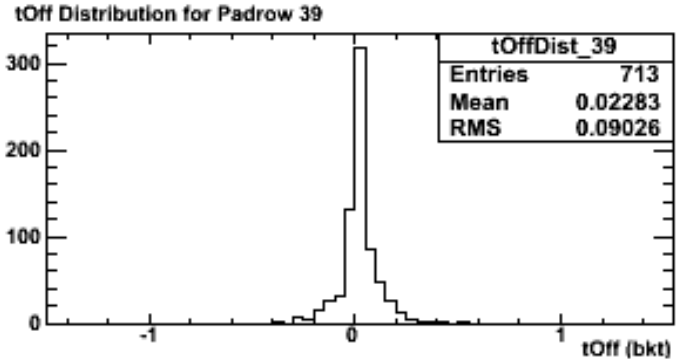
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tOffDist_39
Entries 713
Mean 0.02283
RMS 0.09026
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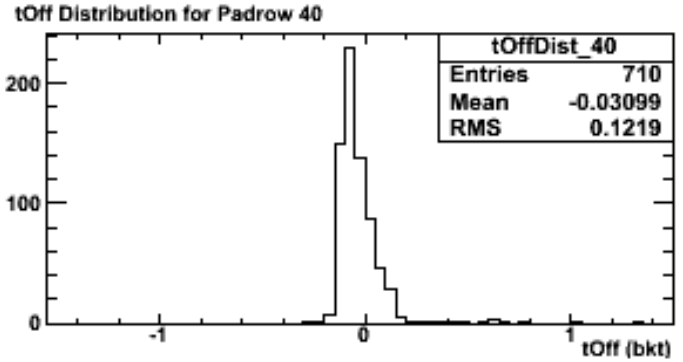
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Mean -0.03099
RMS 0.1219
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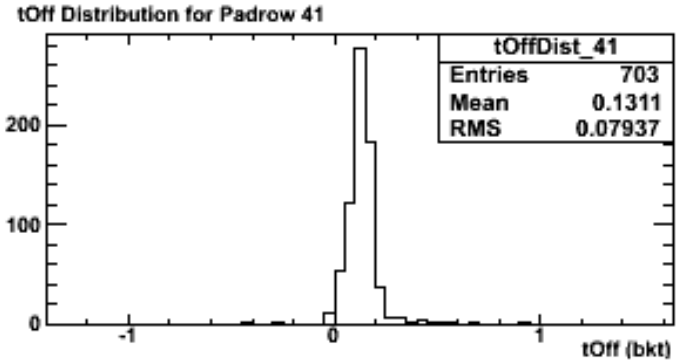
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Entries 703
Mean 0.1311
RMS 0.07937
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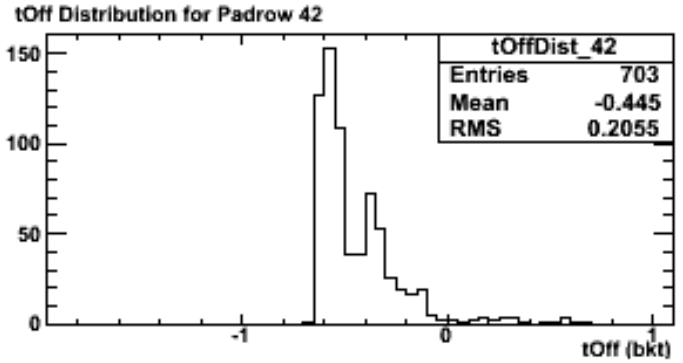
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Entries 703
Mean -0.445
RMS 0.2055
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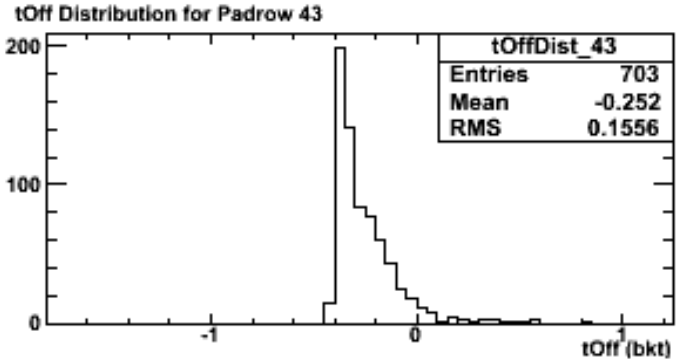
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tOffDist_43
Entries 703
Mean -0.252
RMS 0.1556
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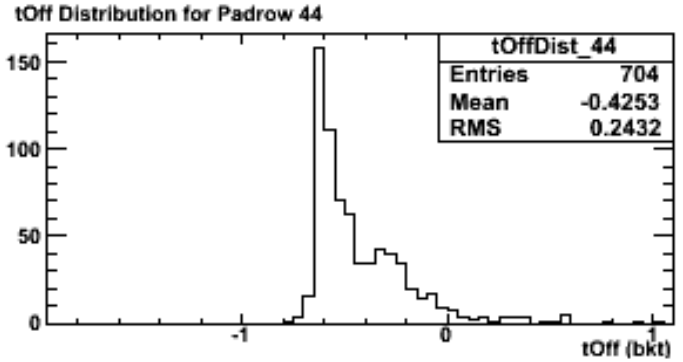
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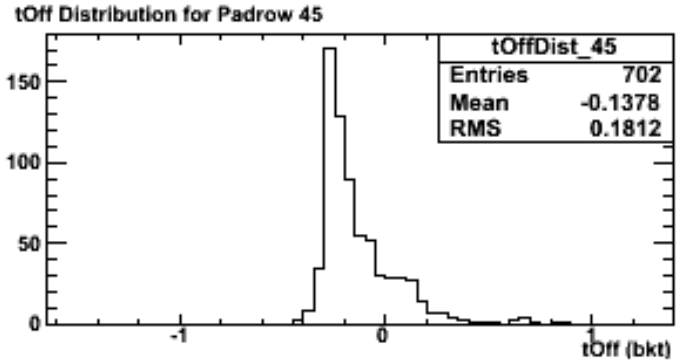
Entries 704
Mean -0.4253
RMS 0.2432
tOff (bkt)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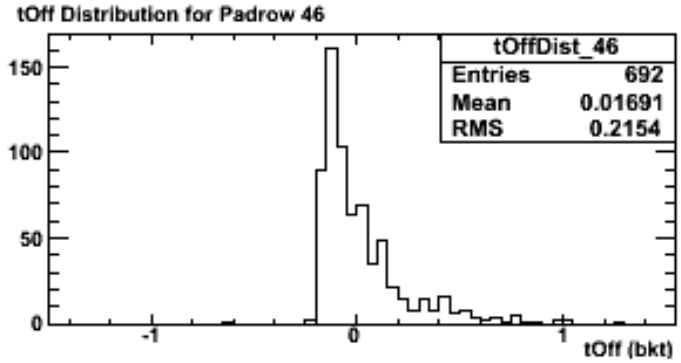
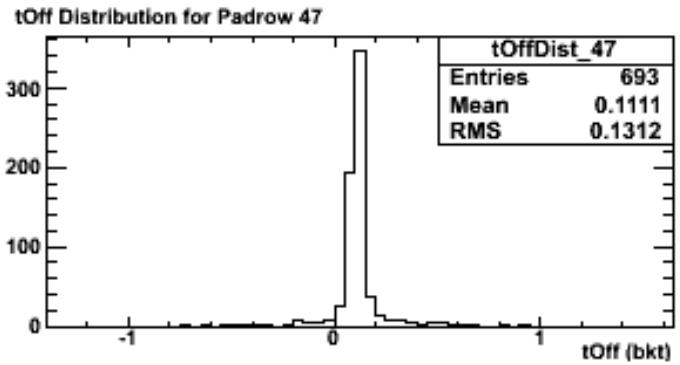
tOffDist_45
Entries 702
Mean -0.1378
RMS 0.1812
tOff (bkt)


tOff Distribution for Padrow 46
tOffDist_46
Entries 692
Mean 0.01691
RMS 0.2154
tOff (bkt)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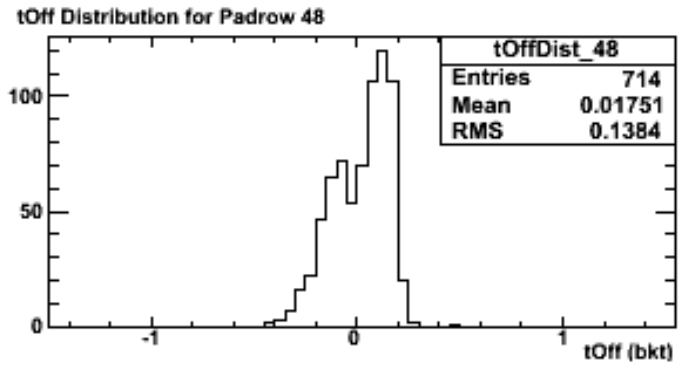
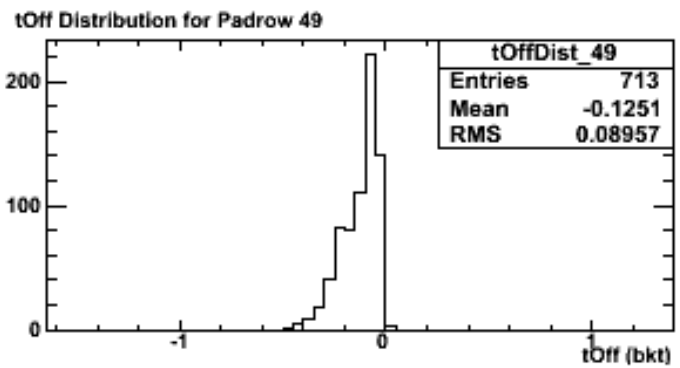
tOffDist_47
Entries 693
Mean 0.1111
RMS 0.1312
tOff (bkt)


tOff Distribution for Padrow 48
tOffDist_48
Entries 714
Mean 0.01751
RMS 0.1384
tOff (bkt)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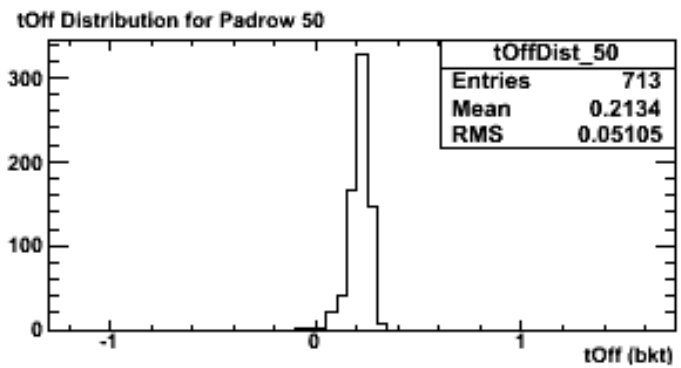
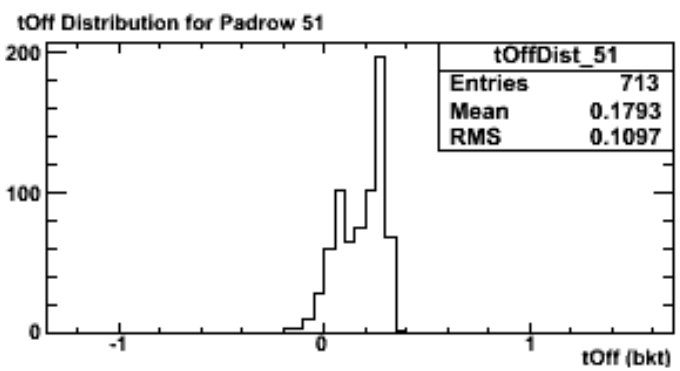
tOffDist_49
Entries 713
Mean -0.1251
RMS 0.08957
tOff (bkt)


tOff Distribution for Padrow 50
tOffDist_50
Entries 713
Mean 0.2134
RMS 0.05105
tOff (bkt)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Entries 713
Mean 0.1793
RMS 0.1097
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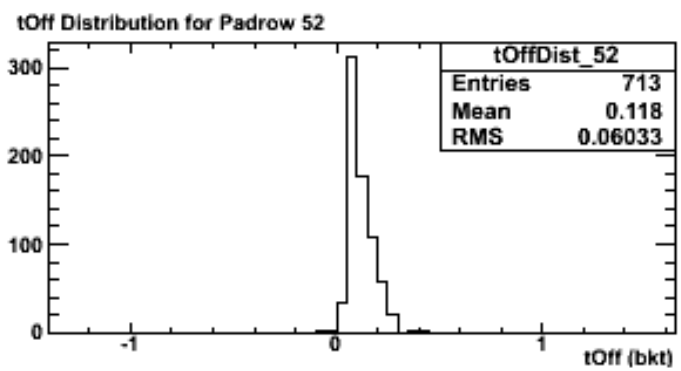
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Entries 713
Mean 0.118
RMS 0.06033
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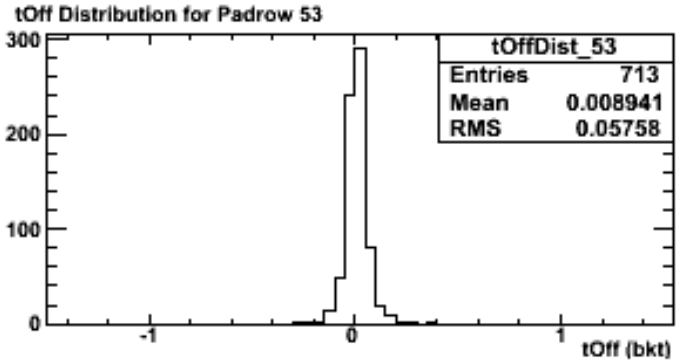
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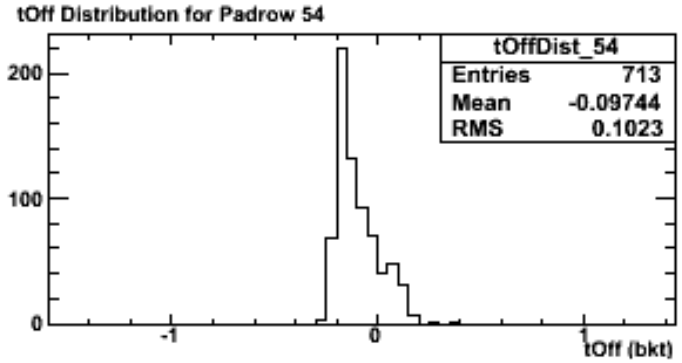
tOffDist_53
Entries 713
Mean 0.008941
RMS 0.05758
tOff (bkt)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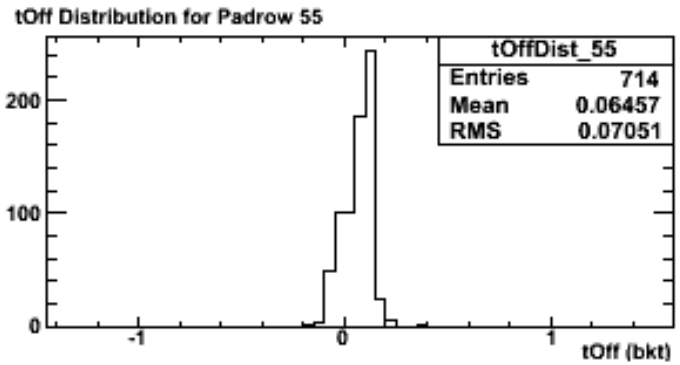
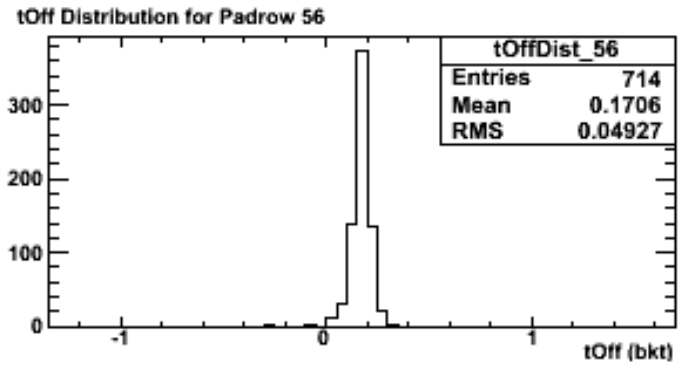
tOffDist_54
Entries 713
Mean -0.09744
RMS 0.1023
tOff (bkt)


tOff Distribution for Padrow 55
tOffDist_55
Entries 714
Mean 0.06457
RMS 0.07051
tOff (bkt)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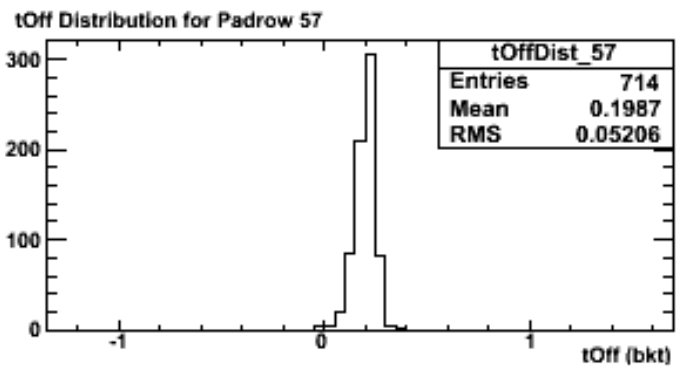
tOffDist_56
Entries 714
Mean 0.1706
RMS 0.04927
tOff (bkt)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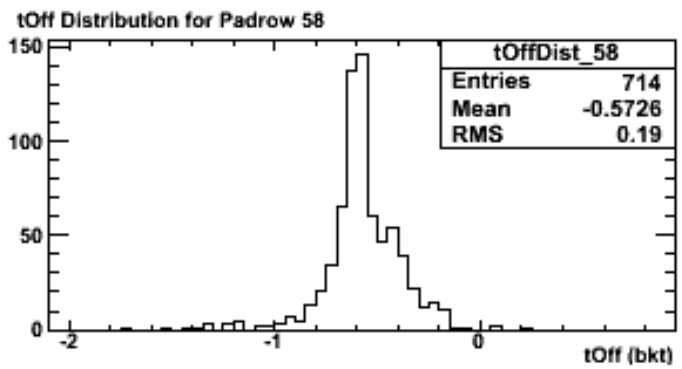
tOffDist_57
Entries 714
Mean 0.1987
RMS 0.05206
tOff (bkt)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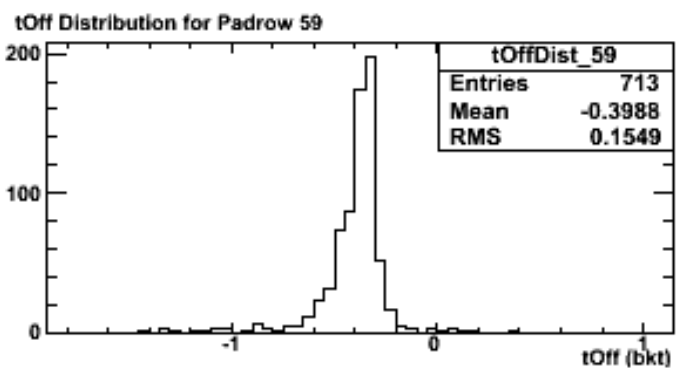
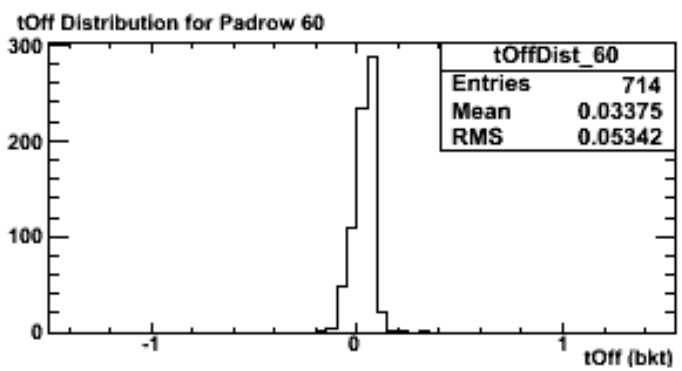
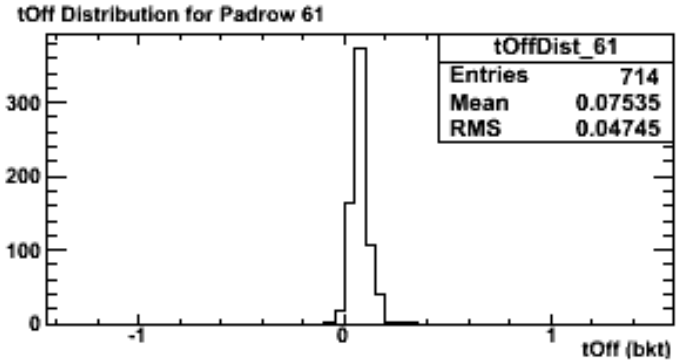
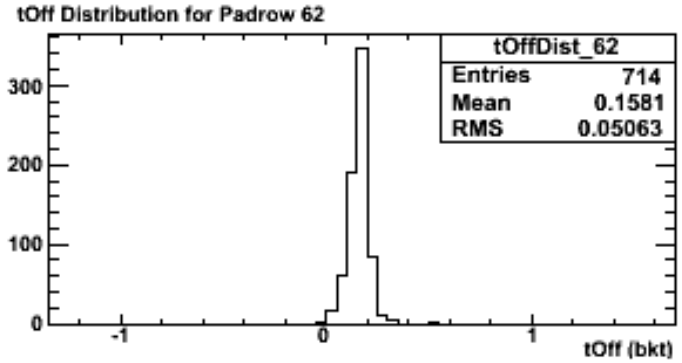
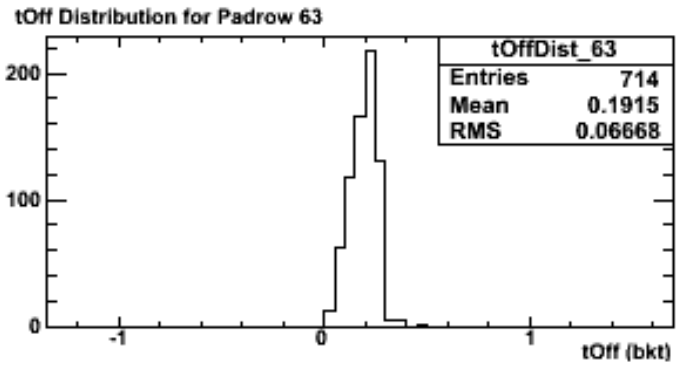
tOffDist_58
Entries 714
Mean -0.5726
RMS 0.19
tOff (bkt)

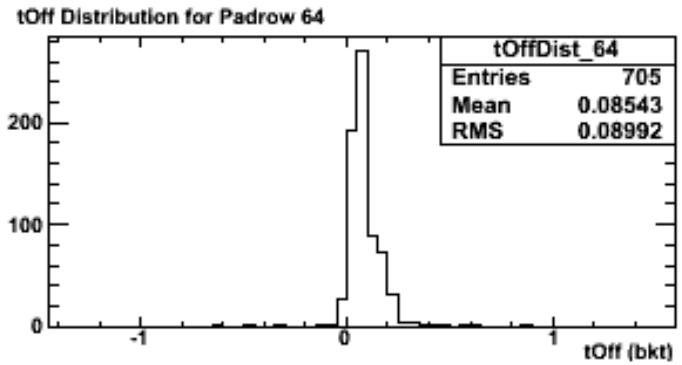

tOff Distribution for Padrow 59
tOffDist_59
Entries 713
Mean -0.3988
RMS 0.1549
tOff (bkt)

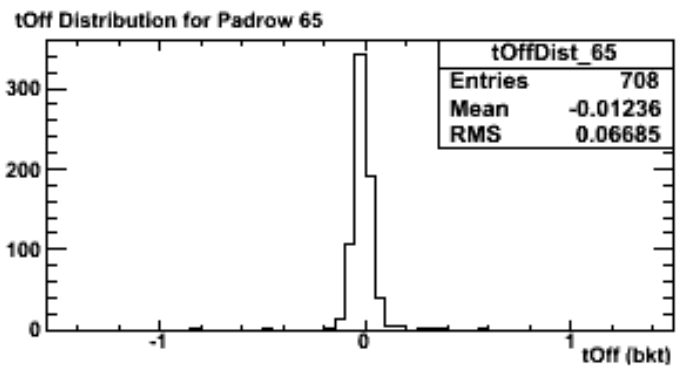

tOff Distribution for Padrow 60
tOffDist_60
Entries 714
Mean 0.03375
RMS 0.05342
tOff (bkt)


tOff Distribution for Padrow 61
tOffDist_61
Entries 714
Mean 0.07535
RMS 0.04745
tOff (bkt)


tOff Distribution for Padrow 62
tOffDist_62
Entries 714
Mean 0.1581
RMS 0.05063
tOff (bkt)


tOff Distribution for Padrow 63
tOffDist_63
Entries 714
Mean 0.1915
RMS 0.06668
tOff (bkt)


tOff Distribution for Padrow 64
tOffDist_64
Entries 705
Mean 0.08543
RMS 0.08992
tOff (bkt)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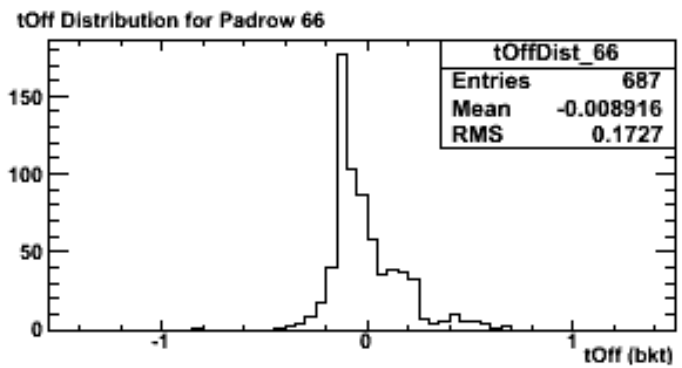
Entries 708
Mean -0.01236
RMS 0.06685
tOff (bkt)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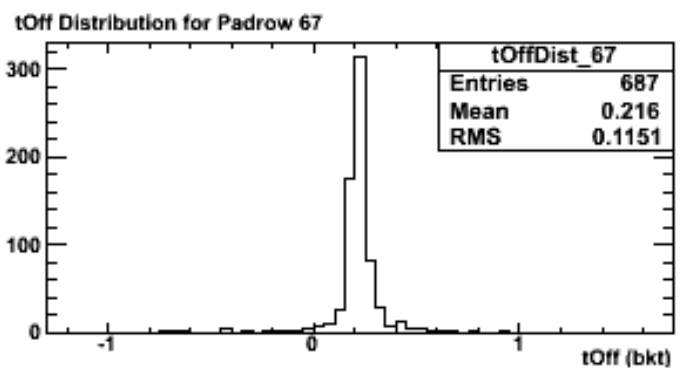
tOffDist_66
Entries 687
Mean -0.008916
RMS 0.1727
tOff (bkt)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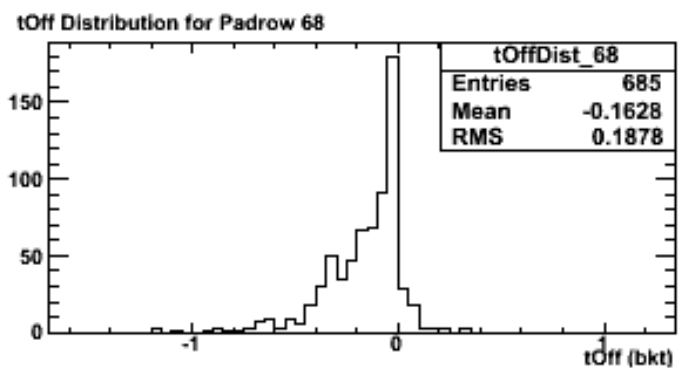
tOffDist_67
Entries 687
Mean 0.216
RMS 0.1151
tOff (bkt)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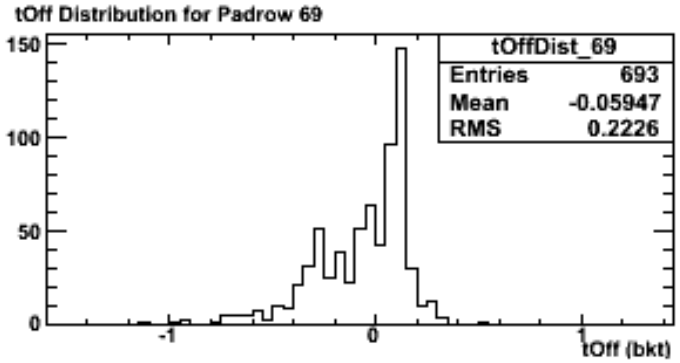
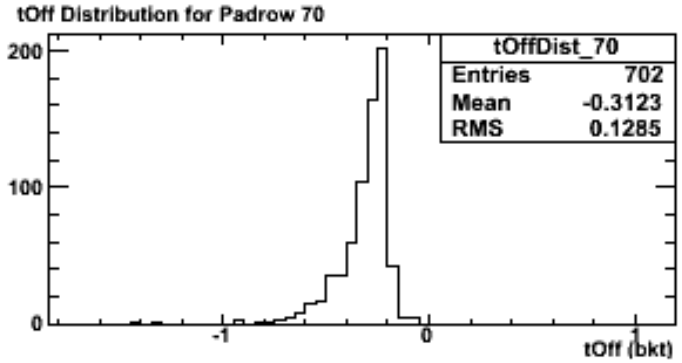
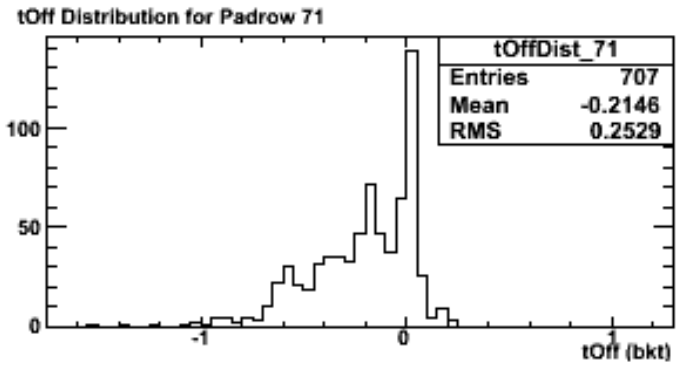
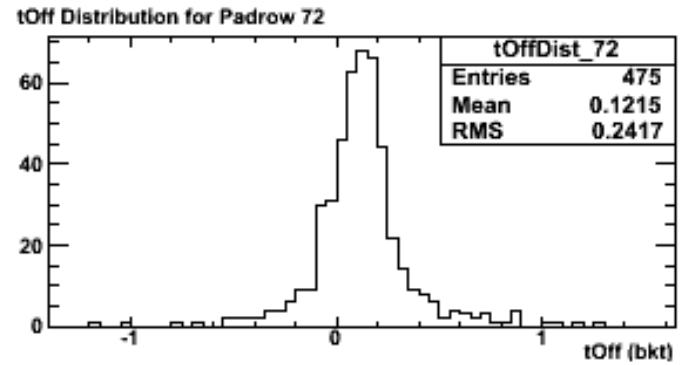
tOffDist_68
Entries 685
Mean -0.1628
RMS 0.1878
tOff (bkt)


tOff Distribution for Padrow 69
tOffDist_69
Entries 693
Mean -0.05947
RMS 0.2226
tOff (bkt)


tOff Distribution for Padrow 70
tOffDist_70
Entries 702
Mean -0.3123
RMS 0.1285
tOff (bkt)


tOff Distribution for Padrow 71
tOffDist_71
Entries 707
Mean -0.2146
RMS 0.2529
tOff (bkt)


tOff Distribution for Padrow 72
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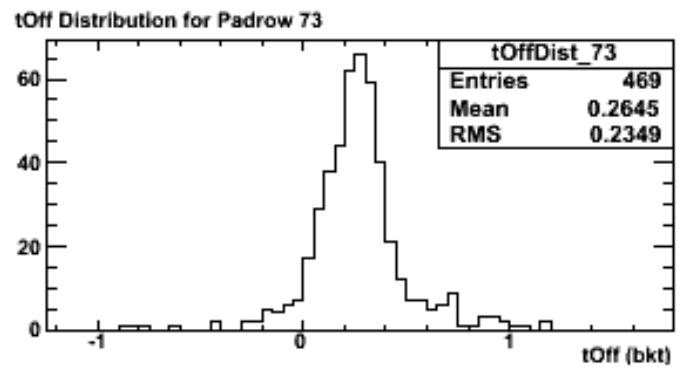
Entries 475
Mean 0.1215
RMS 0.2417
tOff (bkt)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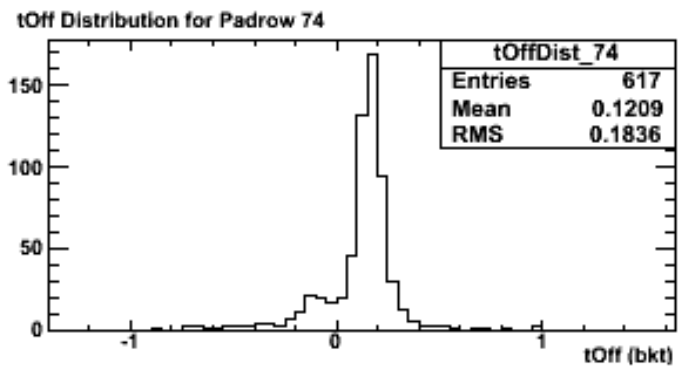
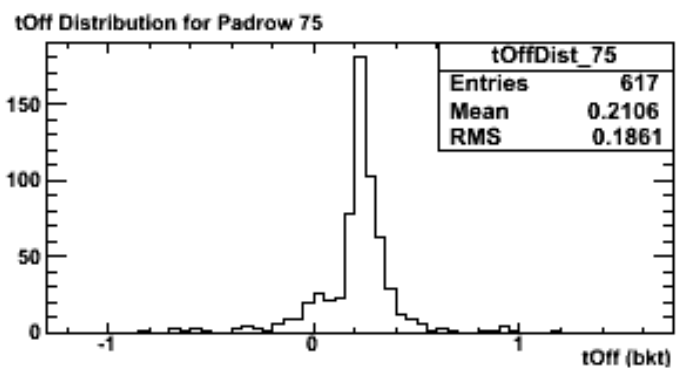
tOffDist_73
Entries 469
Mean 0.2645
RMS 0.2349
tOff (bkt)


tOff Distribution for Padrow 74
tOffDist_74
Entries 617
Mean 0.1209
RMS 0.1836
tOff (bkt)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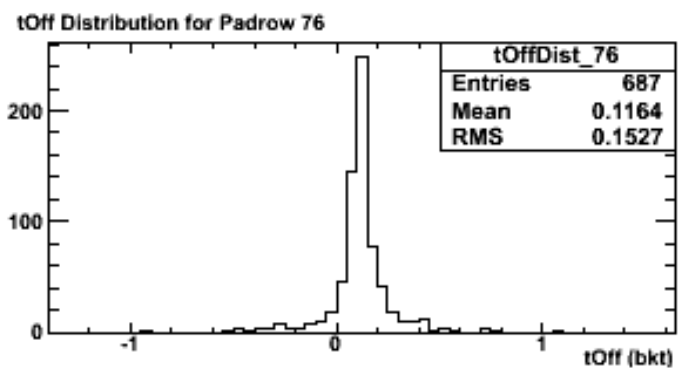
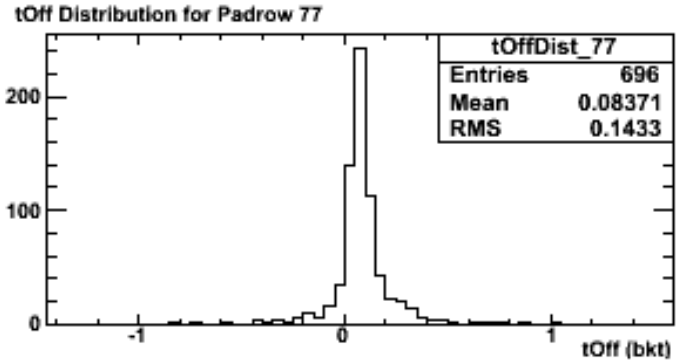
tOffDist_75
Entries 617
Mean 0.2106
RMS 0.1861
tOff (bkt)


tOff Distribution for Padrow 76
tOffDist_76
Entries 687
Mean 0.1164
RMS 0.1527
tOff (bkt)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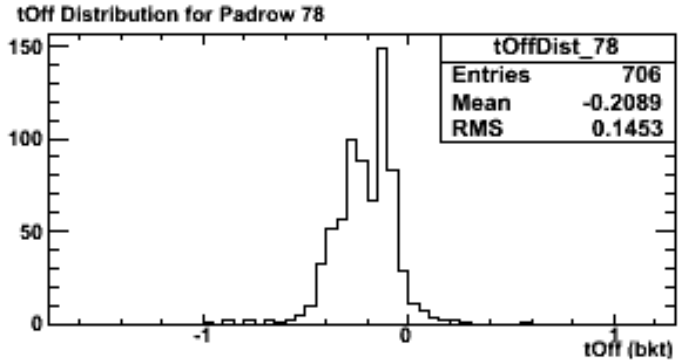
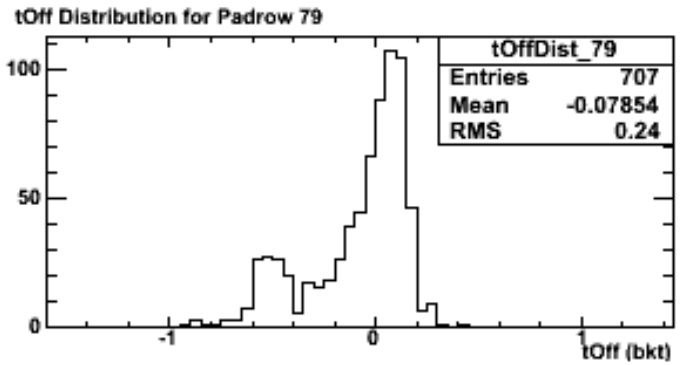
tOffDist_77
Entries 696
Mean 0.08371
RMS 0.1433
tOff (bkt)


tOff Distribution for Padrow 78
tOffDist_78
Entries 706
Mean -0.2089
RMS 0.1453
tOff (bkt)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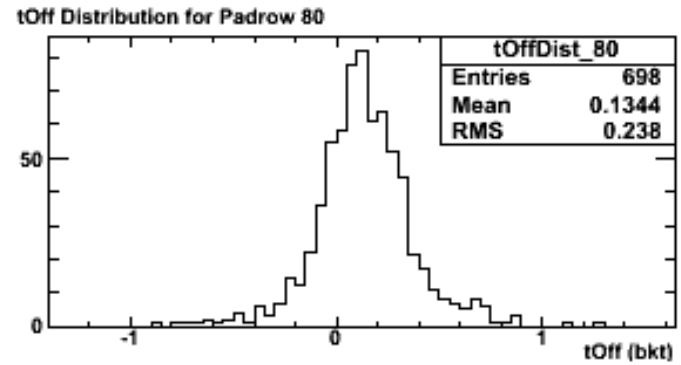
tOffDist_79
Entries 707
Mean -0.07854
RMS 0.24
tOff (bkt)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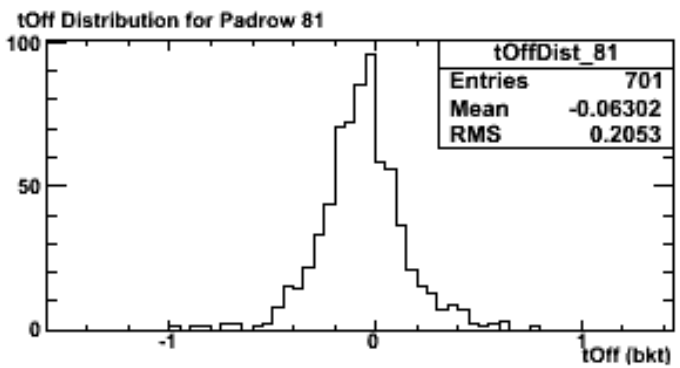
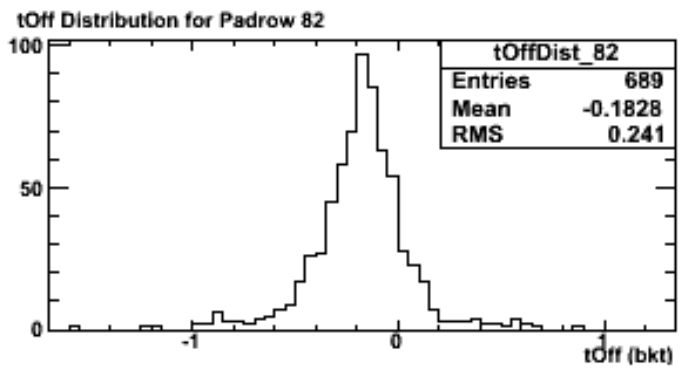
tOffDist_80
Entries 698
Mean 0.1344
RMS 0.238
tOff (bkt)


tOff Distribution for Padrow 81
tOffDist_81
Entries 701
Mean -0.06302
RMS 0.2053
tOff (bkt)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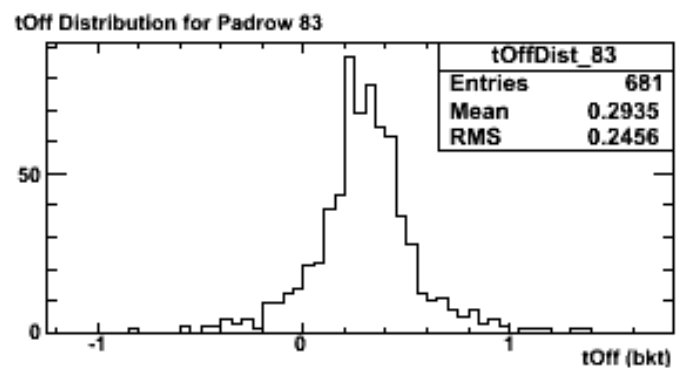
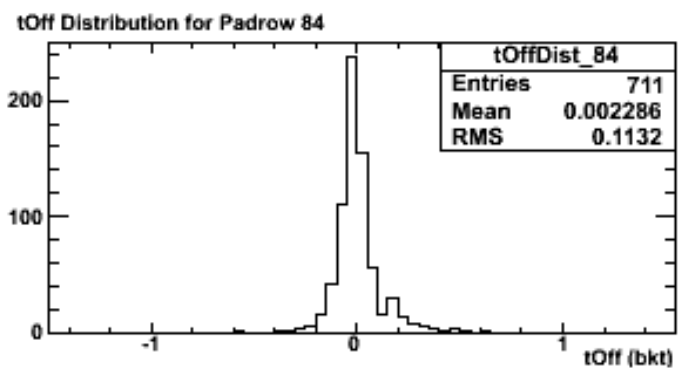
tOffDist_82
Entries 689
Mean -0.1828
RMS 0.241
tOff (bkt)


tOff Distribution for Padrow 83
tOffDist_83
Entries 681
Mean 0.2935
RMS 0.2456
tOff (bkt)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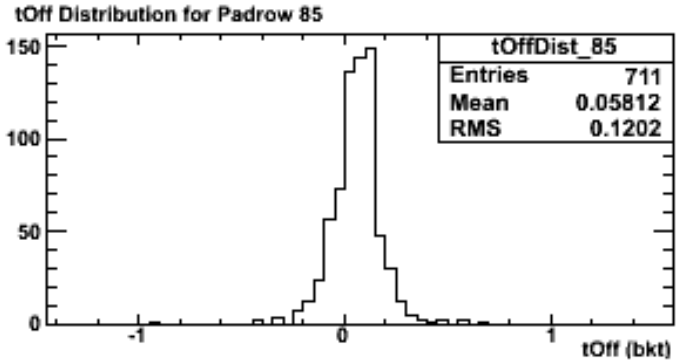
tOffDist_84
Entries 711
Mean 0.002286
RMS 0.1132
tOff (bkt)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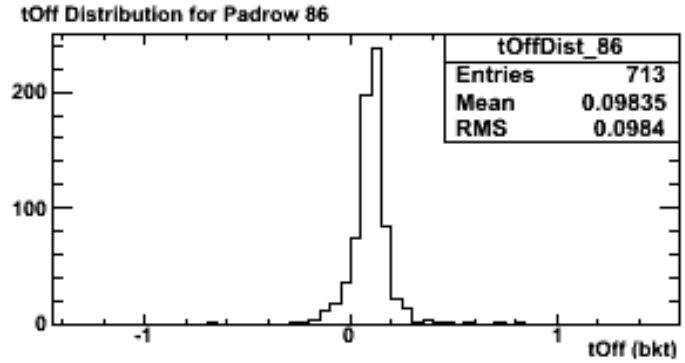
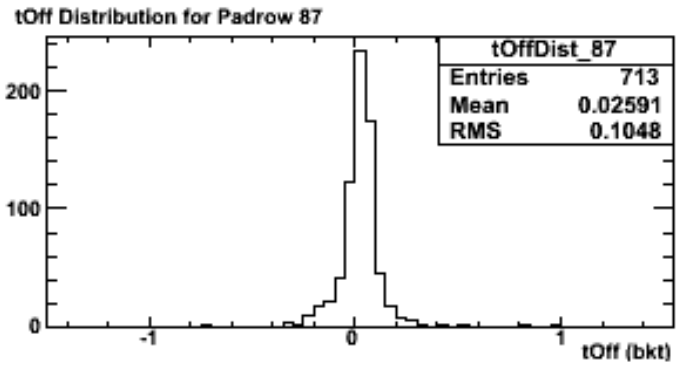
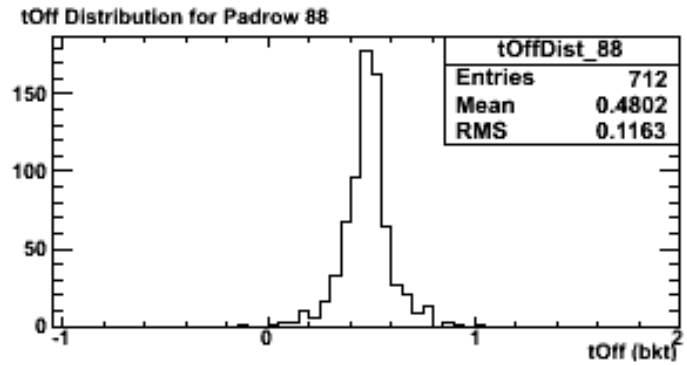
tOffDist_85
Entries 711
Mean 0.05812
RMS 0.1202
tOff (bkt)


tOff Distribution for Padrow 86
tOffDist_86
Entries 713
Mean 0.09835
RMS 0.0984
tOff (bkt)


tOff Distribution for Padrow 87
tOffDist_87
Entries 713
Mean 0.02591
RMS 0.1048
tOff (bkt)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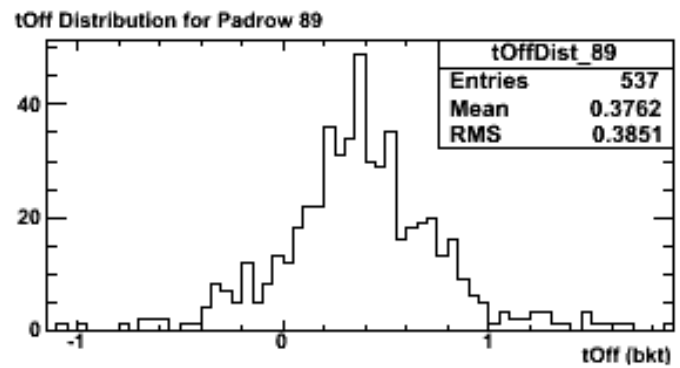
tOffDist_88
Entries 712
Mean 0.4802
RMS 0.1163
tOff (bkt)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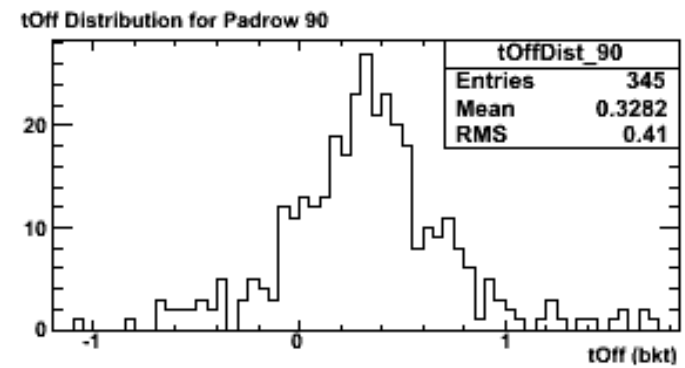
tOffDist_89
Entries 537
Mean 0.3762
RMS 0.3851
tOff (bkt)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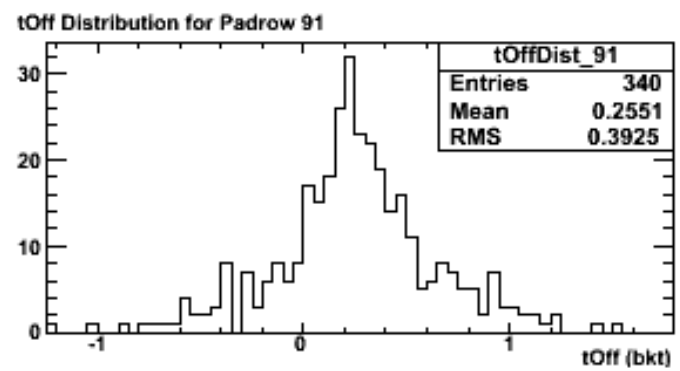
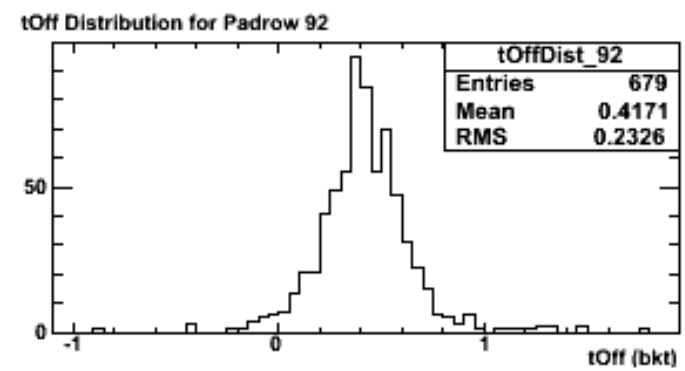
tOffDist_90
Entries 345
Mean 0.3282
RMS 0.41
tOff (bkt)


tOff Distribution for Padrow 91
tOffDist_91
Entries 340
Mean 0.2551
RMS 0.3925
tOff (bkt)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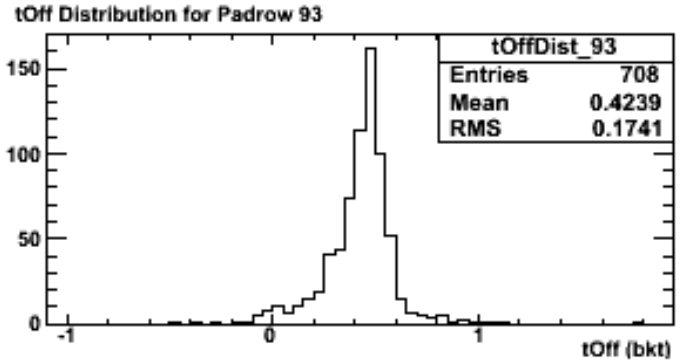
tOffDist_92
Entries 679
Mean 0.4171
RMS 0.2326
tOff (bkt)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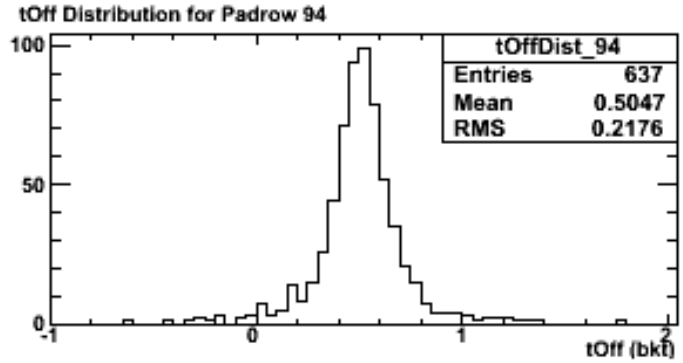
tOffDist_93
Entries 708
Mean 0.4239
RMS 0.1741
tOff (bkt)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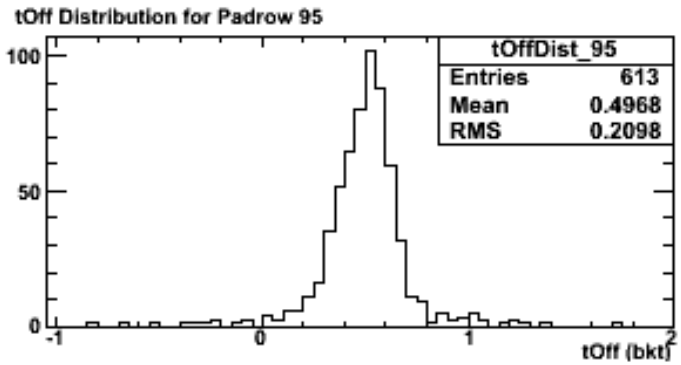
tOffDist_94
Entries 637
Mean 0.5047
RMS 0.2176
tOff (bkt)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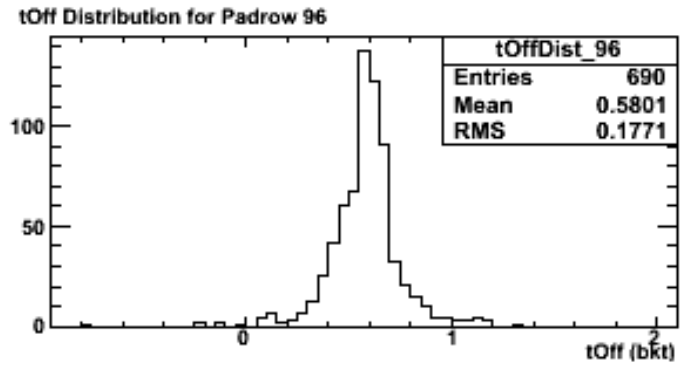
Entries 613
Mean 0.4968
RMS 0.2098
tOff (bkt)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tOffDist_96
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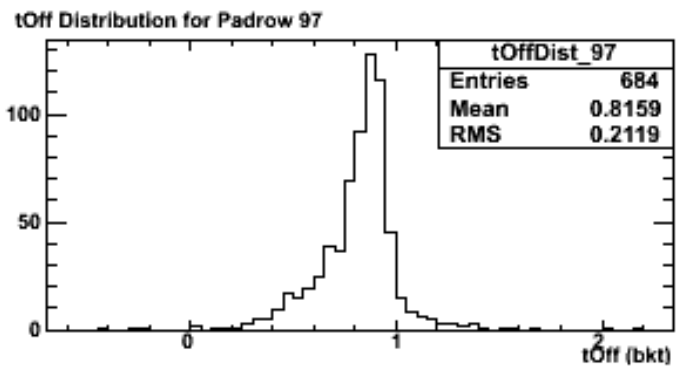
Mean 0.5801
RMS 0.1771
tOff (bkt)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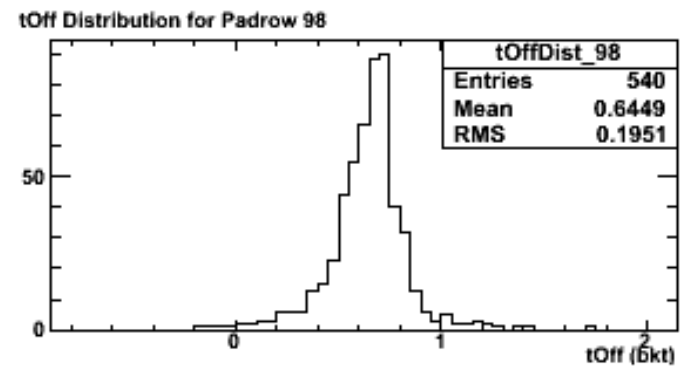
Mean 0.8159
RMS 0.2119
tOff (bkt)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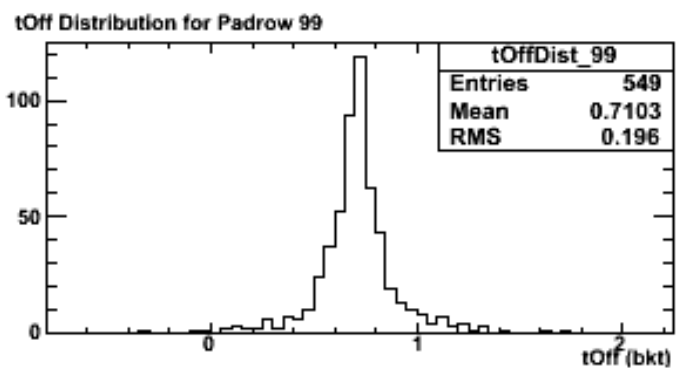
tOffDist_98
Entries 540
Mean 0.6449
RMS 0.1951
tOff (bkt)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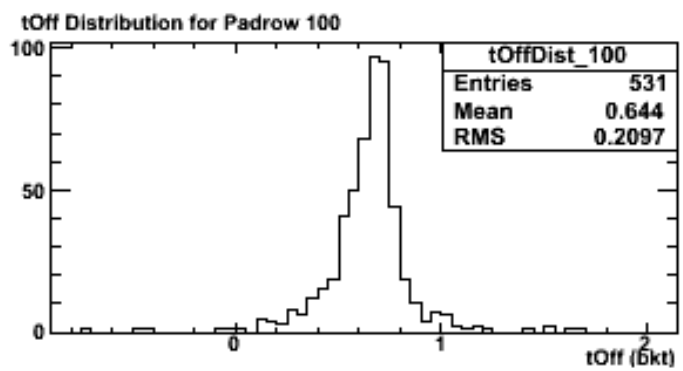
tOffDist_99
Entries 549
Mean 0.7103
RMS 0.196
tOff (bkt)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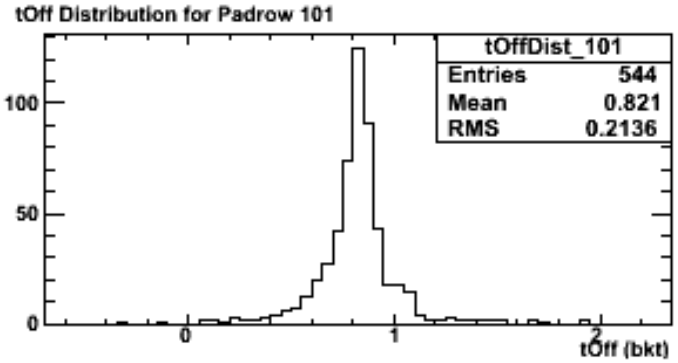
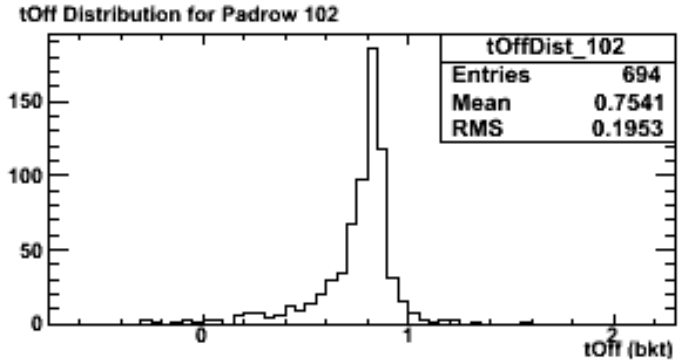
tOffDist_100
Entries 531
Mean 0.644
RMS 0.2097
tOff (bkt)


tOff Distribution for Padrow 101
tOffDist_101
Entries 544
Mean 0.821
RMS 0.2136
tOff (bkt)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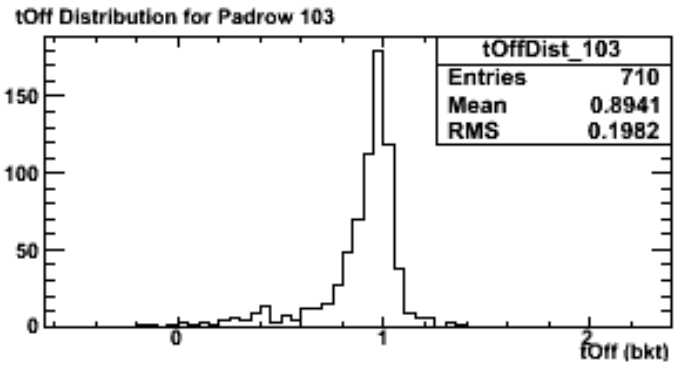
Entries 694
Mean 0.7541
RMS 0.1953
tOff (bkt)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tOffDist_103
Entries 710
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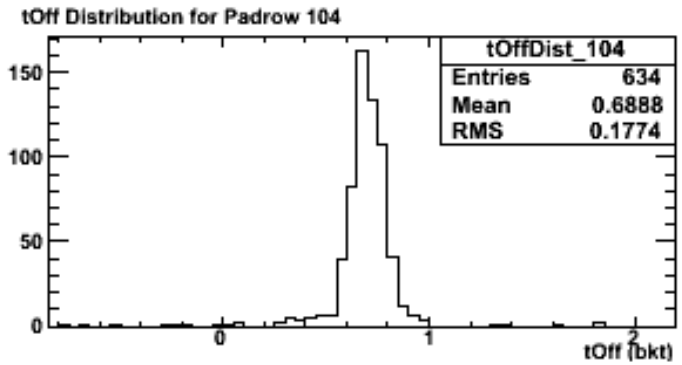
RMS 0.1982
tOff (bkt)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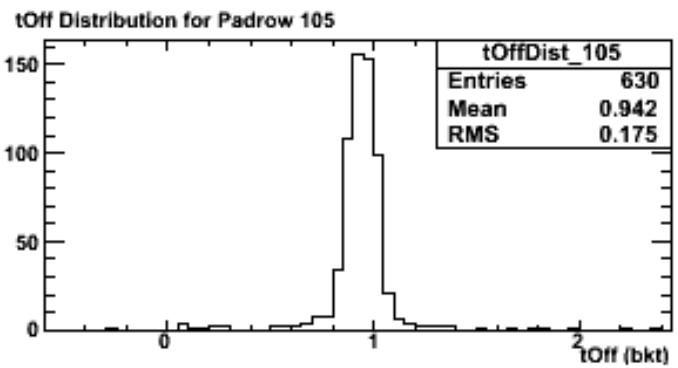
tOffDist_104
Entries 634
Mean 0.6888
RMS 0.1774
tOff (bkt)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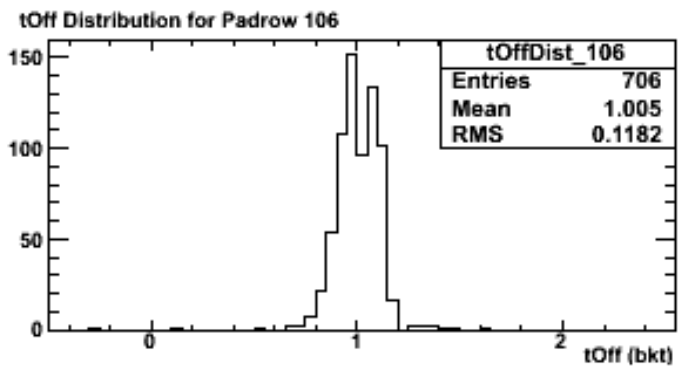
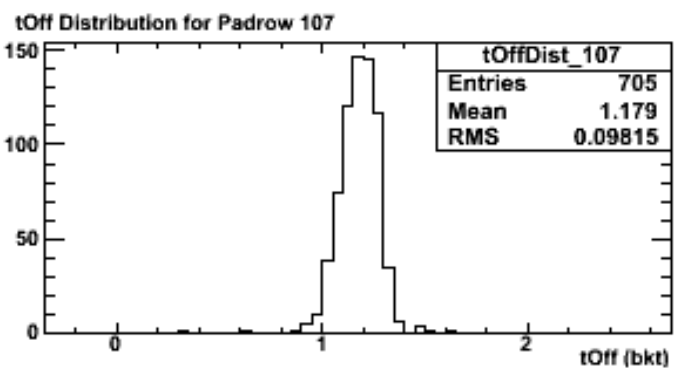
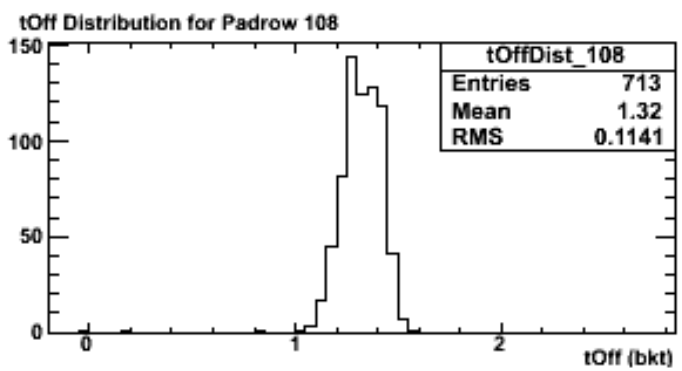
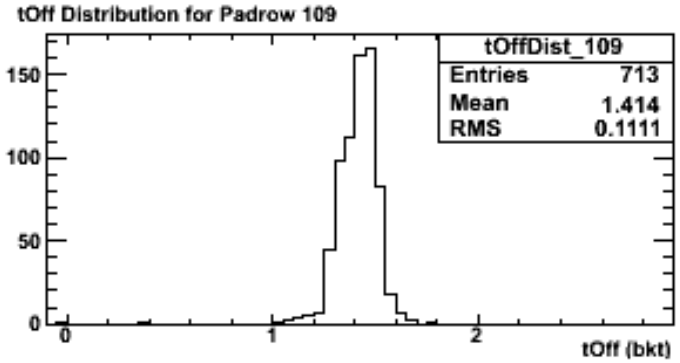
tOffDist_105
Entries 630
Mean 0.942
RMS 0.175
tOff (bkt)


tOff Distribution for Padrow 106
tOffDist_106
Entries 706
Mean 1.005
RMS 0.1182
tOff (bkt)


tOff Distribution for Padrow 107
tOffDist_107
Entries 705
Mean 1.179
RMS 0.09815
tOff (bkt)


tOff Distribution for Padrow 108
tOffDist_108
Entries 713
Mean 1.32
RMS 0.1141
tOff (bkt)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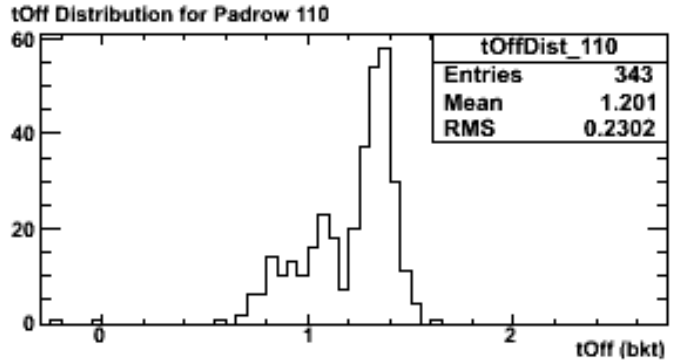
tOffDist_109
Entries 713
Mean 1.414
RMS 0.1111
tOff (bkt)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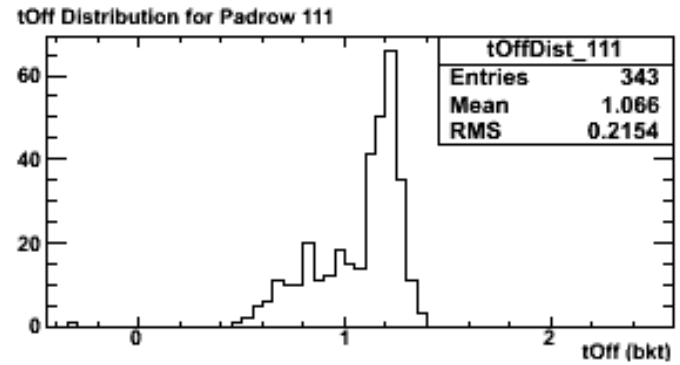
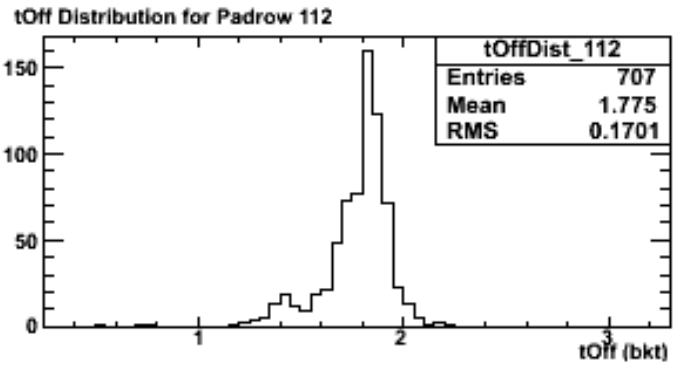
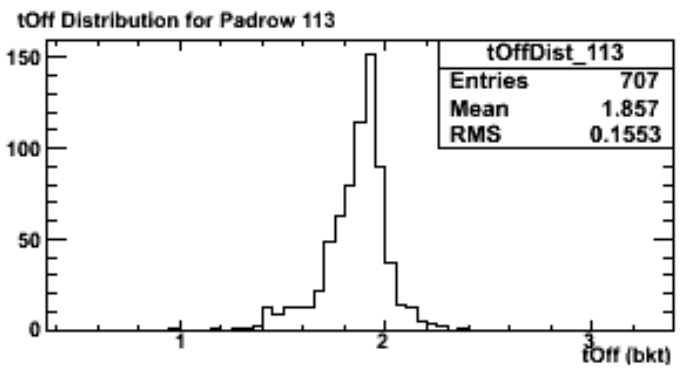
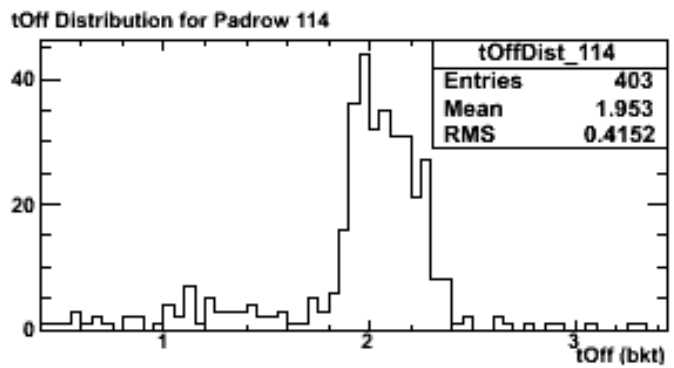
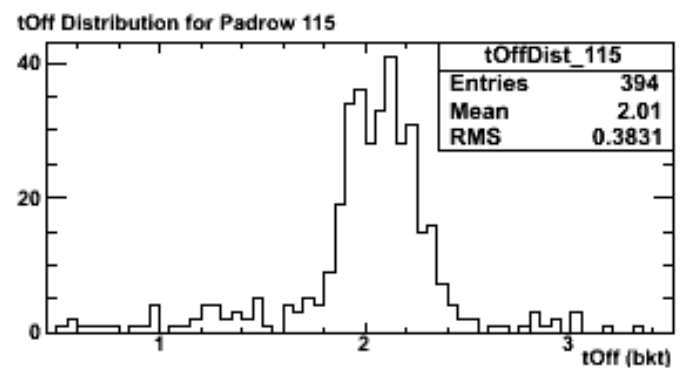
tOffDist_110
Entries 343
Mean 1.201
RMS 0.2302
tOff (bkt)

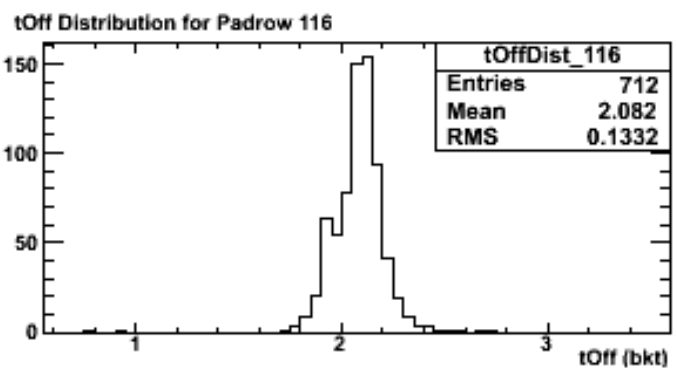

tOff Distribution for Padrow 111
tOffDist_111
Entries 343
Mean 1.066
RMS 0.2154
tOff (bkt)

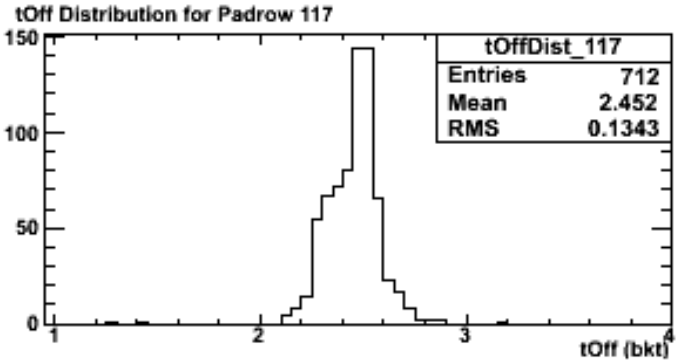

tOff Distribution for Padrow 112
tOffDist_112
Entries 707
Mean 1.775
RMS 0.1701
tOff (bkt)

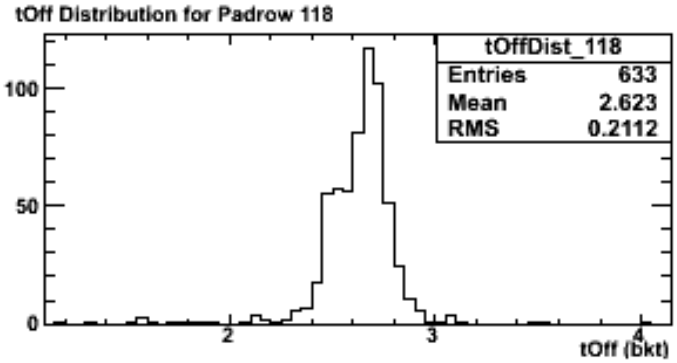

tOff Distribution for Padrow 113
tOffDist_113
Entries 707
Mean 1.857
RMS 0.1553
tOff (bkt)

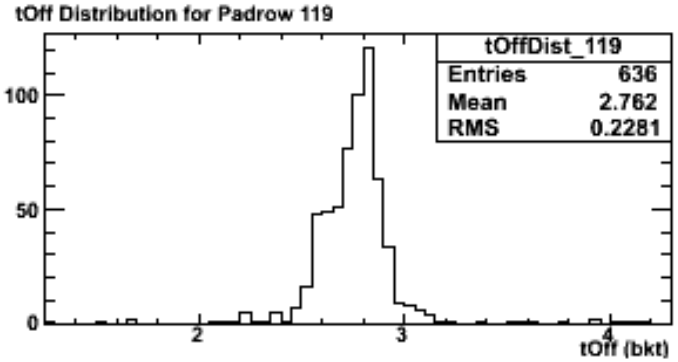

tOff Distribution for Padrow 114
tOffDist_114
Entries 403
Mean 1.953
RMS 0.4152
tOff (bkt)

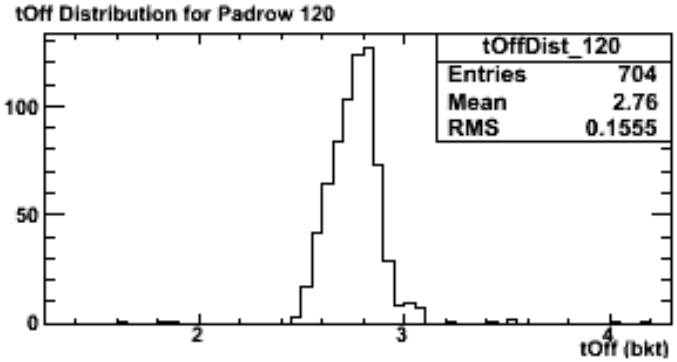

tOff Distribution for Padrow 115
tOffDist_115
Entries 394
Mean 2.01
RMS 0.3831
tOff (bkt)

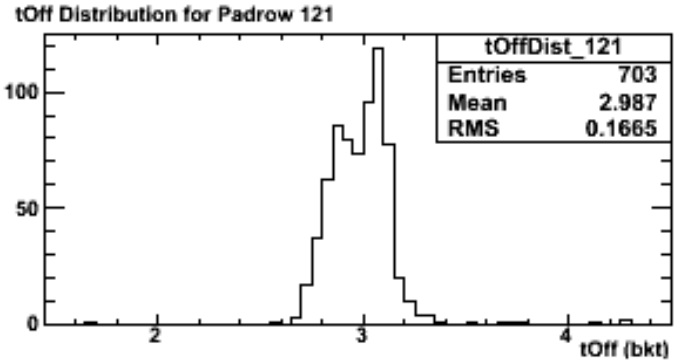

tOff Distribution for Padrow 116
tOffDist_116
Entries 712
Mean 2.082
RMS 0.1332
tOff (bkt)

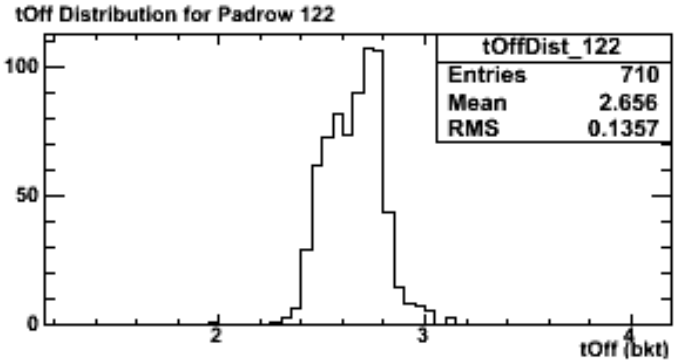

tOff Distribution for Padrow 117
tOffDist_117
Entries 712
Mean 2.452
RMS 0.1343
tOff (bkt)

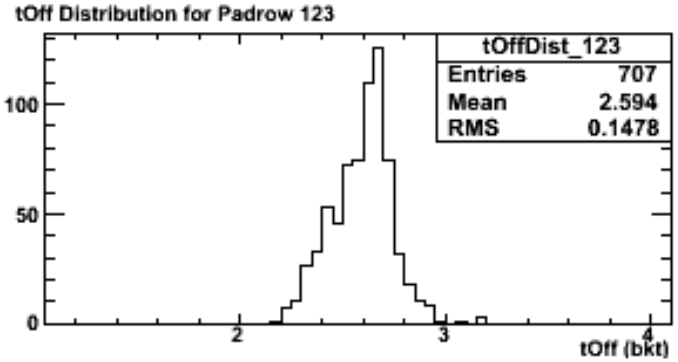

tOff Distribution for Padrow 118
tOffDist_118
Entries 633
Mean 2.623
RMS 0.2112
tOff (bkt)

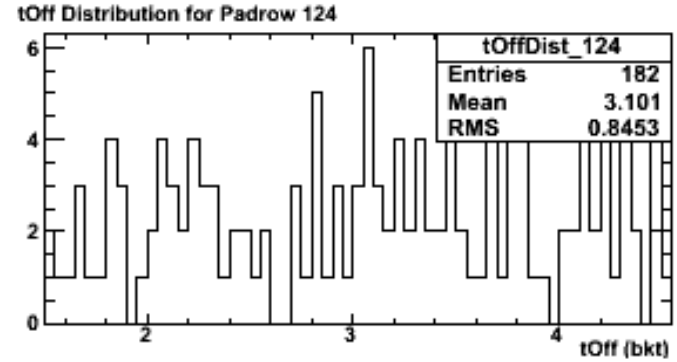

tOff Distribution for Padrow 119
tOffDist_119
Entries 636
Mean 2.762
RMS 0.2281
tOff (bkt)


tOff Distribution for Padrow 120
tOffDist_120
Entries 704
Mean 2.76
RMS 0.1555
tOff (bkt)

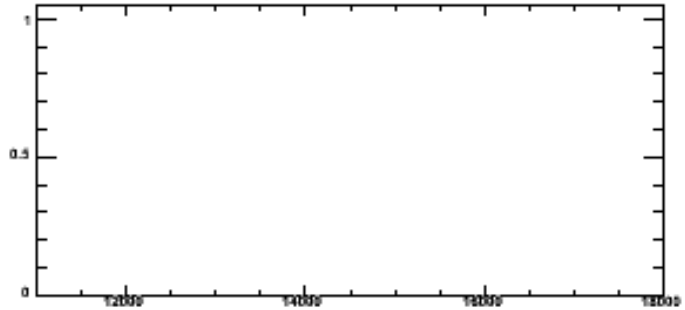

tOff Distribution for Padrow 121
tOffDist_121
Entries 703
Mean 2.987
RMS 0.1665
tOff (bkt)


tOff Distribution for Padrow 122
tOffDist_122
Entries 710
Mean 2.656
RMS 0.1357
tOff (bkt)

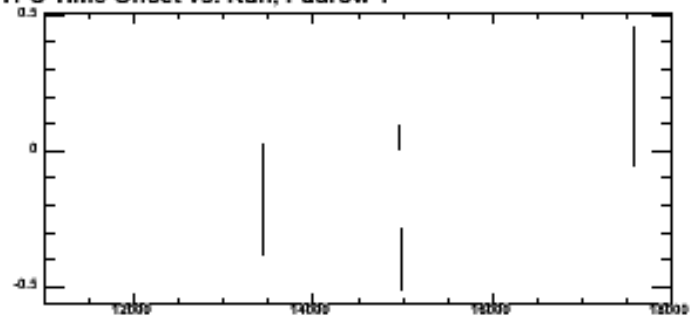

tOff Distribution for Padrow 123
tOffDist_123
Entries 707
Mean 2.594
RMS 0.1478
tOff (bkt)


tOff Distribution for Padrow 124
tOffDist_124
Entries 182
Mean 3.101
RMS 0.8453
tOff (bkt)

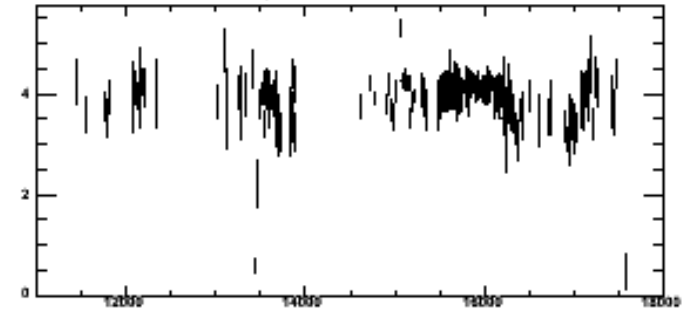
TPC Time Offset vs. Run, Padrow 0



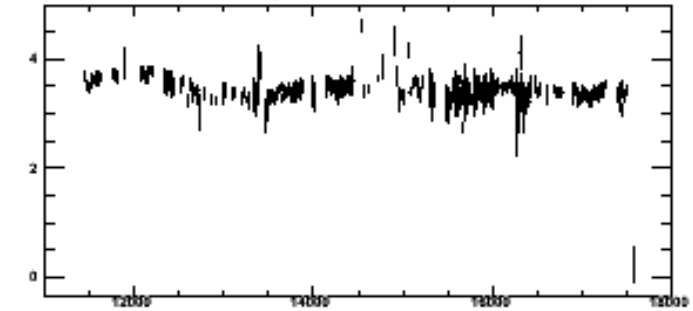
TPC Time Offset vs. Run, Padrow 1



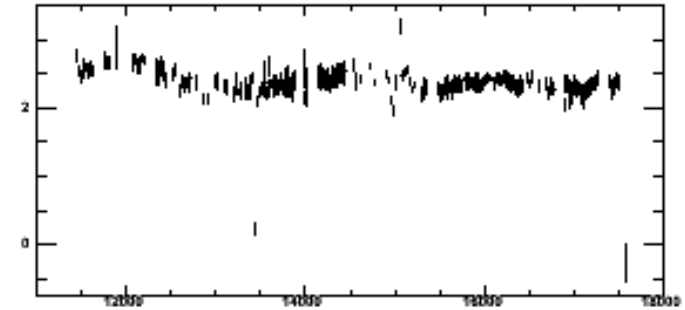
TPC Time Offset vs. Run, Padrow 2



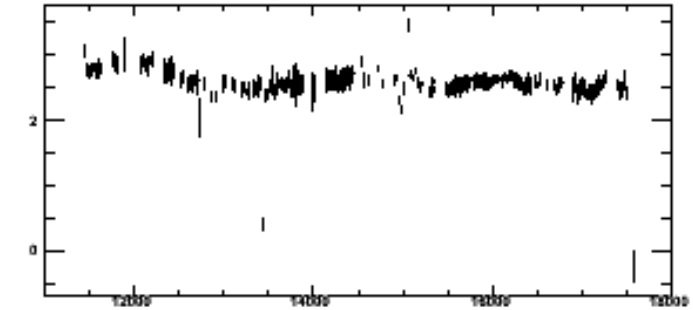
TPC Time Offset vs. Run, Padrow 3



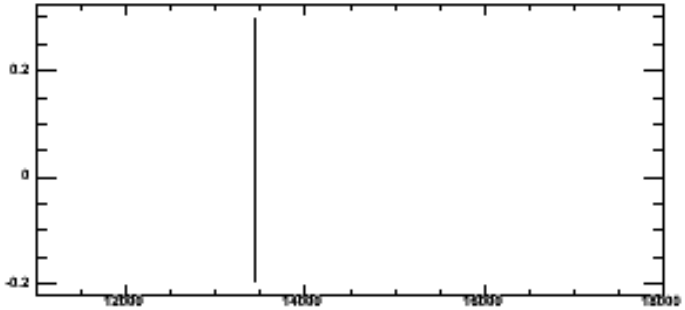
TPC Time Offset vs. Run, Padrow 4



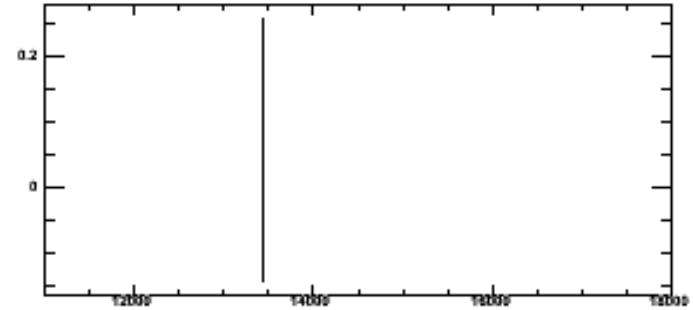
TPC Time Offset vs. Run, Padrow 5



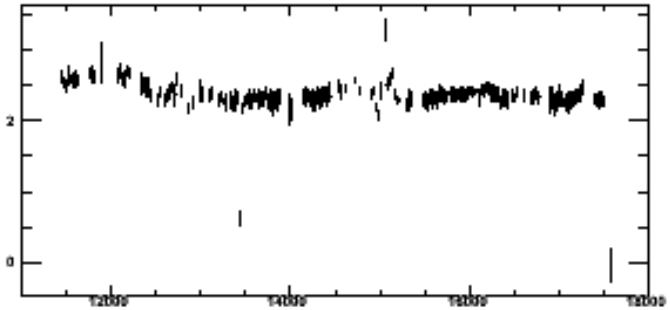
TPC Time Offset vs. Run, Padrow 6



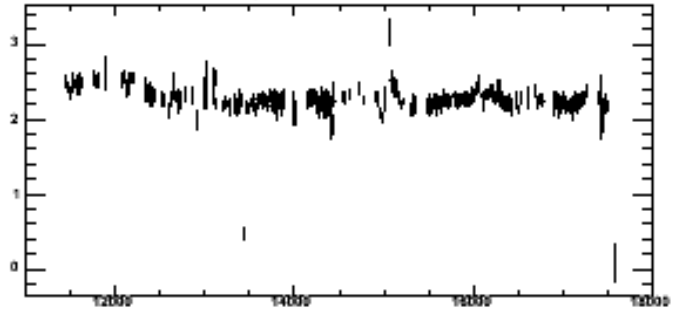
TPC Time Offset vs. Run, Padrow 7



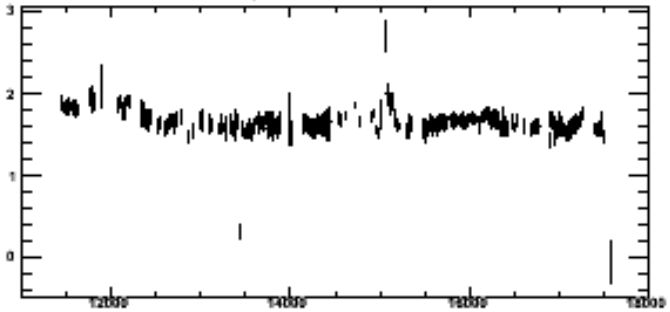
TPC Time Offset vs. Run, Padrow 8



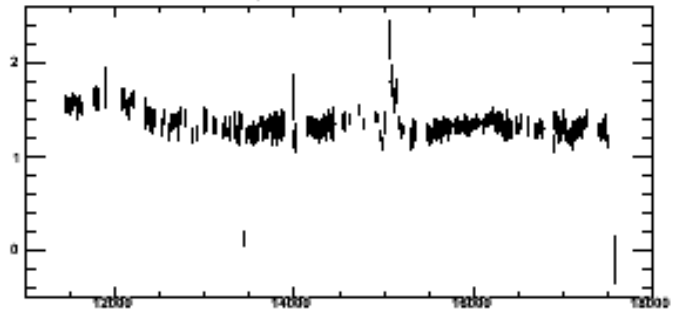
TPC Time Offset vs. Run, Padrow 9



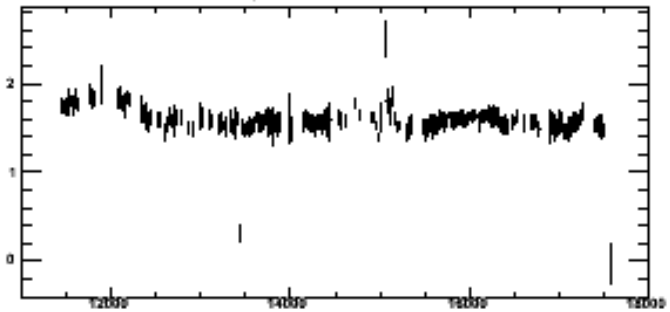
TPC Time Offset vs. Run, Padrow 10



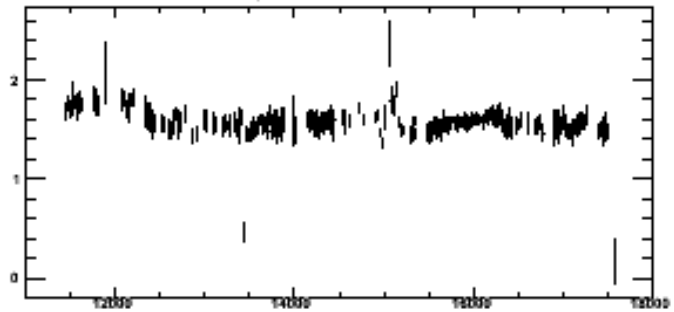
TPC Time Offset vs. Run, Padrow 11



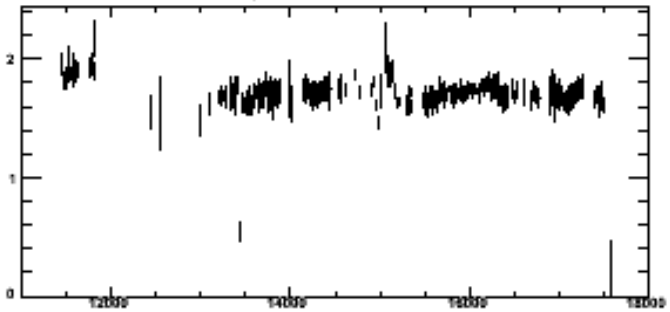
TPC Time Offset vs. Run, Padrow 12



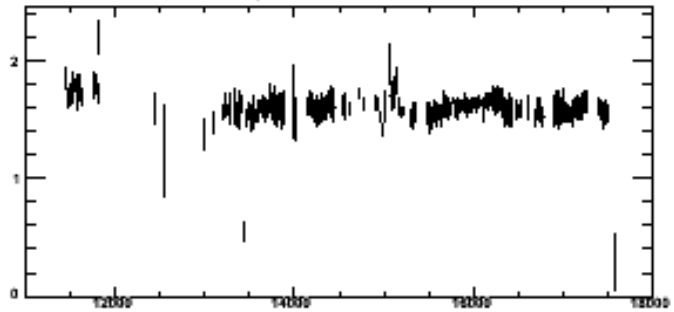
TPC Time Offset vs. Run, Padrow 13



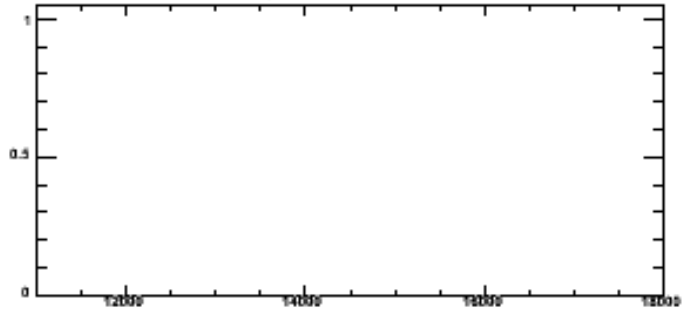
TPC Time Offset vs. Run, Padrow 14



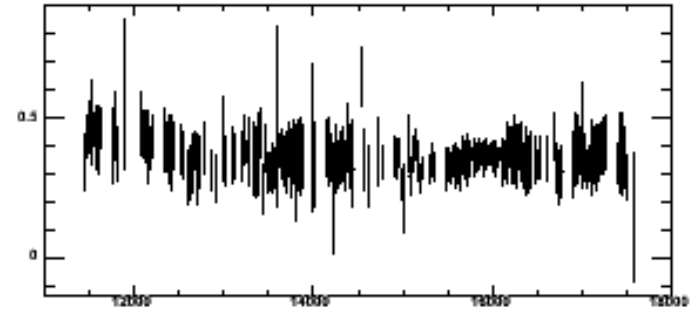
TPC Time Offset vs. Run, Padrow 15



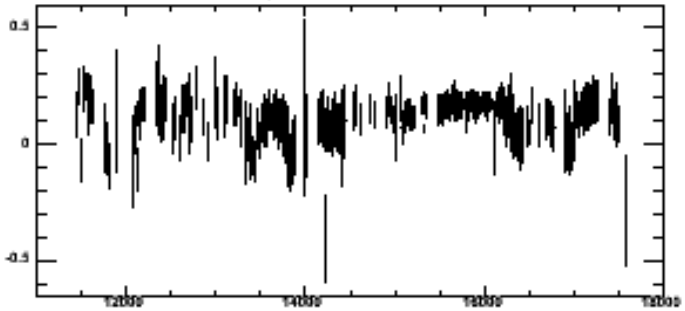
TPC Time Offset vs. Run, Padrow 32



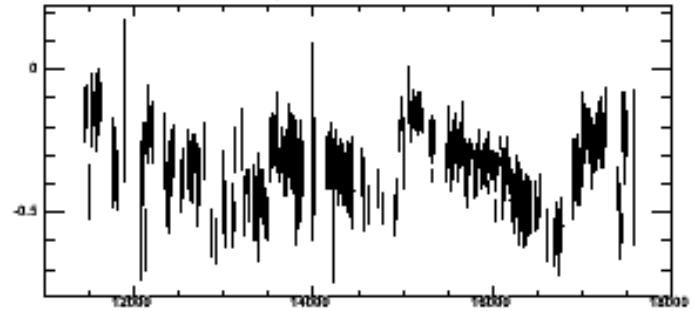
TPC Time Offset vs. Run, Padrow 33



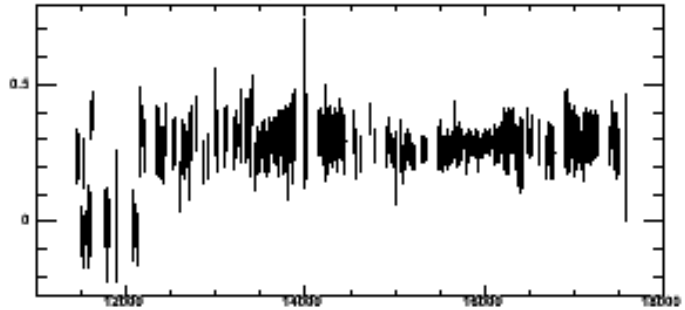
TPC Time Offset vs. Run, Padrow 34



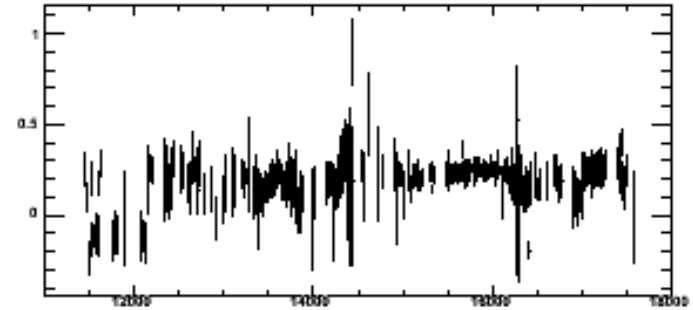
TPC Time Offset vs. Run, Padrow 35



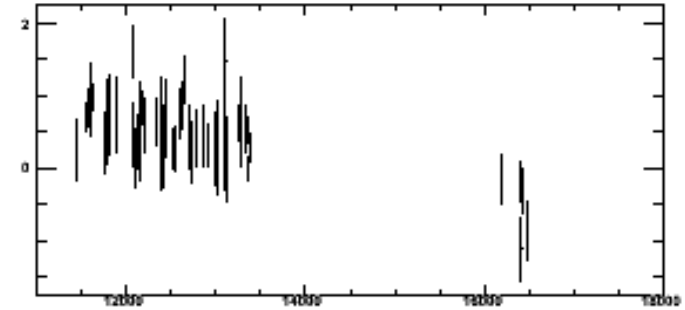
TPC Time Offset vs. Run, Padrow 36



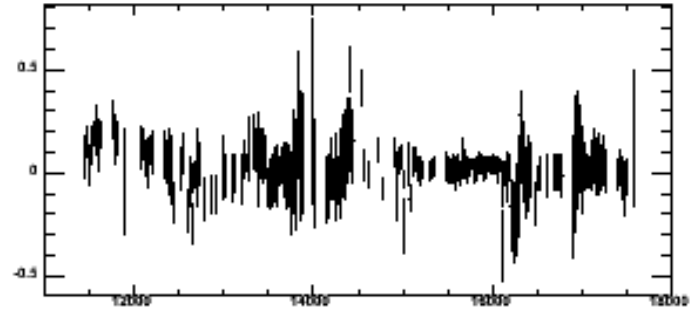
TPC Time Offset vs. Run, Padrow 37



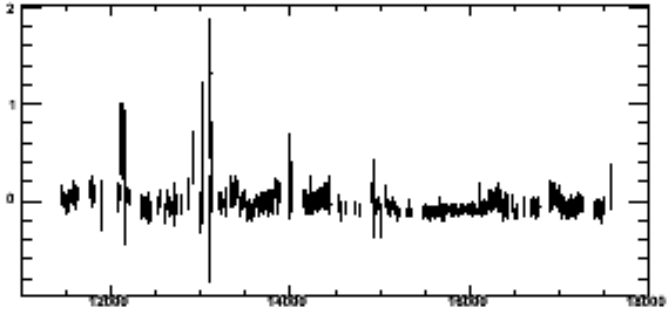
TPC Time Offset vs. Run, Padrow 38



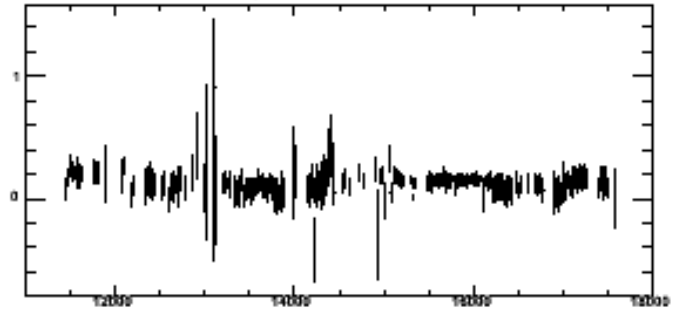
TPC Time Offset vs. Run, Padrow 39



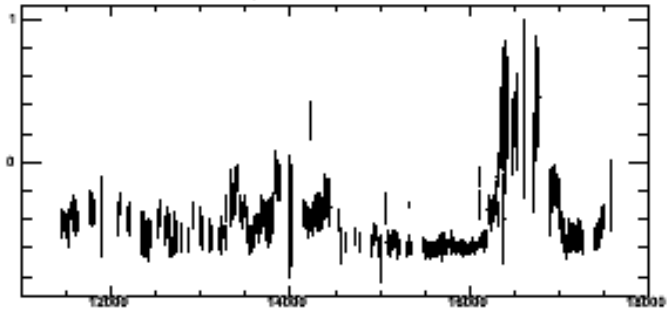
TPC Time Offset vs. Run, Padrow 40



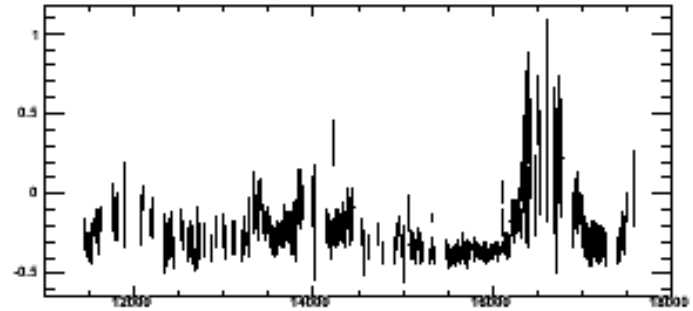
TPC Time Offset vs. Run, Padrow 41



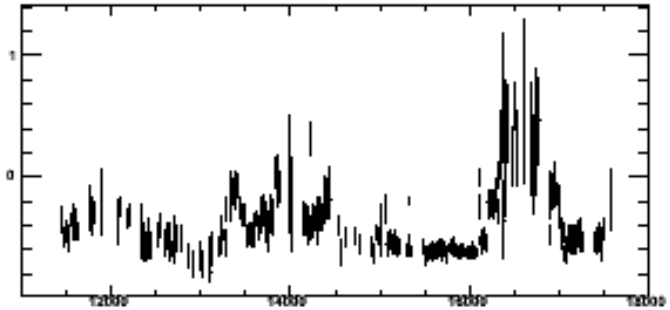
TPC Time Offset vs. Run, Padrow 42



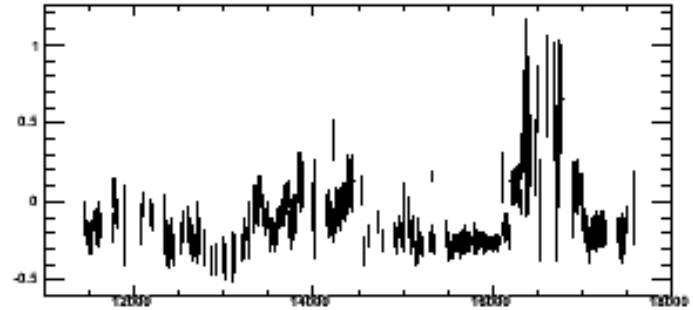
TPC Time Offset vs. Run, Padrow 43



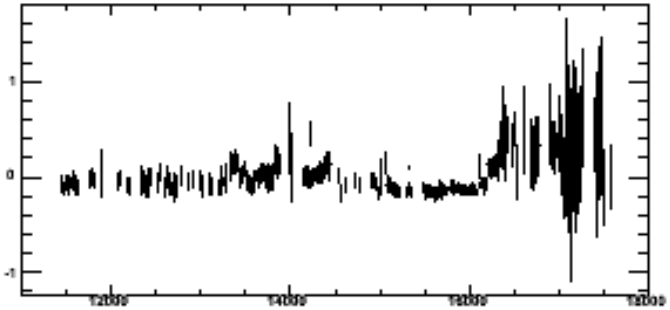
TPC Time Offset vs. Run, Padrow 44



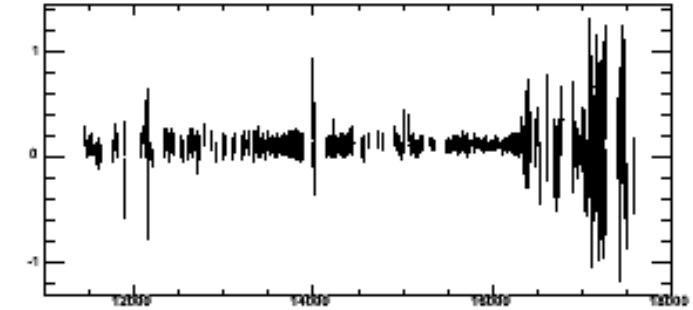
TPC Time Offset vs. Run, Padrow 45



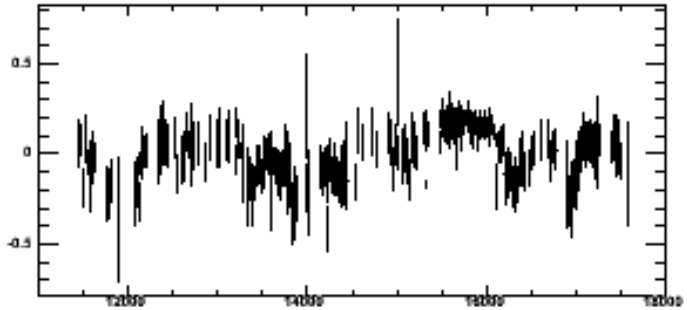
TPC Time Offset vs. Run, Padrow 46



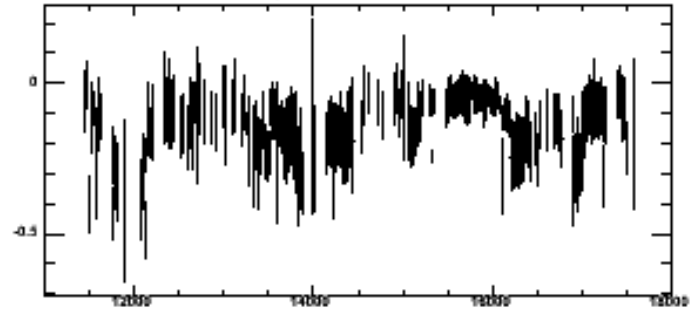
TPC Time Offset vs. Run, Padrow 47



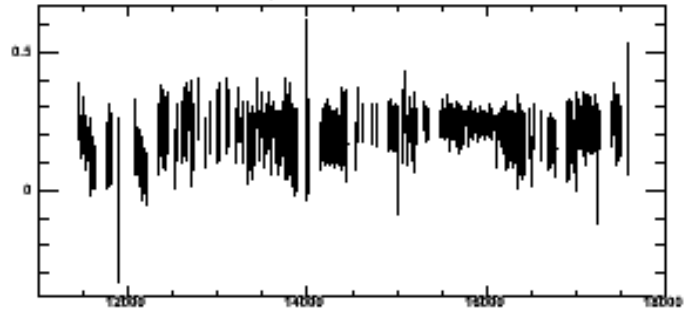
TPC Time Offset vs. Run, Padrow 48



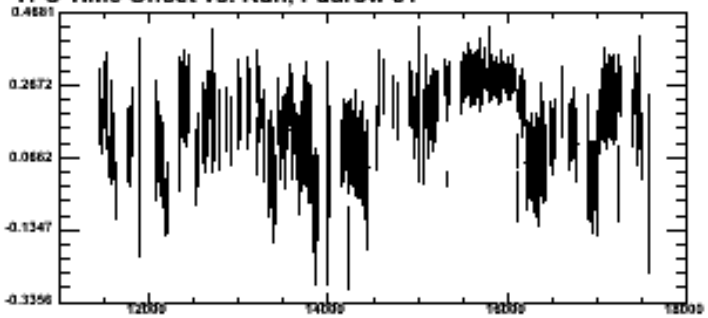
TPC Time Offset vs. Run, Padrow 49



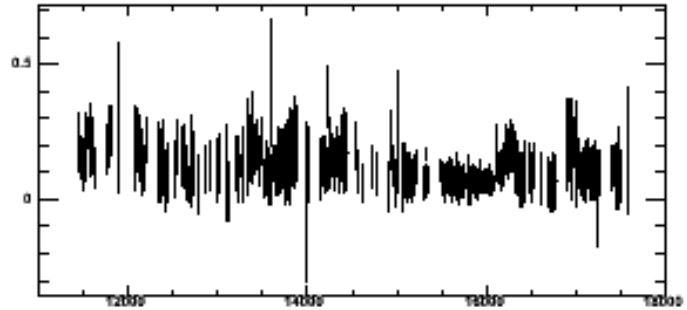
TPC Time Offset vs. Run, Padrow 50



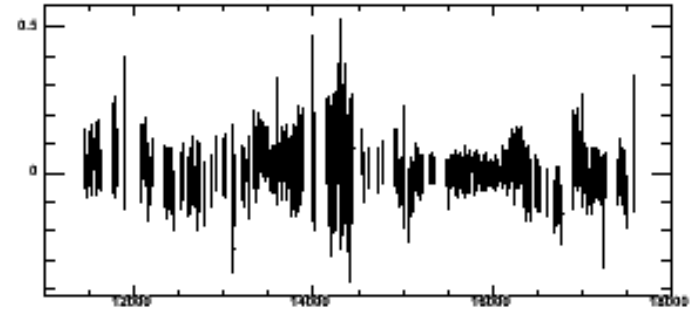
TPC Time Offset vs. Run, Padrow 51



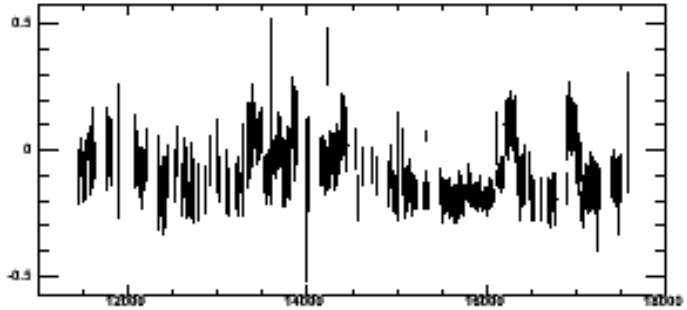
TPC Time Offset vs. Run, Padrow 52



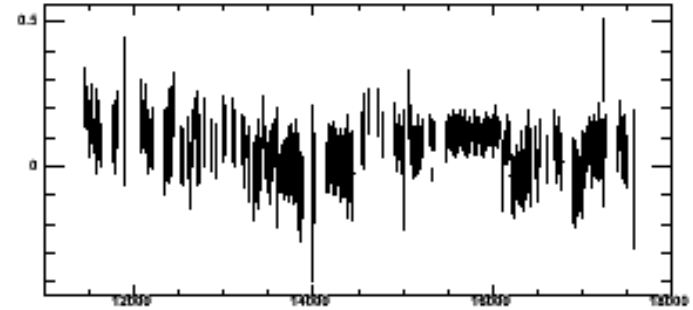
TPC Time Offset vs. Run, Padrow 53



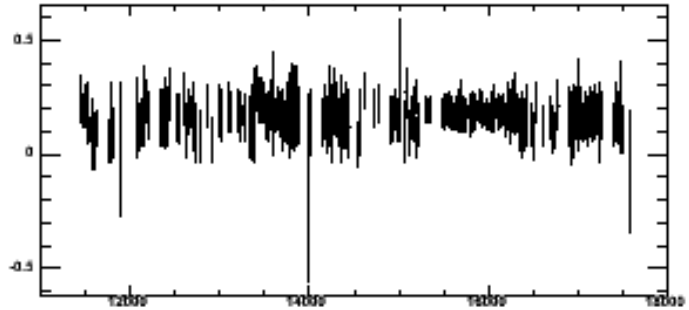
TPC Time Offset vs. Run, Padrow 54



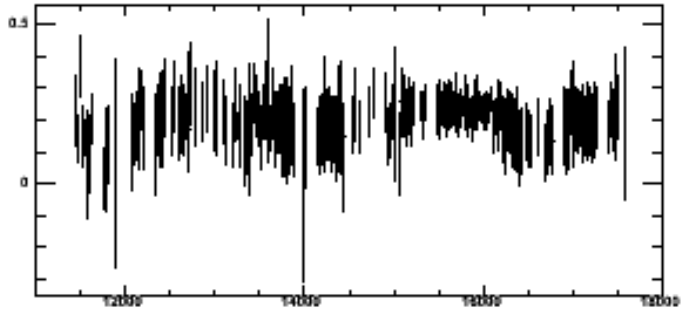
TPC Time Offset vs. Run, Padrow 55



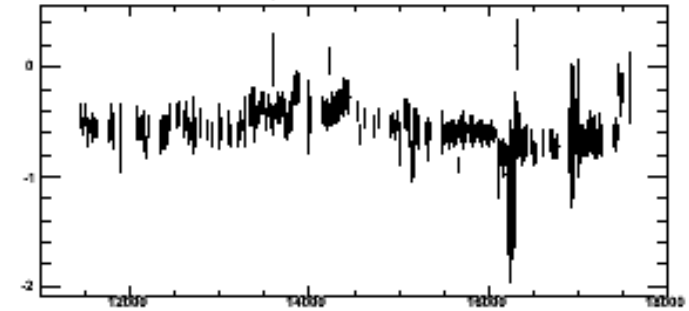
TPC Time Offset vs. Run, Padrow 56



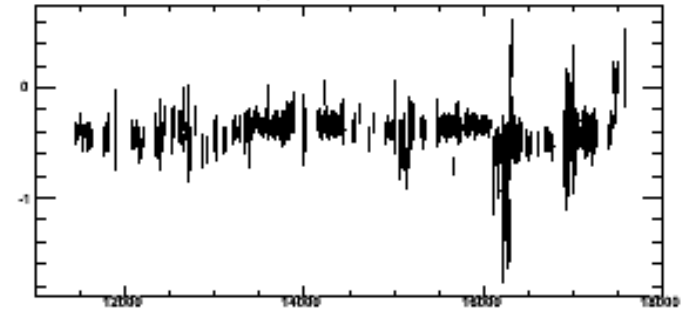
TPC Time Offset vs. Run, Padrow 57



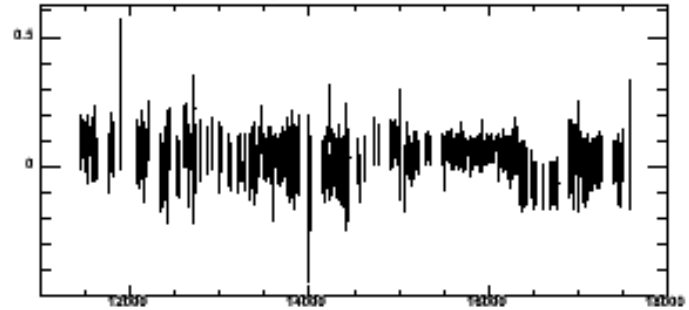
TPC Time Offset vs. Run, Padrow 58



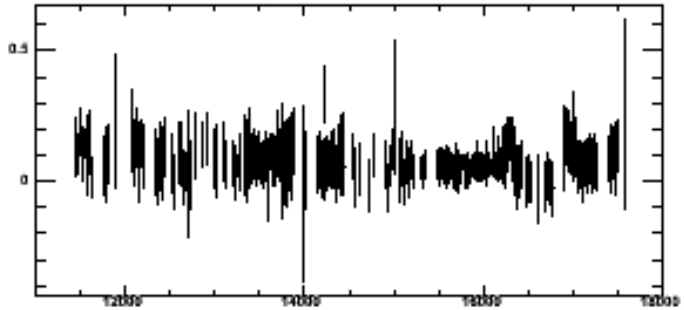
TPC Time Offset vs. Run, Padrow 59



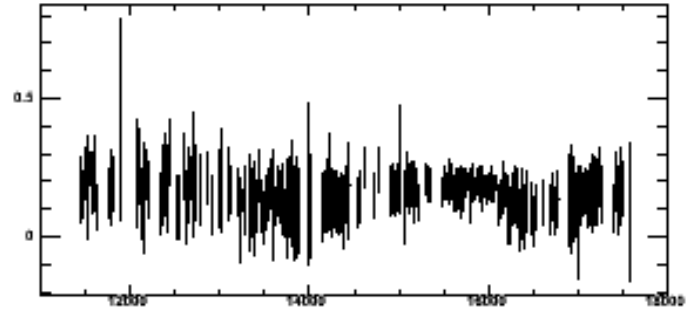
TPC Time Offset vs. Run, Padrow 60



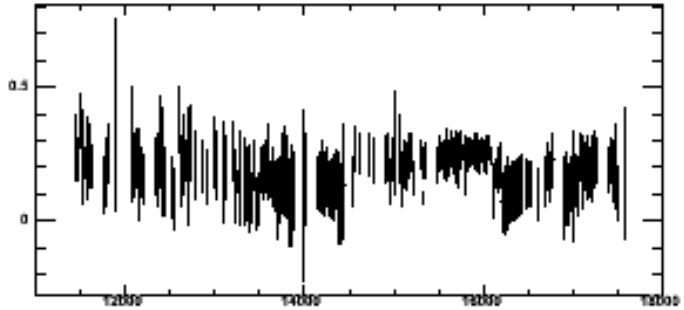
TPC Time Offset vs. Run, Padrow 61



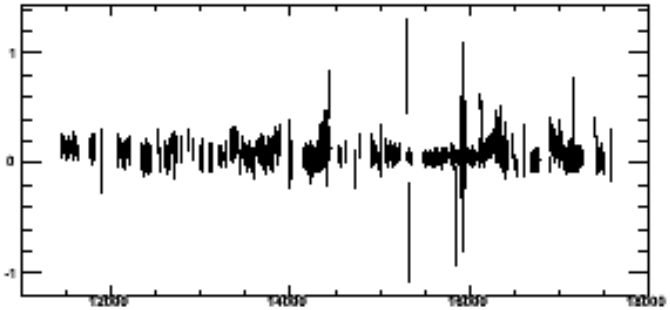
TPC Time Offset vs. Run, Padrow 62



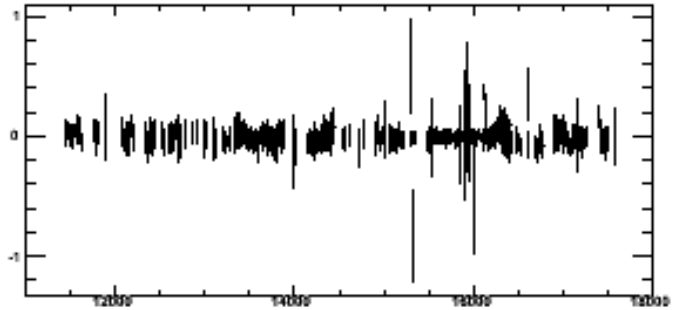
TPC Time Offset vs. Run, Padrow 63



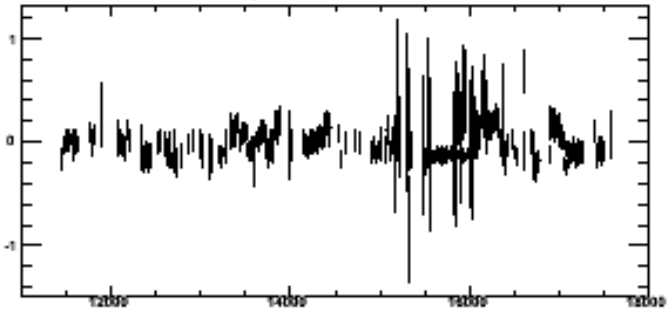
TPC Time Offset vs. Run, Padrow 64



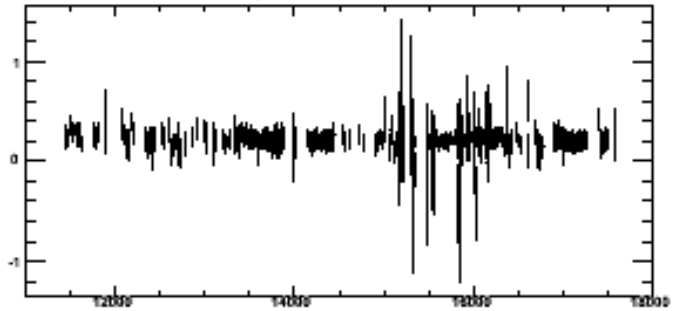
TPC Time Offset vs. Run, Padrow 65



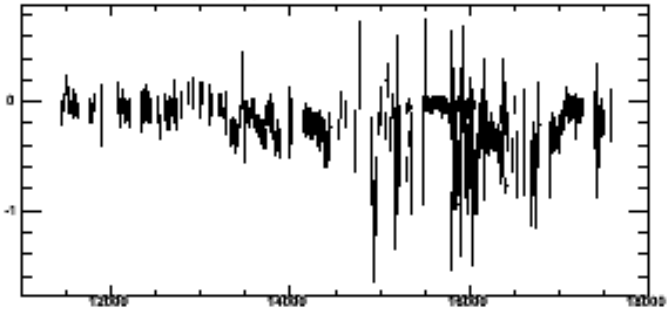
TPC Time Offset vs. Run, Padrow 66



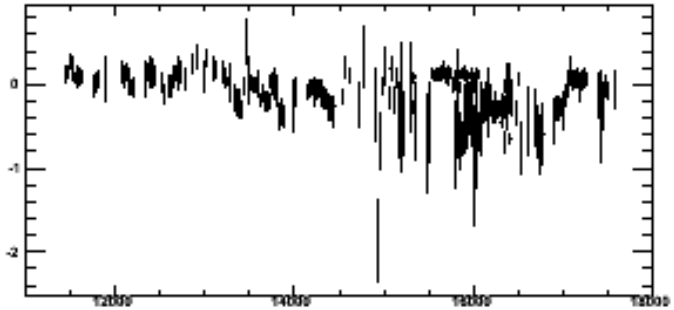
TPC Time Offset vs. Run, Padrow 67



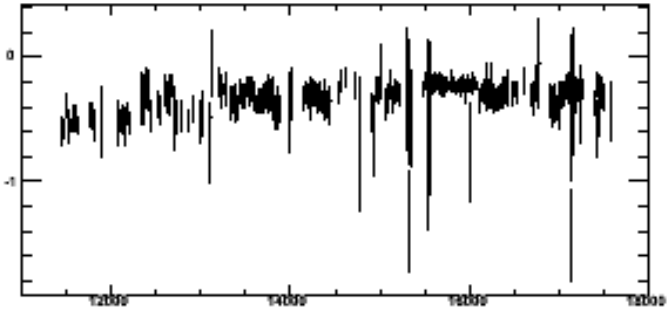
TPC Time Offset vs. Run, Padrow 68



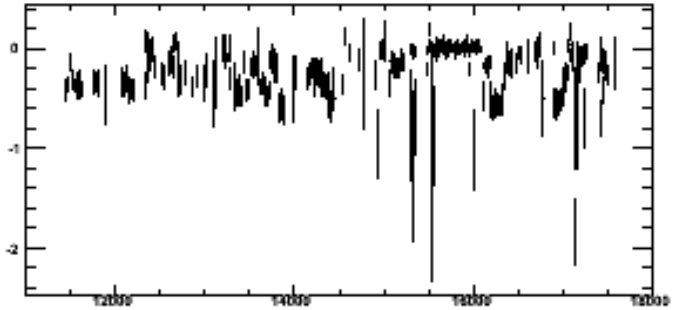
TPC Time Offset vs. Run, Padrow 69



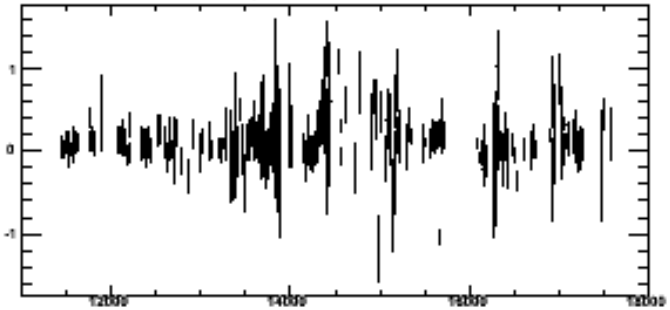
TPC Time Offset vs. Run, Padrow 70



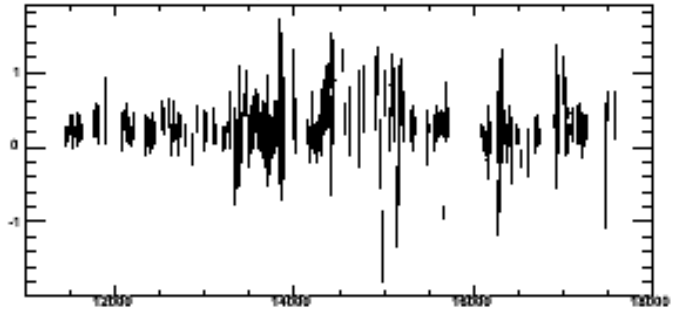
TPC Time Offset vs. Run, Padrow 71



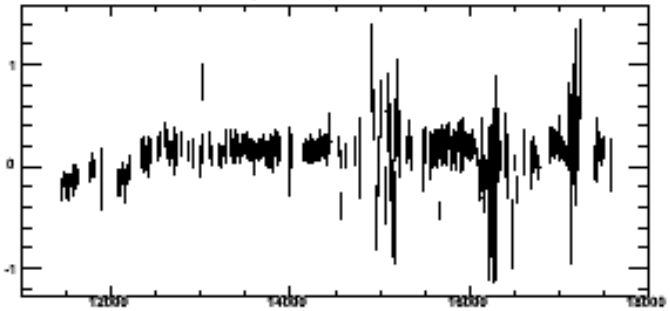
TPC Time Offset vs. Run, Padrow 72



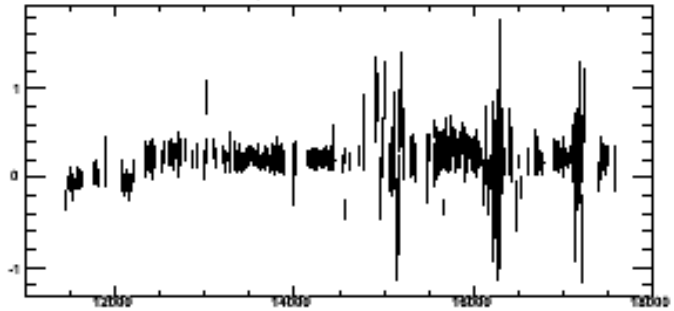
TPC Time Offset vs. Run, Padrow 73



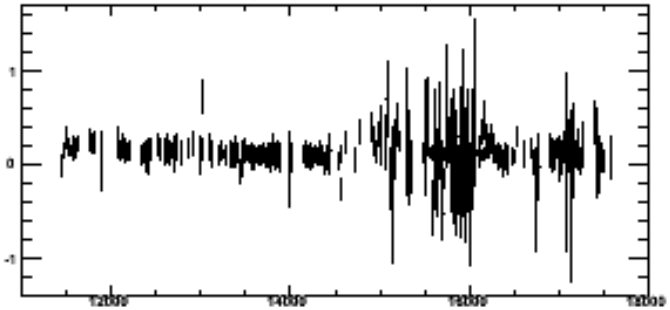
TPC Time Offset vs. Run, Padrow 74



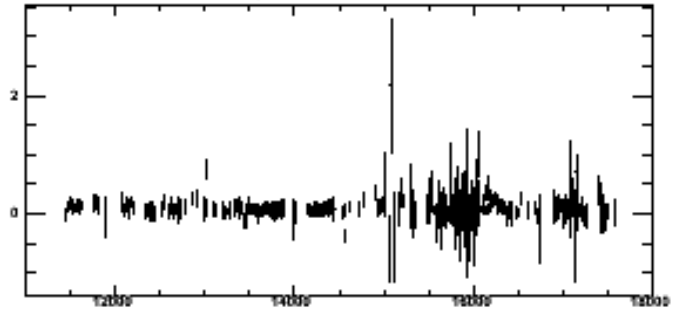
TPC Time Offset vs. Run, Padrow 75



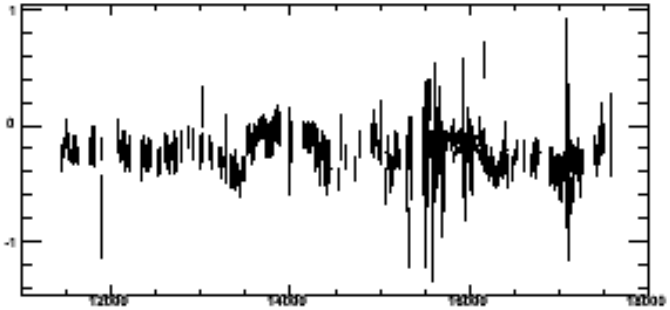
TPC Time Offset vs. Run, Padrow 76



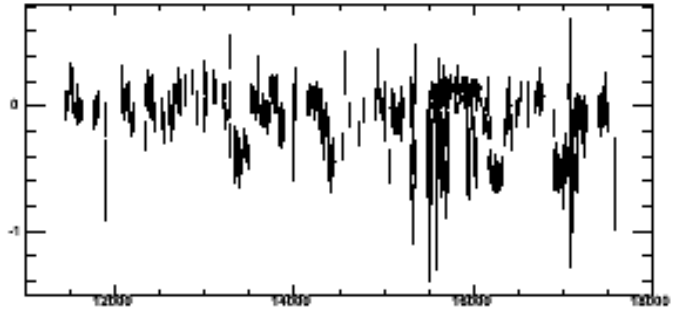
TPC Time Offset vs. Run, Padrow 77



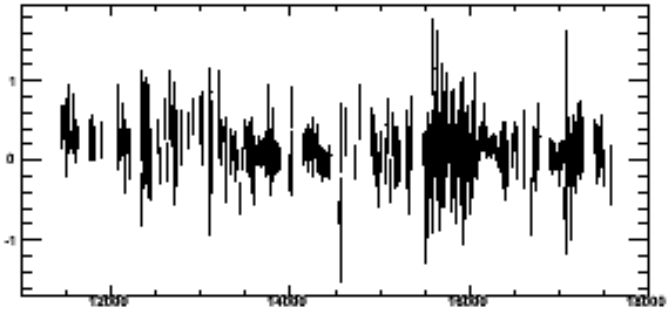
TPC Time Offset vs. Run, Padrow 78



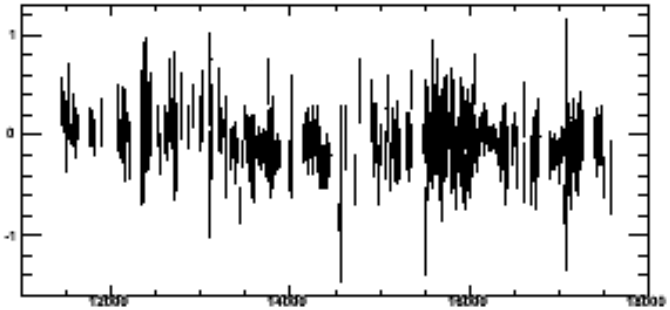
TPC Time Offset vs. Run, Padrow 79



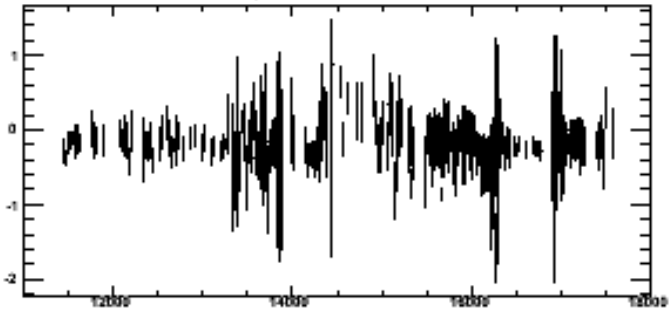
TPC Time Offset vs. Run, Padrow 80



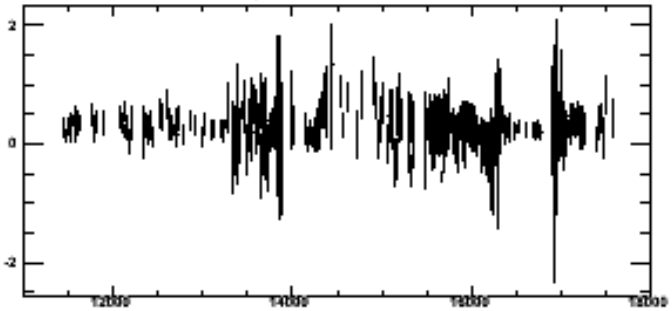
TPC Time Offset vs. Run, Padrow 81



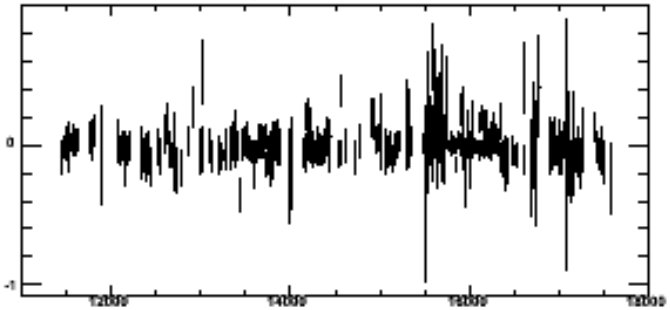
TPC Time Offset vs. Run, Padrow 82



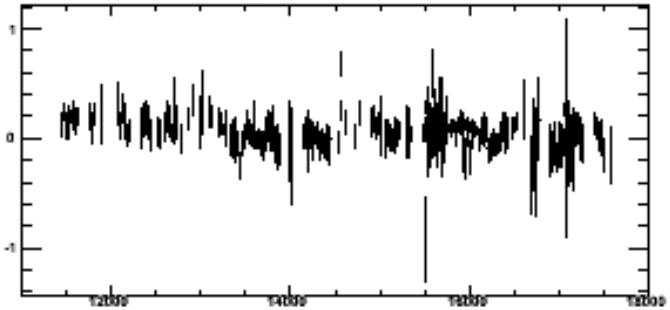
TPC Time Offset vs. Run, Padrow 83



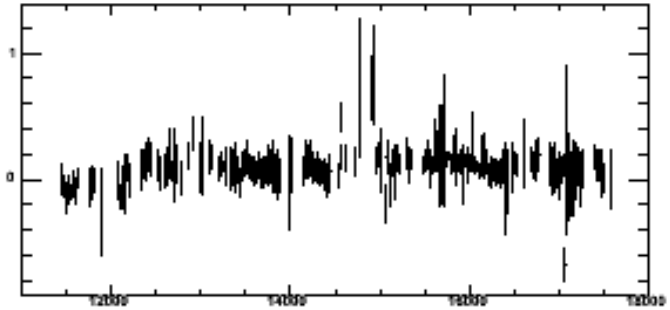
TPC Time Offset vs. Run, Padrow 84



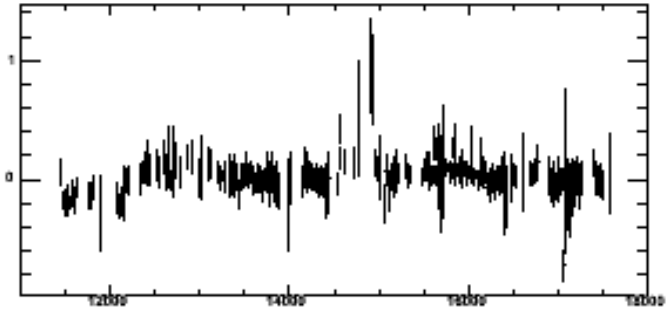
TPC Time Offset vs. Run, Padrow 85



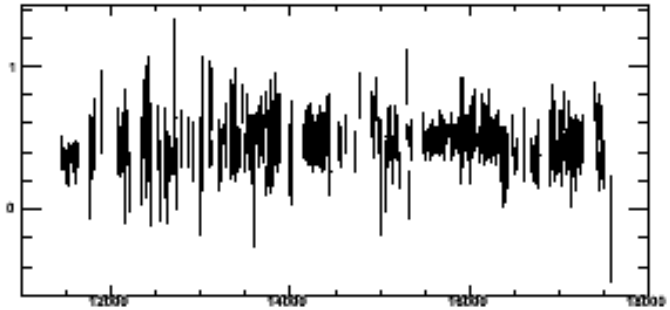
TPC Time Offset vs. Run, Padrow 86



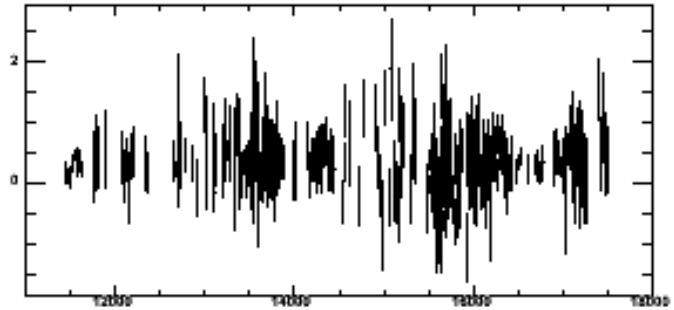
TPC Time Offset vs. Run, Padrow 87



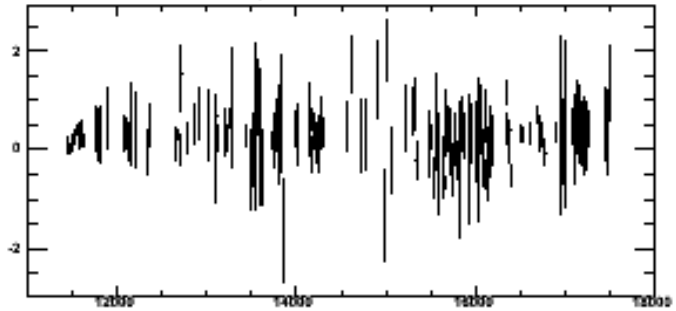
TPC Time Offset vs. Run, Padrow 88



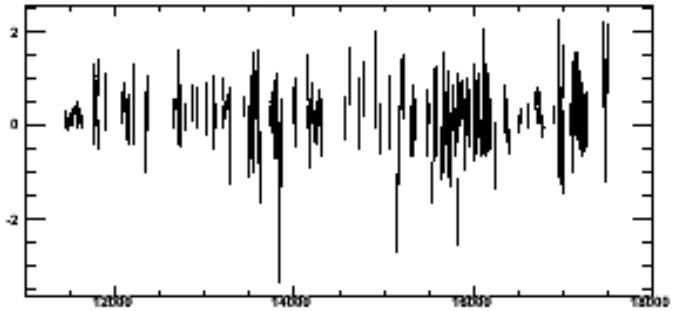
TPC Time Offset vs. Run, Padrow 89



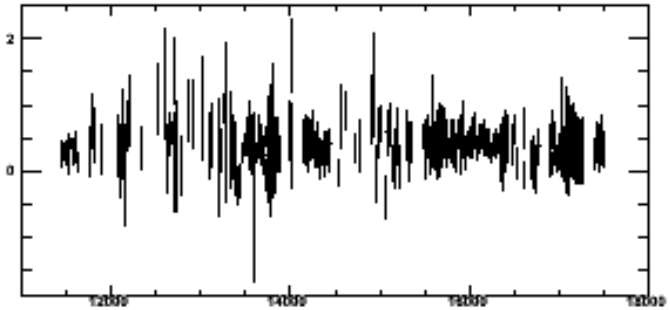
TPC Time Offset vs. Run, Padrow 90



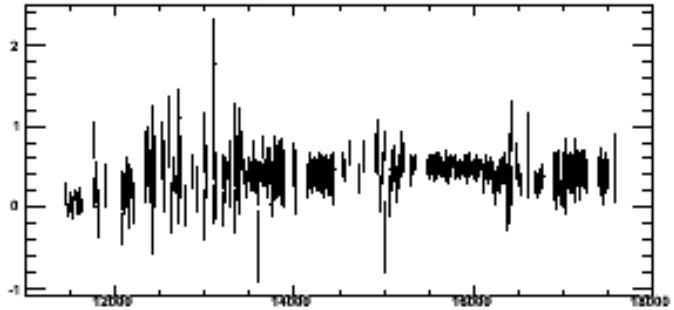
TPC Time Offset vs. Run, Padrow 91



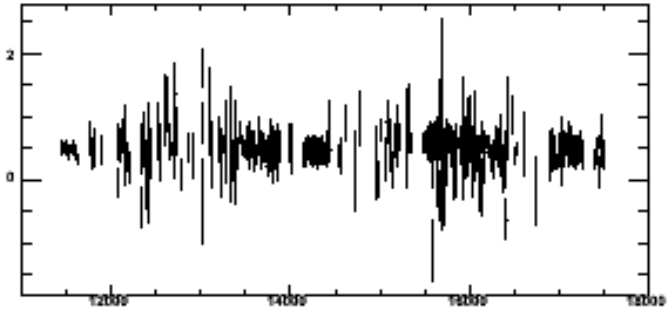
TPC Time Offset vs. Run, Padrow 92



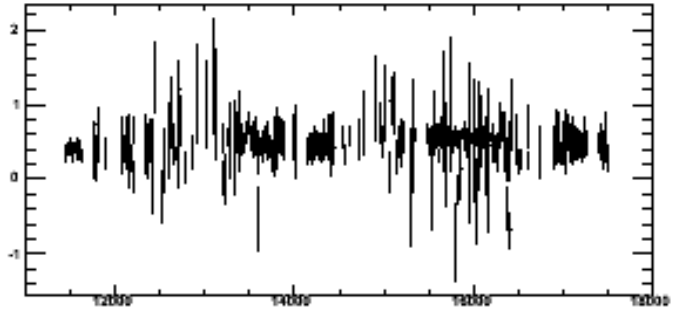
TPC Time Offset vs. Run, Padrow 93



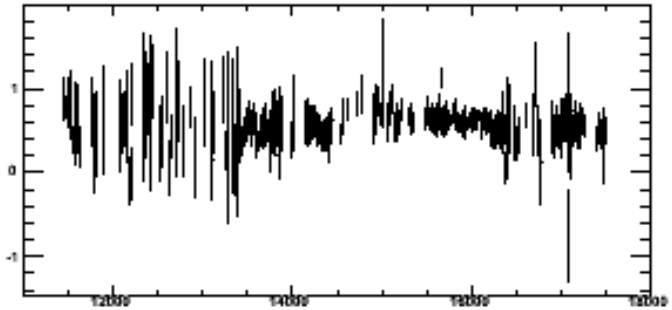
TPC Time Offset vs. Run, Padrow 94



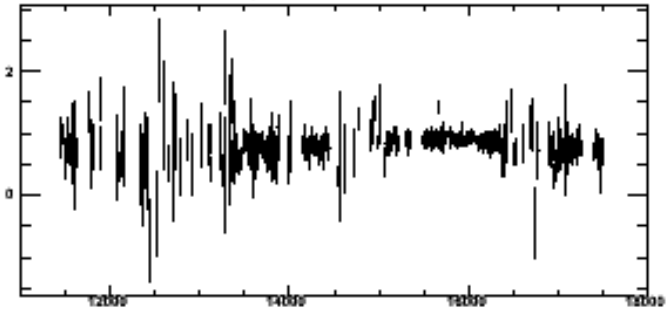
TPC Time Offset vs. Run, Padrow 95



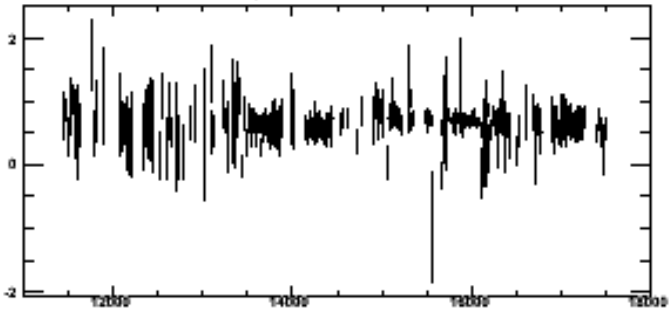
TPC Time Offset vs. Run, Padrow 96



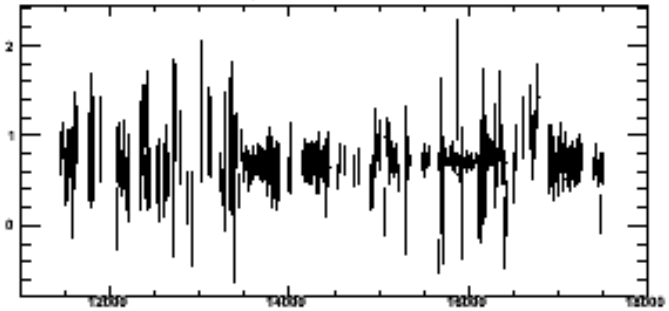
TPC Time Offset vs. Run, Padrow 97



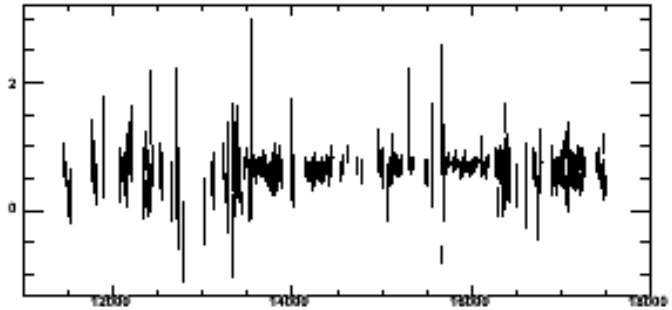
TPC Time Offset vs. Run, Padrow 98



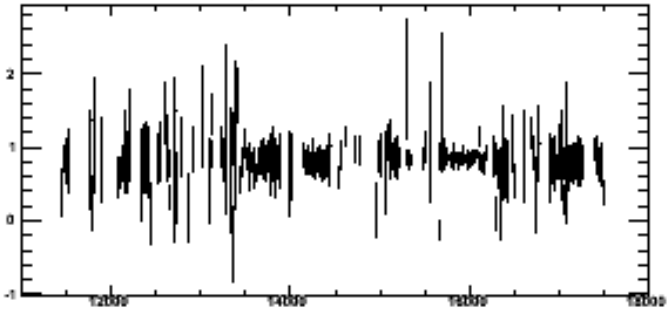
TPC Time Offset vs. Run, Padrow 99



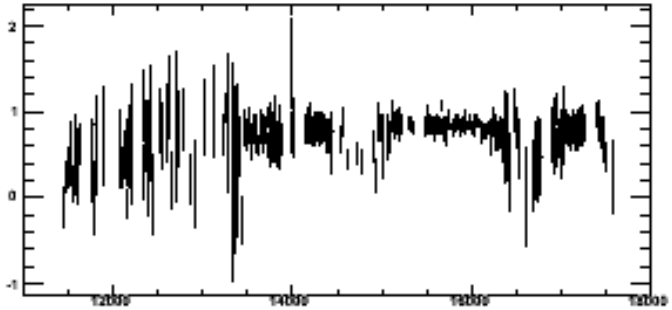
TPC Time Offset vs. Run, Padrow 100



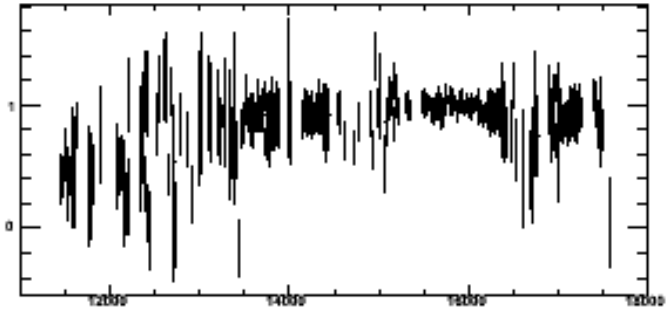
TPC Time Offset vs. Run, Padrow 101



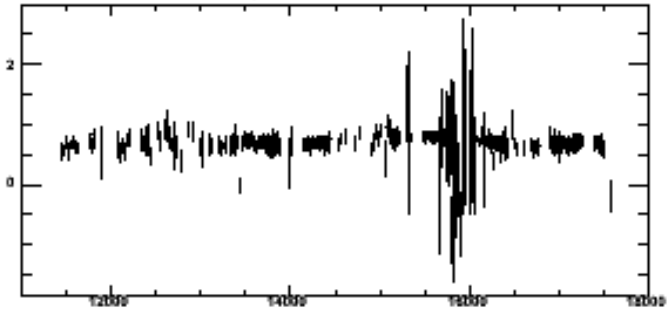
TPC Time Offset vs. Run, Padrow 102



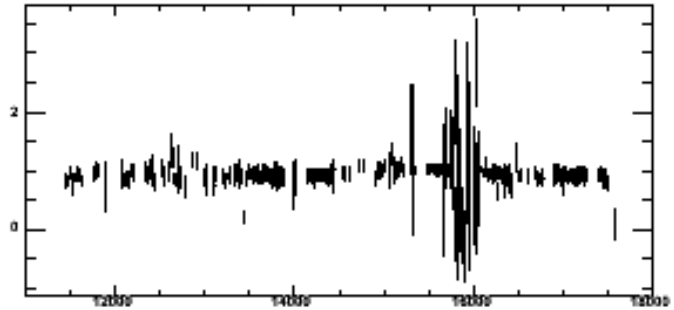
TPC Time Offset vs. Run, Padrow 103



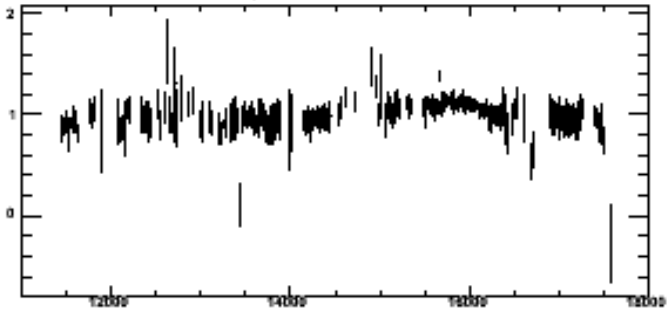
TPC Time Offset vs. Run, Padrow 104



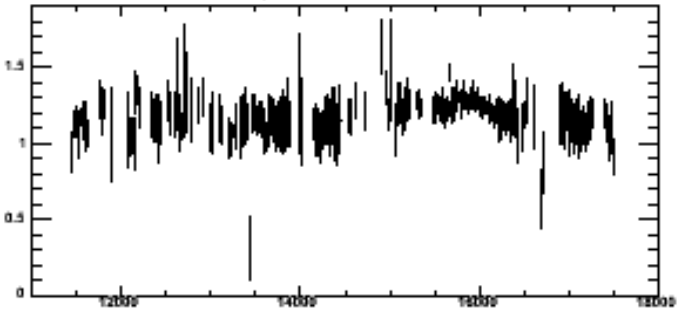
TPC Time Offset vs. Run, Padrow 105



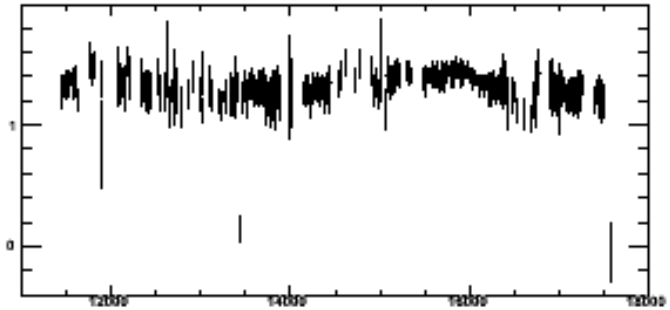
TPC Time Offset vs. Run, Padrow 106



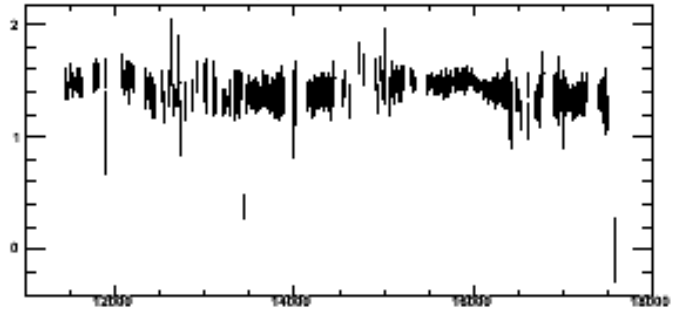
TPC Time Offset vs. Run, Padrow 107



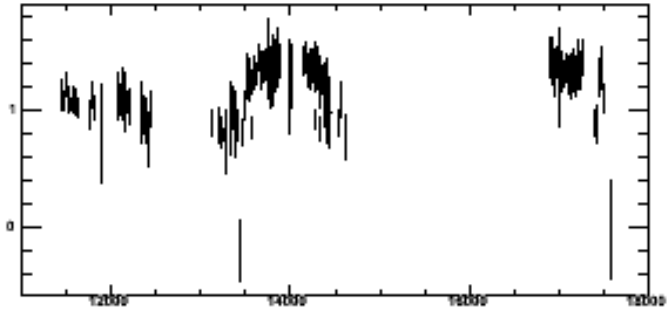
TPC Time Offset vs. Run, Padrow 108



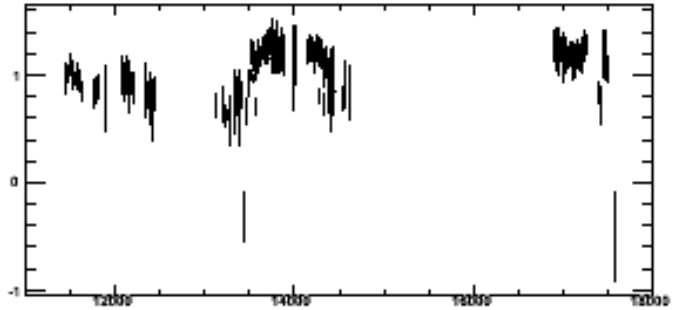
TPC Time Offset vs. Run, Padrow 109



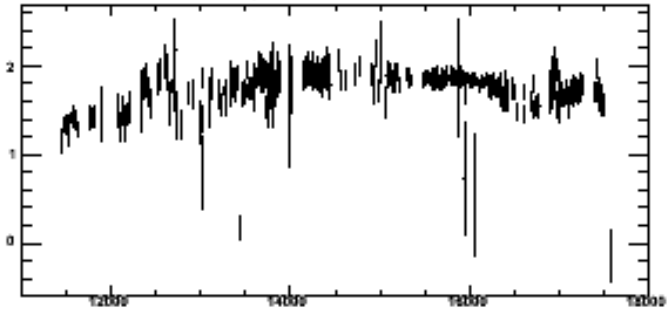
TPC Time Offset vs. Run, Padrow 110



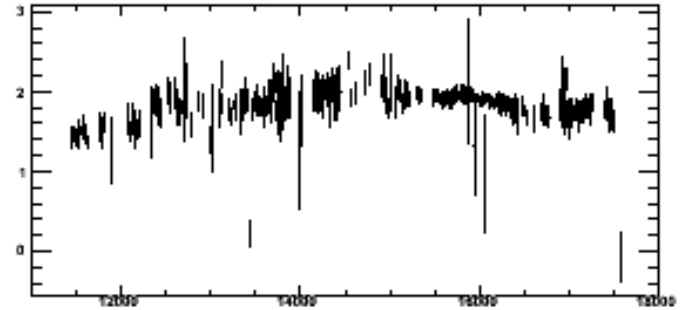
TPC Time Offset vs. Run, Padrow 111



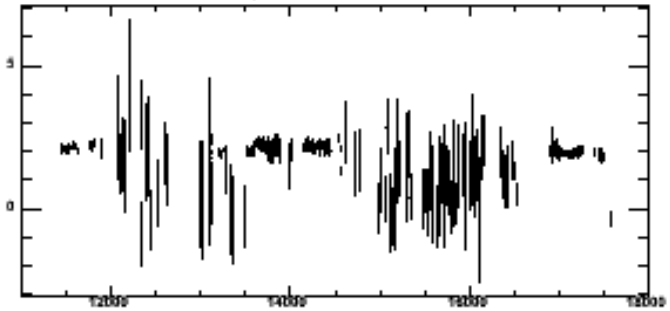
TPC Time Offset vs. Run, Padrow 112



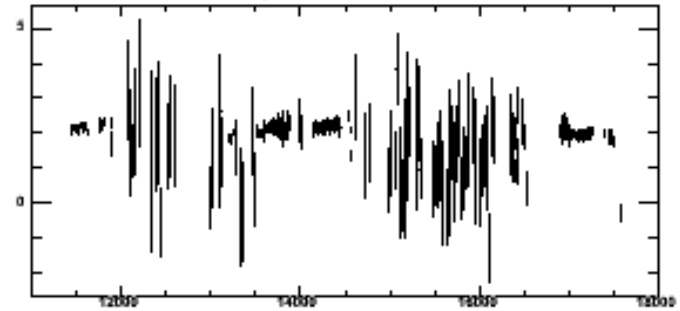
TPC Time Offset vs. Run, Padrow 113



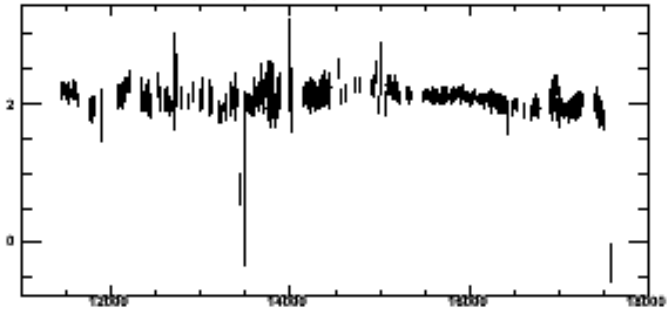
TPC Time Offset vs. Run, Padrow 114



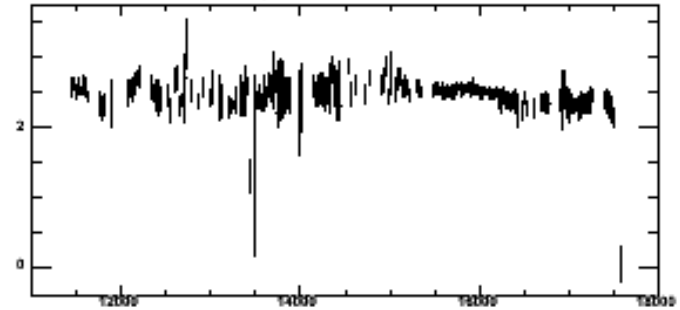
TPC Time Offset vs. Run, Padrow 115



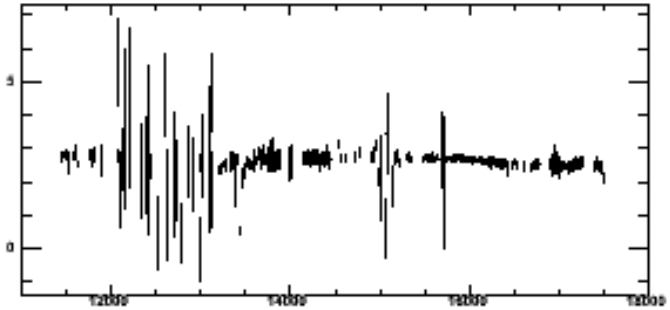
TPC Time Offset vs. Run, Padrow 116



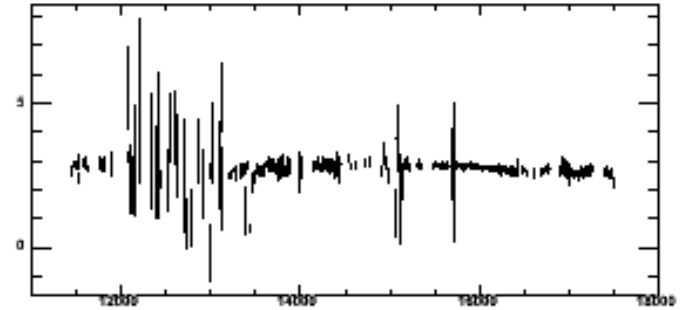
TPC Time Offset vs. Run, Padrow 117



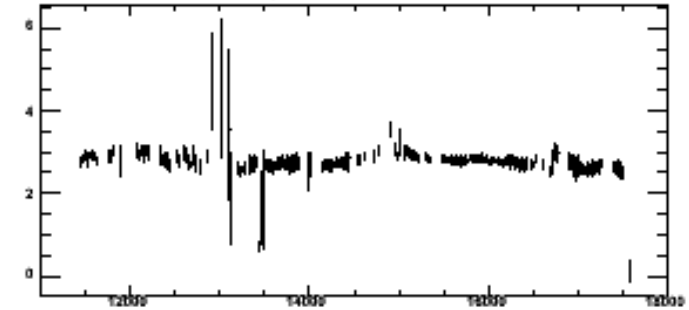
TPC Time Offset vs. Run, Padrow 118



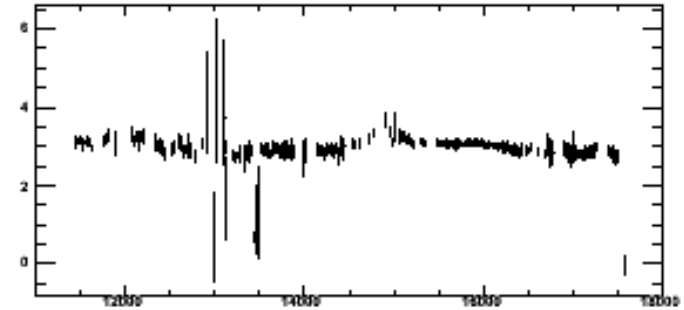
TPC Time Offset vs. Run, Padrow 119



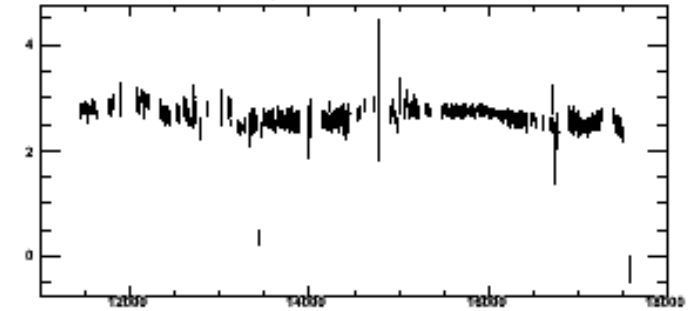
TPC Time Offset vs. Run, Padrow 120



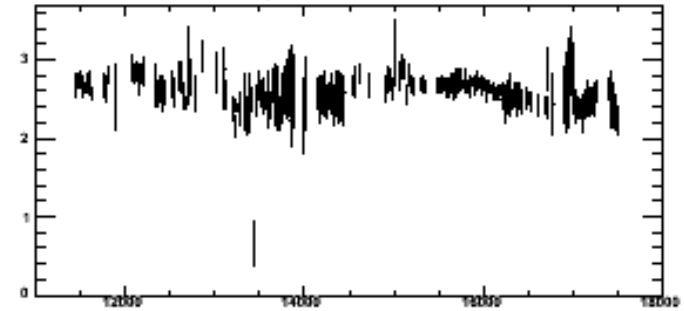
TPC Time Offset vs. Run, Padrow 121



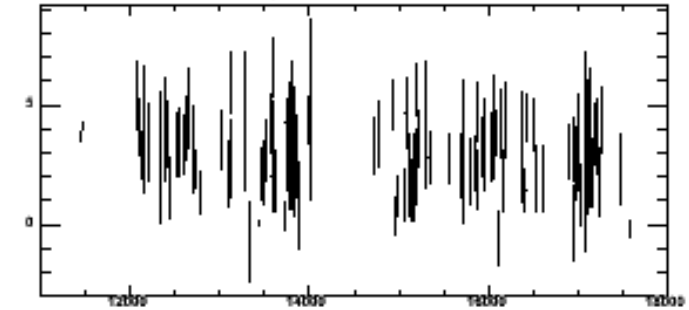
TPC Time Offset vs. Run, Padrow 122



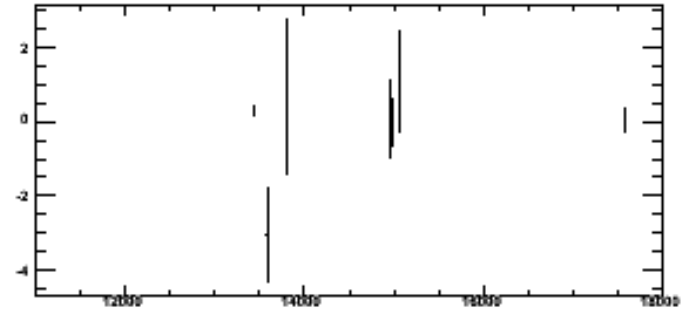
TPC Time Offset vs. Run, Padrow 123



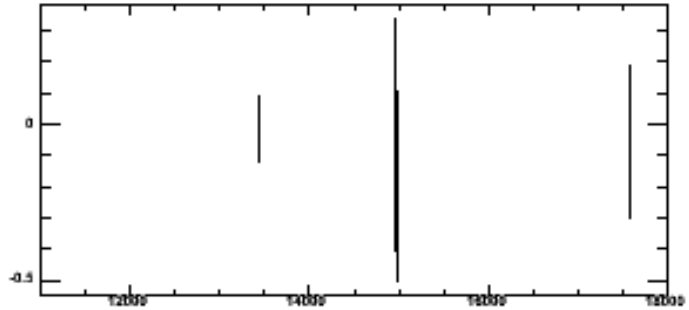
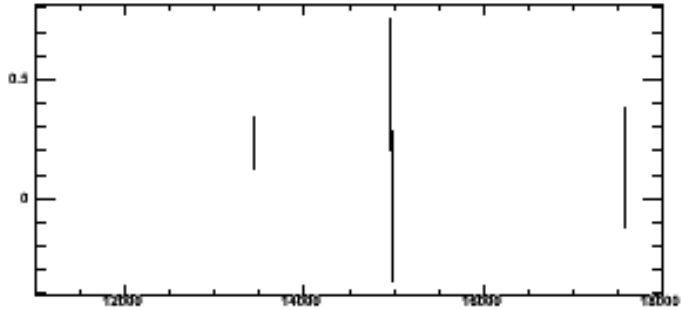
TPC Time Offset vs. Run, Padrow 124



TPC Time Offset vs. Run, Padrow 125



TPC Time Offset vs. Run, Padrow 126



TPC Time Offset vs. Run, Padrow 127