Wire chamber

Data from A/D card which record in “time” in TDC unit requiring “stop”.
“time” convert to “distance” to the wire.

Time conversion has three options:

1. LinearTTD
2. TanhFitTTD ** current setting
3. Pol2FitTTD

Time offset

1. total time offset which will associate with the change in “stop”
2. individual time offset to each wire

The “distance” to wire collectively compare to the “pattern” which will choose the “road” for each direction (x = 0, v = -30 degree, and u = 30 degree rotating from +x to +y).

possible options for extracting data with current setting in [ ]:

1. no partner (??)[1]
2. max hits [75]
3. max pat (??) [1500]
4. 3d match cut [2e-3]
5. chi2 confident level [1e-5]
6. 3d chi2 confident level [1e-9]
7. max miss [1] : maximum missing for each direction [i.e. x1,x1p ,x2, x2p] which in our case can be either 0 or 1
8. req1of2 (??) [1]
9. require each particular plane is optional

Table 1:

Plane	Total wire	Wire section
U1	141	15,16,16,16,16,16,16,16,16,14
U1p	141	13,16,16,16,16,16,16,16,16,16
U2	200	12,16,16,16,16,16,16,16,16,16,16, 16,12
U2p	200	12,16,16,16,16,16,16,16,16,16,16, 16,12
X1	142	15,16,16,16,16,16,16,16,16,15
X1p	142	15,16,16,16,16,16,16,16,16,15
X2	202	13,16,16,16,16,16,16,16,16,16,16, 16,13
X2p	202	13,16,16,16,16,16,16,16,16,16,16, 16,13
V1	141	15,16,16,16,16,16,16,16,16,14
V1p	141	14,16,16,16,16,16,16,16,16,15
V2	200	12,16,16,16,16,16,16,16,16,16,16, 16,12
V2p	200	12,16,16,16,16,16,16,16,16,16,16, 16,12

For Elastic Run 2009 (Feb 28,11)

The time offset was far off which result in pattern for track chosen are far from the location identify from time conversion.

Original:

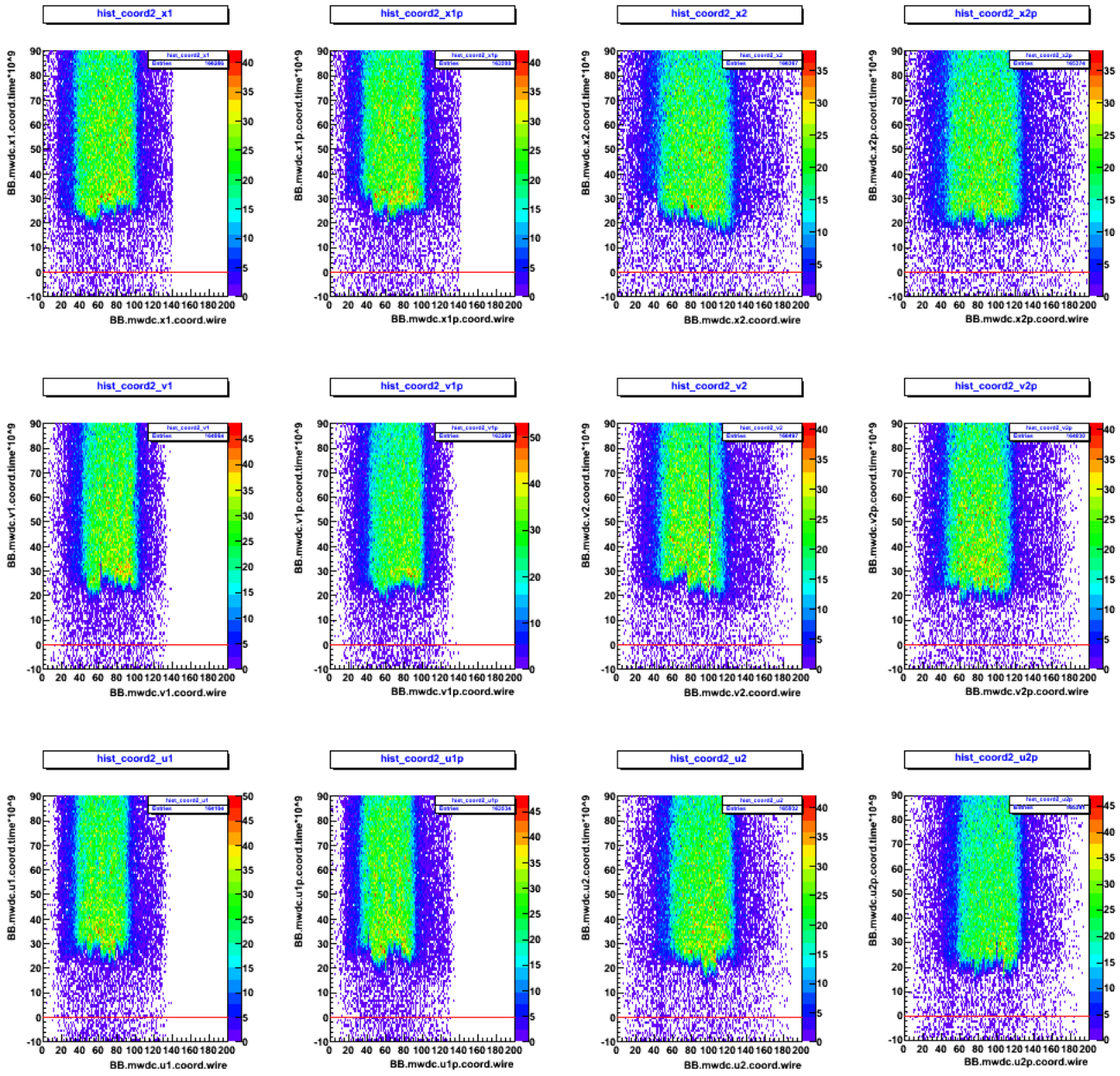

Figure 1.1: Time of each plane vs wire for only those hit that form track pattern. (x1,x1p,x2,x2p, ...). The redline indicate “zero” time in [ns] unit.

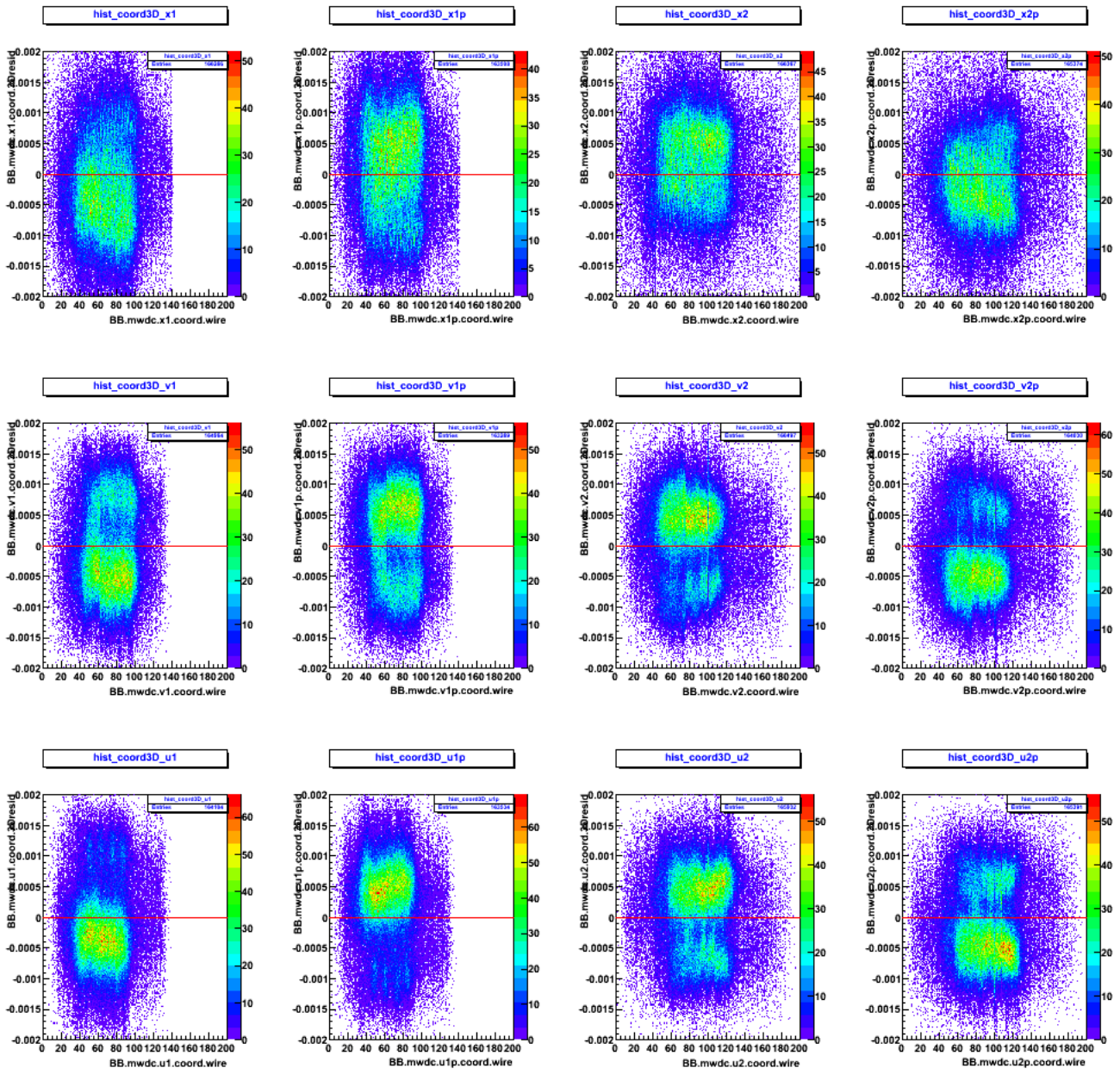

Figure 1.2: The 3D residue vs wire.

3D residue is the difference between the “chosen” track pattern location in the plane – the location from “time” conversion. The Y-axis ranges from -0.002 to 0.002 m [+/-2 mm]. It is “bad”.

From Figure 1.1 and the indication in Figure 1.2, I make a single offset to all MWDC by 20 ns. It result in improving the residue location.
Fine tune the time offset for each section of the A/D card.

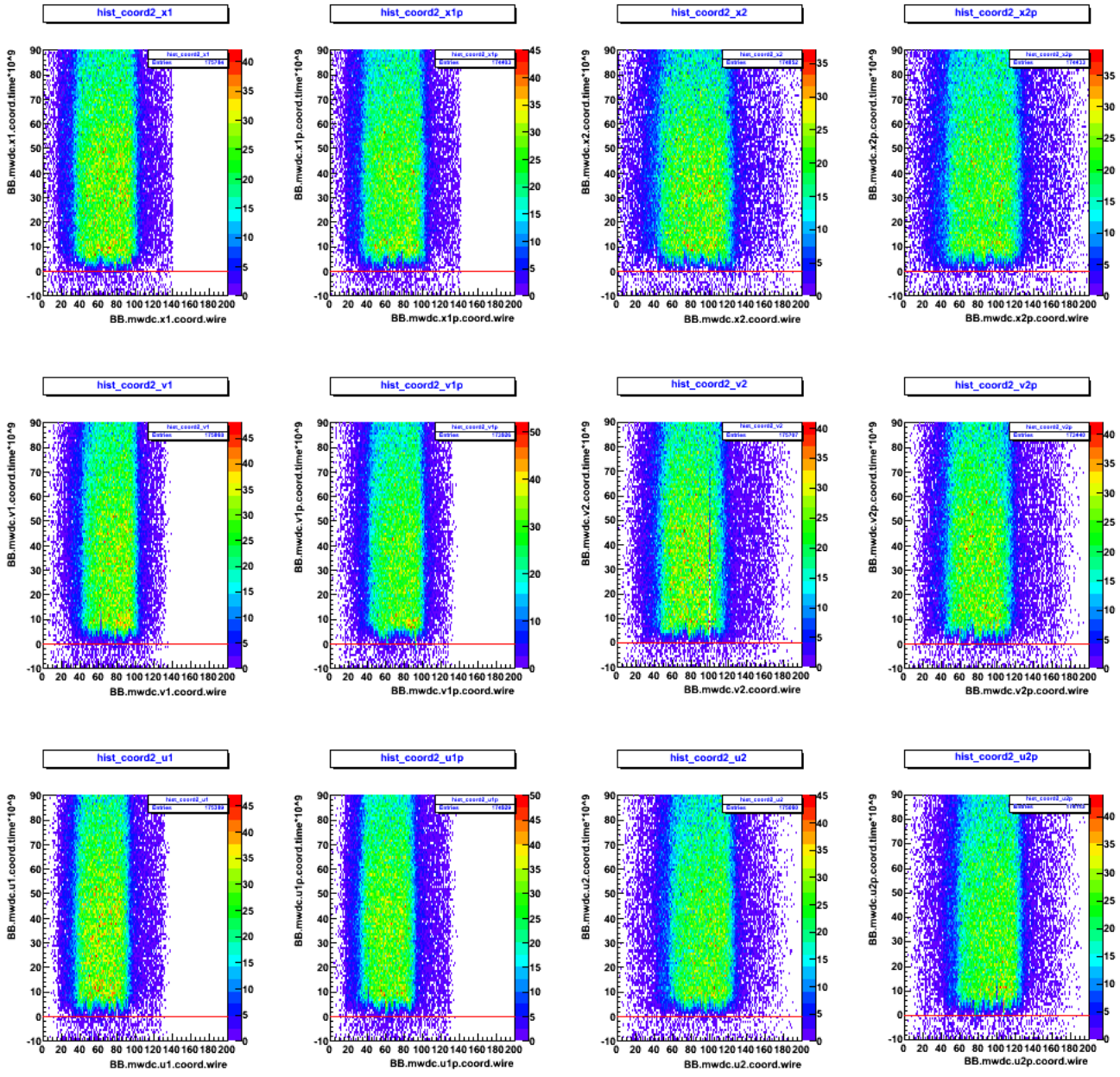

Figure 3.1 The new Time vs wire with each section of the A/D card (16 wires) adjust offset.

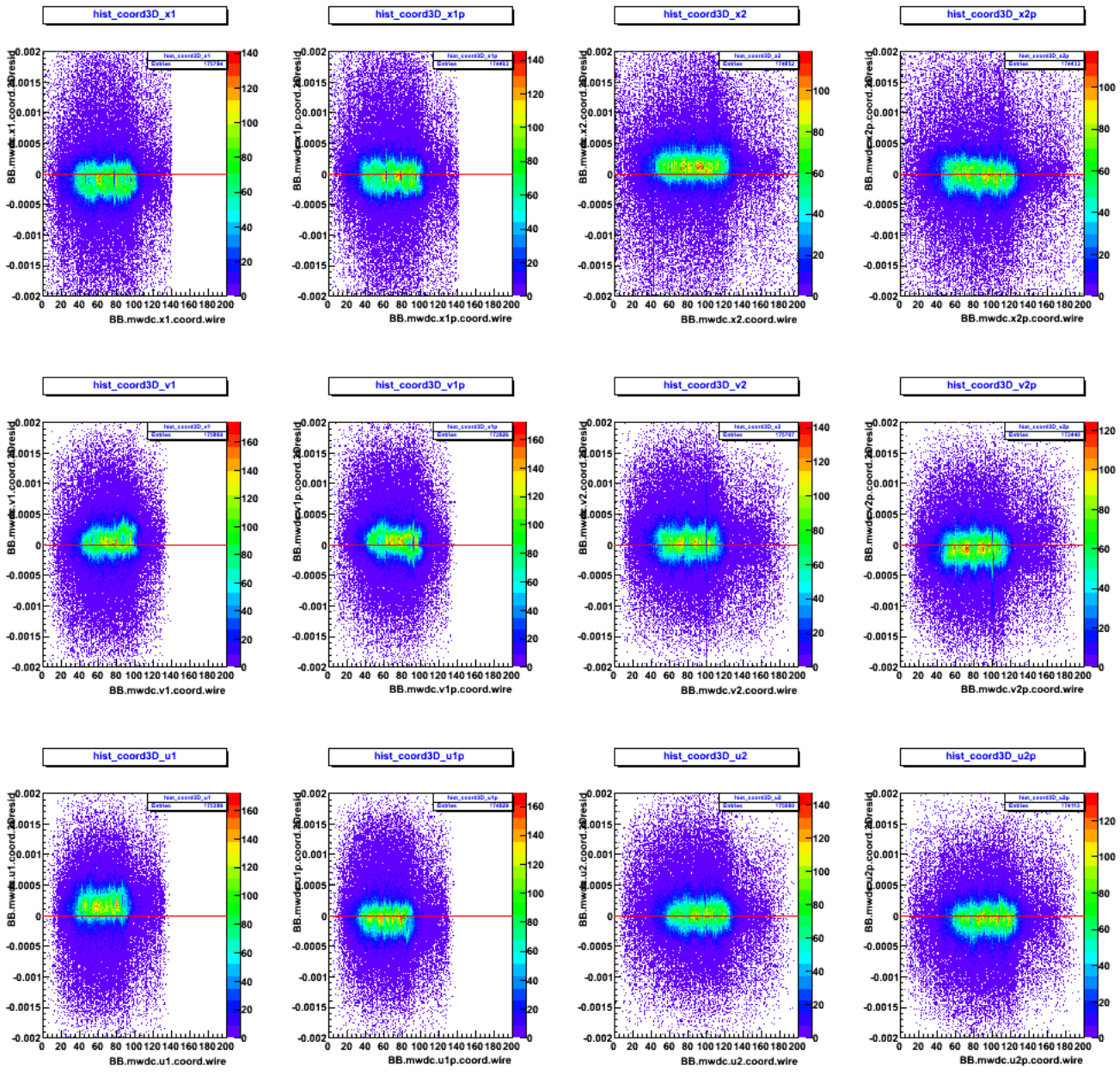

Figure 3.2 The result of 3D residue vs wire with each section of the A/D card (16 wires) adjust offset.

With the last setting (not totally perfect but acceptable), I rerun the MWDC Efficiency study.

Electron Elastic Cut:

1. T3 no edtm
2. theta and phi acceptance |theta|<= 60 mrad |phi|<= 30 mrad.
3. single track
4. has track to S2
5. W = proton mass (938.3 MeV/c2)<=4.49 MeV/c2
6. Vertex (target is 4 cm LH2) (none)

MWDC Eff == (proton PID in MWDC after PID in E-plane)/ (proton PID in E-plane)

Making tight cut on E-plane to eliminate most of the background.

Proton Elastic cut:

1. Proton PID in E-plane:
    1. CT = |BB-L| time
    2. “tight” Graphic cut E vs q

Since there are not many events (~ 0.25%) that has multiple hit passing proton PID in E. I would only consider the data that has single hit passing proton PID in E.

2. Matching data from E-plane to MWDC (or from MWDC to E-plane in E-plane Efficiency)
    1. | track x – 0.65*Ebar + 0.657|<= 0.15 (m)
    2. | track y – 0.1*E_tdiff| <= 0.045 (m)
3. Proton PID in MWDC:
    1. |q- MWDC_momentum|<=24 MeV/c

Run 2009 |q| 0.32 to 0.38 GeV/c	Event pass CT	Event pass graph E q	Single hit pass E q	Event pass track matching	Event pass |q-p|	MWDC Efficiency
Before 2009 ()	85917 nhit 0 29004 nhit 1 84397 nhit 2 1503 nhit 3 16 nhit 4 1	66863 nhit 0 48058 nhit 1 66778 nhit 2 85 nhit 3 0 nhit 4 0	66778	63199 ntrack 0 3664 ntrack 1 63027 ntrack 2 171 ntrack 3 1 ntrack 4 0	61991 ntrack 0 4872 ntrack 1 61982 ntrack 2 9 ntrack 3 0 ntrack 4 0	92.83%
With new	85917	66863	66778	64624	63811	95.56%

T0 calibration : 2009	nhit 0 29004 nhit 1 84397 nhit 2 1503 nhit 3 16 nhit 4 1	nhit 0 48058 nhit 1 66778 nhit 2 85 nhit 3 0 nhit 4 0		ntrack 0 2239 ntrack 1 64411 ntrack 2 211 ntrack 3 2 ntrack 4 0	ntrack 0 3052 ntrack 1 63791 ntrack 2 20 ntrack 3 0 ntrack 4 0	
Run 2033 |q| 0.38 to 0.44 GeV/c	Event pass CT	Event pass graph E q	Single hit pass E q	Event pass track matching	Event pass |q-p|	MWDC Efficiency
Before	154796 nhit 0 9717 nhit 1 152520 nhit 2 2248 nhit 3 27 nhit 4 1	101943 nhit 0 62570 nhit 1 101687 nhit 2 256 nhit 3 0 nhit 4 0	101687	85717 ntrack 0 16226 ntrack 1 84670 ntrack 2 1035 ntrack 3 12 ntrack 4 0	79730 ntrack 0 22213 ntrack 1 79694 ntrack 2 36 ntrack 3 0 ntrack 4 0	78.41%
After	154796 nhit 0 9717 nhit 1 152520 nhit 2 2248 nhit 3 27 nhit 4 1	101943 nhit 0 62570 nhit 1 101687 nhit 2 256 nhit 3 0 nhit 4 0	101687	90375 ntrack 0 11568 ntrack 1 89275 ntrack 2 1093 ntrack 3 7 ntrack 4 0	87776 ntrack 0 14167 ntrack 1 87709 ntrack 2 67 ntrack 3 0 ntrack 4 0	86.32%
Run 2037 |q| 0.42 to 0.48 GeV/c	Event pass CT	Event pass graph E q	Single hit pass E q	Event pass track matching	Event pass |q-p|	MWDC Efficiency
Before	128529 nhit 0 26418 nhit 1 127394 nhit 2 1115 nhit 3 19 nhit 4 1	84371 nhit 0 70576 nhit 1 84282 nhit 2 89 nhit 3 0 nhit 4 0	84282	71144 ntrack 0 13227 ntrack 1 70426 ntrack 2 714 ntrack 3 4 ntrack 4 0	65811 ntrack 0 18560 ntrack 1 65800 ntrack 2 11 ntrack 3 0 ntrack 4 0	78.08%

After	128529 nhit 0 26418 nhit 1 127394 nhit 2 1115 nhit 3 19 nhit 4 1	84371 nhit 0 70576 nhit 1 84282 nhit 2 89 nhit 3 0 nhit 4 0	84282	75857 ntrack 0 8514 ntrack 1 75094 ntrack 2 758 ntrack 3 5 ntrack 4 0	74118 ntrack 0 10253 ntrack 1 74089 ntrack 2 29 ntrack 3 0 ntrack 4 0	87.94%

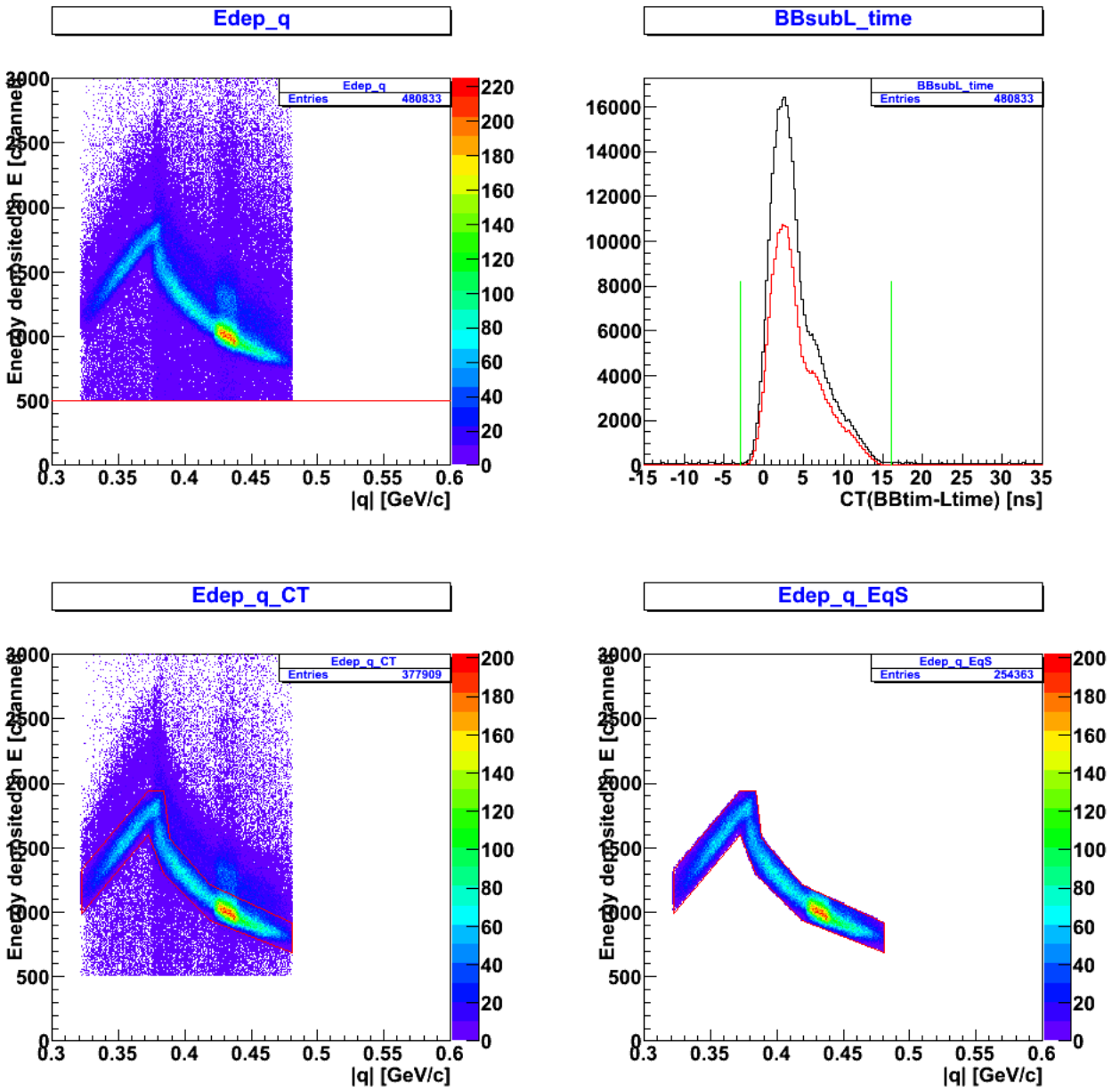

Figure 4.1: PID in E plane

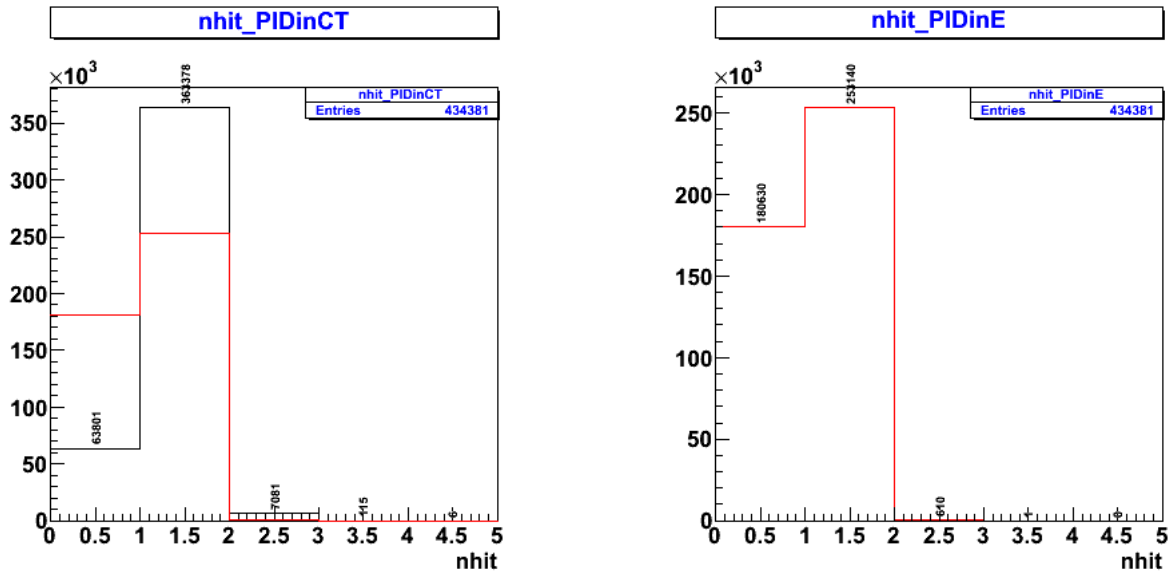

Figure 4.2 event pass “CT” cut and “CT& E_vs_q graph” cut

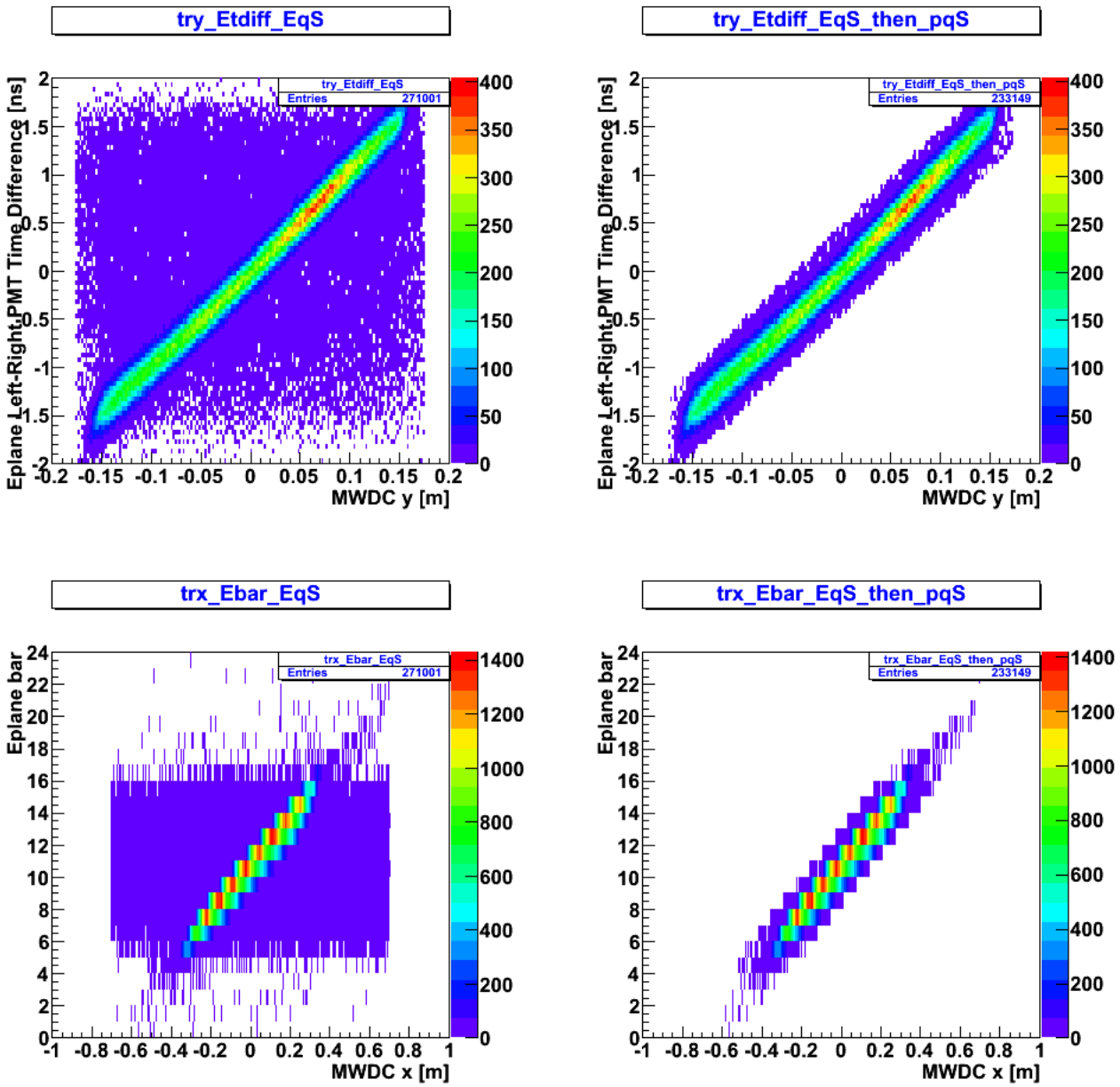

Figure 4.3 Track Matching

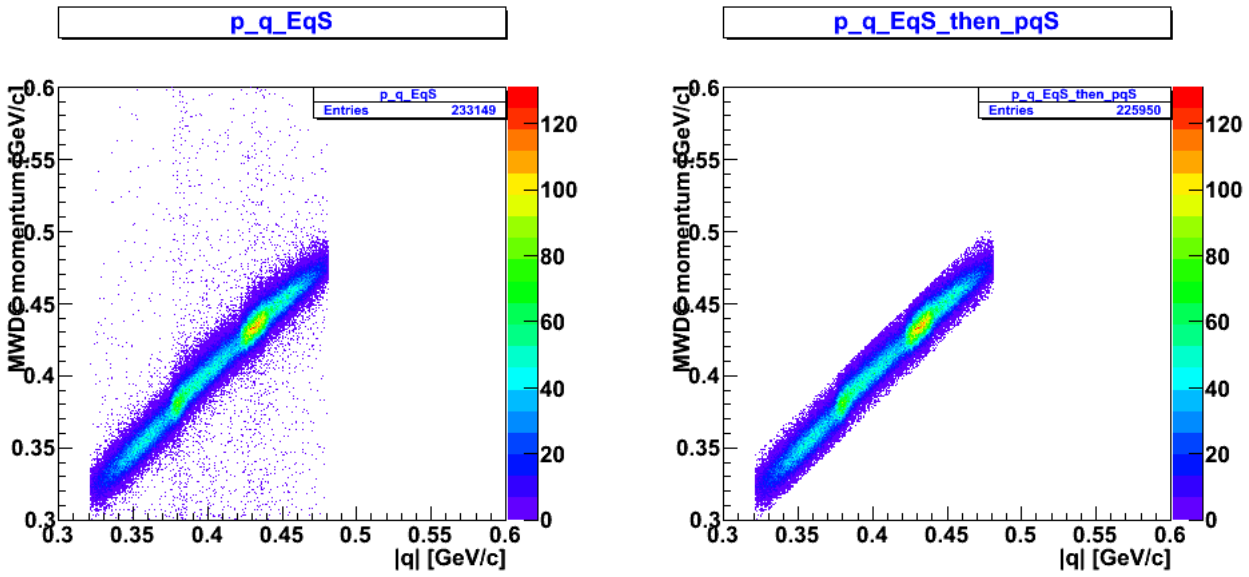

Figure 4.4

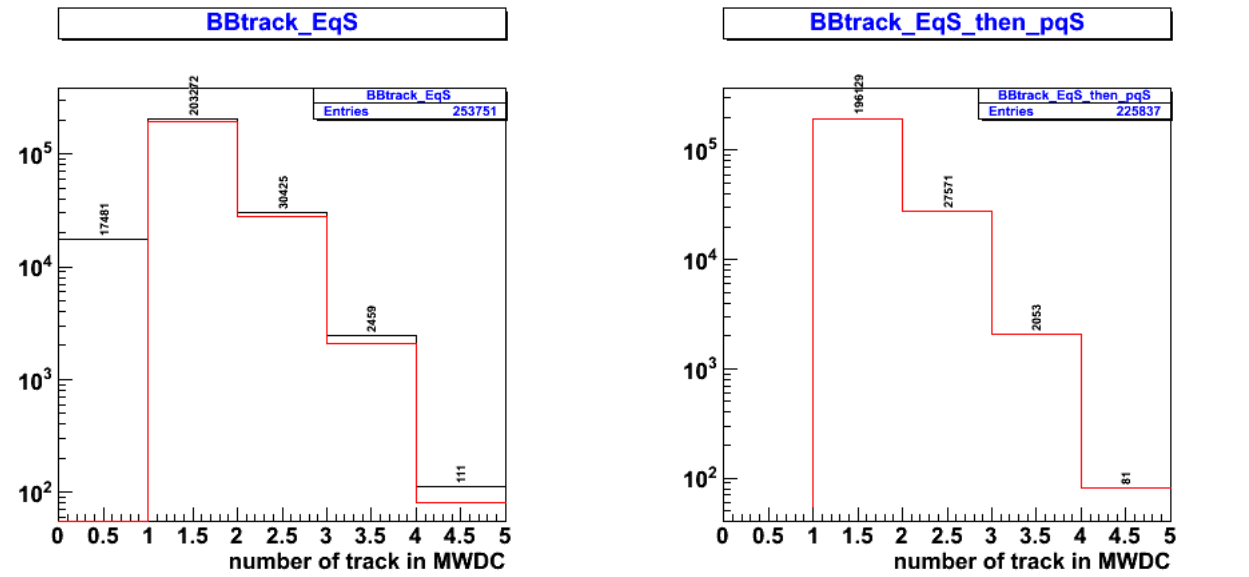

Figure 4.5 event pass “track matching” cut and “track matching & |p-q|” cut