ERT status (Run9)

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1 Introduction

As RHIC luminosity improves, the role of ERT trigger becomes more important. It was long time ago when we studied the ERT performance in detail [1]. In Run9, we took physics data with two different EMCal dynamic ranges. It gives us an opportunity to study the other aspect.

In this note, we intend to summarize the ERT performance and underlying problems. Based on the study, we discuss about the direction of upgrades.

2 Issues

2.1 Summary

Numbers refer ERT logbook entries.
-ERTLL1 board failures
Symptom
Diagnose
Solution
#781,#776,

-ROC replacement
Symptom
#803,#791,#713

- Why is PbGl(E1) noisy? Why is E0 OK?
Hit rates varies SM by SM (but stable).
#685 (an attempt to find hot tiles. It got better, but not completely solved.)

- EMCal(or LL1) burst
#716,

- timing (ERT, LL1)
low entries in one of ROCs
#749
ppg(laser), LL1
#795(+1.25ns),#749(Misc),#744,#674 #672(+2.5ns)

ppg(laser) low livetime (→ contamination from ppg events in crossing 108)
LED long pulse makes ERT livetime lower. It depends on the relative rate.
#802, #749, #672
- Is the ERT trigger responsible to a spike in Low Runnumber monitor?

2.2 Threshold analysis

The procedure is described below. The ADC sum was used to separate the effect of PMT gain variation. In this note, 3 runs are analyzed. Table 1 summarizes the conditions of each run.

1. Select non-biased sector. (Check if ERT bits exist in the other sectors.)
2. If the SM has only one tower entry, reject those from the sample. It is likely a electrical noise.
3. Calculate low gain ADC (post-pre) sum, if it's not on the hot channel list (Table 10,11).
4. Pick the maximum 2x2 or 4x4 sum as the representative of the SM.
5. Check if the SM has ERT bit.

For each SM, two histograms are filled (e.g. Fig.1) as a function of low gain sum. A turn-on curve is the ratio of the two (e.g. Fig. 2). Here a simple error function was used to fit the curve (TMath::Erf((x-[1])/[0])/2+0.5).

run	DAC_2x2	DAC_4x4c	comment
276874	29(27)	29(29)	500GeV dynamic range, E1 sector (4x4a,c) was masked off E2South has a timing problem
281974	29(27)	29(29)	200GeV dynamic range
289787	29(27)	29(29)	200GeV dynamic range

Table 1: Processed runs summary

All plots are collected in Section 5. There are some remarks.
The spectra tends to have a high energy tail because the events are biased. (Clusters are not biased.)
There are still hot channels, but it is independent to the trigger (e.g. W1-SM16-2x2 Fig.16, W3-SM11-2x2 Fig.50, W2-many-4x4c Fig.33).
Because of the statistical limitation, high threshold results are not very reliable. PbGl SMs are also difficult to study with this statistics.

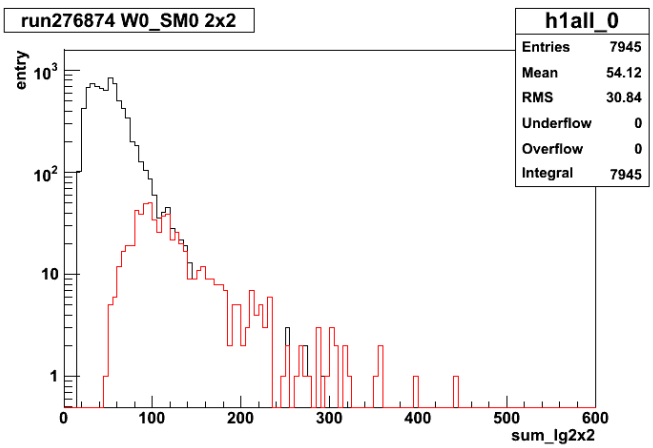

Figure 1: run276874 W0-SM0 2x2 entry

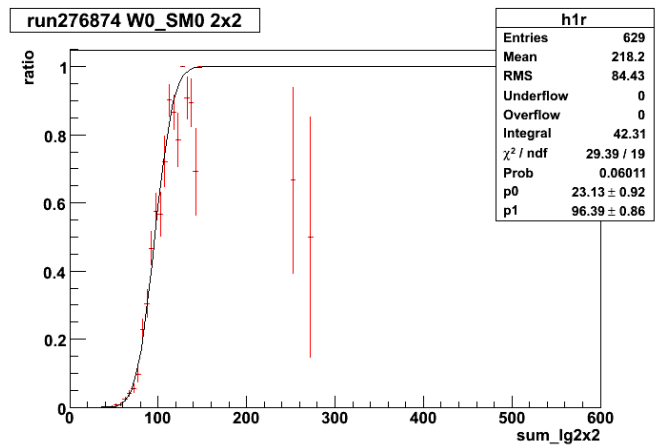

Figure 2: run276874 W0-SM0 2x2 ratio

Figure 3 and Fig.4 (Fig.5 and Fig.6) show the comparison of 2x2 (4x4c) mean values between two runs. Red points are from PbGl. While Fig.4 and Fig.6 shows a good correlation as expected, a systematic shift is observed in Fig.5. The energy thresholds in 500GeV setting are higher than we expected from the PMT gain difference. This also shows the low gain ADC sum isn't a perfect representative of the trigger circuit.

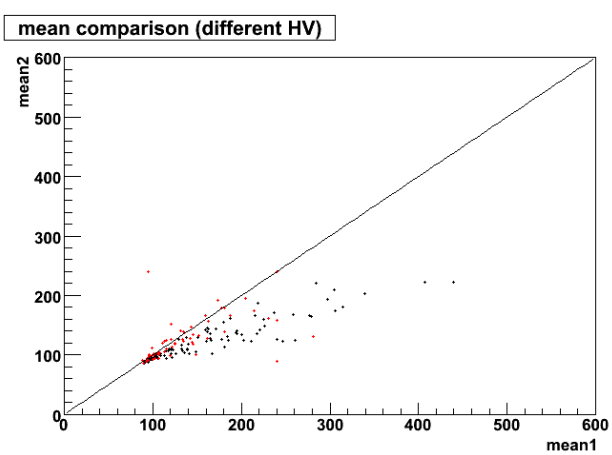

Figure 3: mean thresholds (2x2) m1:run276874, m2:run281974

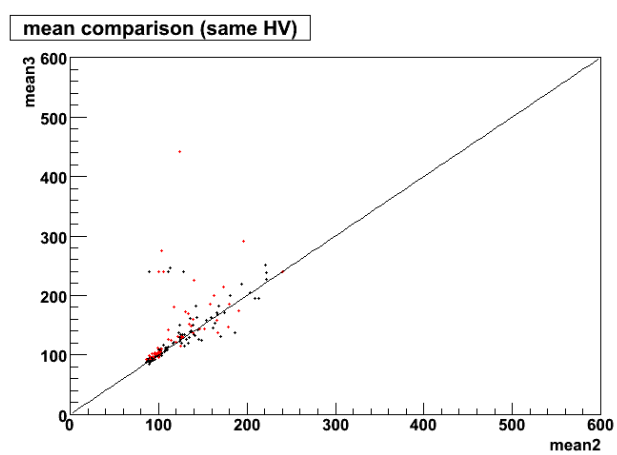

Figure 4: mean thresholds (2x2) m2:run281974, m3:run289787

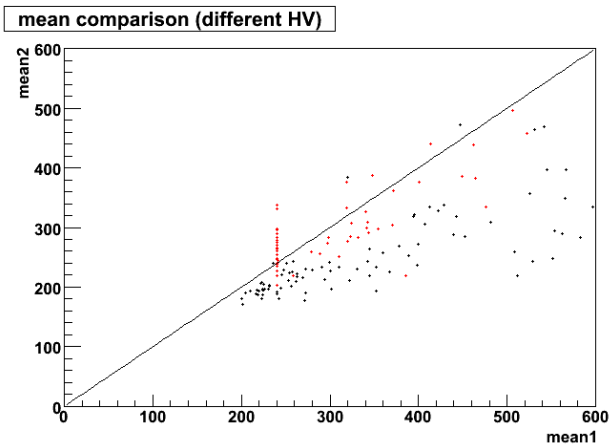

Figure 5: mean thresholds (4x4c) m1:run276874, m2:run281974

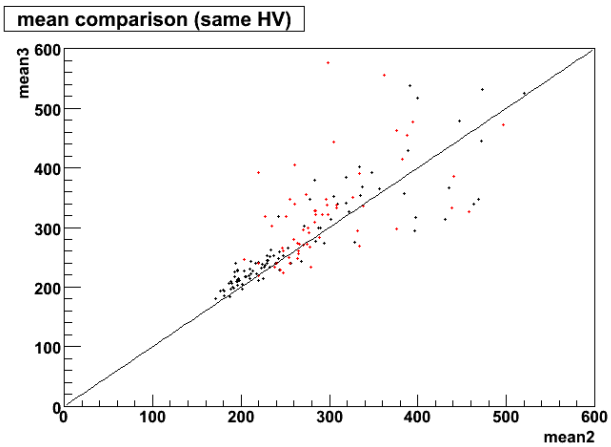

Figure 6: mean thresholds (4x4c) m2:run281974, m3:run289787

- Rejection factor

Gain unbalance or trigger circuit variation?
(Can we tell from the turn-on width?)

- The next step

Currently the analysis code is based on the online monitor package. It's good enough for a single job. But to accumulate more statistics, we need to write a code based on Subsysreco class.
With more statistics, we may find the reason of the hit entry fluctuation in E1 sector.

3 Future

-Short term
no or few spares (RICH, ROC)
Diagnose tool with ROC pulser.

-Mid term
Too much work for the maintenance and there is always new problem.
Logic analyzer readout from the IR?
-Long term
Triggering after the digitization.

4 ERT preparation in Run9

Numbers refer ERT logbook entries.

4.1 Run9 performance of ERT_EMCal

- hot/dead tiles
noise scan result(500/200GeV setting)
#659(ASIC card replacements),
#680(r9f),#662(r9d) we used r9d+r9f
#686(6+6 scan),#699(6x6 scan)

- Summary of disabled channels (figure, link to the CVS)
We used
$CVSROOT/online_distribution/ERT_tools/conf/pedestal.conf (Revision 1.37)
for both 500GeV and 200GeV.

- DAC setting
PbGl/PbSc balance (#693)
The DAC setting is summarized in the web page.[2]

4.2 Run9 Performance of ERT_RICH

- Hardware fix before the run
30's boards are still problematic.
- The timing adjustment is tricky
#738,#726
[3],[4]
- quiet/hot Level-1 boards. (It comes and goes without doing anything.)

4.3 Monitoring

Issues - The count roll over screws the rejection.
- Many RICH masks appeared because of one single hot 2x2 SM.
- ppg(laser) livetime monitor may be useful.
- Can we detect a burst type problem? (timeline)
- Is it better to calculate RF with live counts?

5 Data

raw entries 2x2
run276874 Fig.7, Fig.8, Fig.9, Fig.10, Fig.11, Fig.12, Fig.13, Fig.14
run281974 Fig.15, Fig.16, Fig.17, Fig.18, Fig.19, Fig.20, Fig.21, Fig.22
run289787 Fig.23, Fig.24, Fig.25, Fig.26, Fig.27, Fig.28, Fig.29, Fig.30

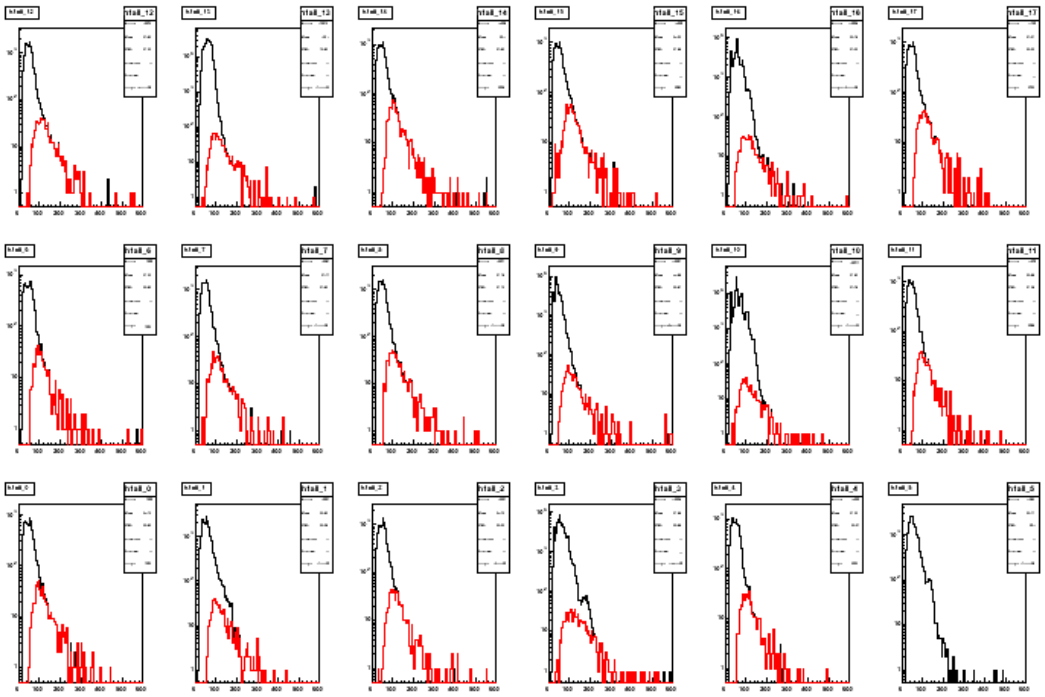

Figure 7: W0 run276874 2x2

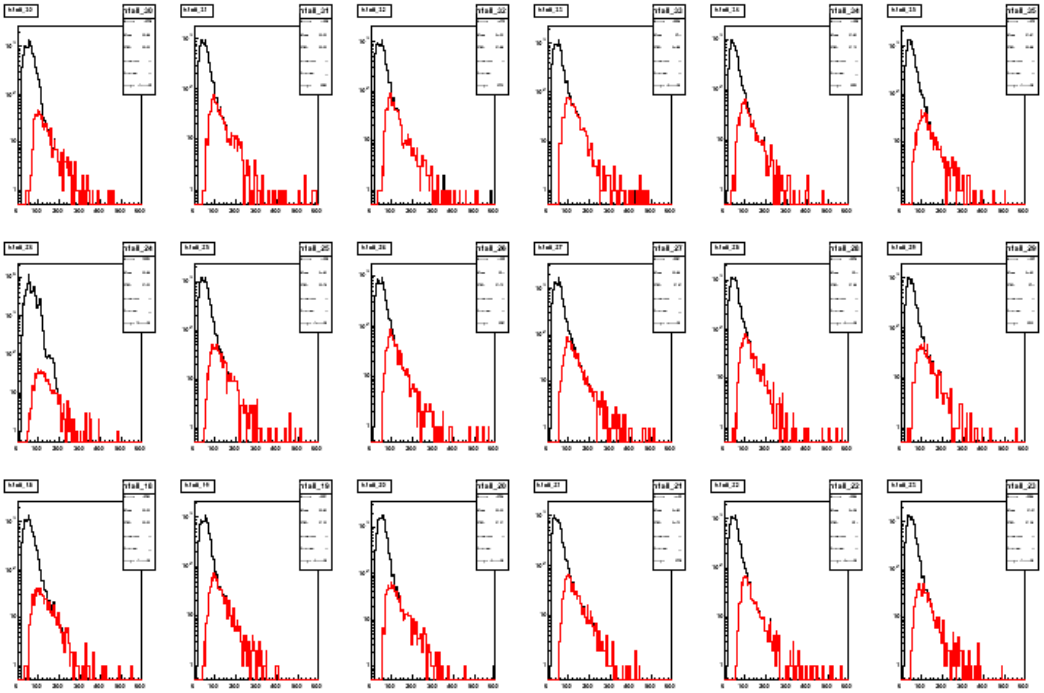

Figure 8: W1 run276874 2x2

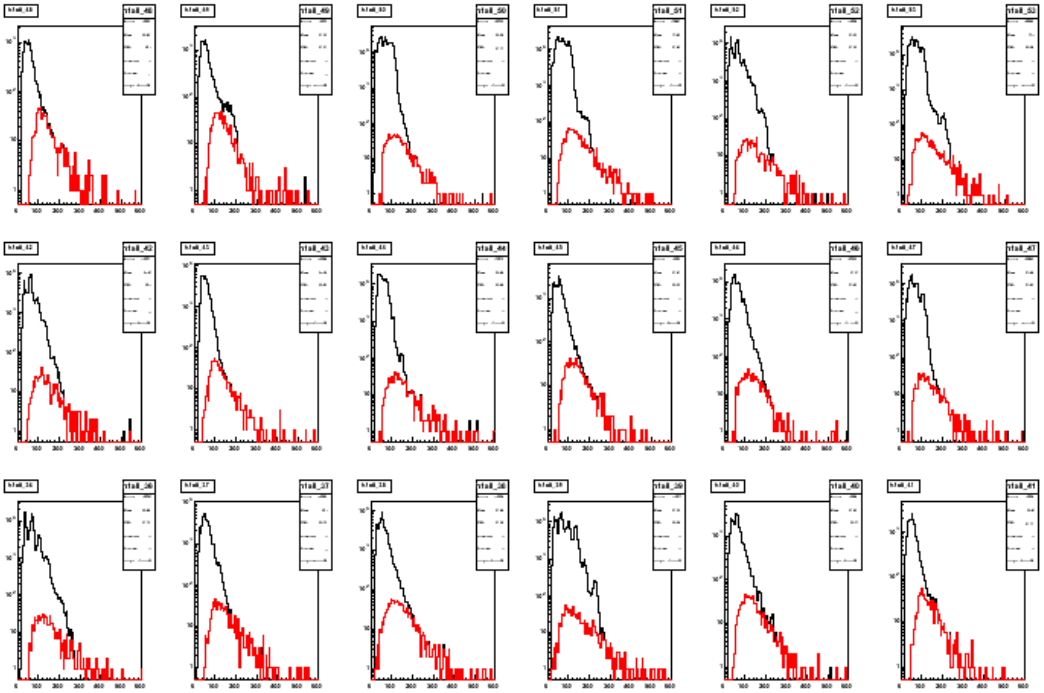

Figure 9: W2 run276874 2x2

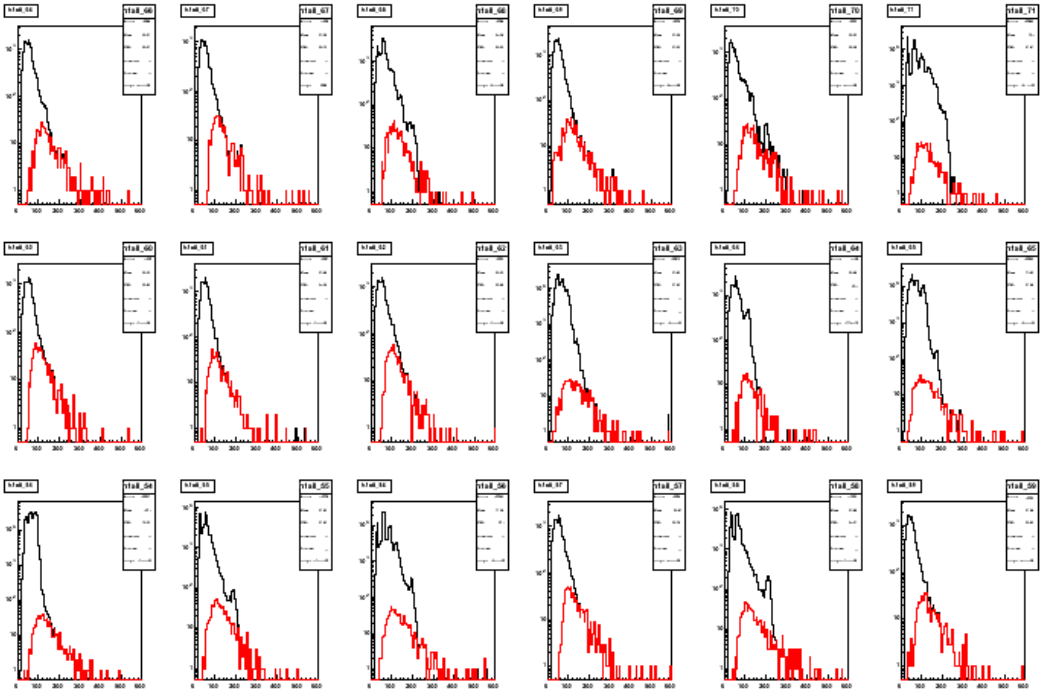

Figure 10: W3 run276874 2x2

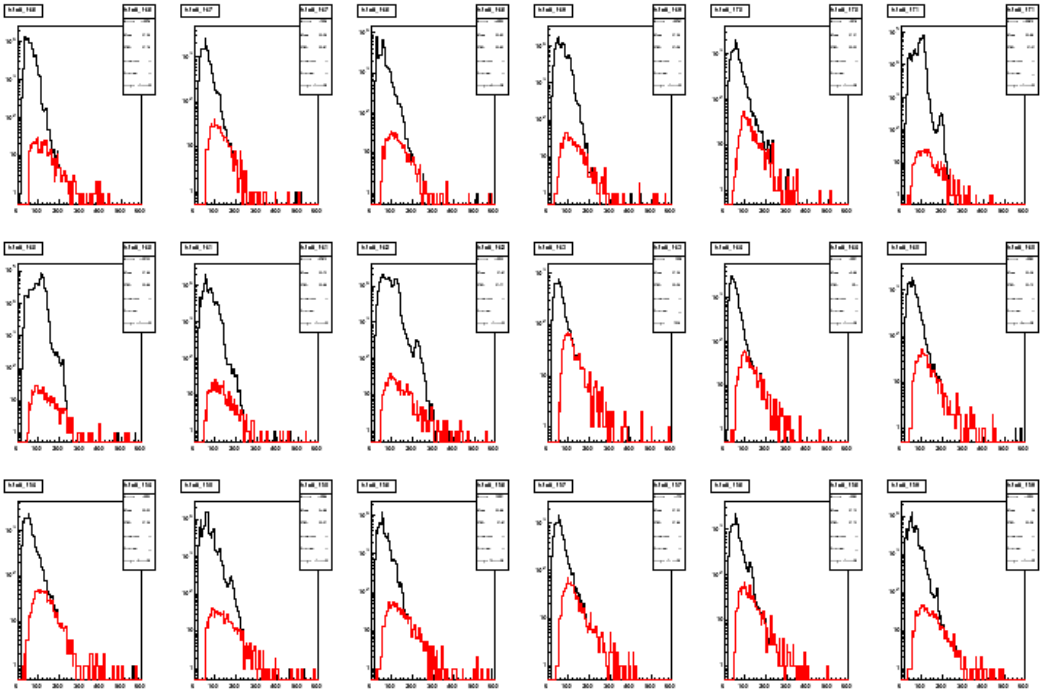

Figure 11: E3 run276874 2x2

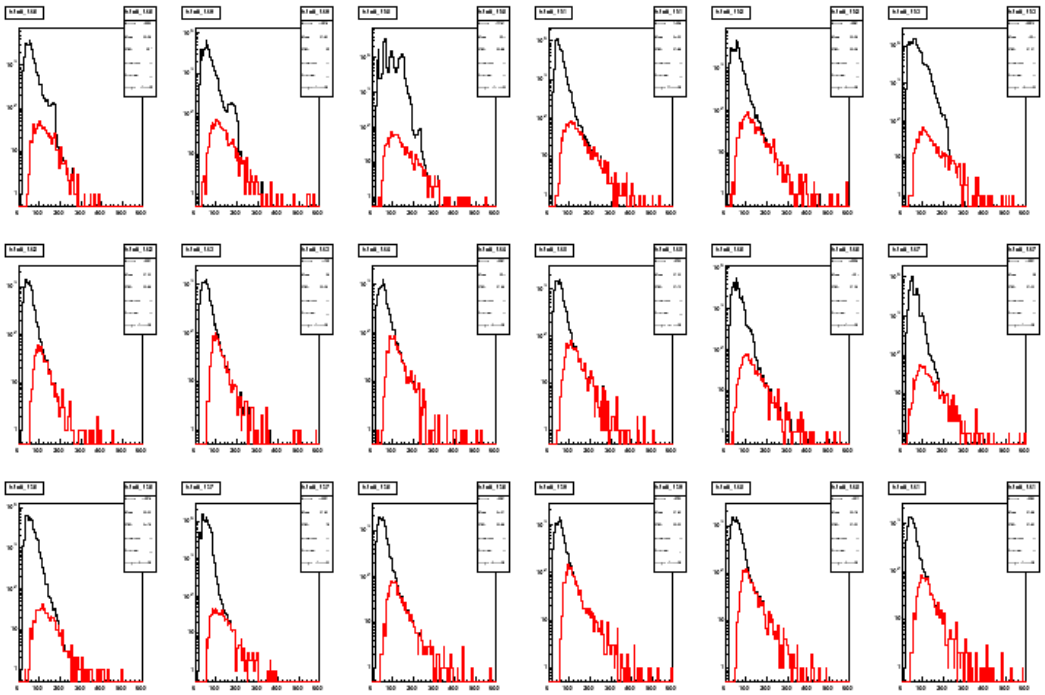

Figure 12: E2 run276874 2x2

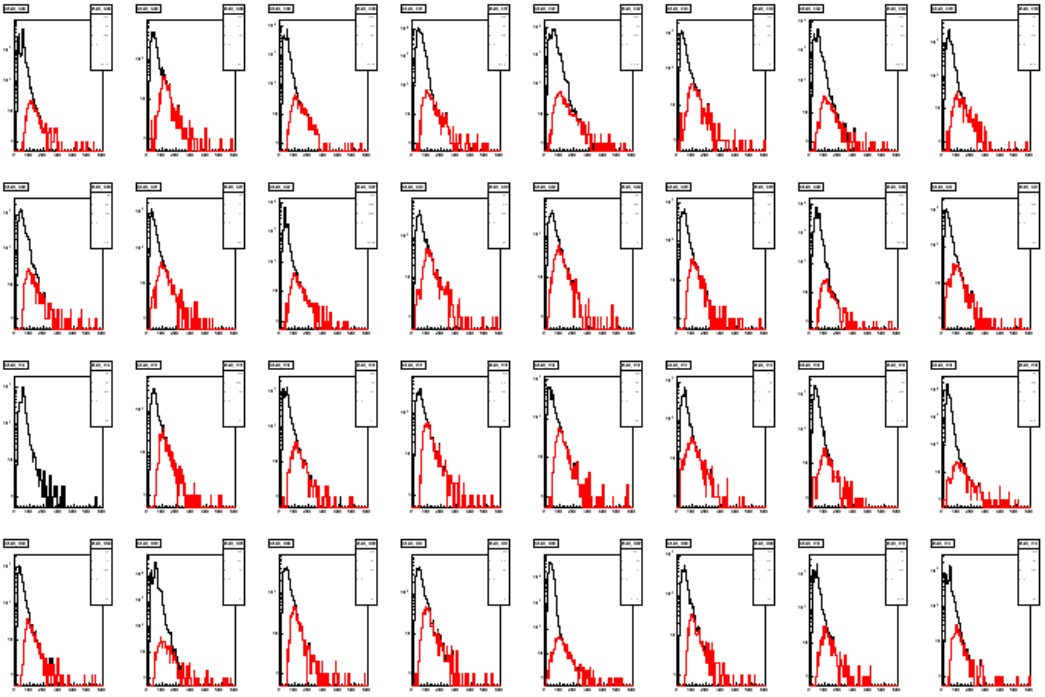

Figure 13: E1 run276874 2x2

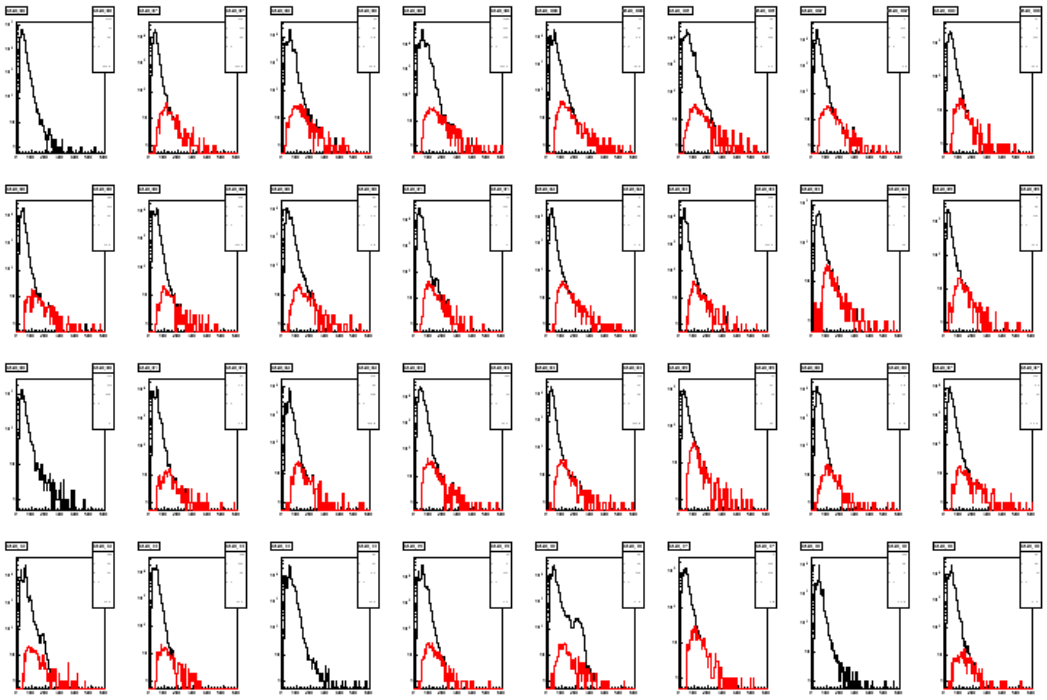

Figure 14: E0 run276874 2x2

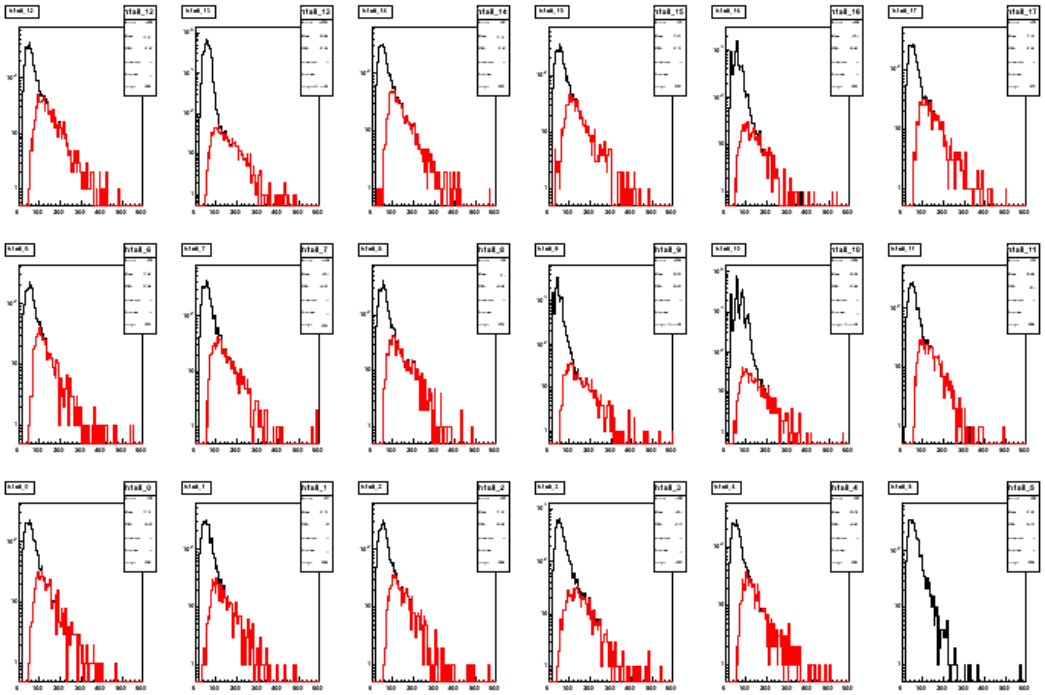

Figure 15: W0 run281974 2x2

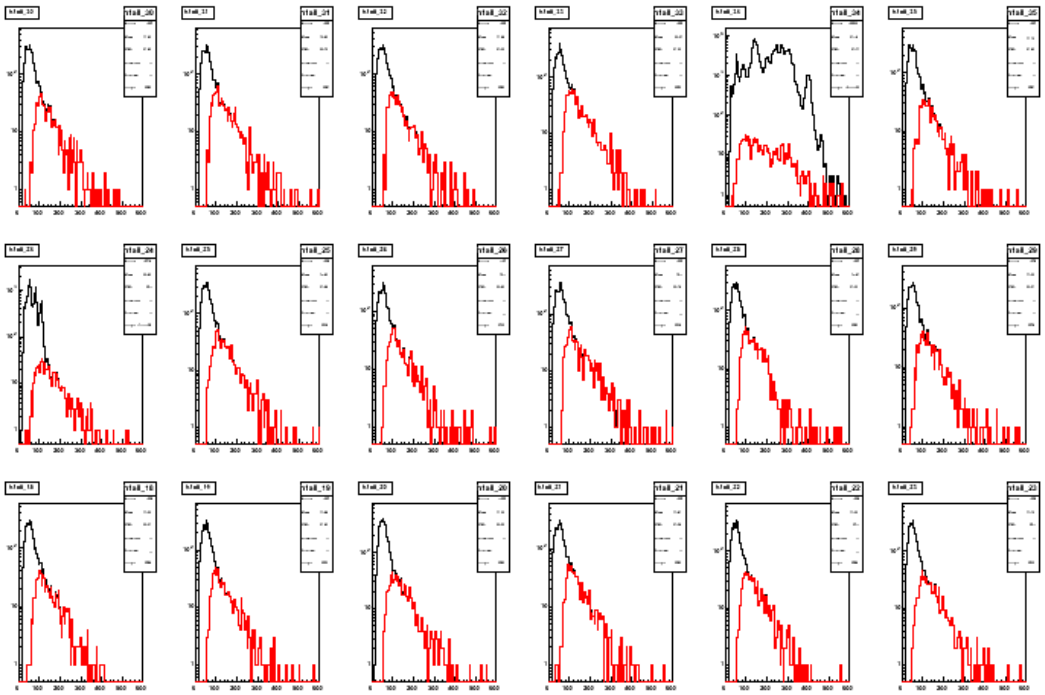

Figure 16: W1 run281974 2x2

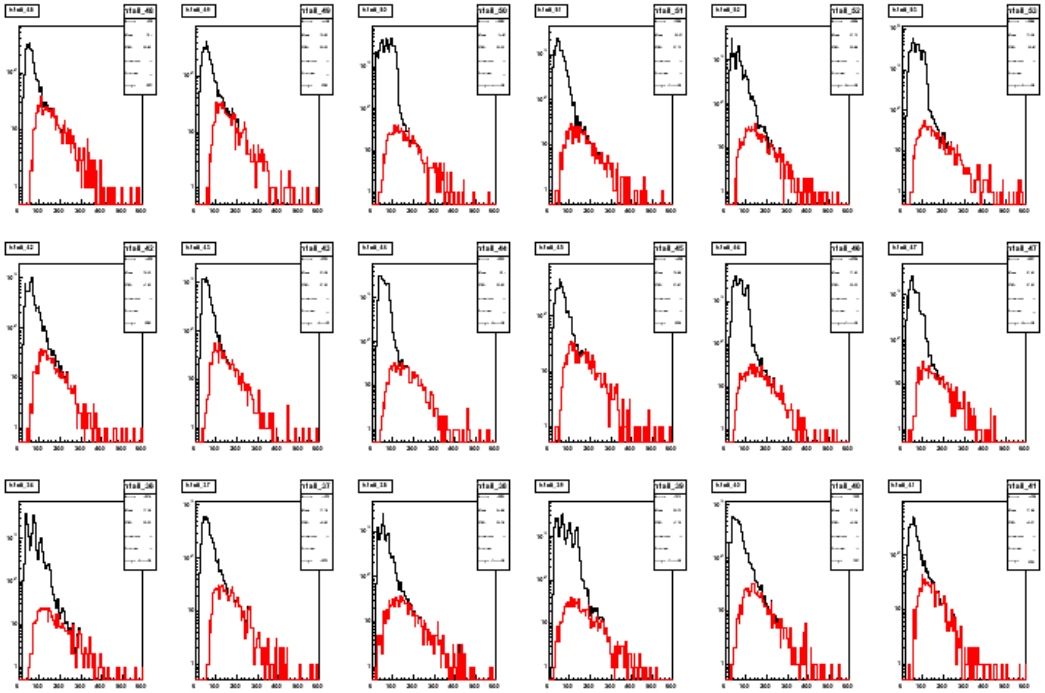

Figure 17: W2 run281974 2x2

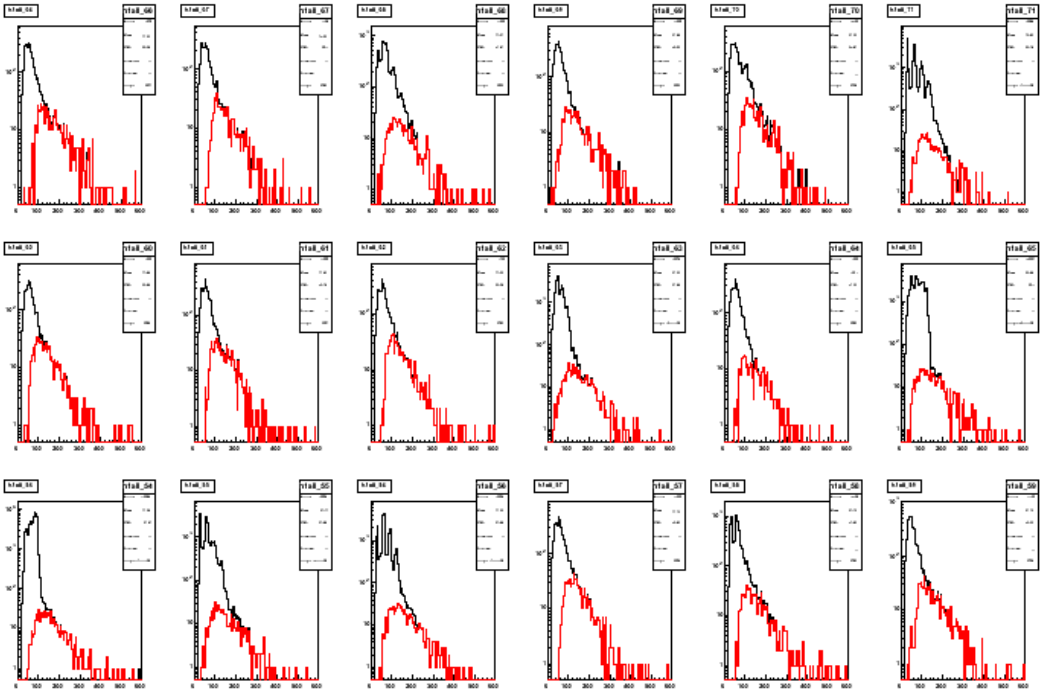

Figure 18: W3 run281974 2x2

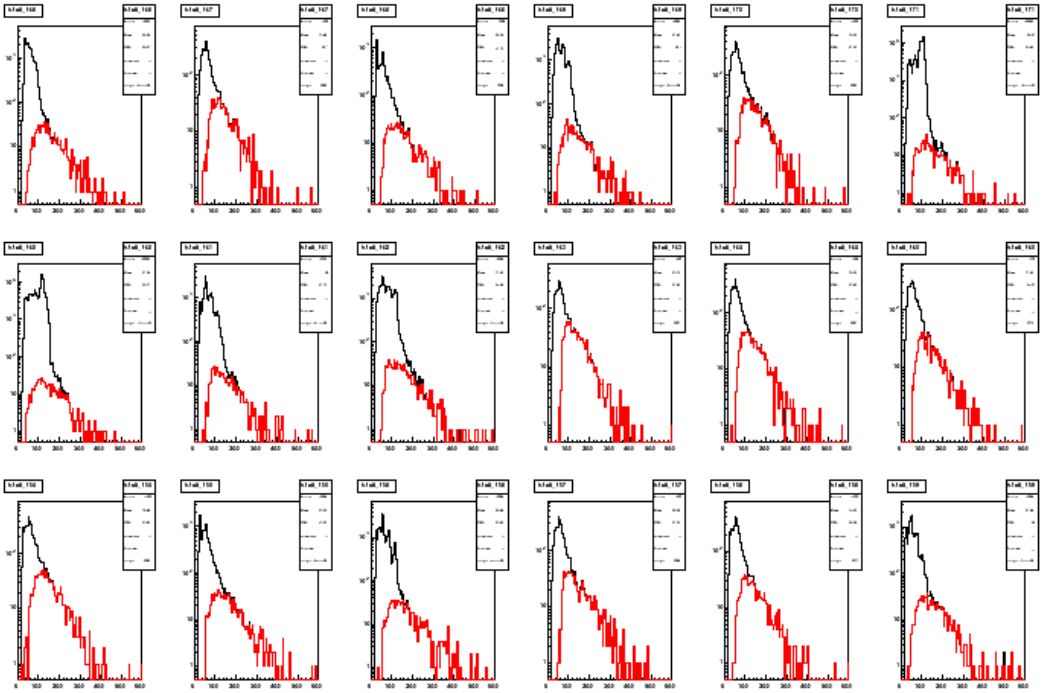

Figure 19: E3 run281974 2x2

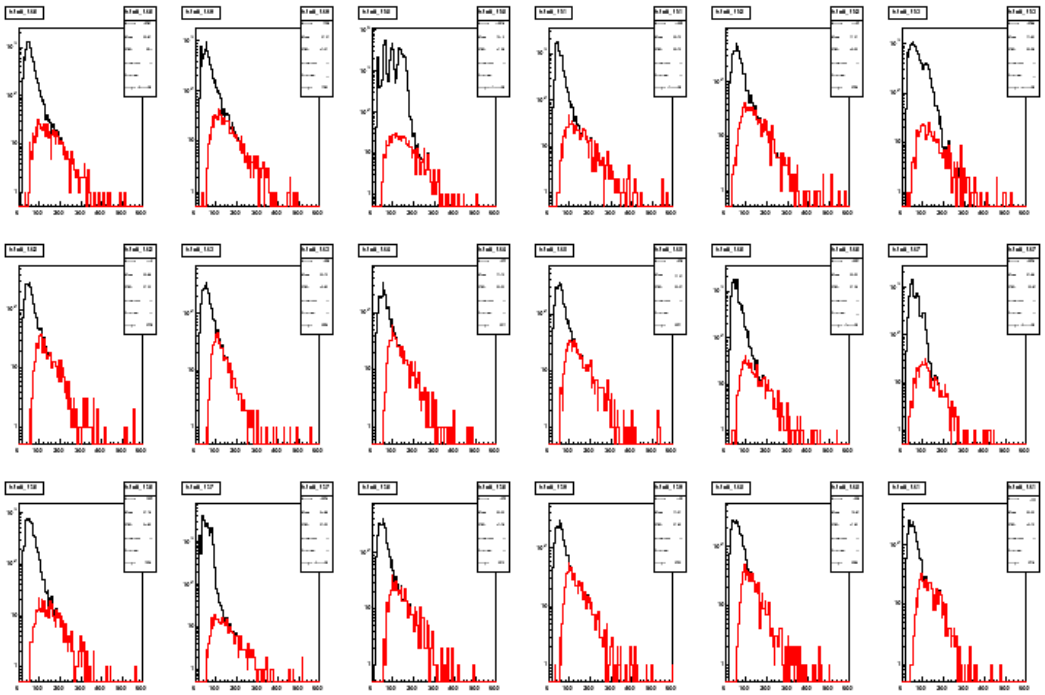

Figure 20: E2 run281974 2x2

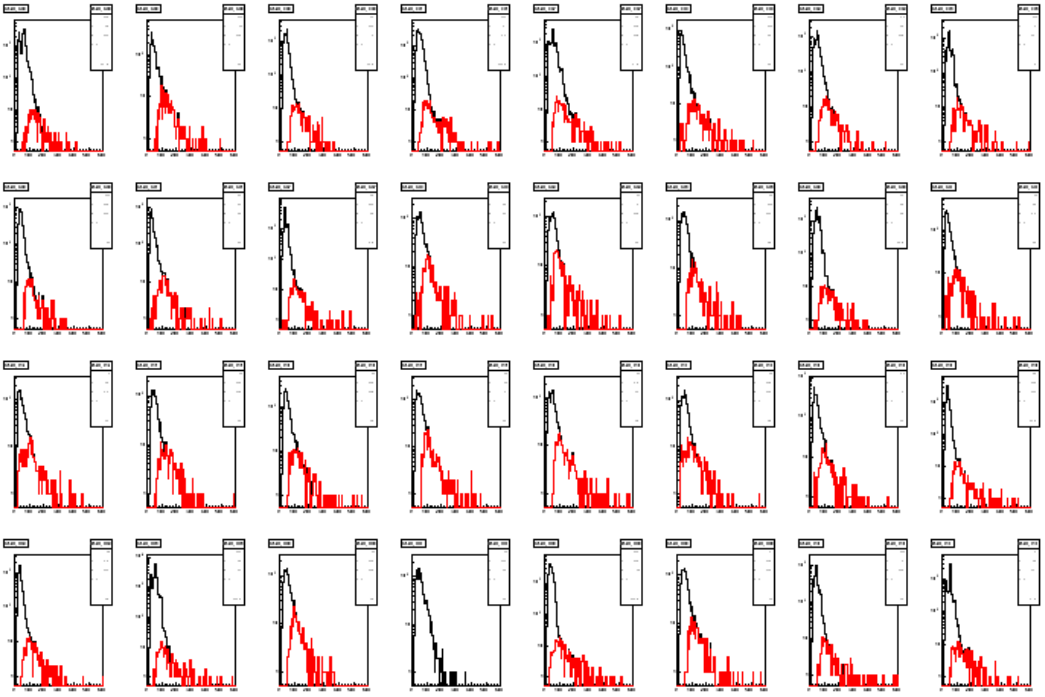

Figure 21: E1 run281974 2x2

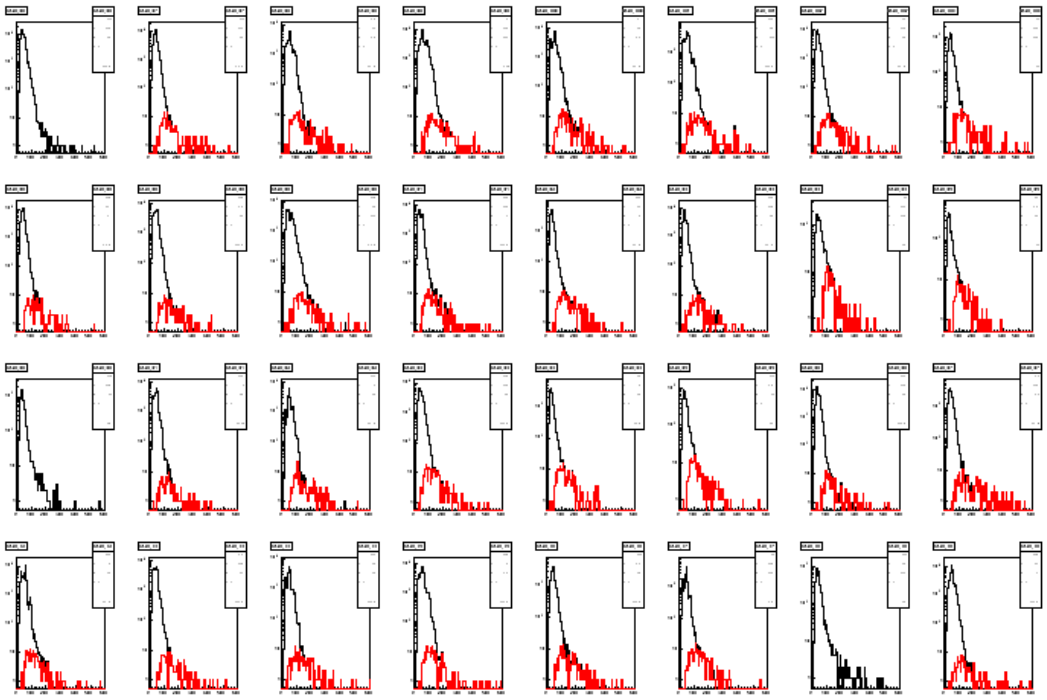

Figure 22: E0 run281974 2x2

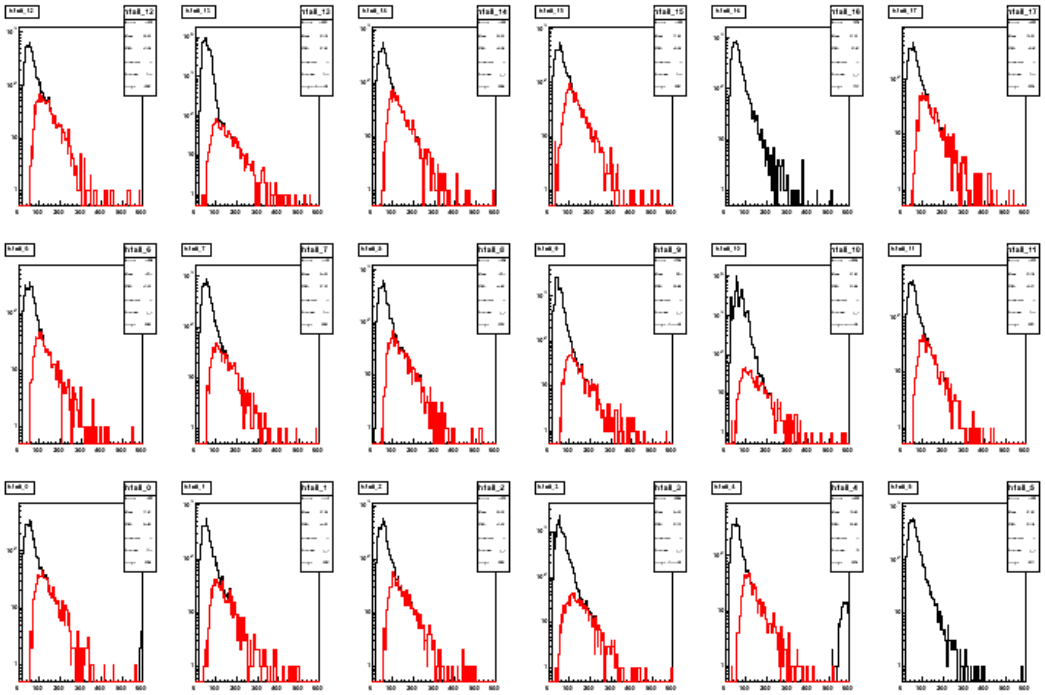

Figure 23: W0 run289787 2x2

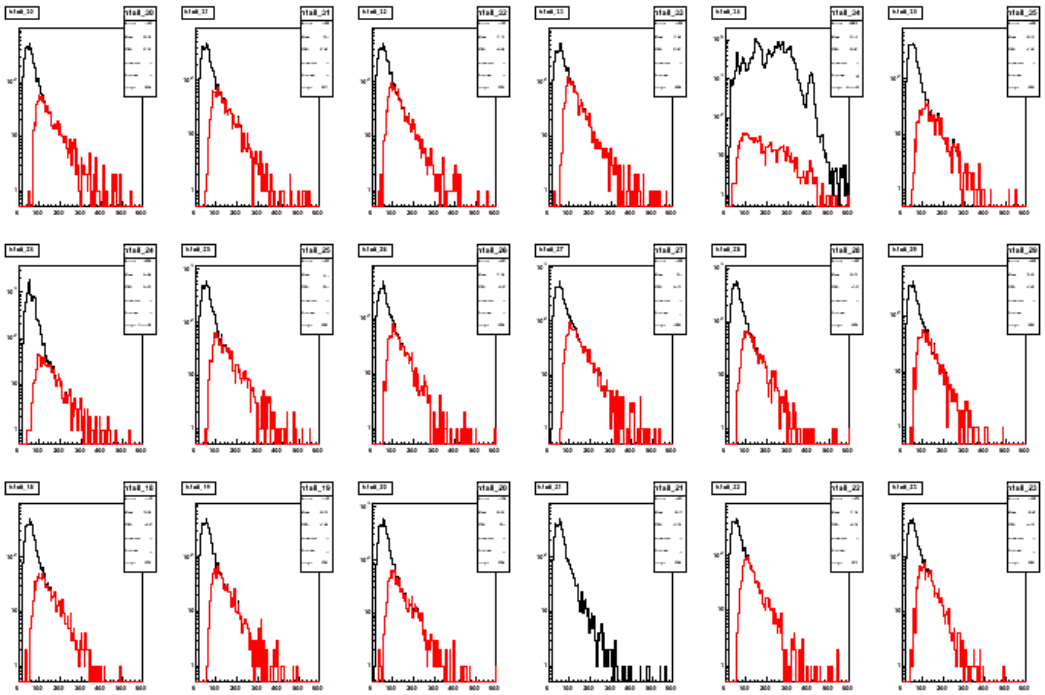

Figure 24: W1 run289787 2x2

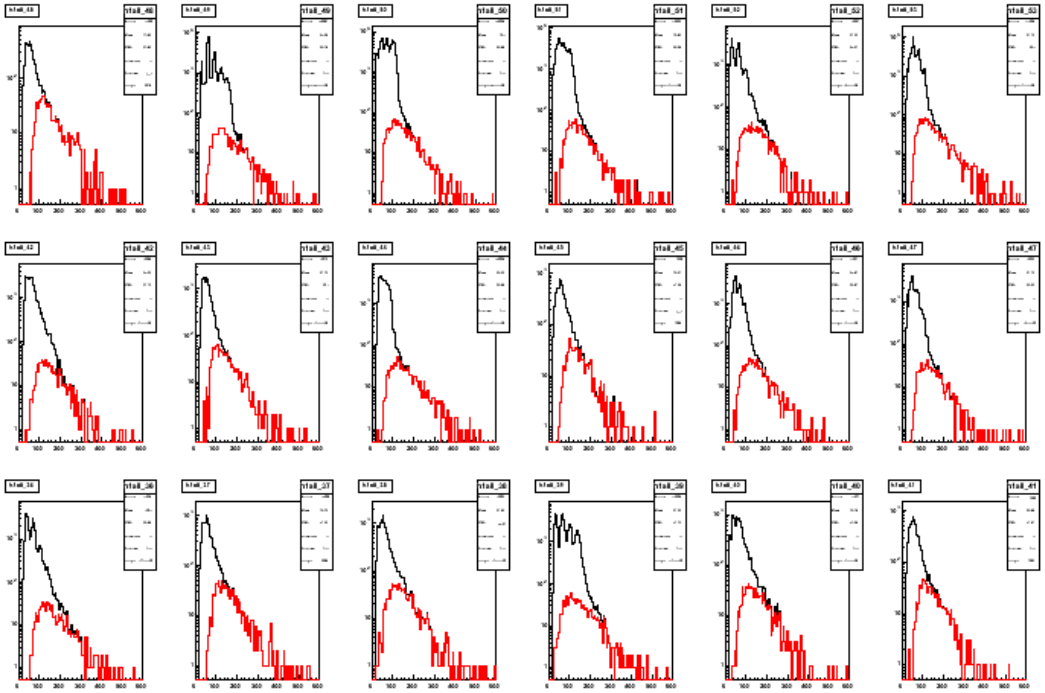

Figure 25: W2 run289787 2x2

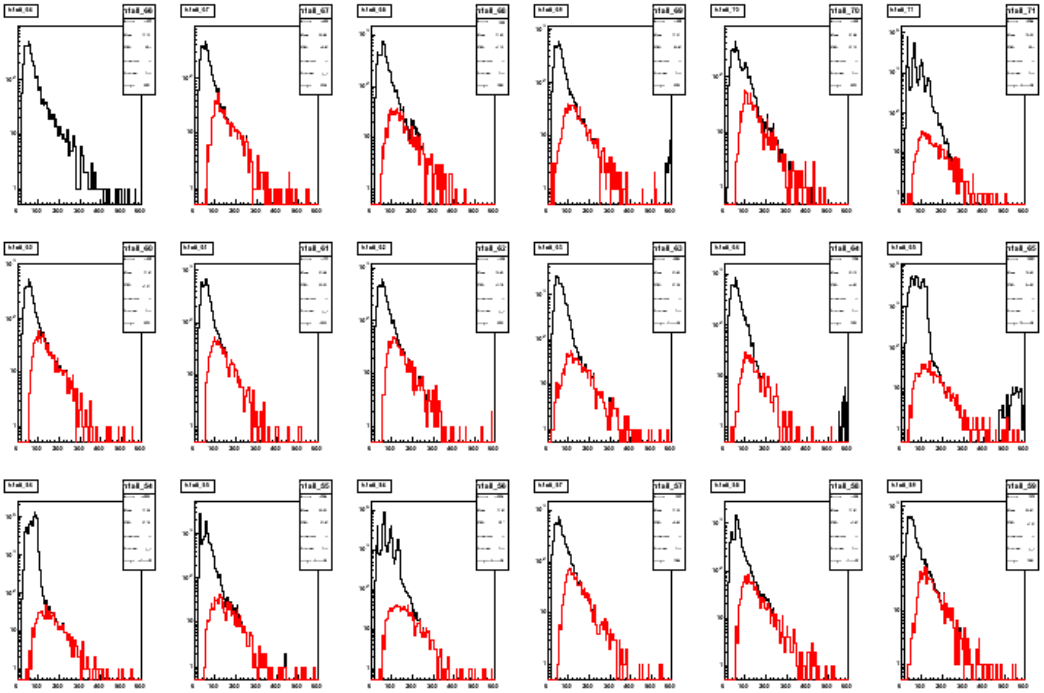

Figure 26: W3 run289787 2x2

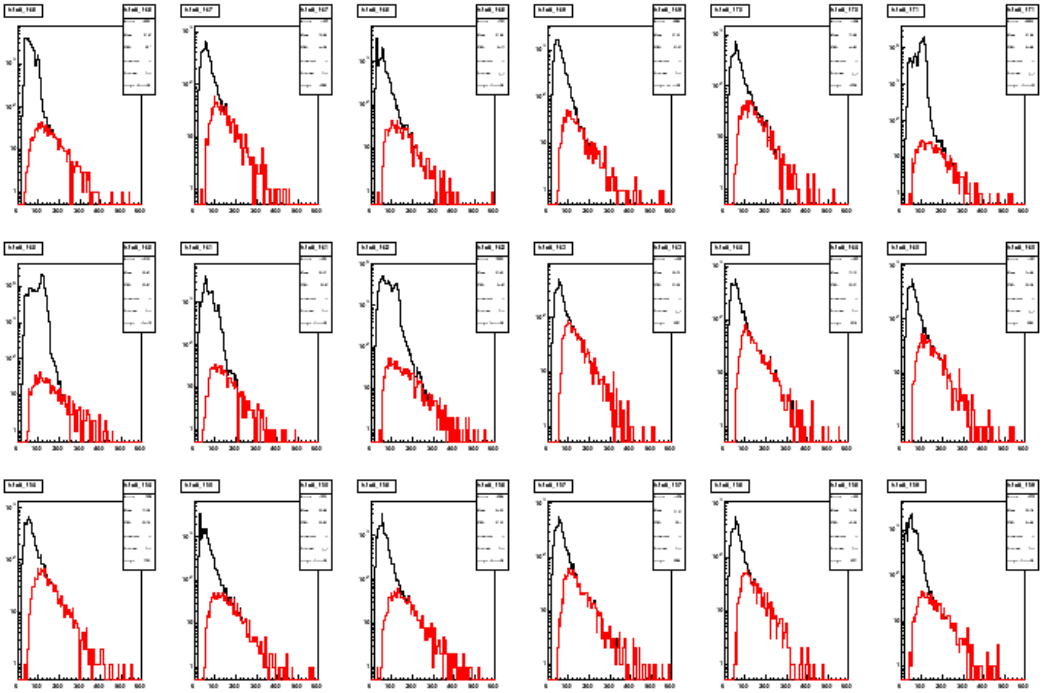

Figure 27: E3 run289787 2x2

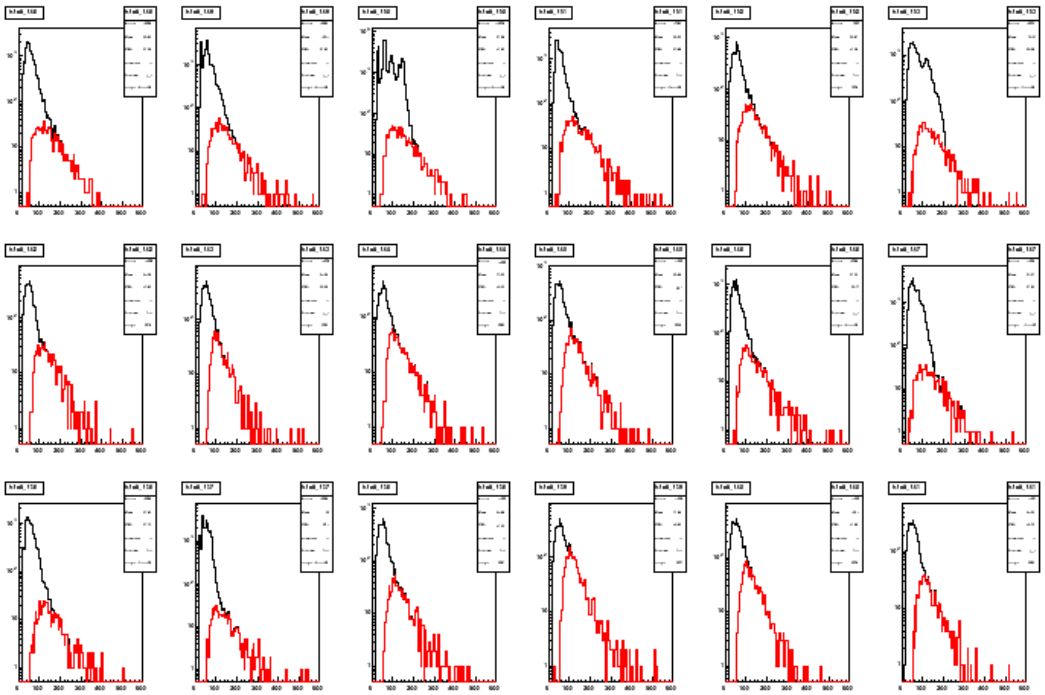

Figure 28: E2 run289787 2x2

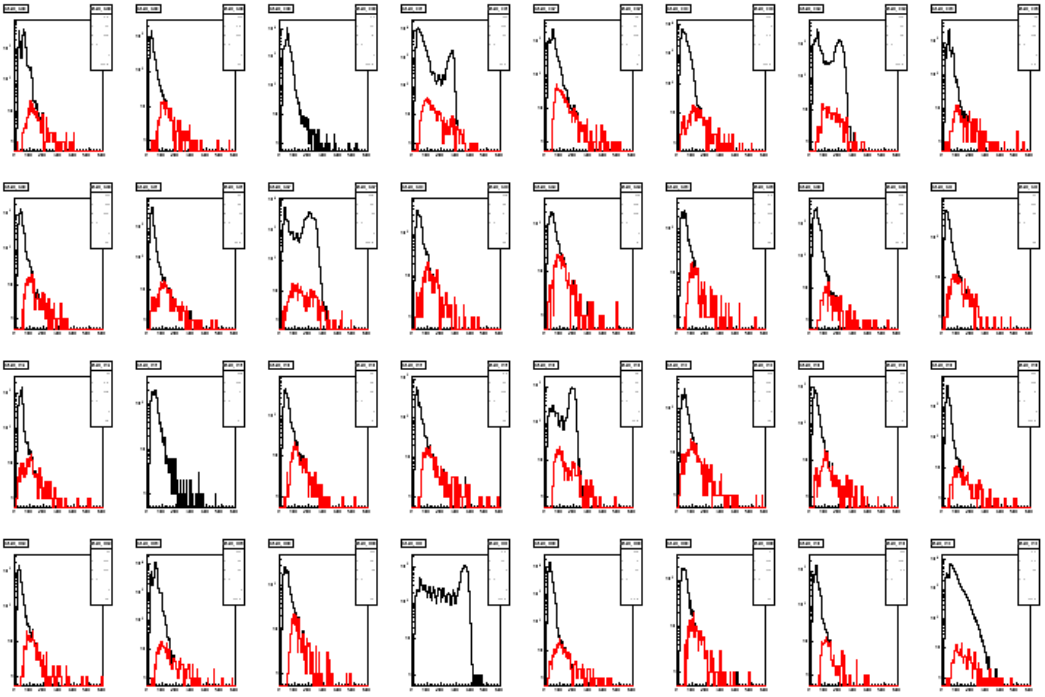

Figure 29: E1 run289787 2x2

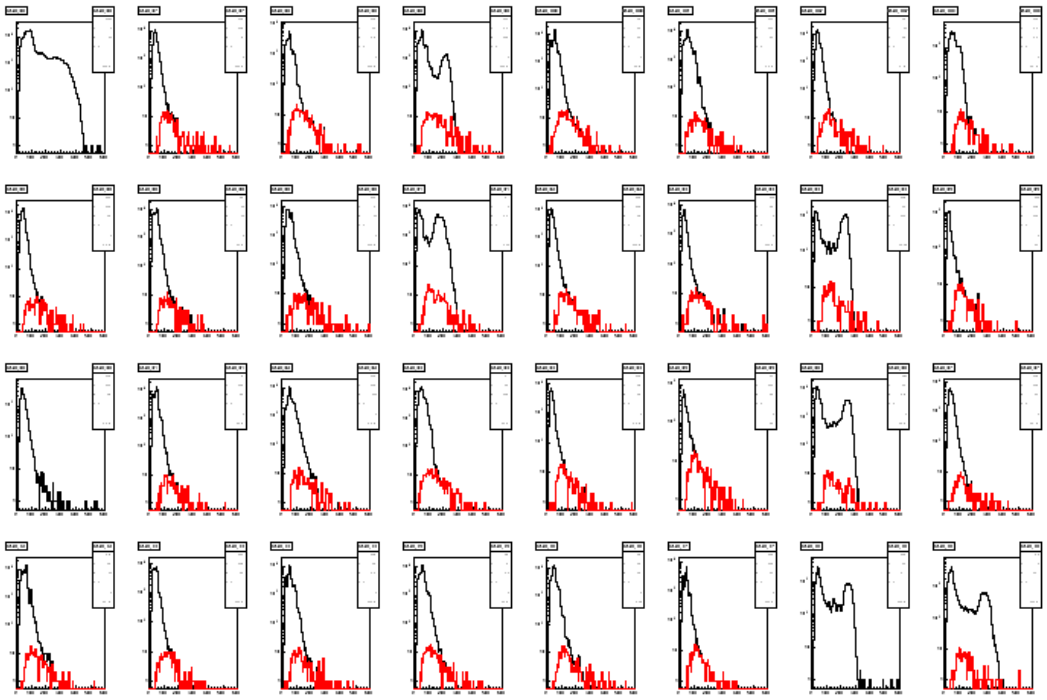

Figure 30: E0 run289787 2x2

4x4c
run276874 Fig.31, Fig.32, Fig.33, Fig.34, Fig.35, Fig.36, Fig.37, Fig.38
run281974 Fig.39, Fig.40, Fig.41, Fig.42, Fig.43, Fig.44, Fig.45, Fig.46
run289787 Fig.47, Fig.48, Fig.49, Fig.50, Fig.51, Fig.52, Fig.53, Fig.54

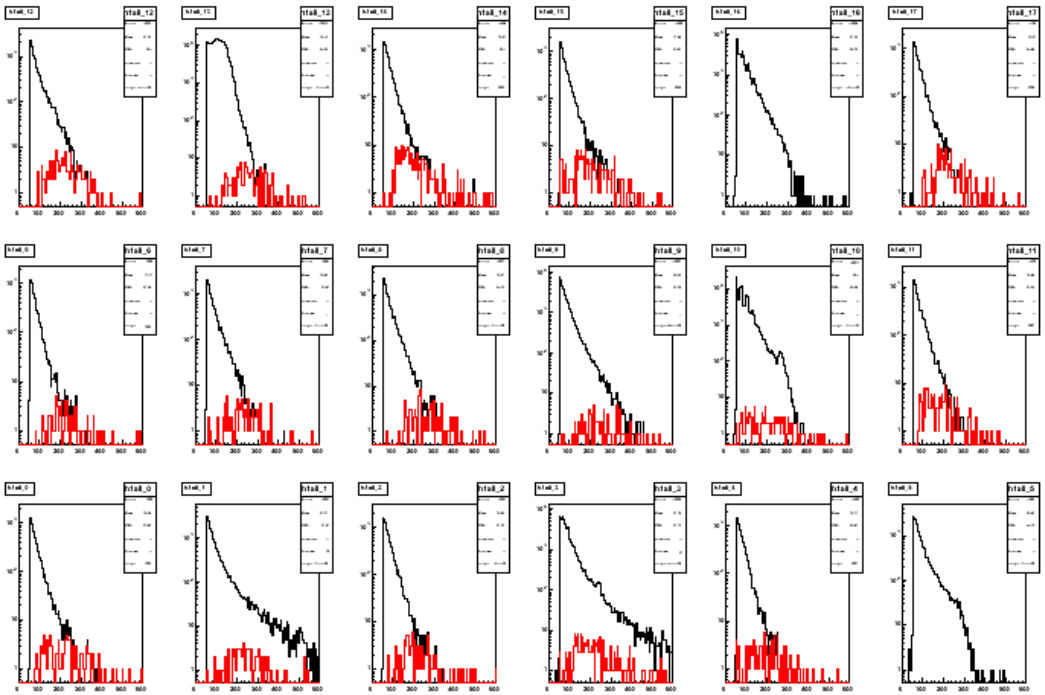

Figure 31: W0 run276874 4x4c

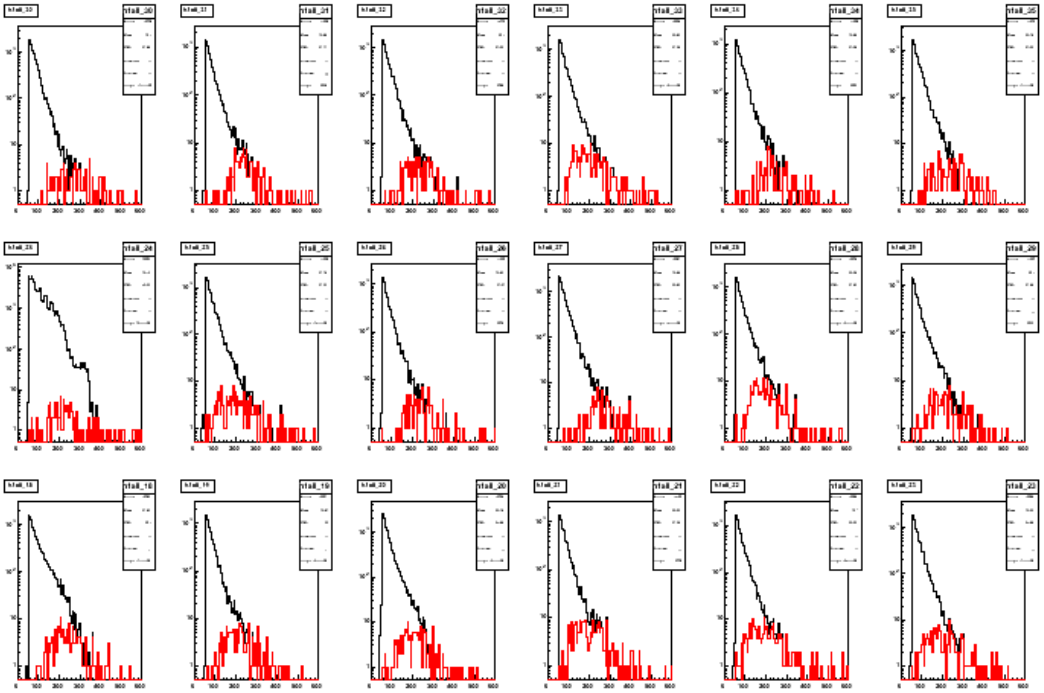

Figure 32: W1 run276874 4x4c

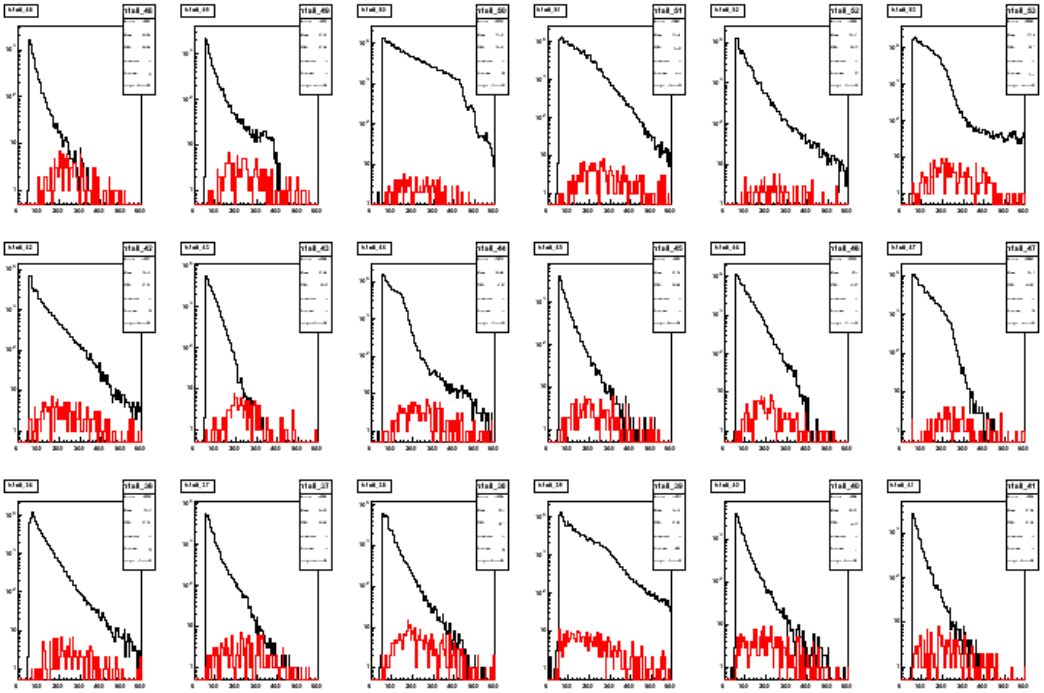

Figure 33: W2 run276874 4x4c

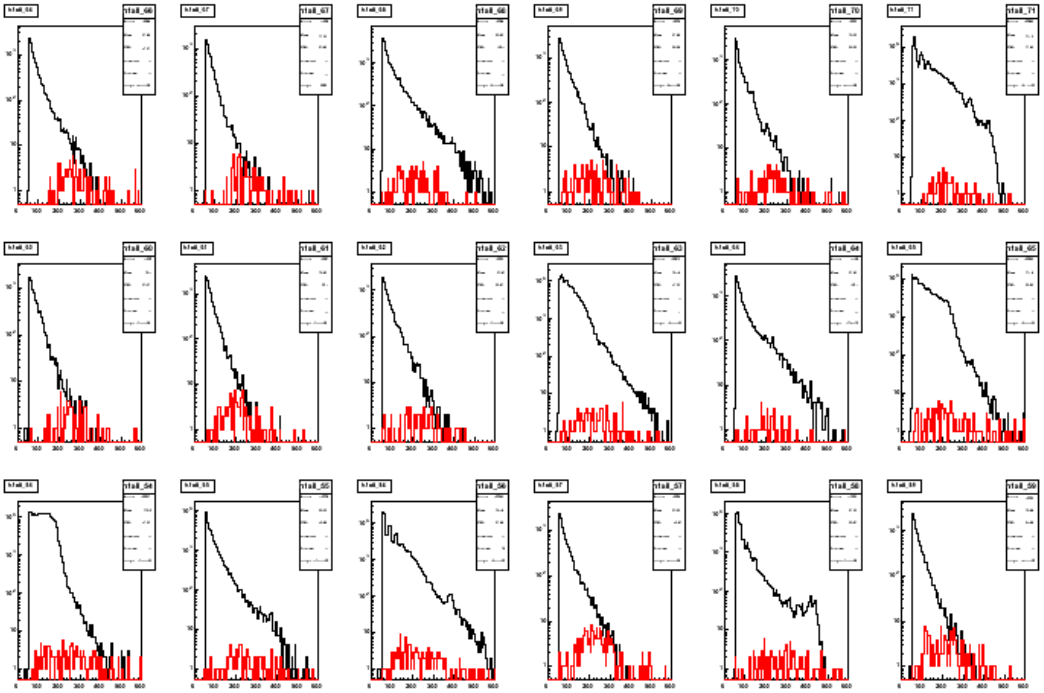

Figure 34: W3 run276874 4x4c

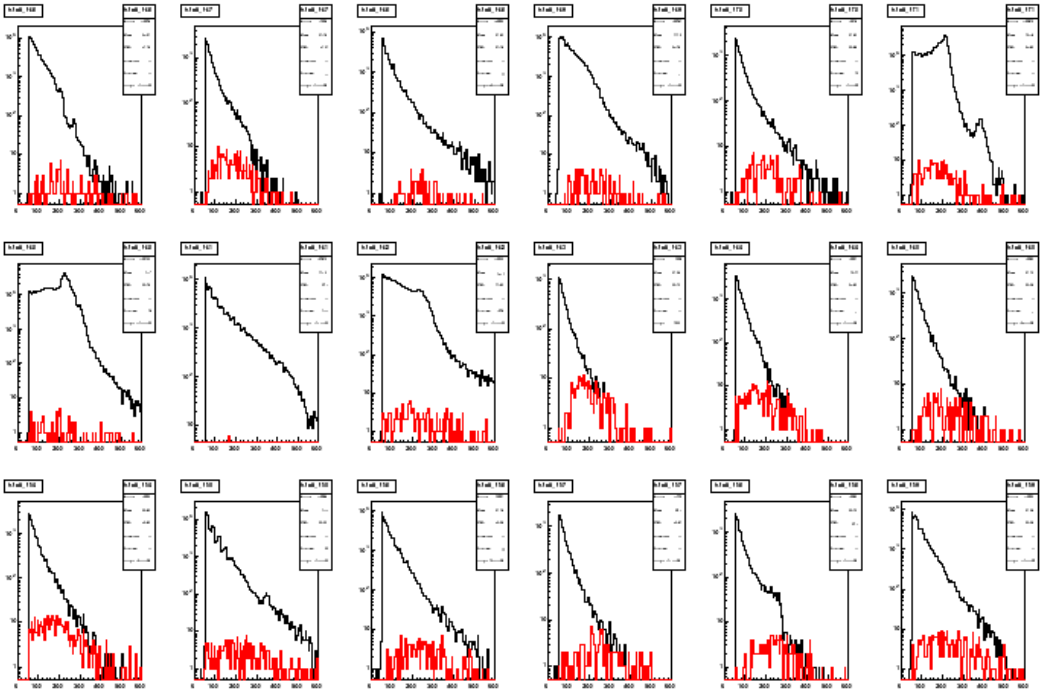

Figure 35: E3 run276874 4x4c

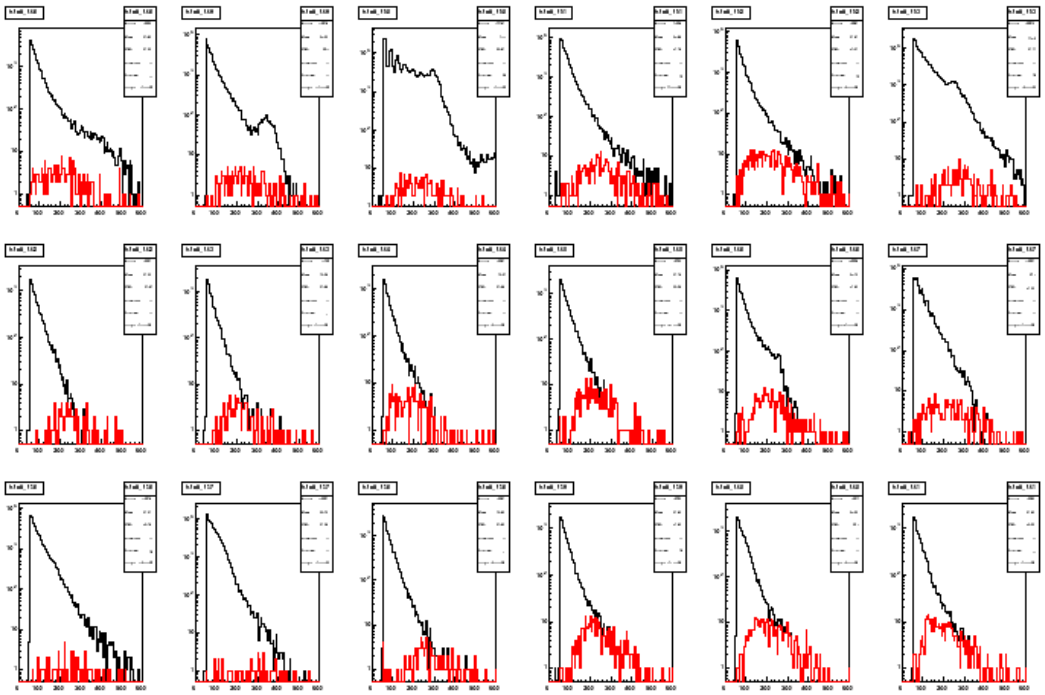

Figure 36: E2 run276874 4x4c

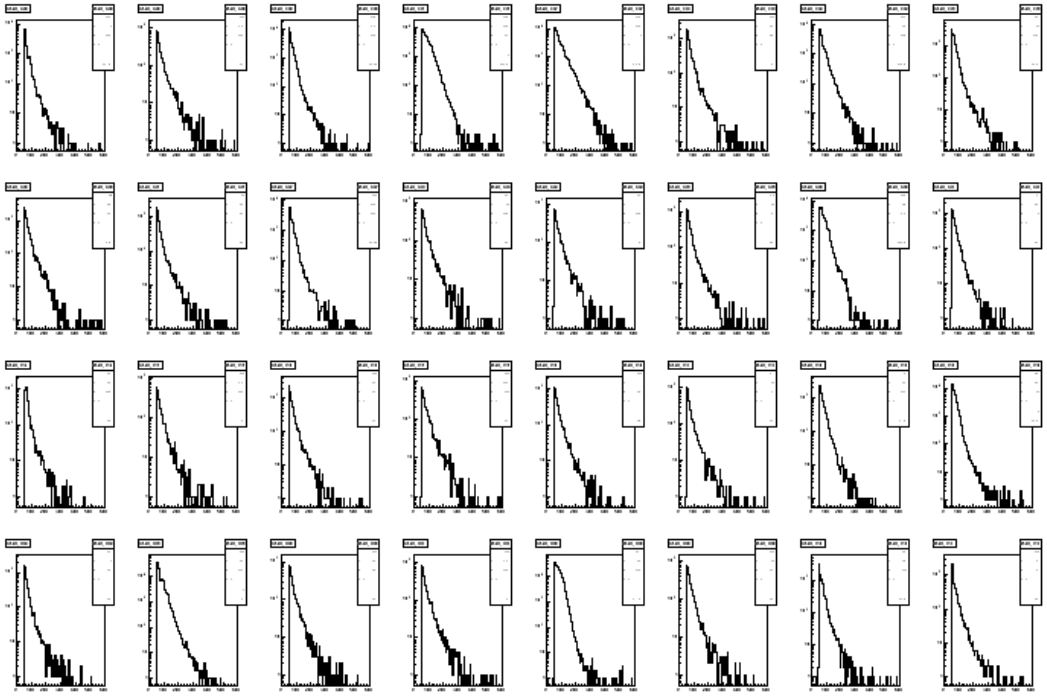

Figure 37: E1 run276874 4x4c

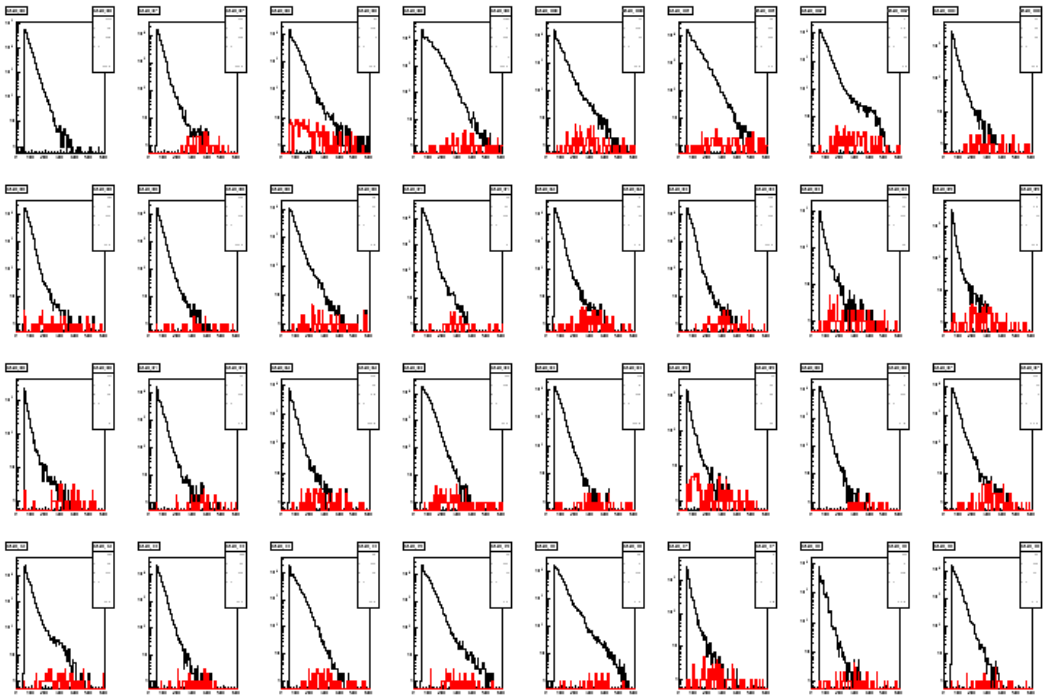

Figure 38: E0 run276874 4x4c

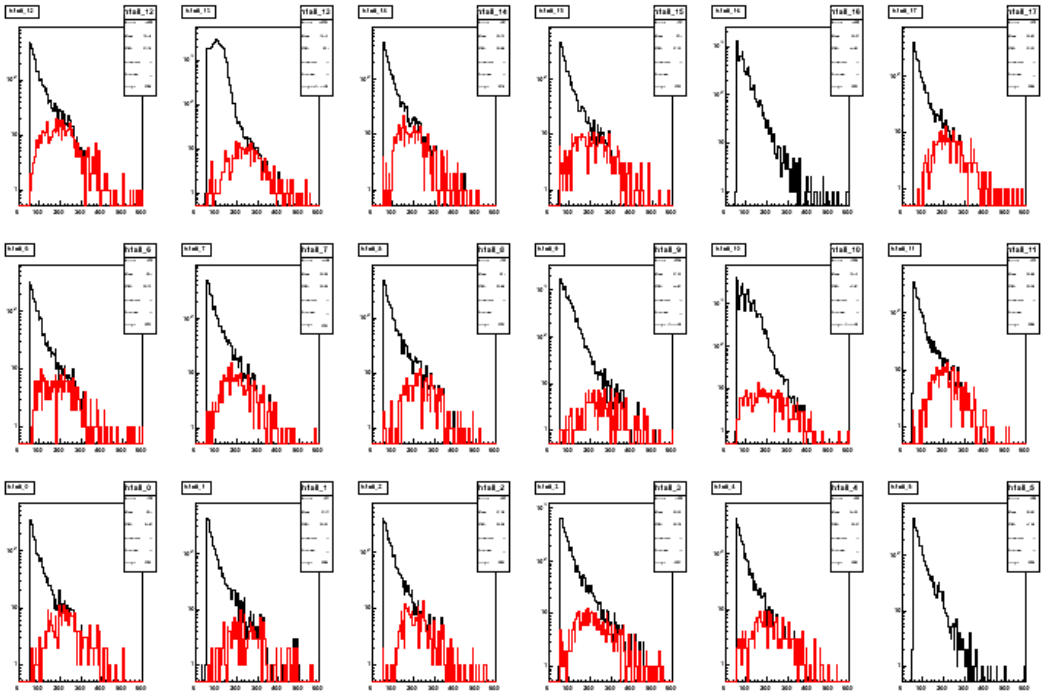

Figure 39: W0 run281974 4x4c

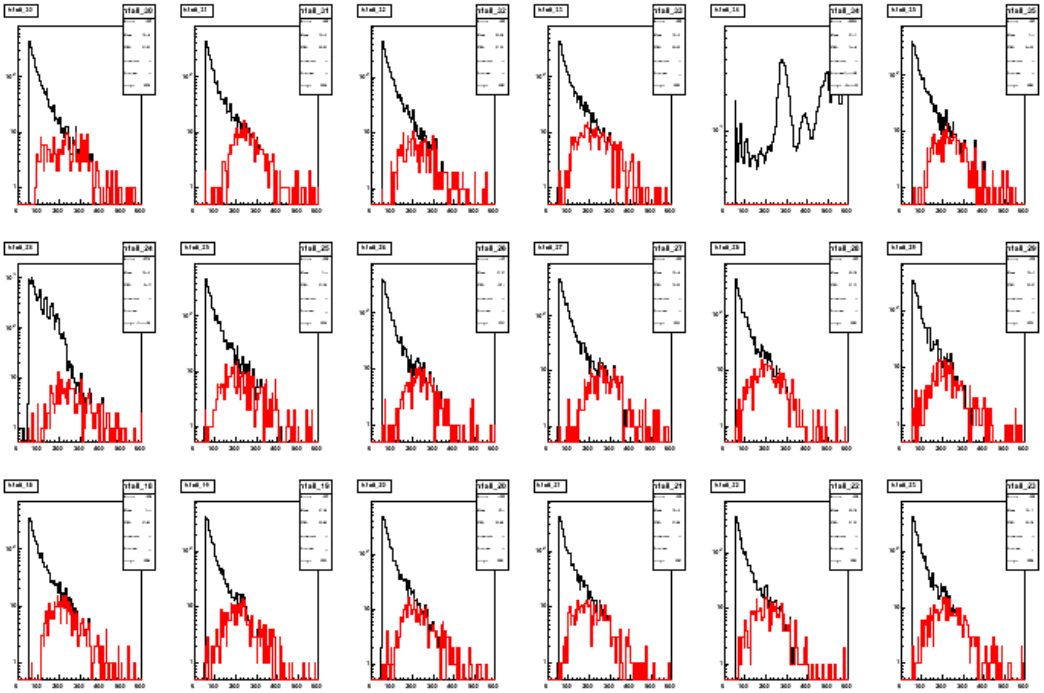

Figure 40: W1 run281974 4x4c

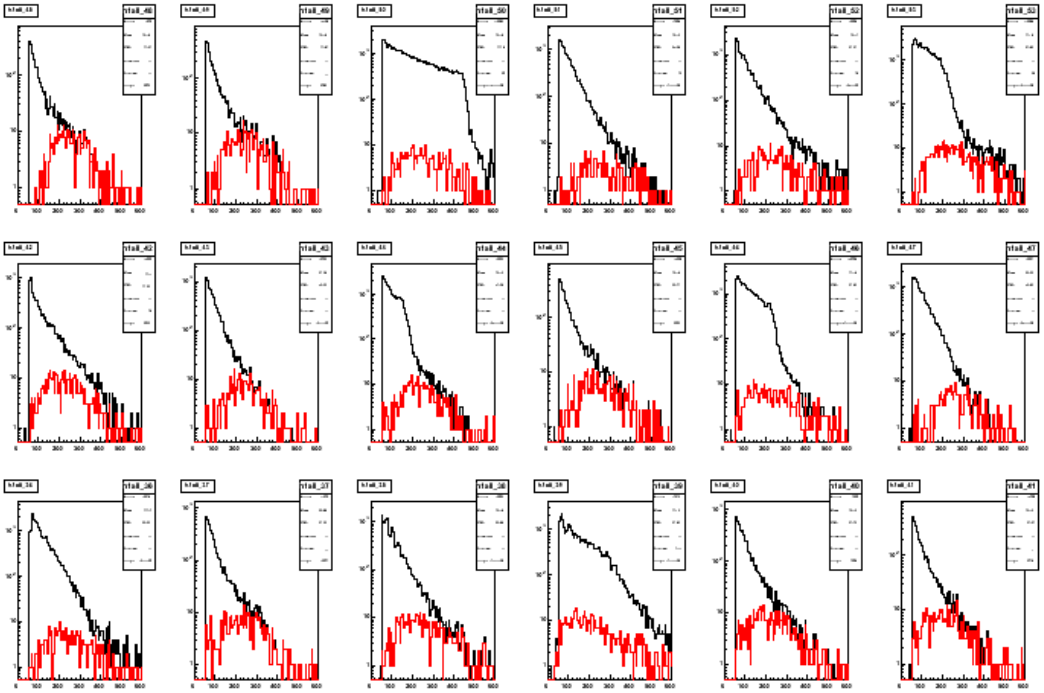

Figure 41: W2 run281974 4x4c

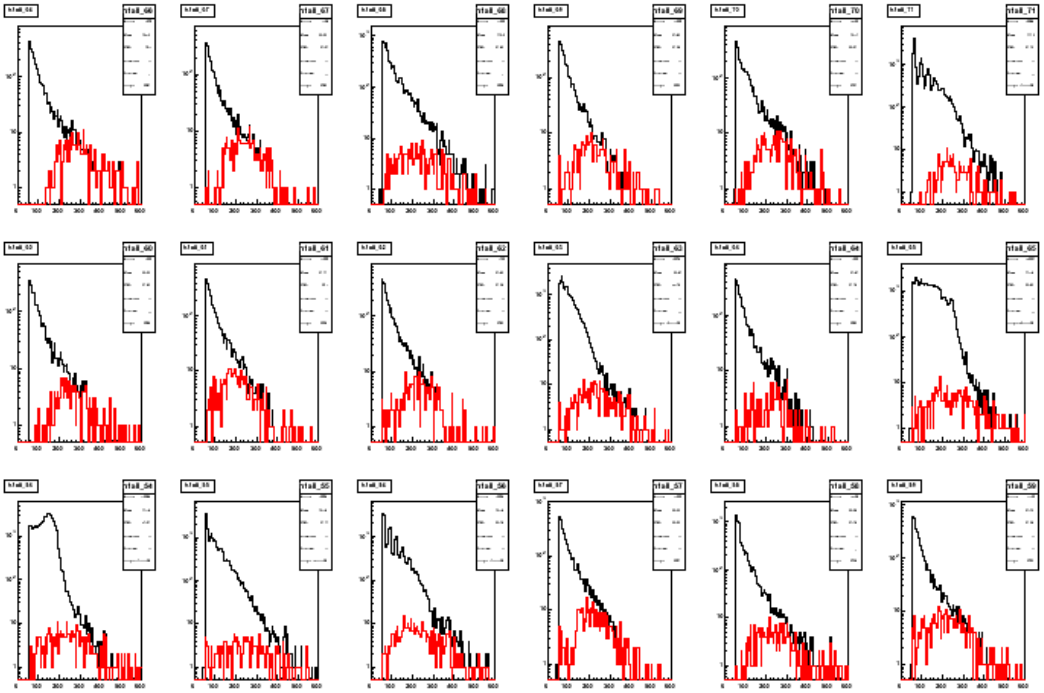

Figure 42: W3 run281974 4x4c

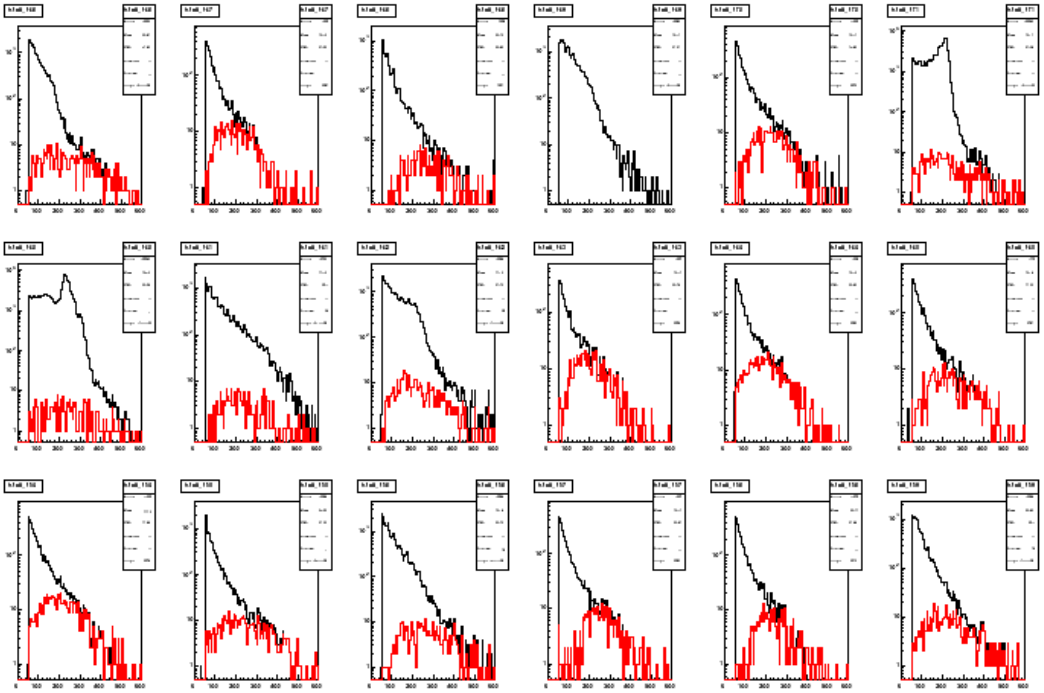

Figure 43: E3 run281974 4x4c

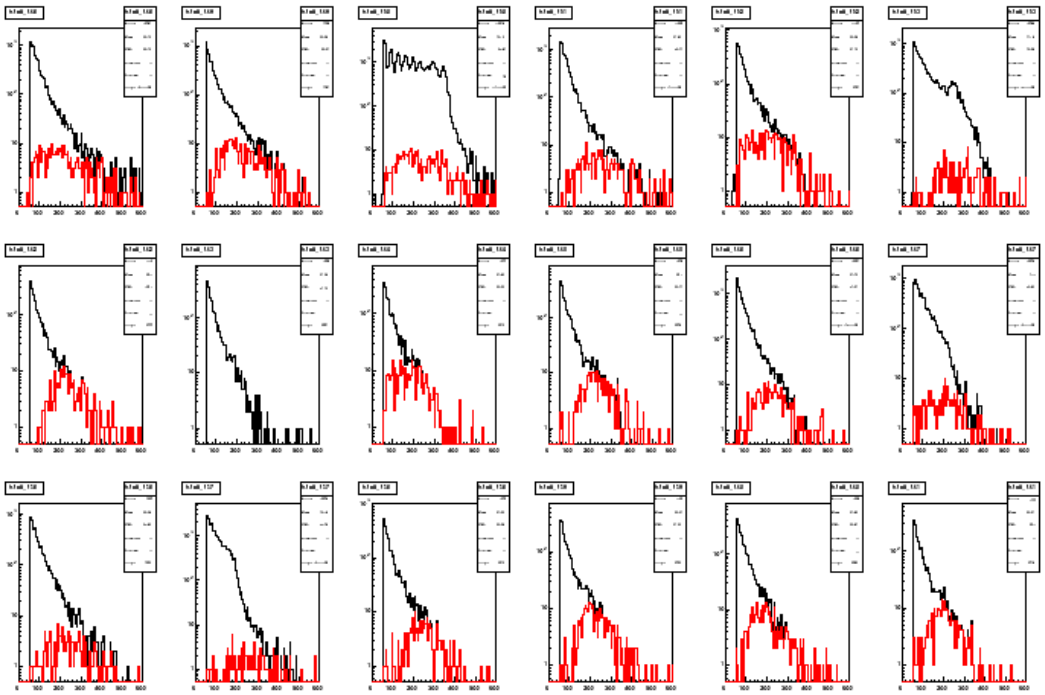

Figure 44: E2 run281974 4x4c

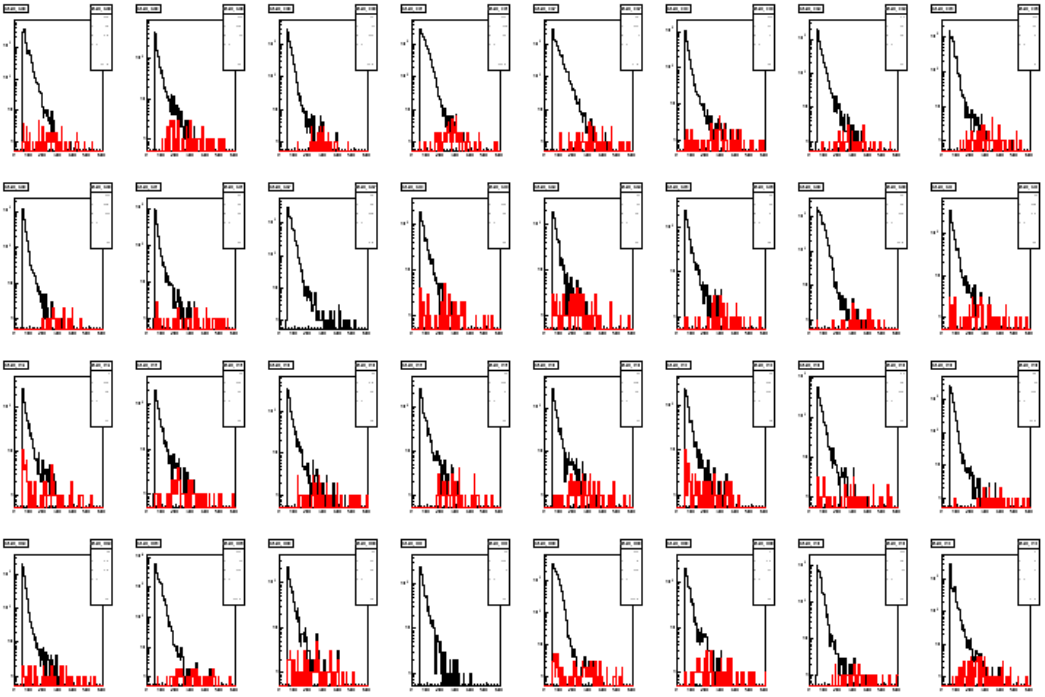

Figure 45: E1 run281974 4x4c

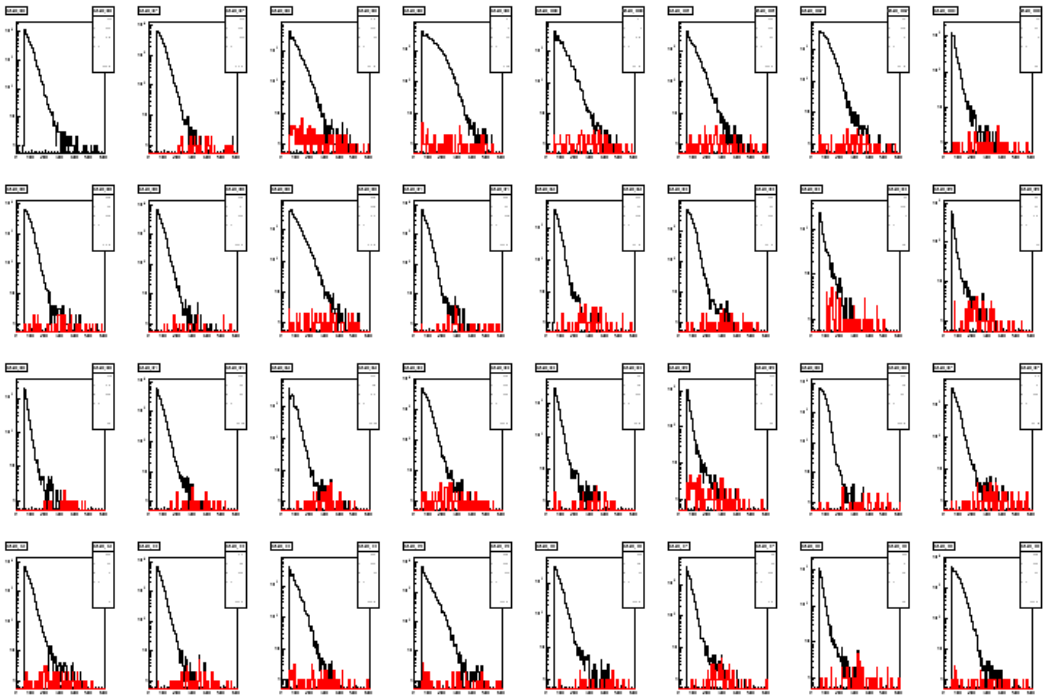

Figure 46: E0 run281974 4x4c

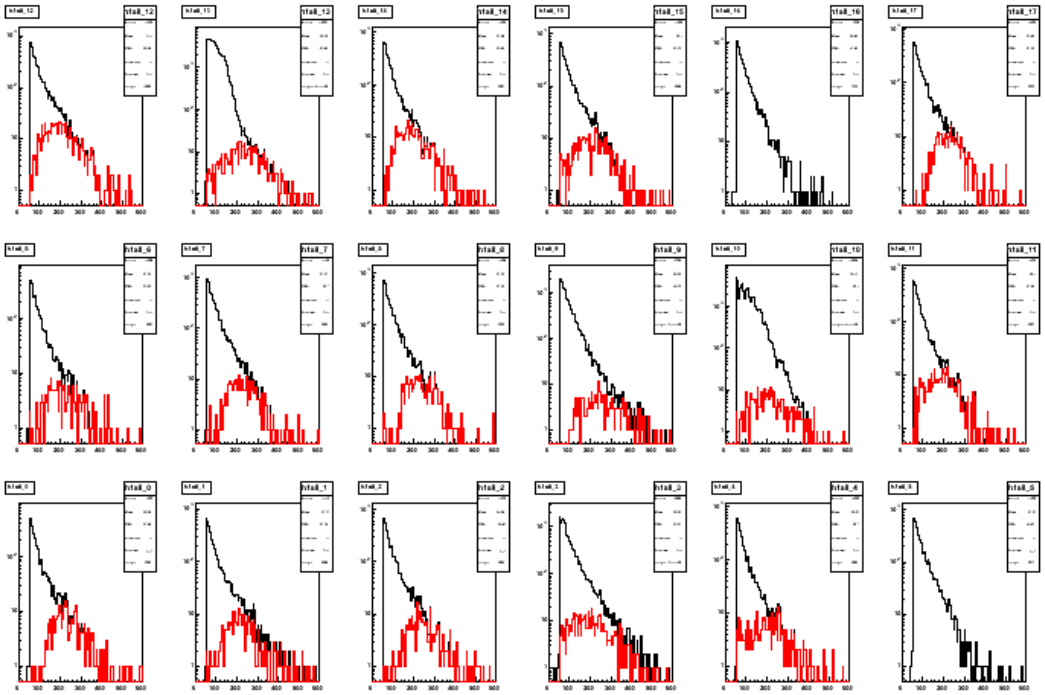

Figure 47: W0 run289787 4x4c

raw entries 2x2
run276874 Fig.55, Fig.56, Fig.57, Fig.58, Fig.59, Fig.60, Fig.61, Fig.62
run281974 Fig.63, Fig.64, Fig.65, Fig.66, Fig.67, Fig.68, Fig.69, Fig.70
run289787 Fig.71, Fig.72, Fig.73, Fig.74, Fig.75, Fig.76, Fig.77, Fig.78

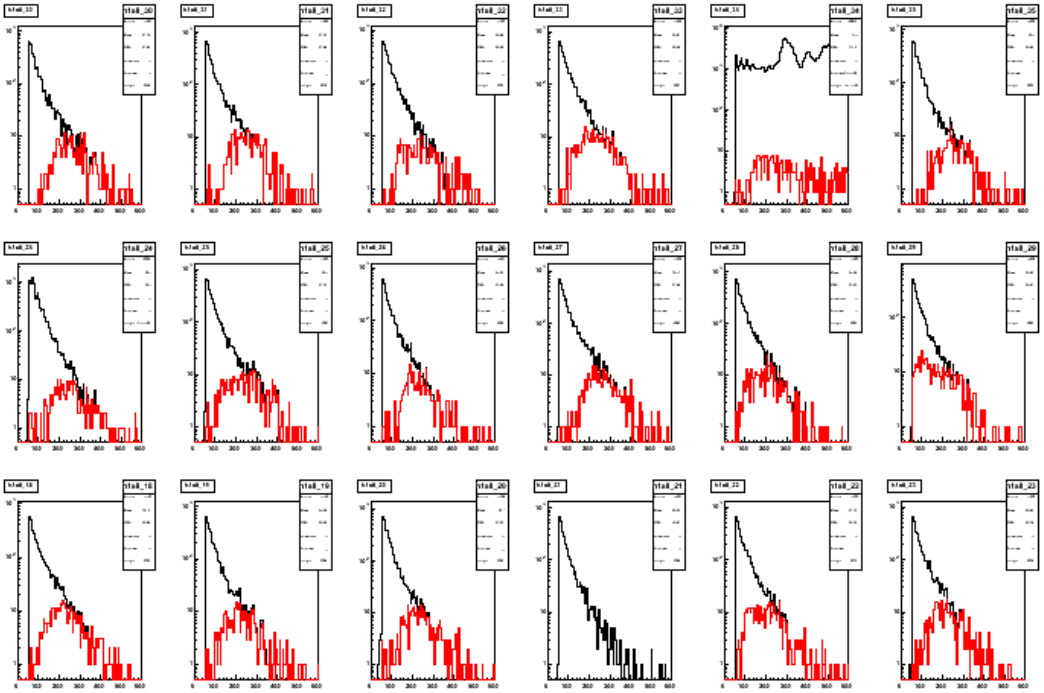

Figure 48: W1 run289787 4x4c

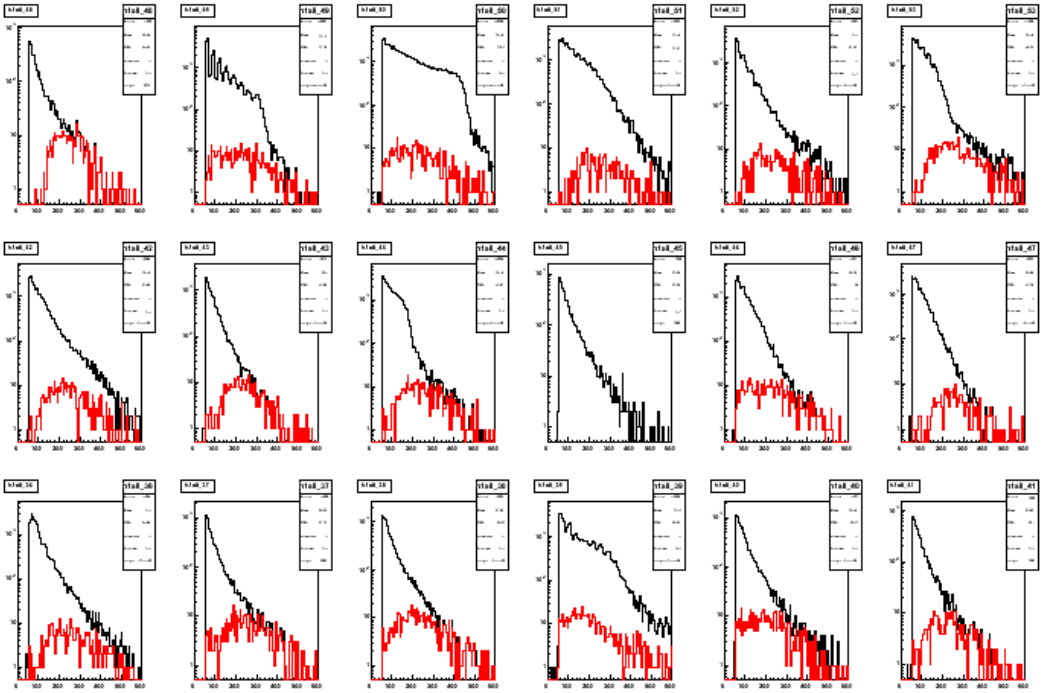

Figure 49: W2 run289787 4x4c

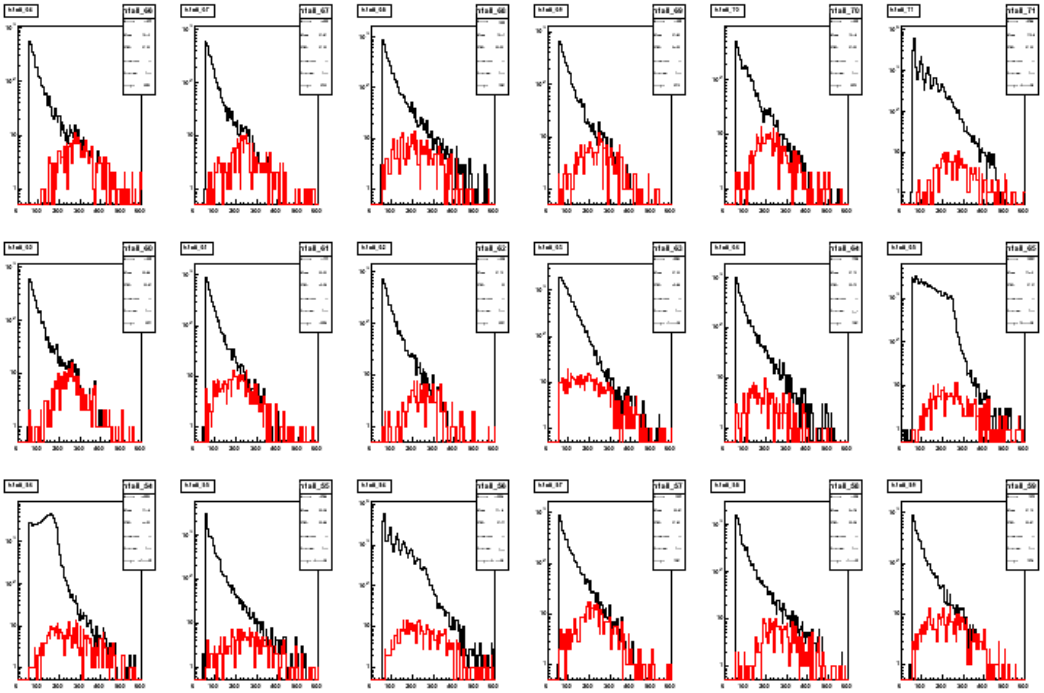

Figure 50: W3 run289787 4x4c

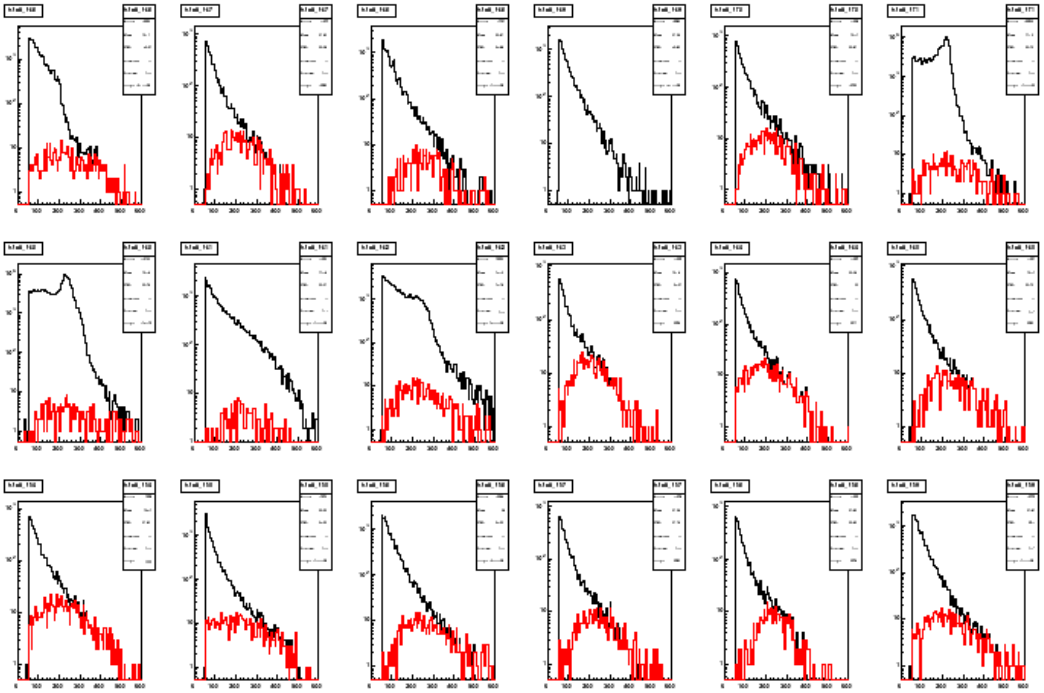

Figure 51: E3 run289787 4x4c

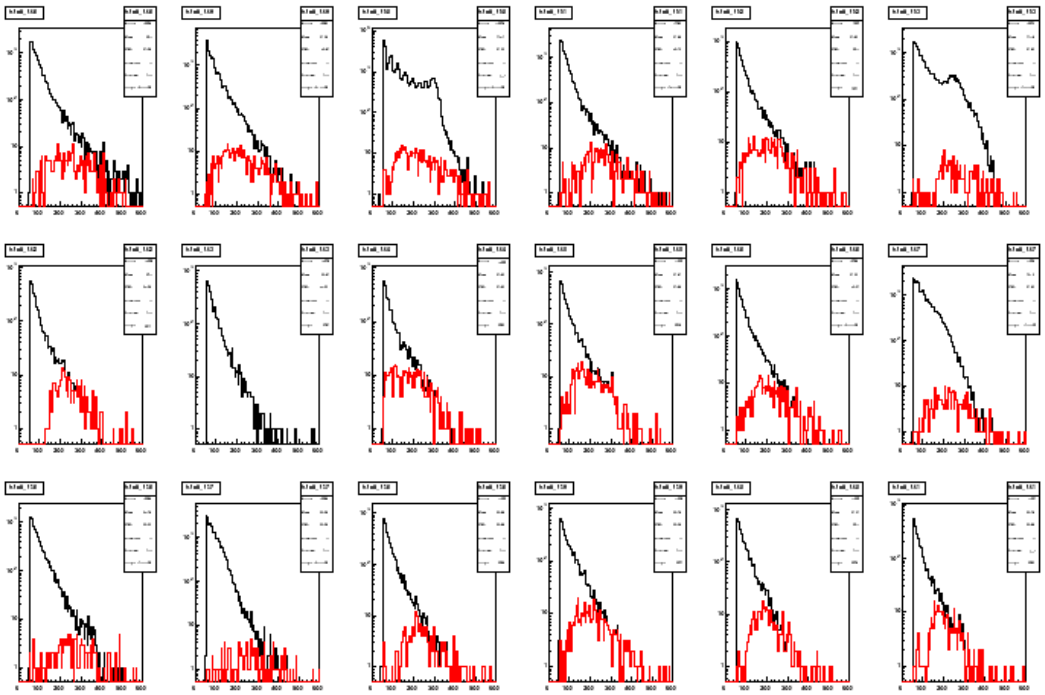

Figure 52: E2 run289787 4x4c

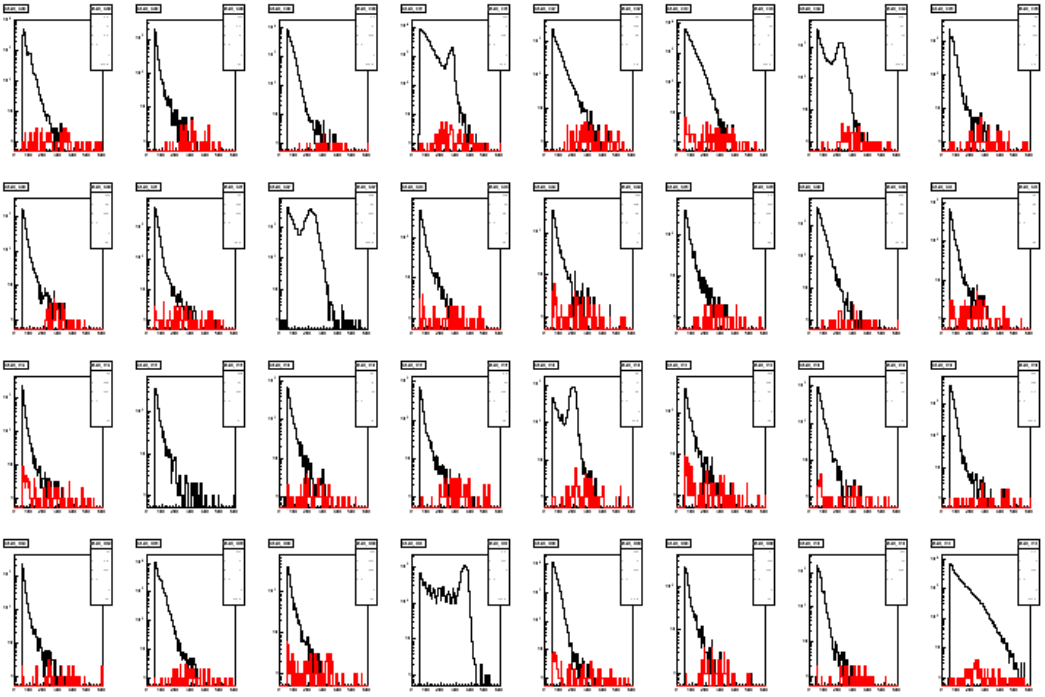

Figure 53: E1 run289787 4x4c

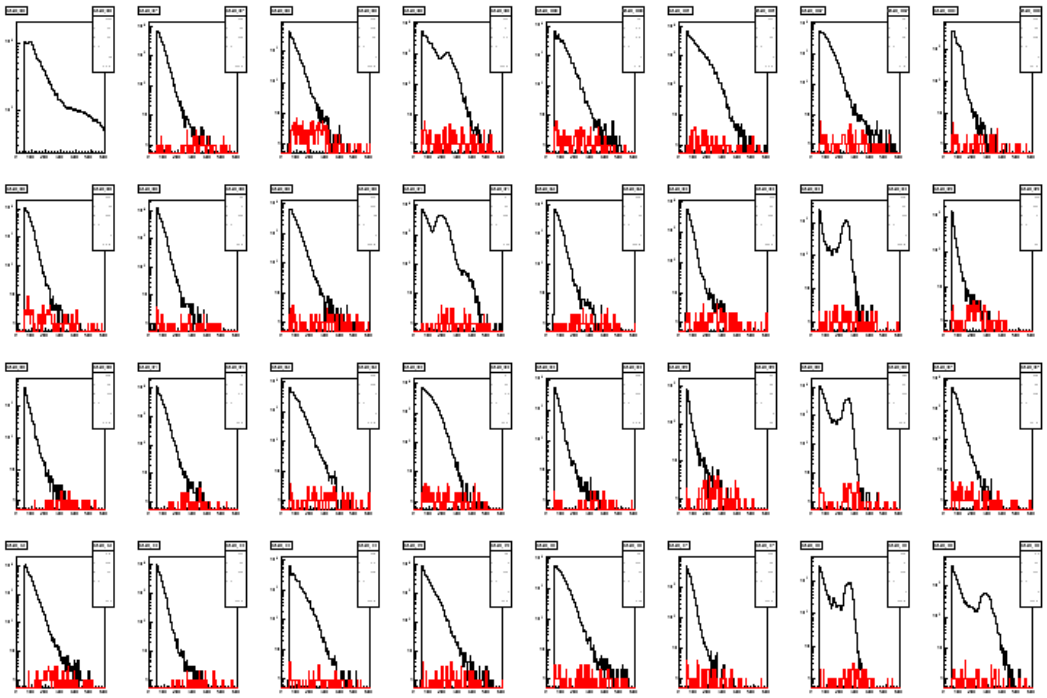

Figure 54: E0 run289787 4x4c

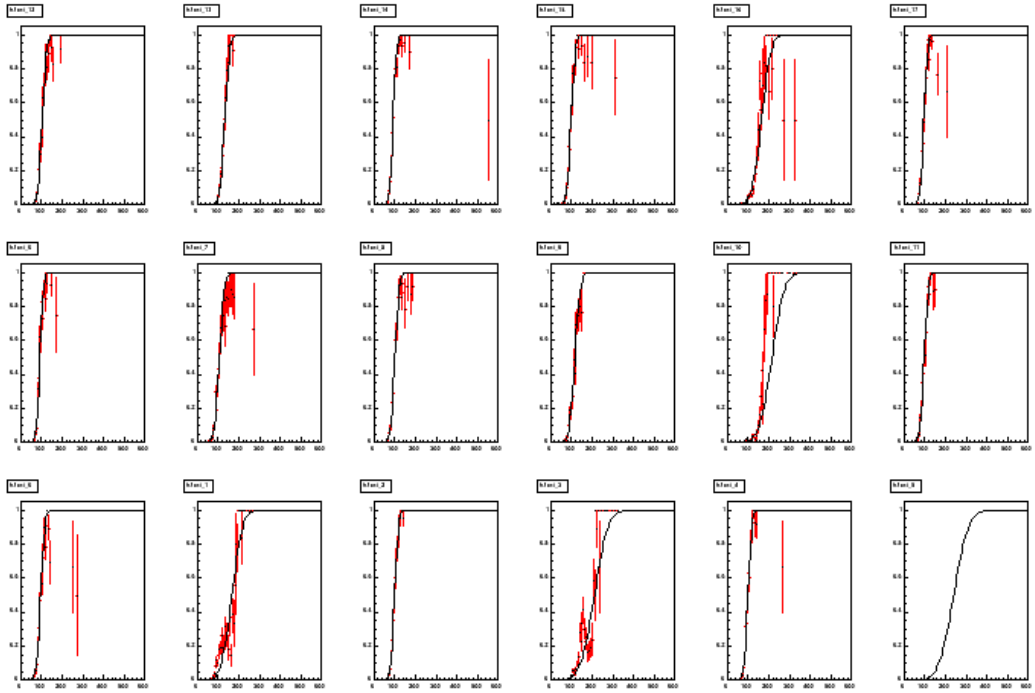

Figure 55: W0 run276874 2x2

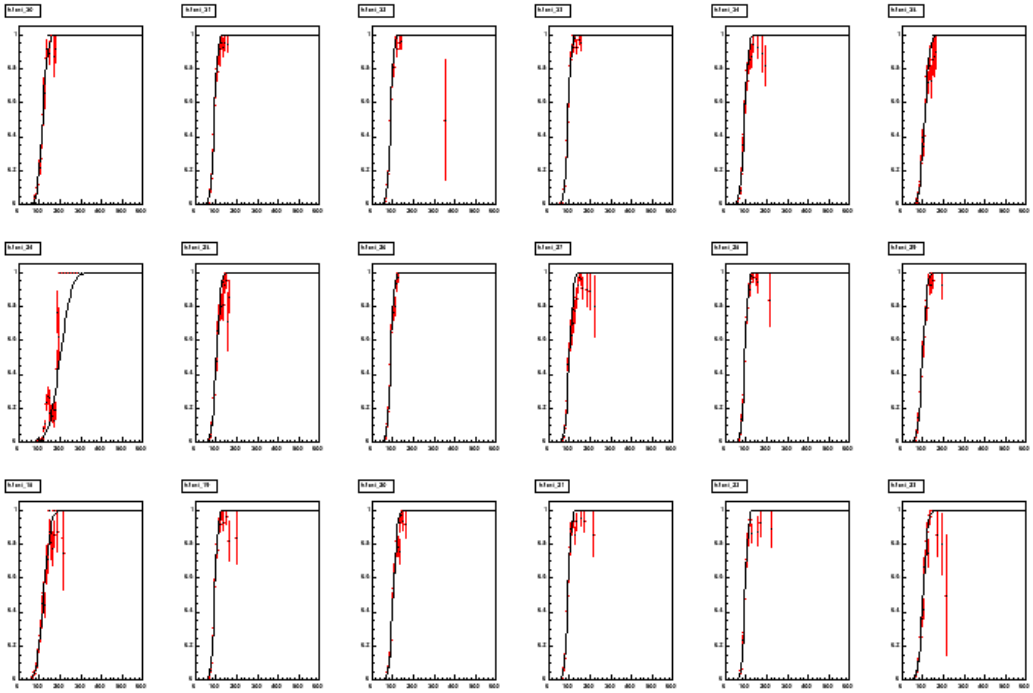

Figure 56: W1 run276874 2x2

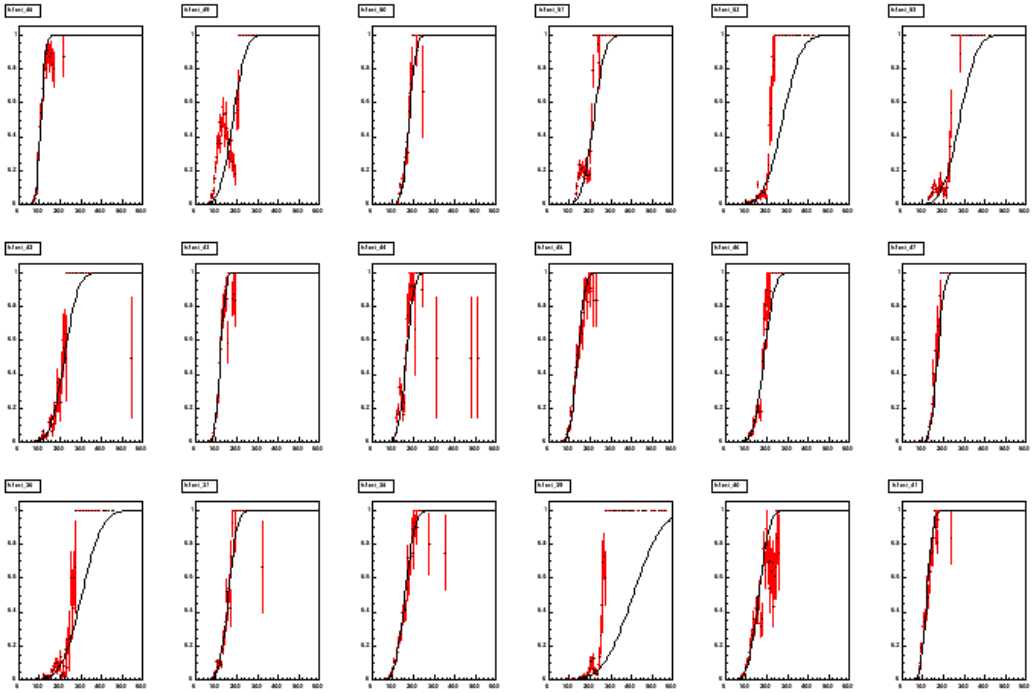

Figure 57: W2 run276874 2x2

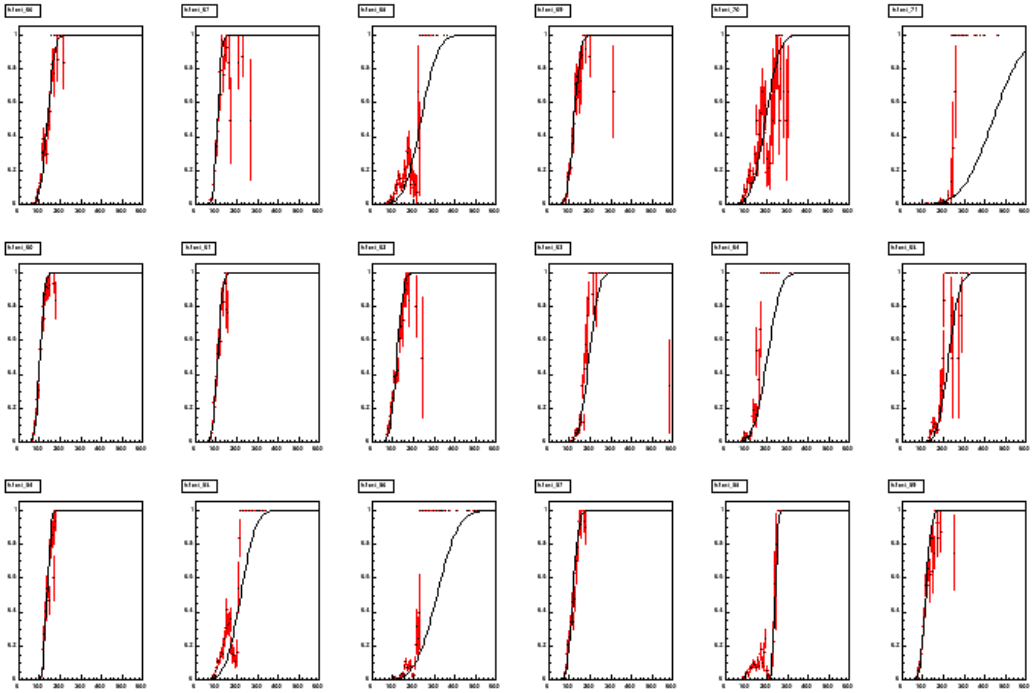

Figure 58: W3 run276874 2x2

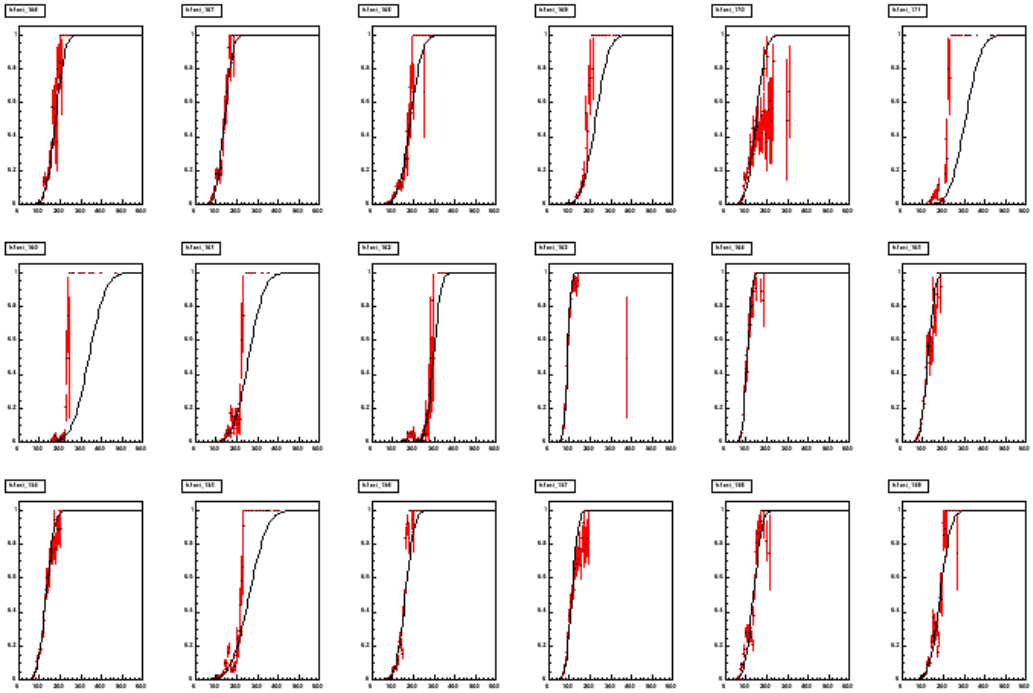

Figure 59: E3 run276874 2x2

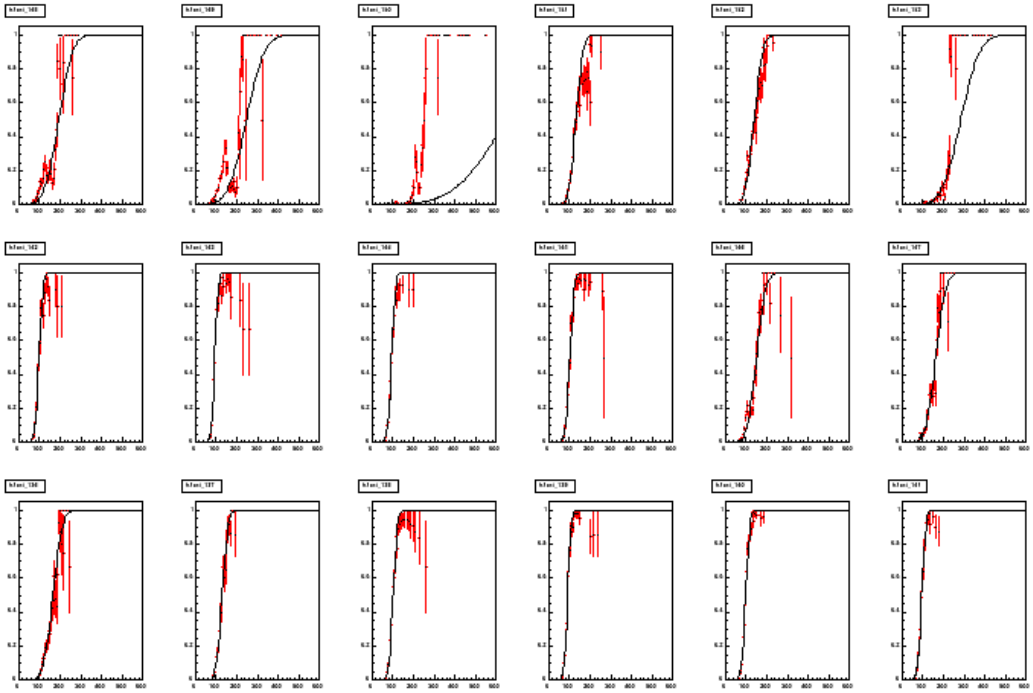

Figure 60: E2 run276874 2x2

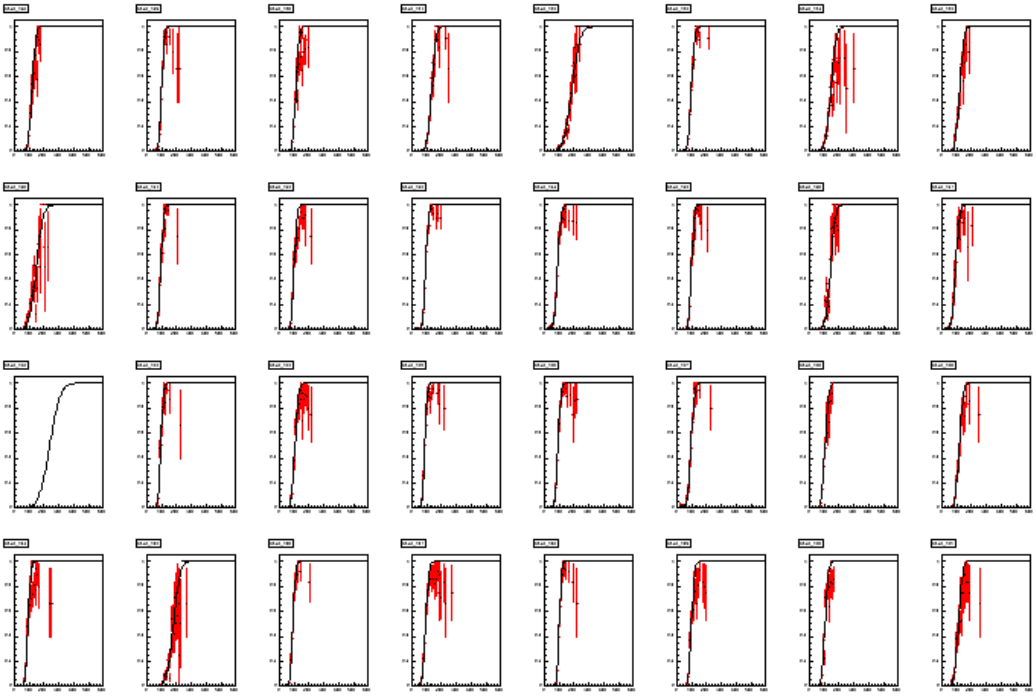

Figure 61: E1 run276874 2x2

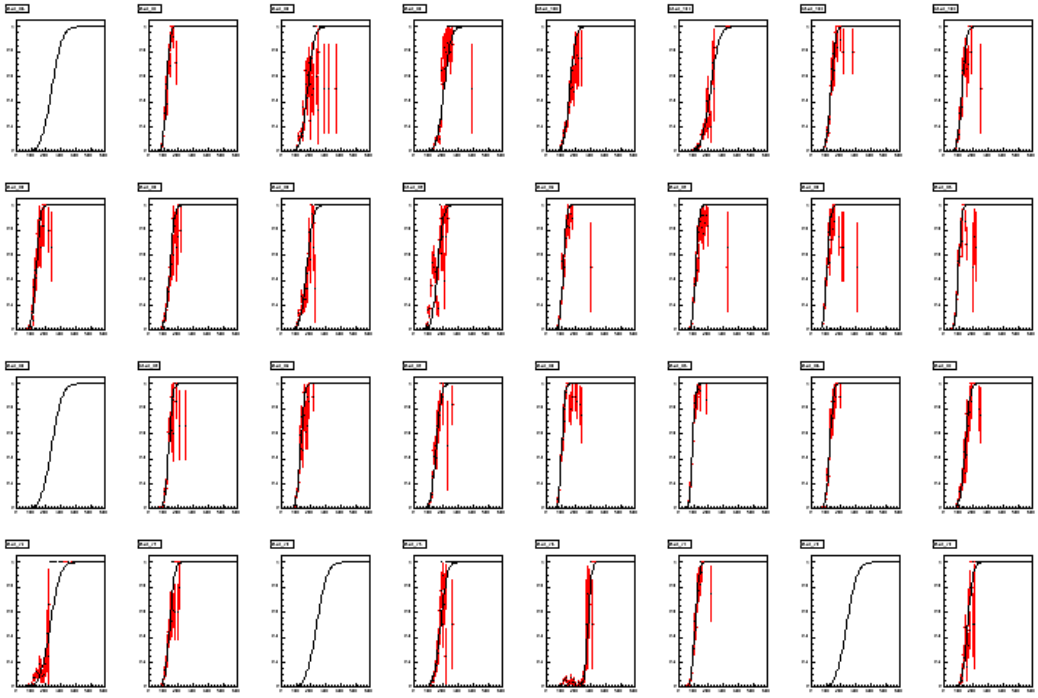

Figure 62: E0 run276874 2x2

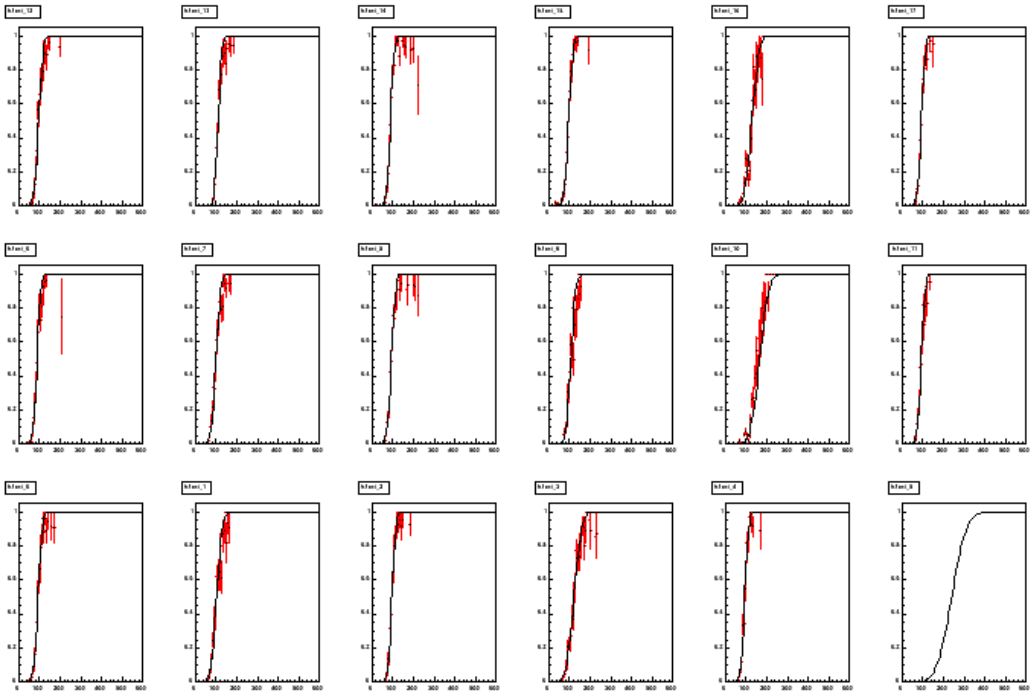

Figure 63: W0 run281974 2x2

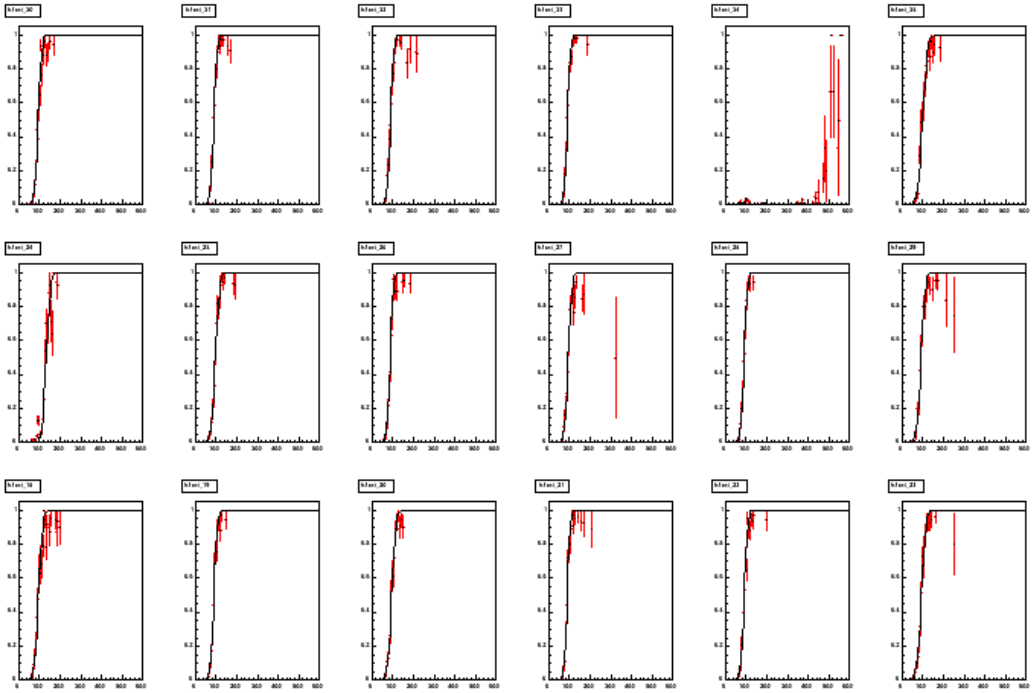

Figure 64: W1 run281974 2x2

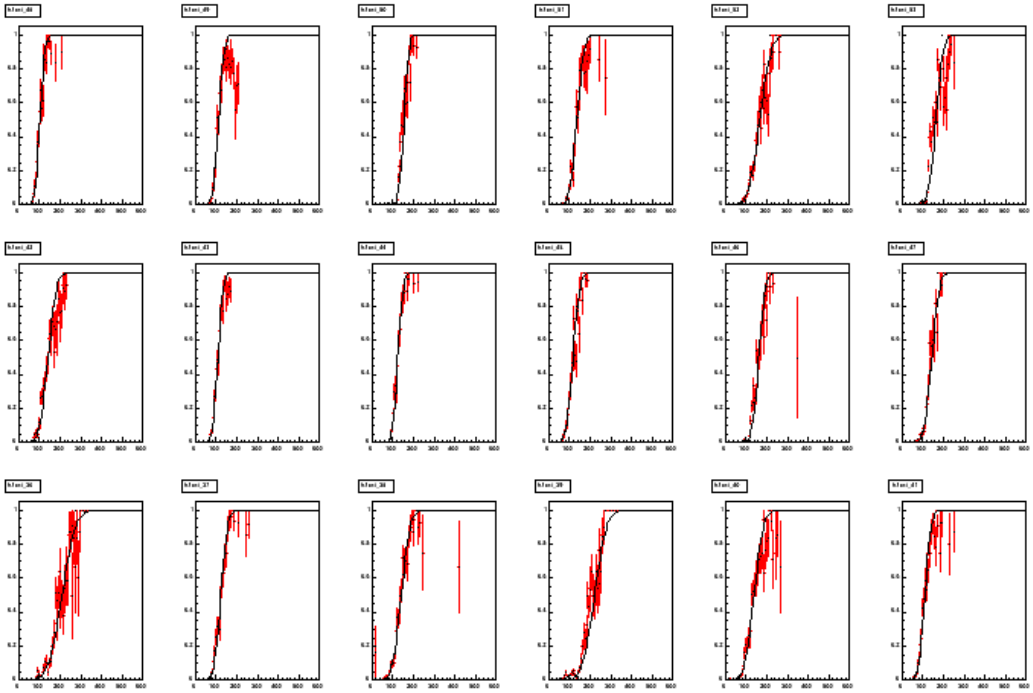

Figure 65: W2 run281974 2x2

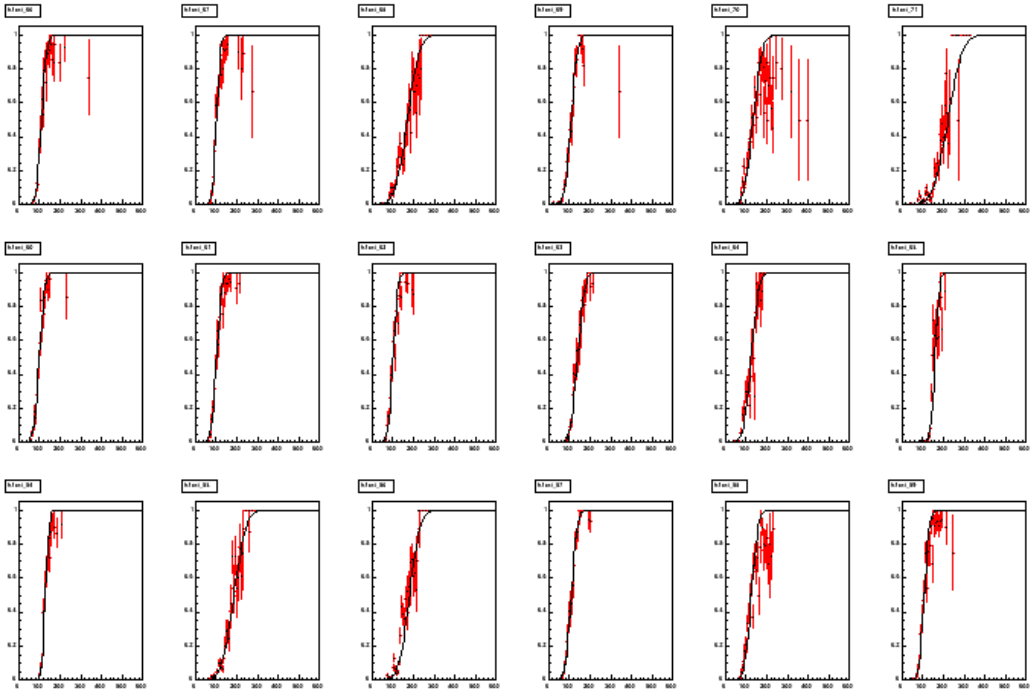

Figure 66: W3 run281974 2x2

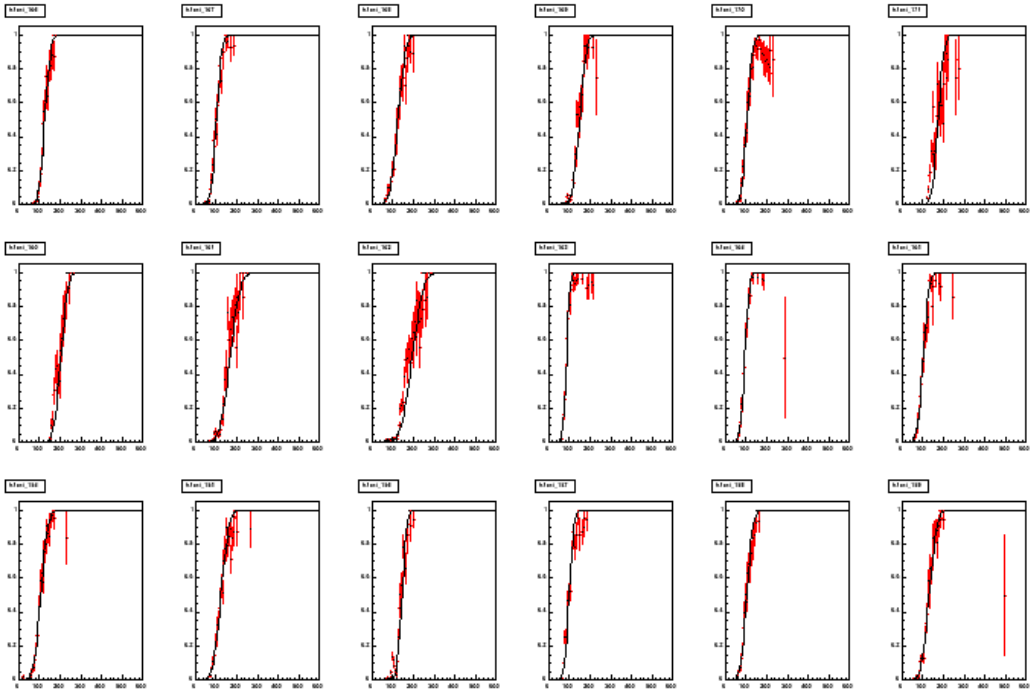

Figure 67: E3 run281974 2x2

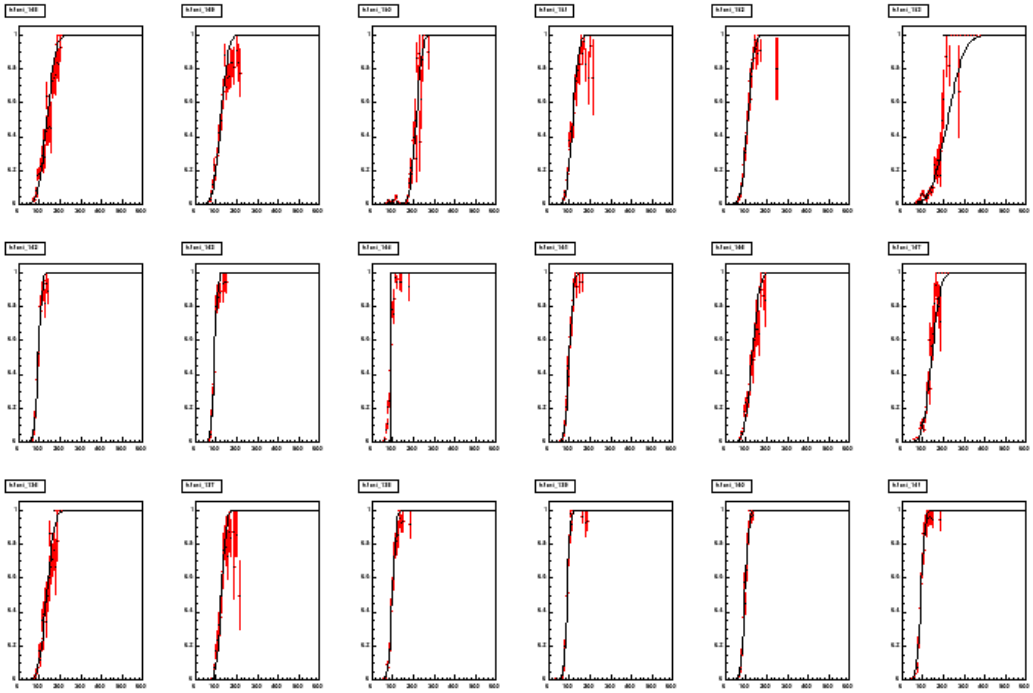

Figure 68: E2 run281974 2x2

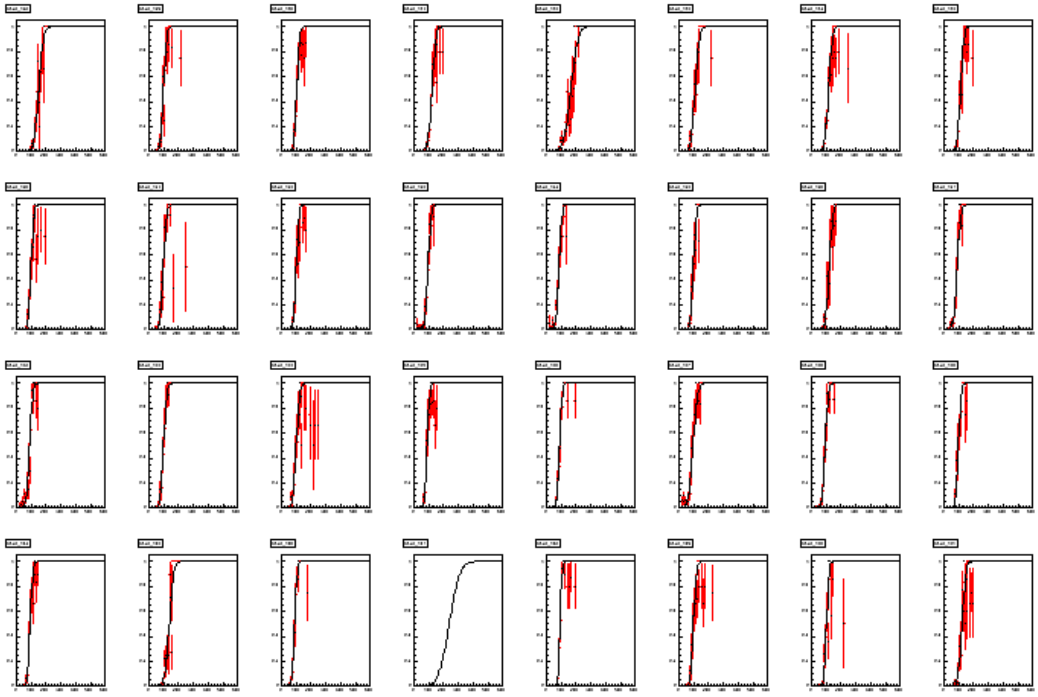

Figure 69: E1 run281974 2x2

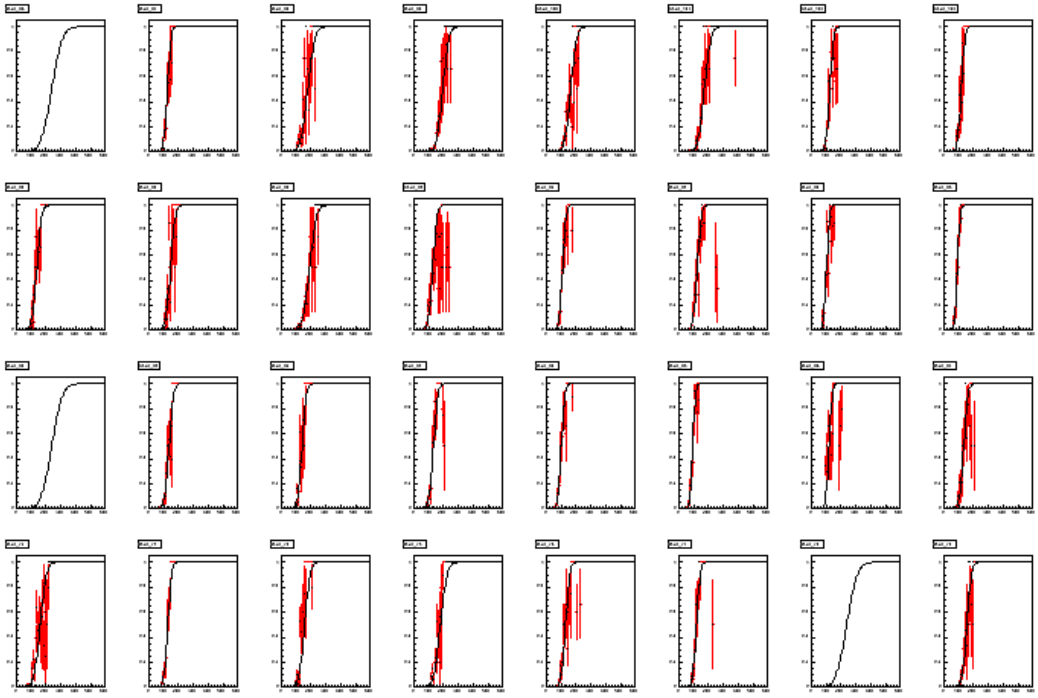

Figure 70: E0 run281974 2x2

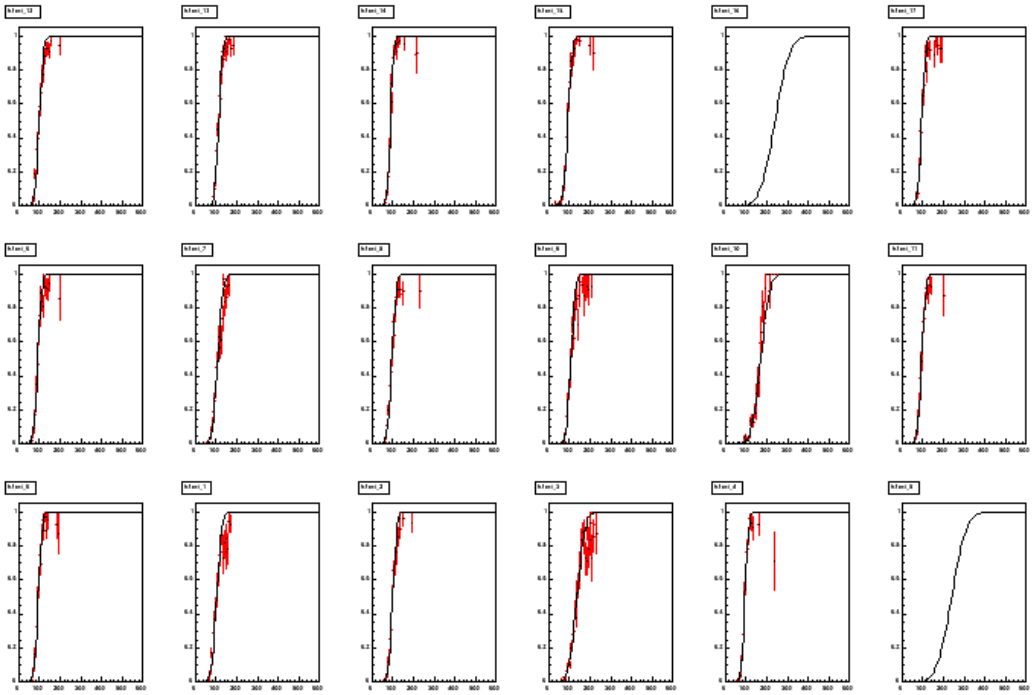

Figure 71: W0 run289787 2x2

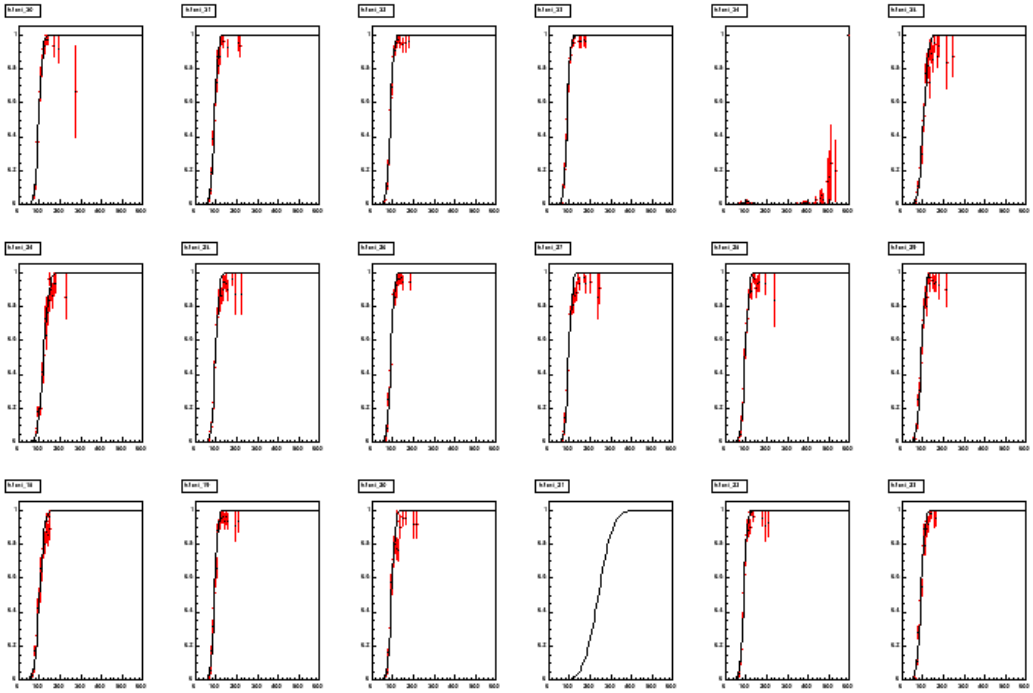

Figure 72: W1 run289787 2x2

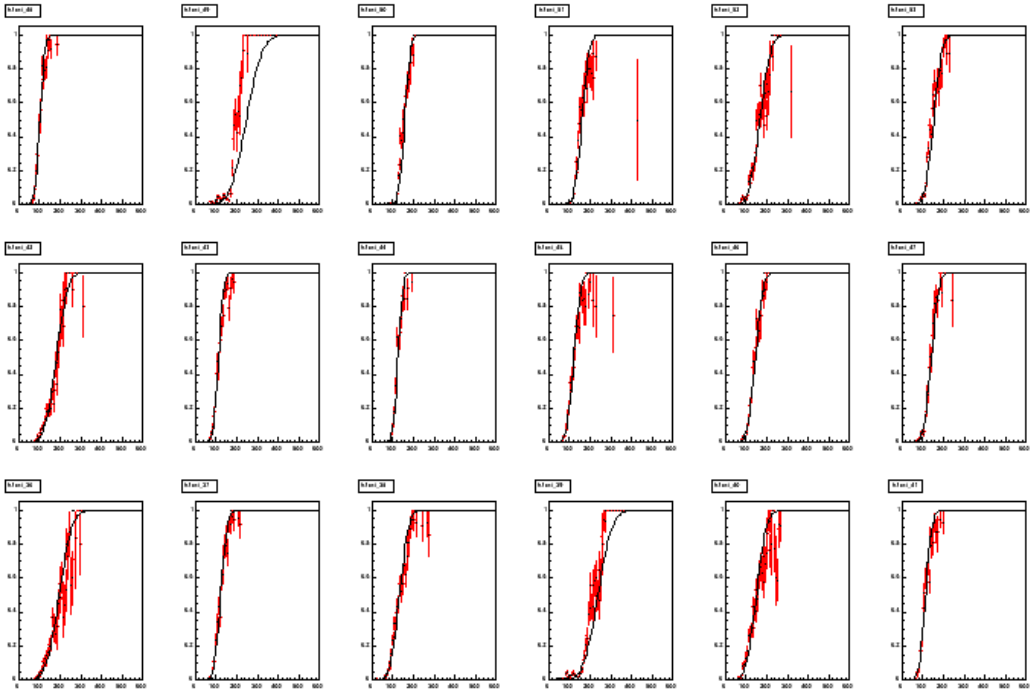

Figure 73: W2 run289787 2x2

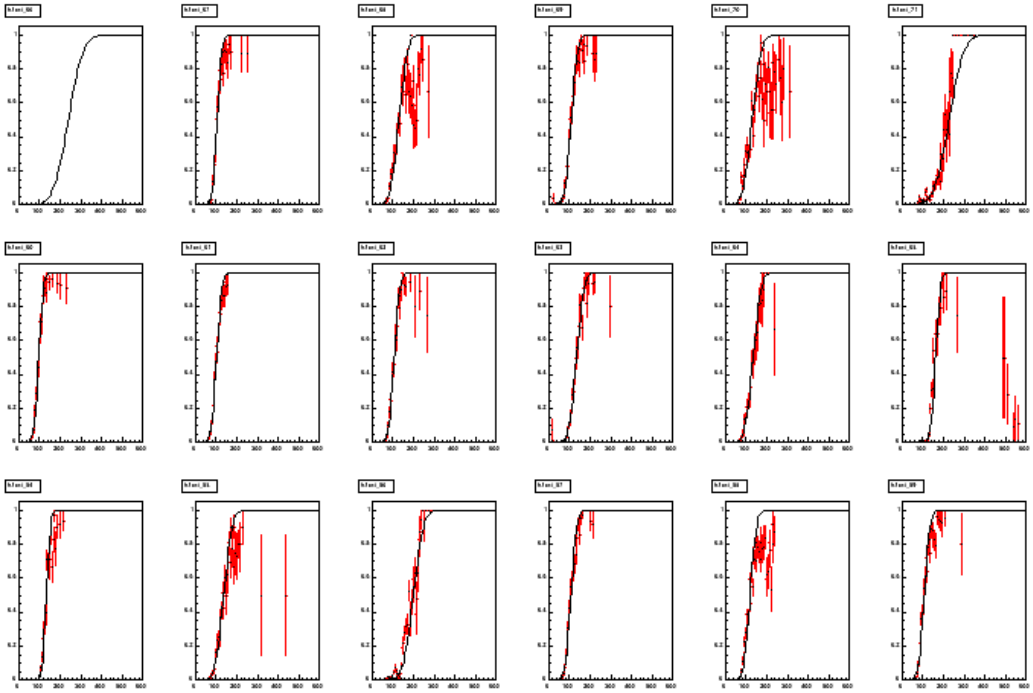

Figure 74: W3 run289787 2x2

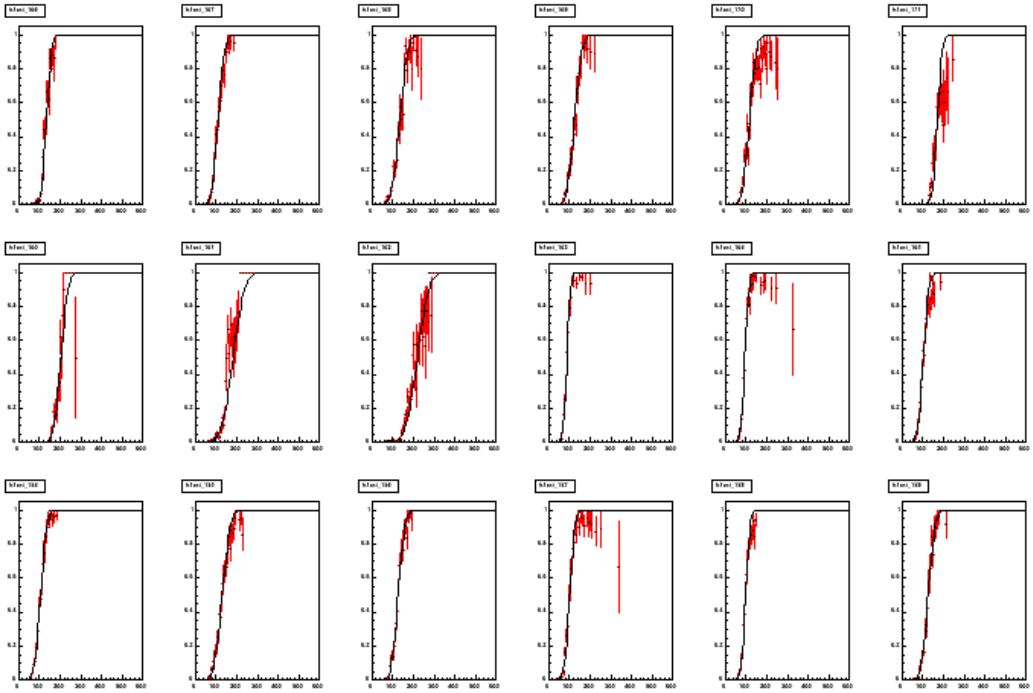

Figure 75: E3 run289787 2x2

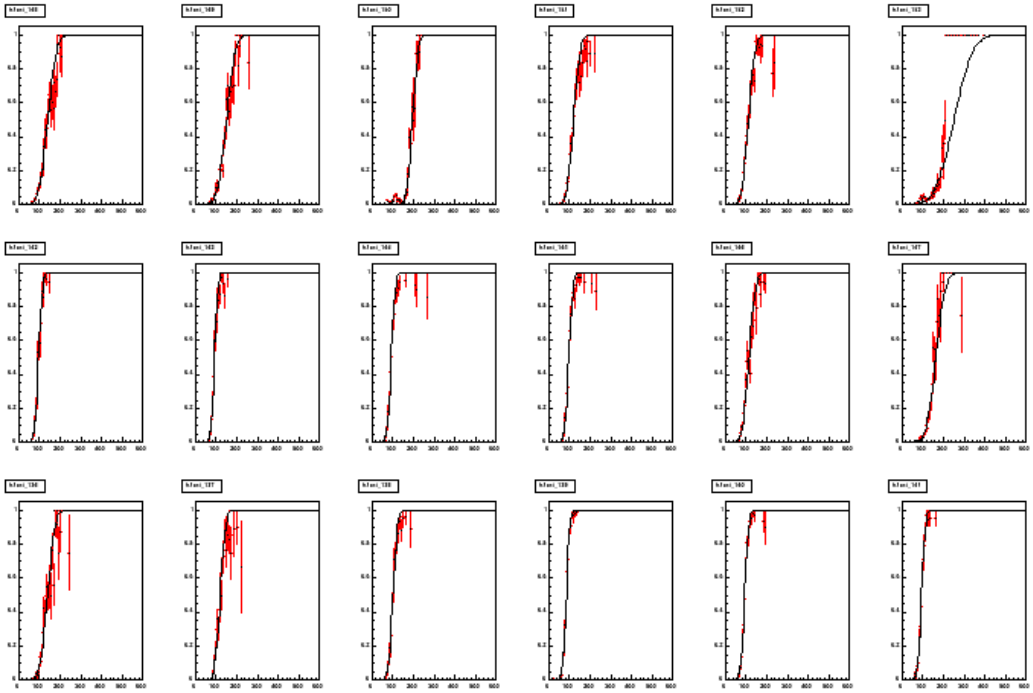

Figure 76: E2 run289787 2x2

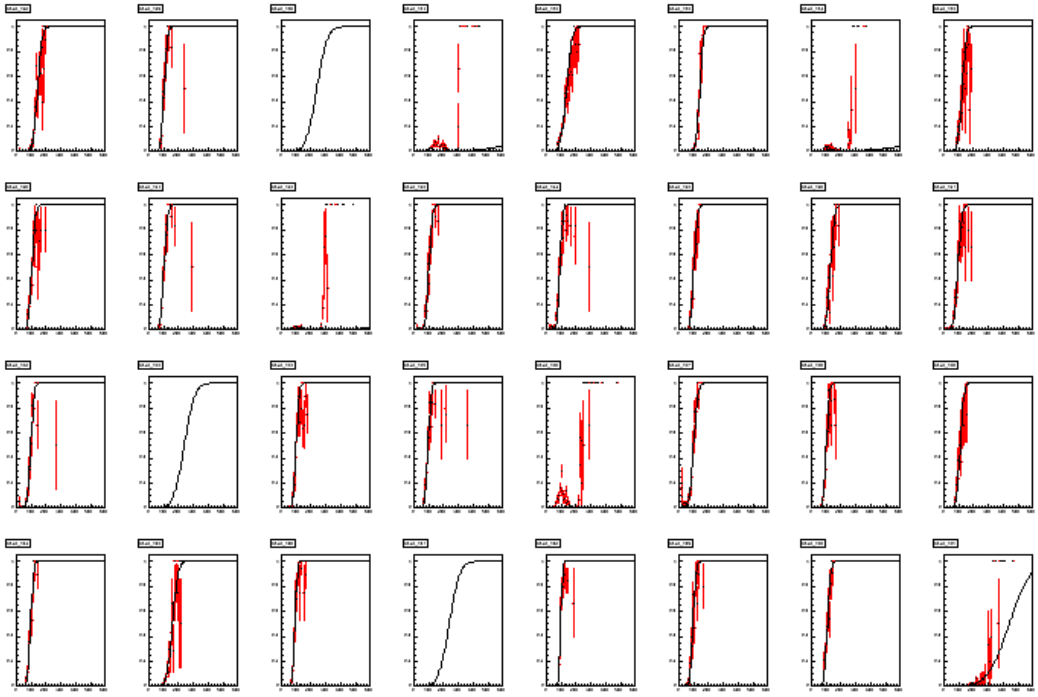

Figure 77: E1 run289787 2x2

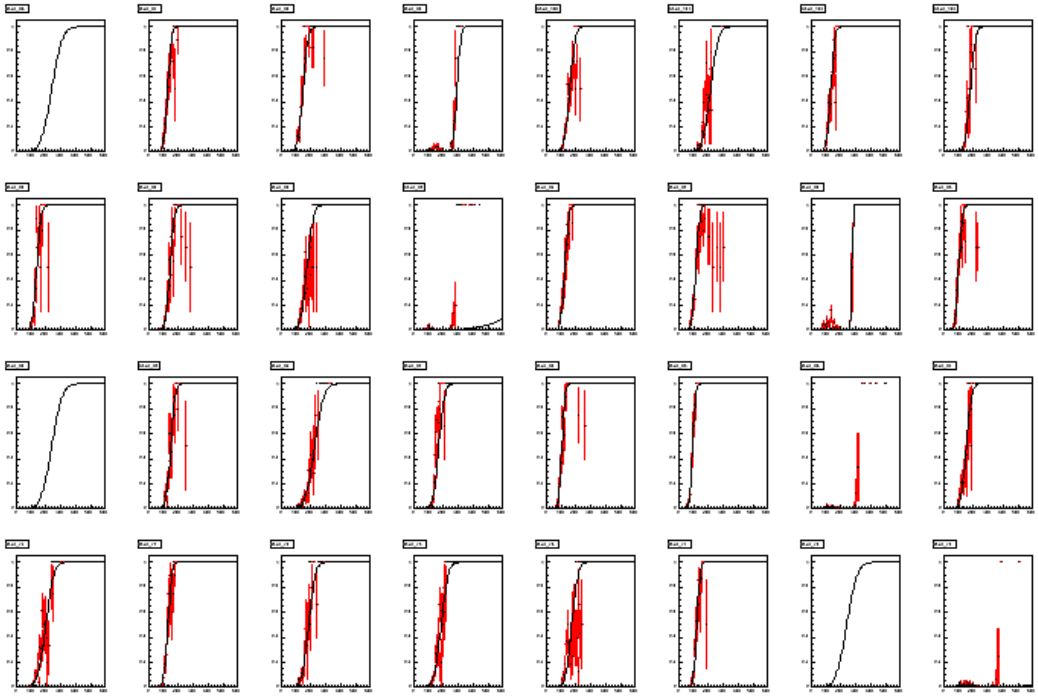

Figure 78: E0 run289787 2x2

4x4c
run276874 Fig.79, Fig.80, Fig.81, Fig.82, Fig.83, Fig.84, Fig.85, Fig.86
run281974 Fig.87, Fig.88, Fig.89, Fig.90, Fig.91, Fig.92, Fig.93, Fig.94
run289787 Fig.95, Fig.96, Fig.97, Fig.98, Fig.99, Fig.100, Fig.101, Fig.102

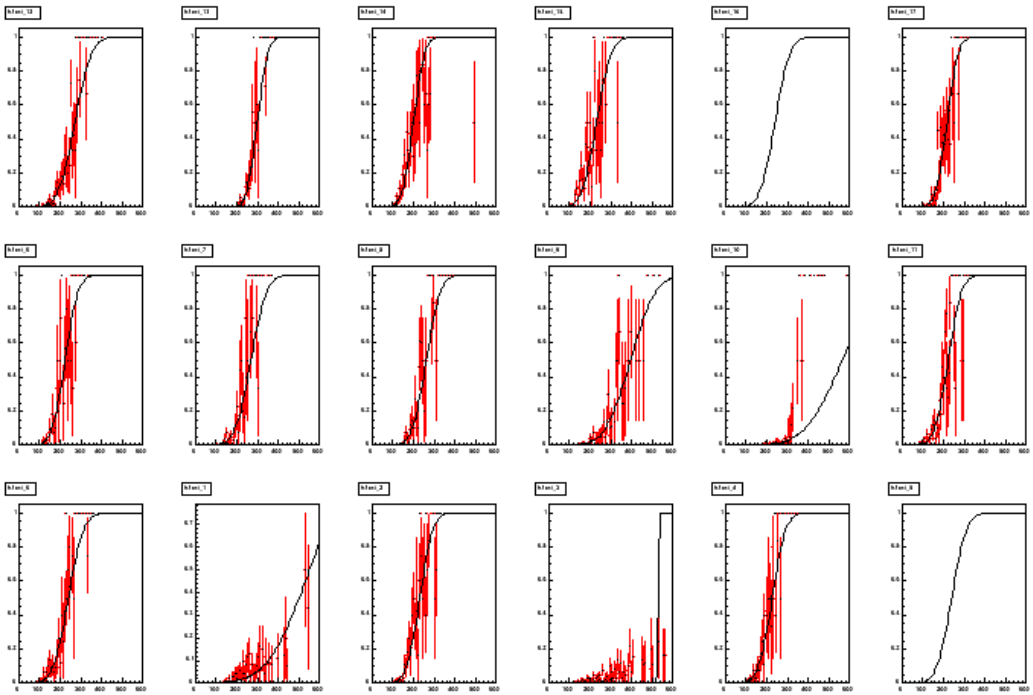

Figure 79: W0 run276874 4x4c

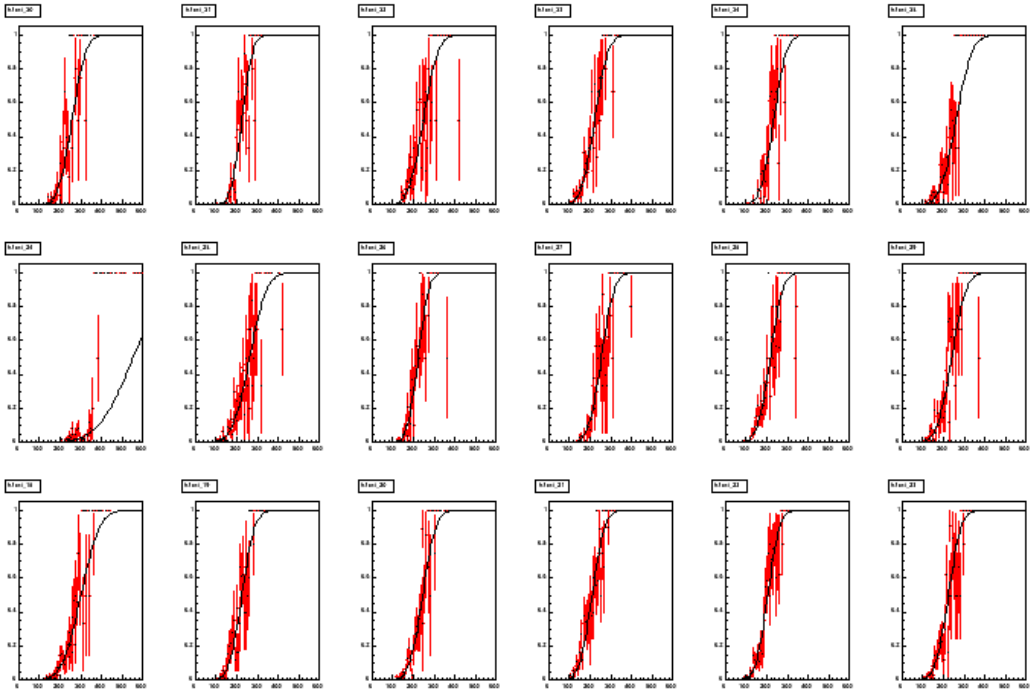

Figure 80: W1 run276874 4x4c

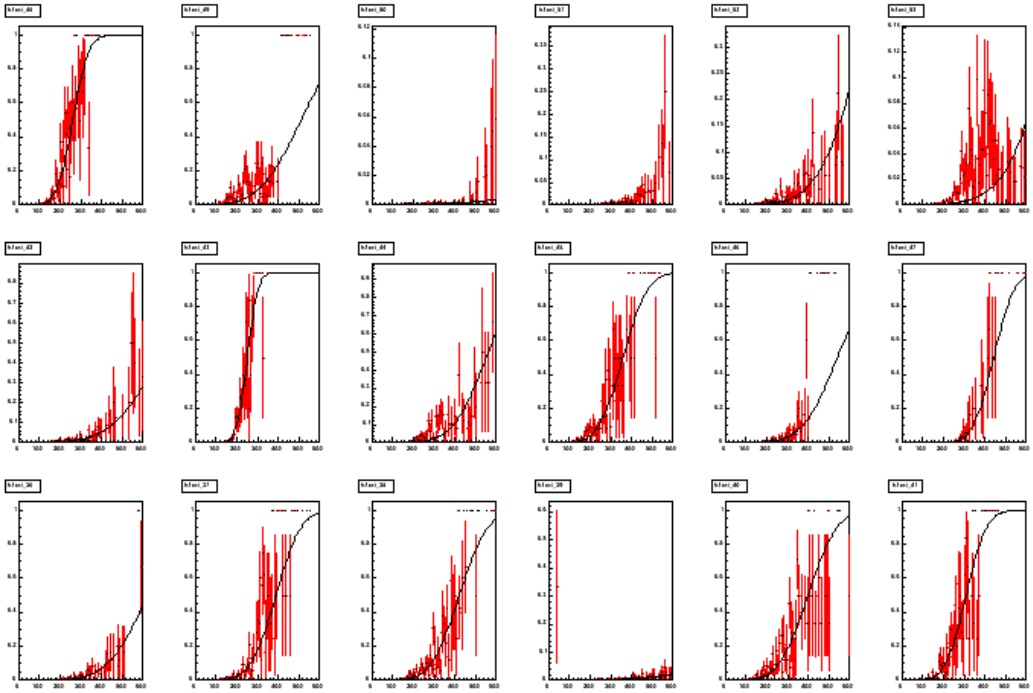

Figure 81: W2 run276874 4x4c

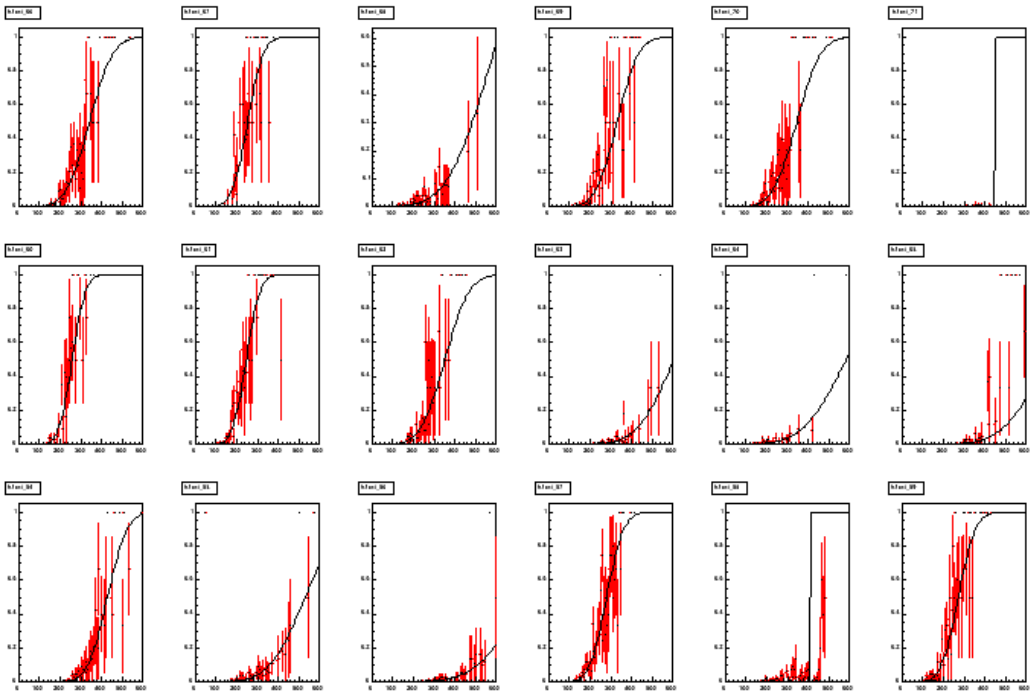

Figure 82: W3 run276874 4x4c

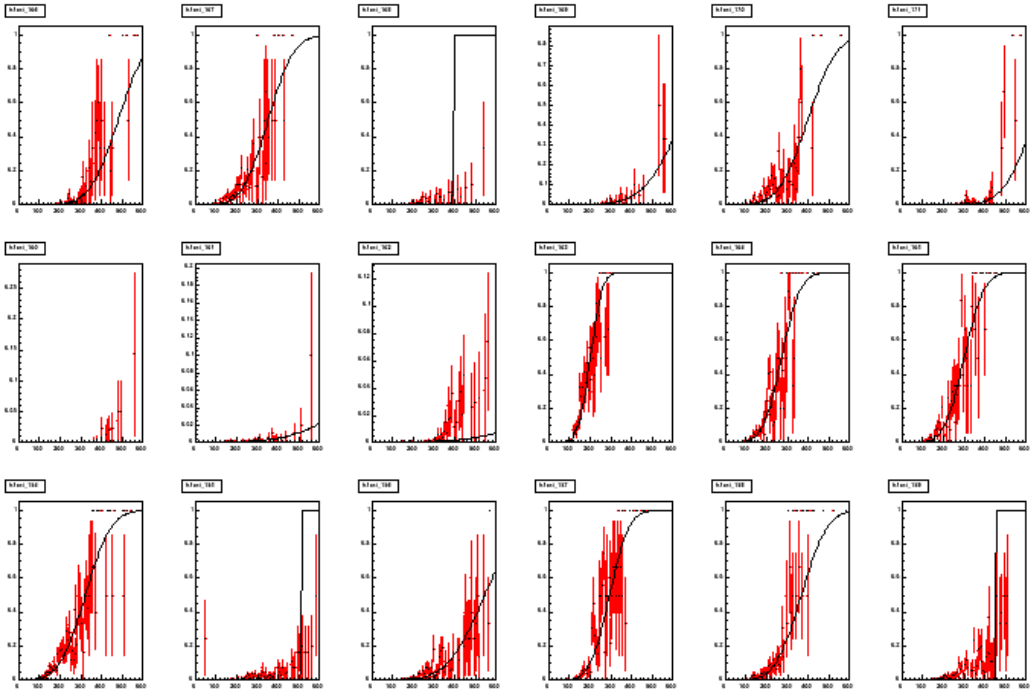

Figure 83: E3 run276874 4x4c

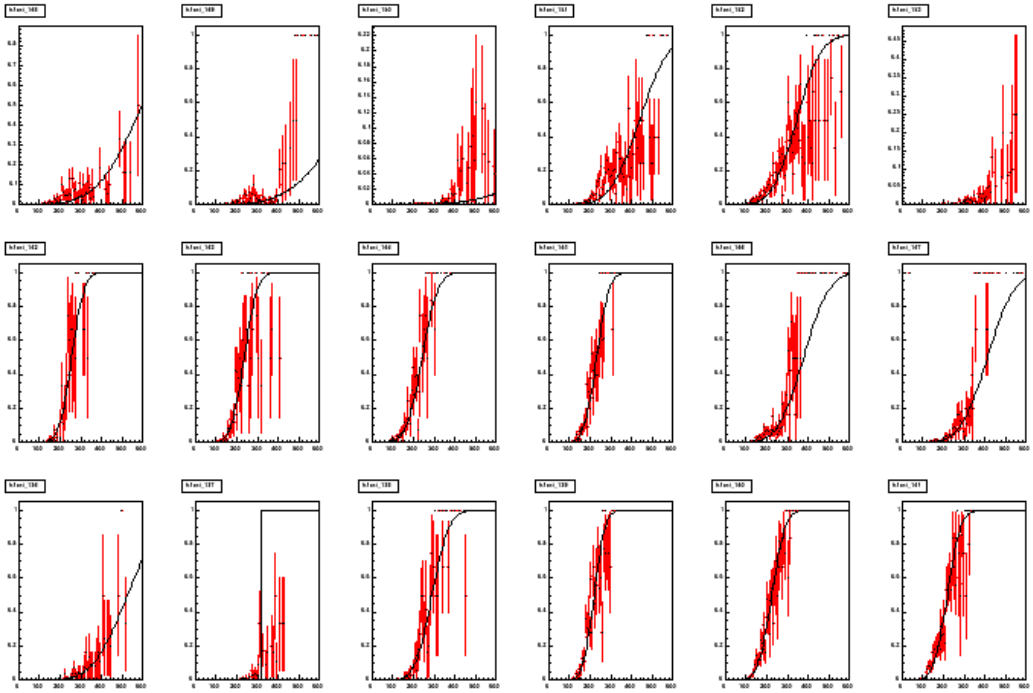

Figure 84: E2 run276874 4x4c

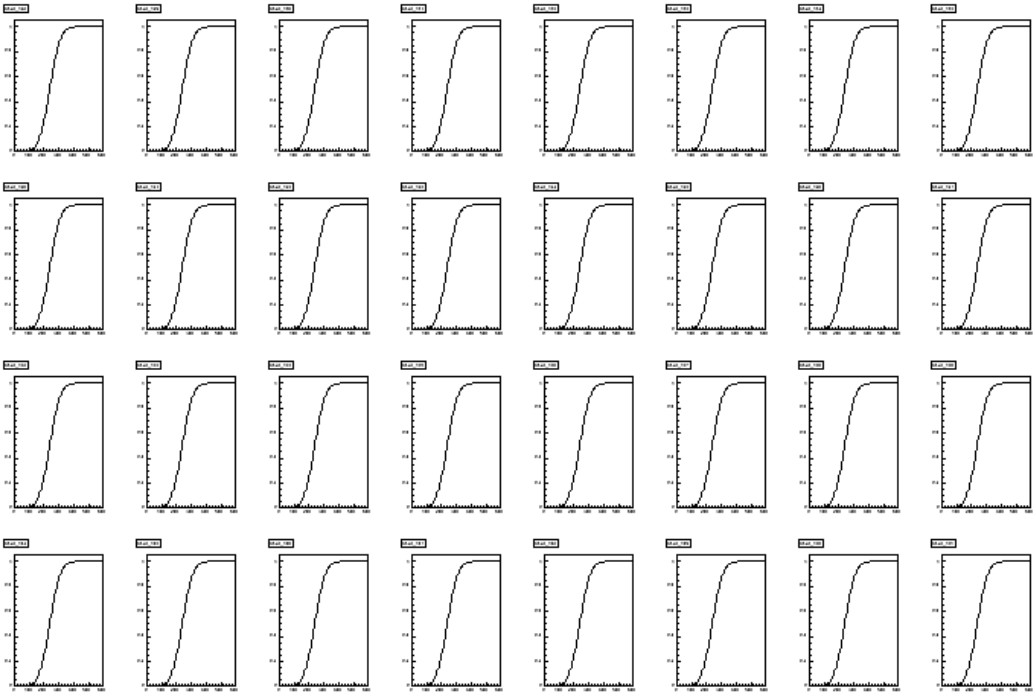

Figure 85: E1 run276874 4x4c

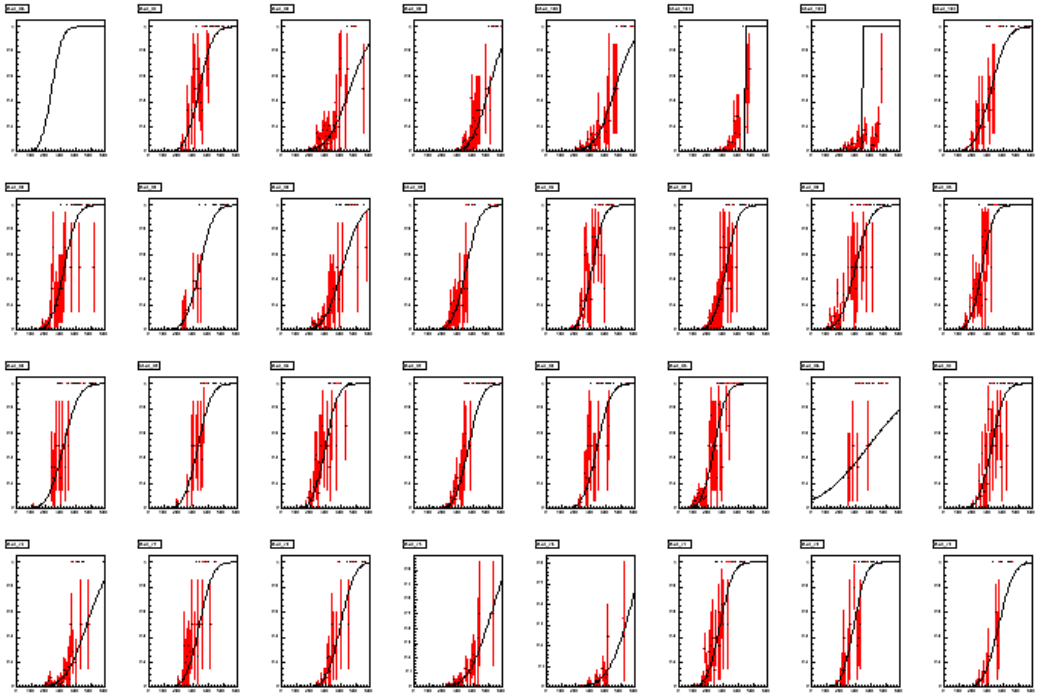

Figure 86: E0 run276874 4x4c

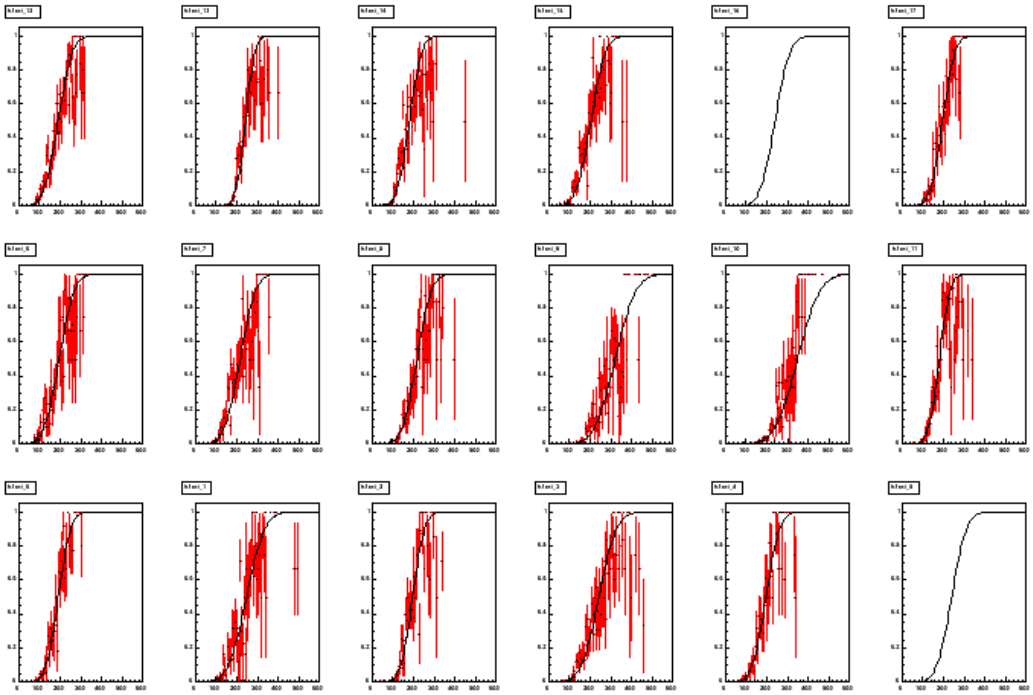

Figure 87: W0 run281974 4x4c

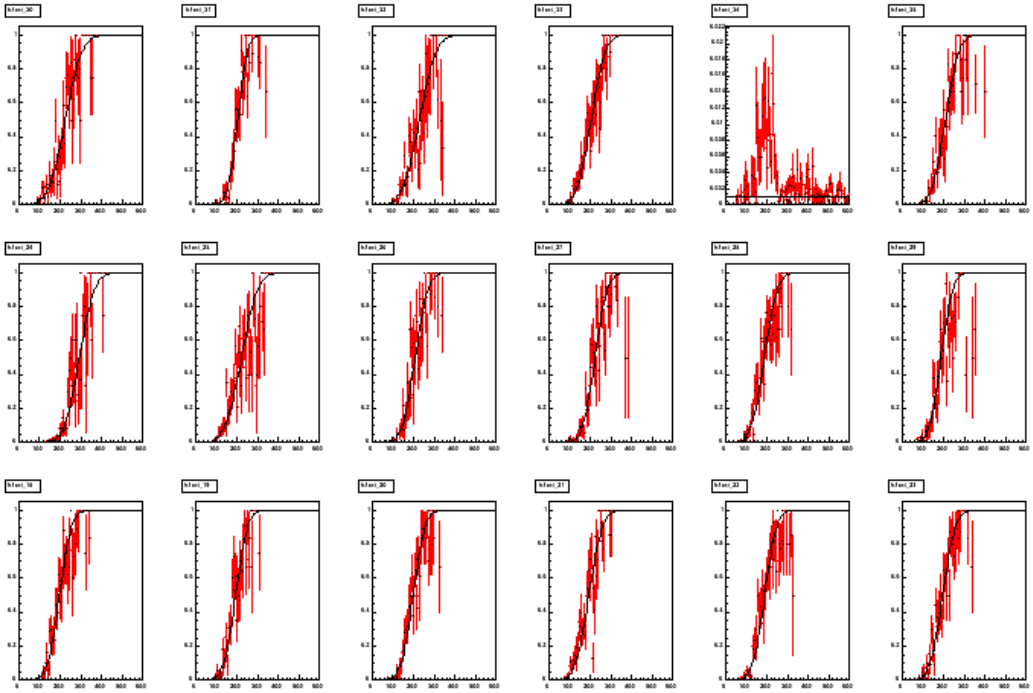

Figure 88: W1 run281974 4x4c

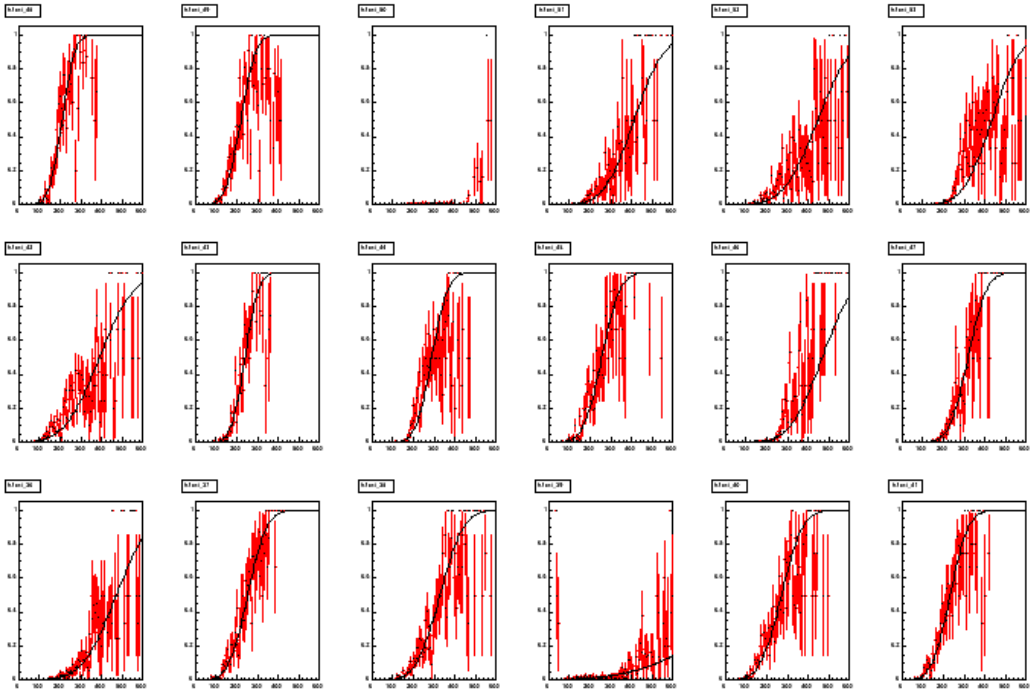

Figure 89: W2 run281974 4x4c

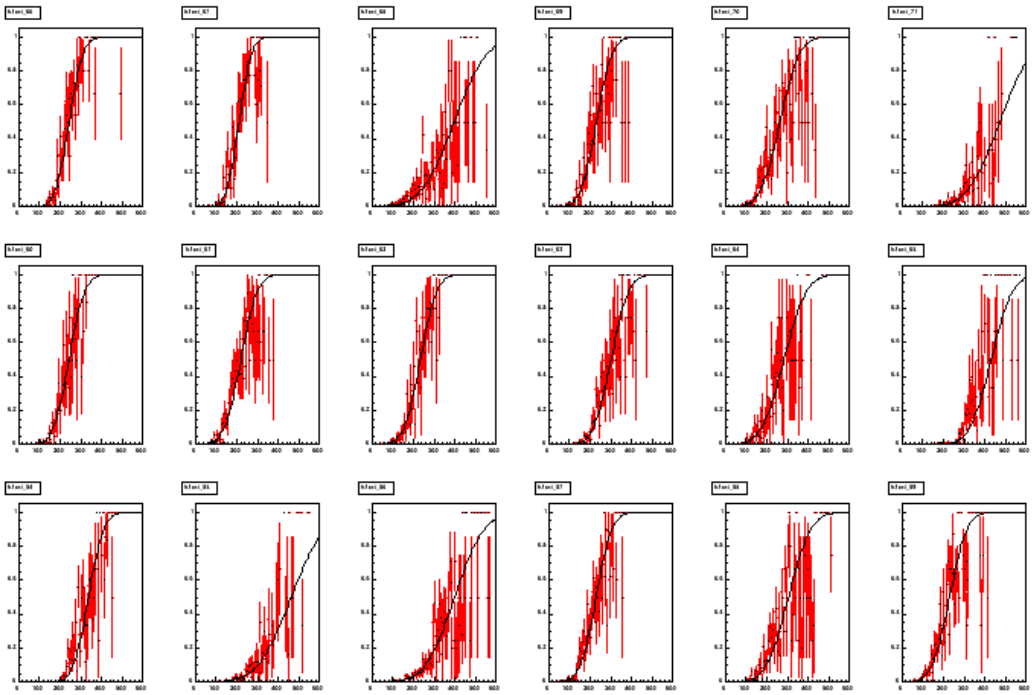

Figure 90: W3 run281974 4x4c

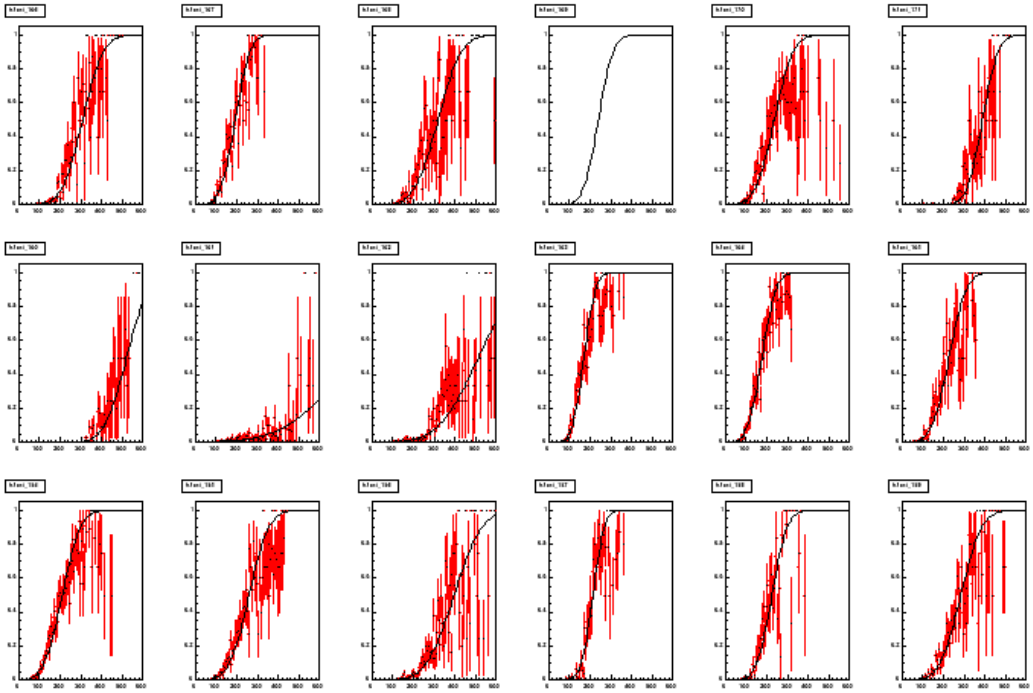

Figure 91: E3 run281974 4x4c

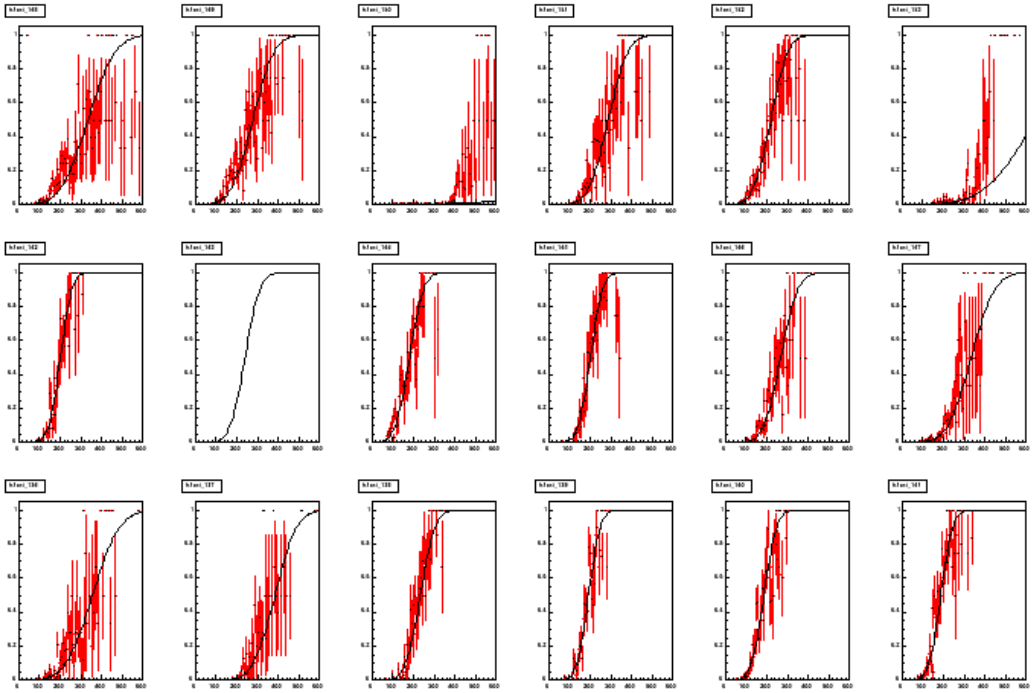

Figure 92: E2 run281974 4x4c

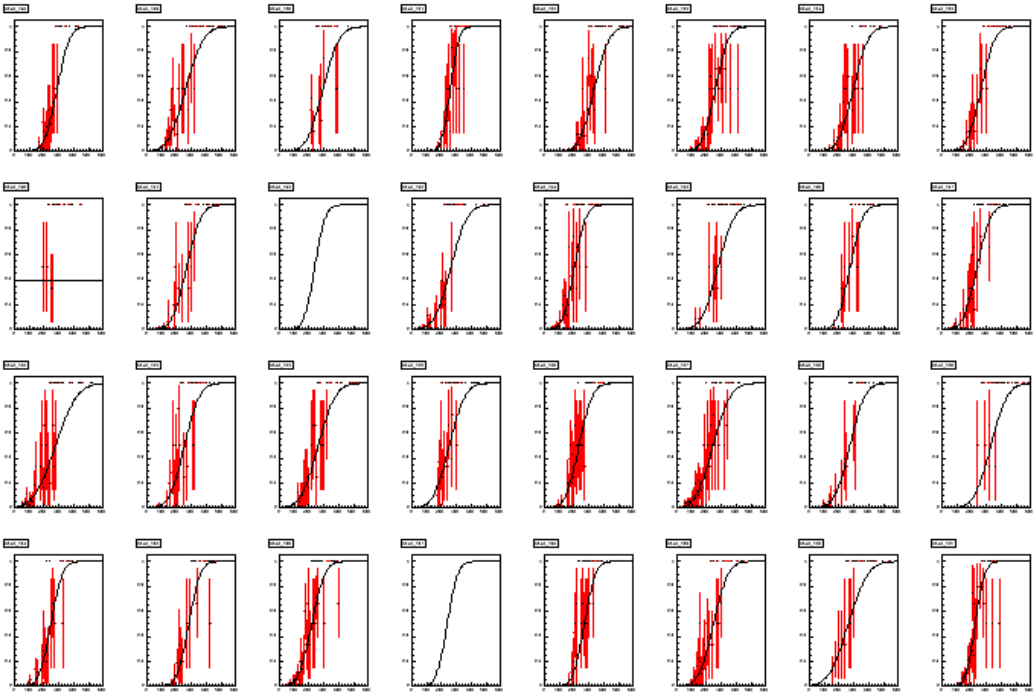

Figure 93: E1 run281974 4x4c

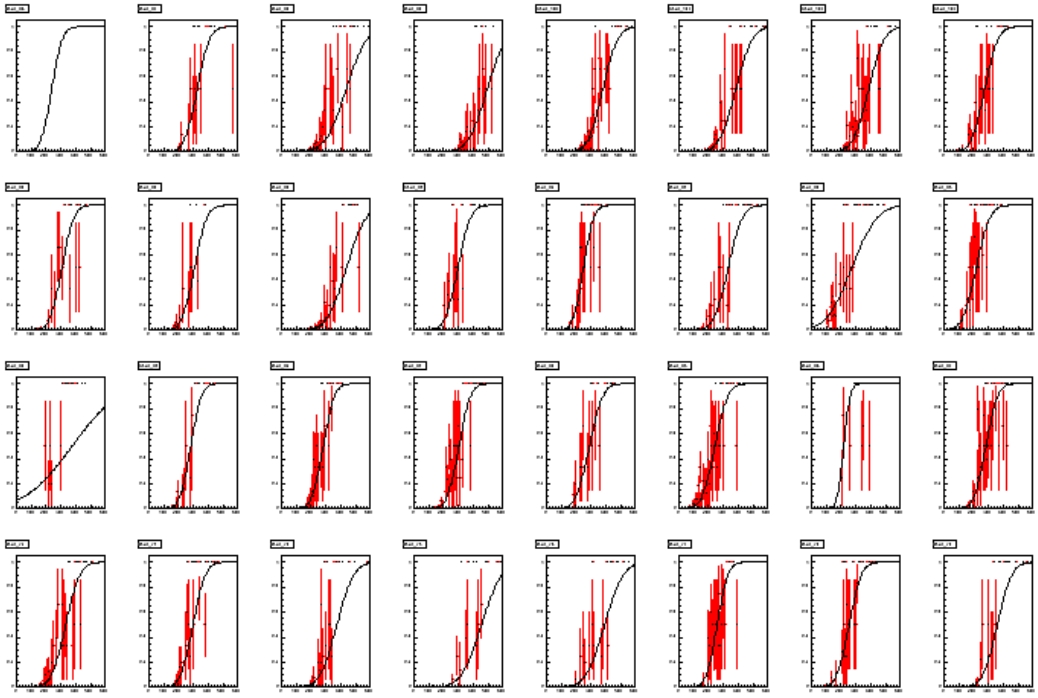

Figure 94: E0 run281974 4x4c

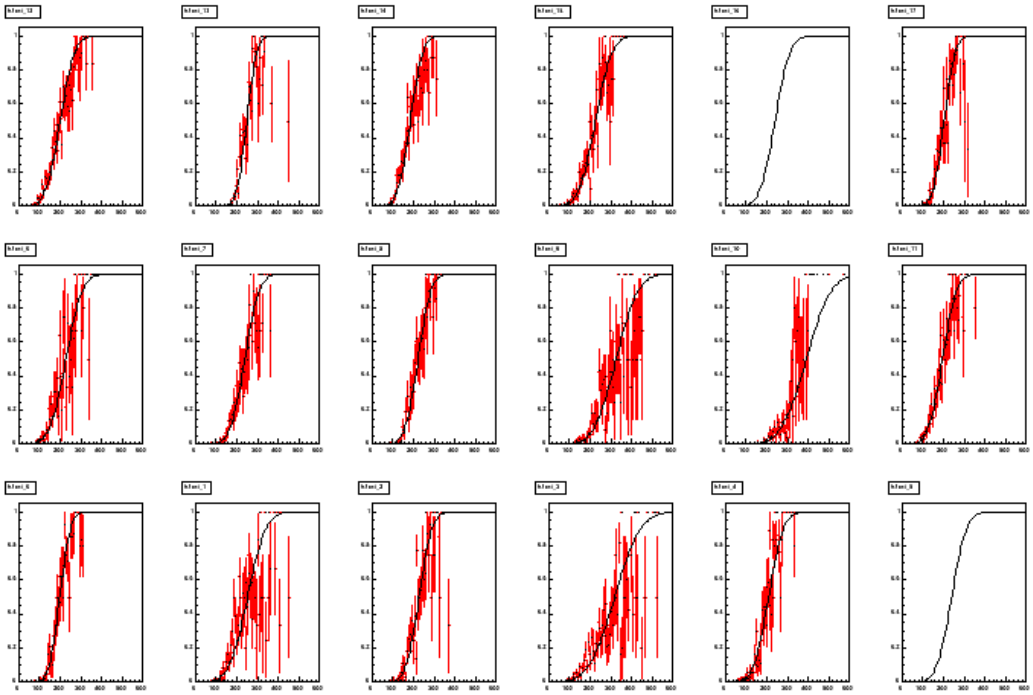

Figure 95: W0 run289787 4x4c

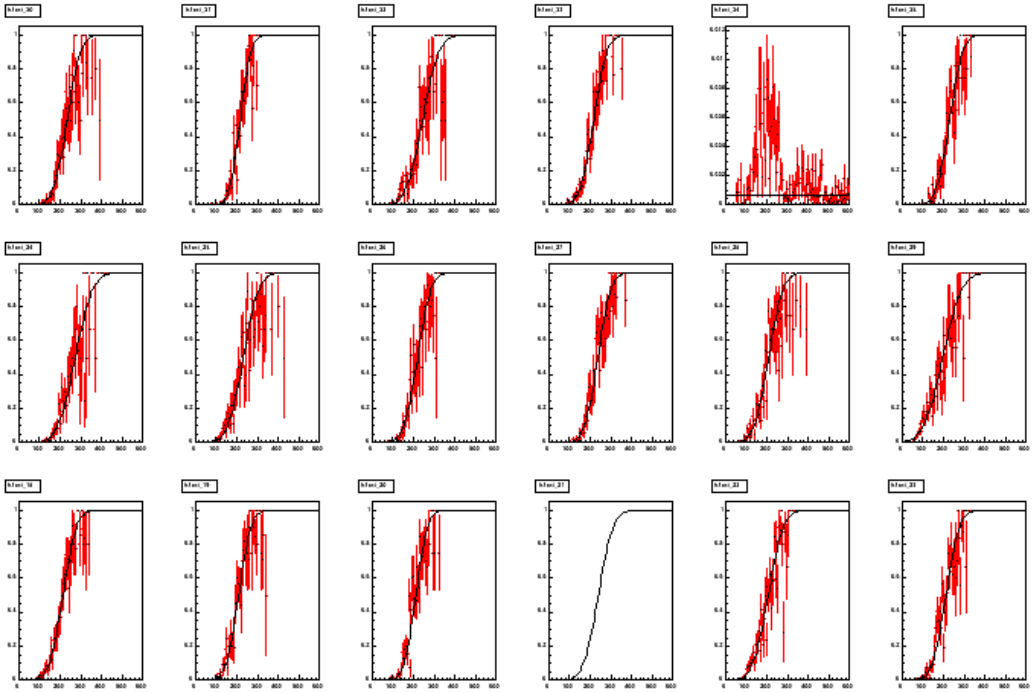

Figure 96: W1 run289787 4x4c

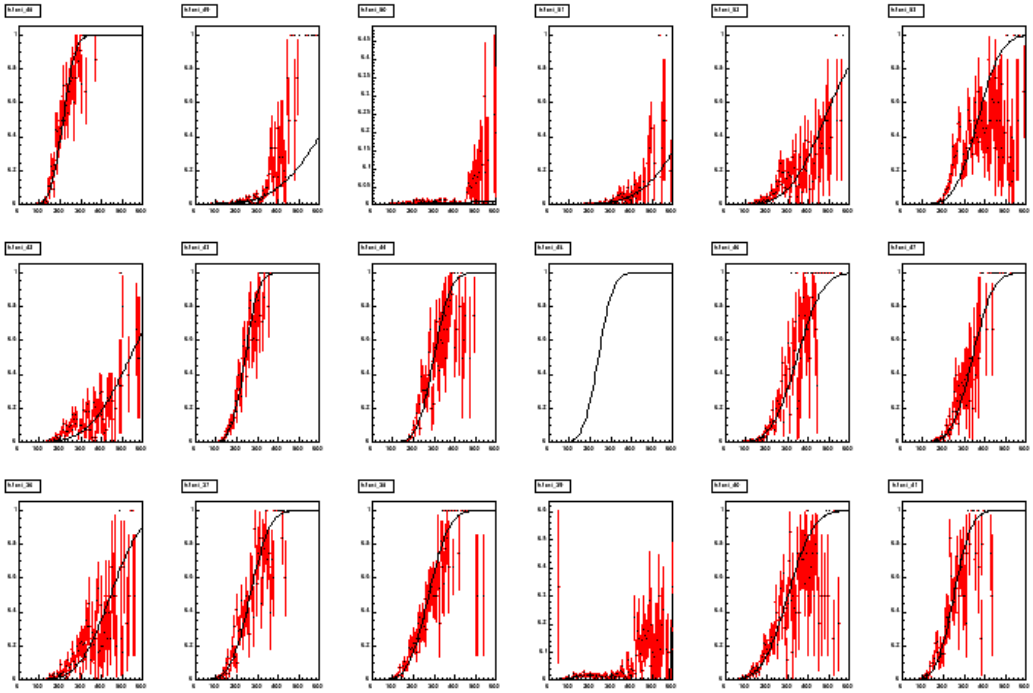

Figure 97: W2 run289787 4x4c

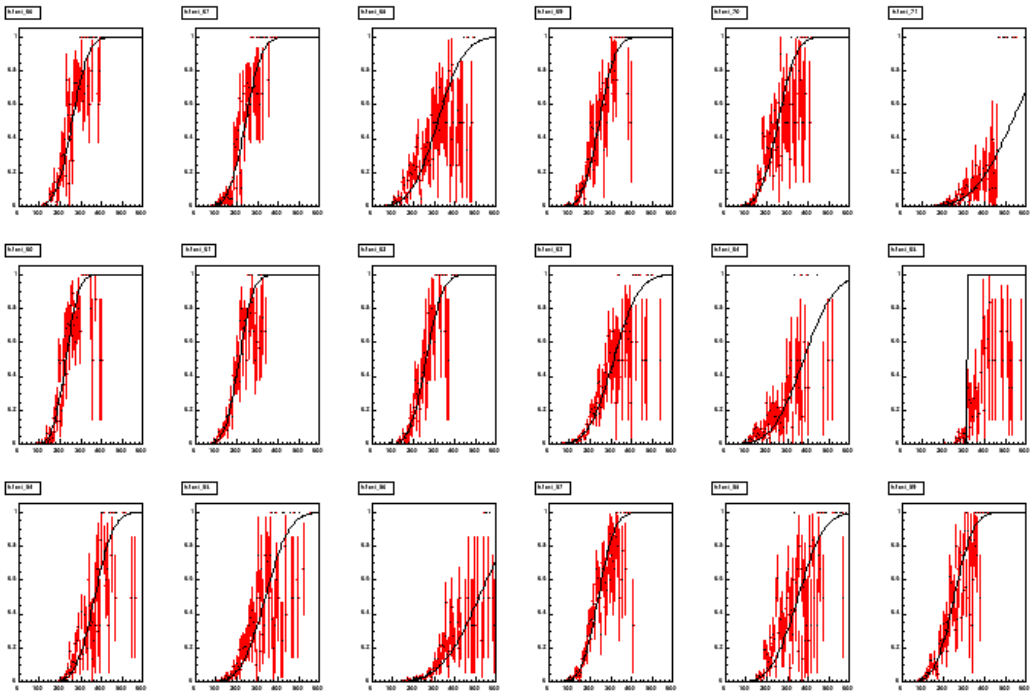

Figure 98: W3 run289787 4x4c

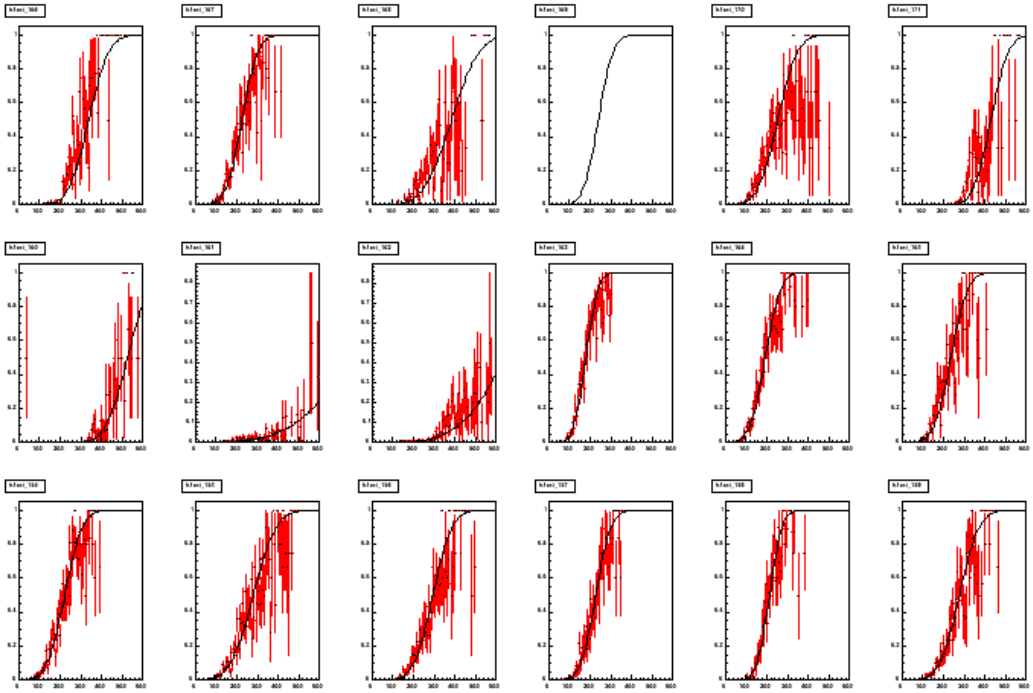

Figure 99: E3 run289787 4x4c

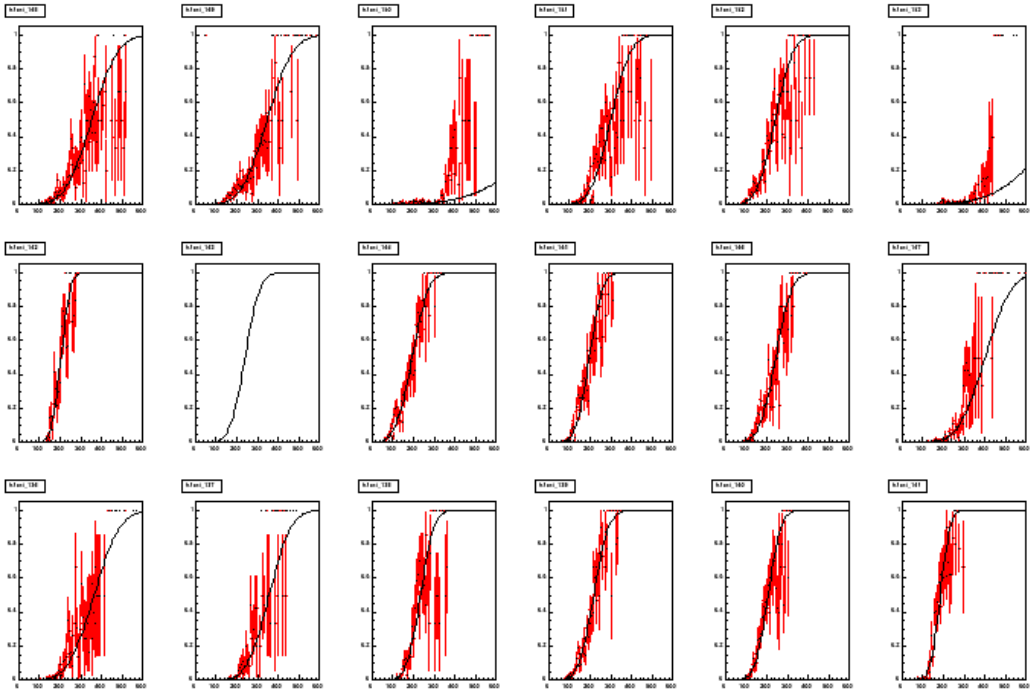

Figure 100: E2 run289787 4x4c

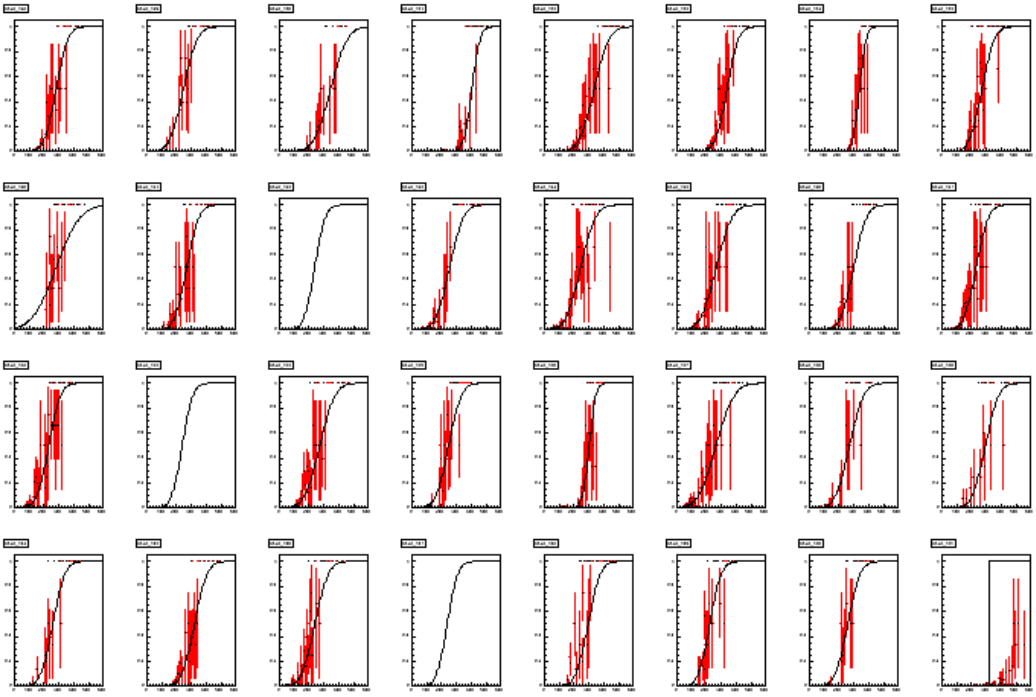

Figure 101: E1 run289787 4x4c

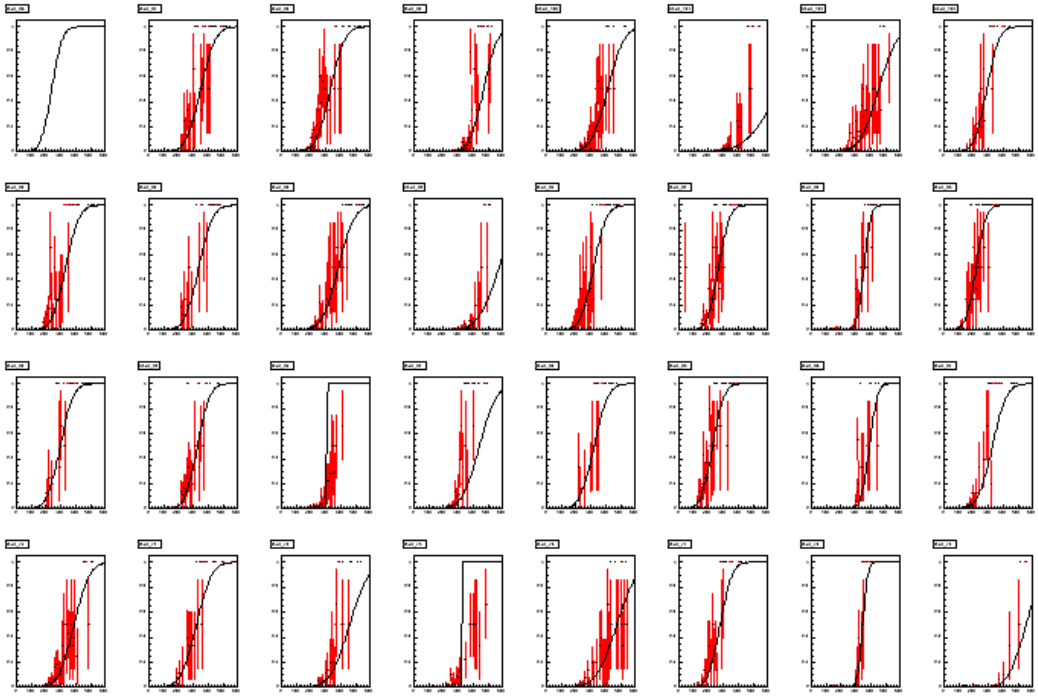

Figure 102: E0 run289787 4x4c

```
int id2secsmxy(int id,int &sec,int &iorder)
{
 int ism;
 if(id<72)  // west arm
   {
     sec=id/18;
     ism=id%18;
     iorder=(2-ism/6)*6+(ism%6);
   }
 else if(id<136) // east arm pbgl
   {
     sec=7-((id-72)/32);
     ism=(id-72)%32;
     iorder=(3-ism/8)*8+(ism%8);
   }
 else   // east arm pbsc
   {
     sec=5-((id-136)/18);
     ism=(id-136)%18;
     iorder=(2-ism/6)*6+(ism%6);
   }
 return 0;
}
```

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
0	23.1	96.4	29.4	19	23.4	93.4	11.3	20	21.8	94.6	20.2	18
1	57.2	167.2	201.4	28	30.8	102.8	28.4	23	27.8	103.5	61.9	24
2	21.7	99.3	6.0	17	21.1	96.2	10.0	17	23.2	100.0	28.2	18
3	73.6	210.8	157.4	35	40.7	122.5	26.7	30	44.2	136.8	48.1	35
4	21.8	99.4	13.0	16	20.9	93.5	20.9	15	20.1	94.7	18.9	18
5	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
6	19.0	92.7	30.4	16	20.2	88.6	27.7	17	22.3	92.2	21.6	17
7	27.8	106.9	43.1	25	25.8	99.8	34.7	20	29.3	108.7	47.6	21
8	23.9	101.1	29.0	21	23.2	93.8	19.9	21	24.3	96.2	34.3	19
9	29.8	117.0	28.1	20	26.0	107.6	55.0	18	25.4	107.7	58.3	25
10	67.7	215.3	183.3	30	48.2	166.2	197.1	30	49.3	170.7	153.2	30
11	23.5	97.6	15.4	17	21.6	92.8	19.3	14	23.4	95.0	16.7	17
12	24.2	104.3	25.8	21	24.6	96.5	32.8	20	24.0	99.4	52.7	20
13	26.6	132.8	60.0	23	20.7	110.3	44.9	23	22.2	113.1	54.2	24
14	18.8	91.8	22.4	19	20.4	88.8	21.4	22	17.9	89.3	39.4	19
15	23.7	98.3	44.1	26	23.9	95.9	20.0	22	24.7	92.8	37.2	24
16	50.5	164.9	64.9	30	38.1	128.2	65.4	25	80.0	240.0	0.0	-2
17	20.7	95.7	19.5	16	22.0	93.6	12.0	17	22.4	95.3	43.7	21
18	37.8	121.3	30.3	26	22.9	95.5	46.6	24	28.0	101.2	30.1	20
19	19.3	93.1	25.4	21	19.3	89.6	12.9	14	19.6	92.4	28.9	21
20	23.5	102.8	44.0	19	22.9	95.1	21.7	18	21.4	94.6	47.6	23
21	19.5	92.7	20.1	18	16.6	89.4	23.0	19	80.0	240.0	0.0	-2
22	18.9	94.9	26.8	17	19.6	91.2	22.5	15	19.1	88.9	23.5	18
23	26.4	102.2	20.5	20	24.9	93.8	18.6	19	22.7	91.5	52.6	21
24	62.3	200.5	168.1	28	22.7	133.6	168.6	24	30.7	120.1	43.3	27
25	25.1	102.1	27.2	21	23.7	96.7	13.0	17	22.1	97.3	36.3	23
26	19.4	90.1	21.7	14	18.0	87.5	30.6	18	20.0	90.6	38.6	19
27	23.4	100.0	81.0	23	20.7	94.7	35.1	16	21.1	96.2	67.0	22
28	19.2	94.0	22.4	19	18.6	90.5	11.9	12	22.4	95.7	25.8	22
29	25.3	98.8	16.6	20	23.0	92.4	30.4	22	23.8	93.2	38.6	22
30	27.8	115.6	31.3	20	19.8	93.8	39.0	19	22.2	96.9	18.2	17
31	19.9	91.2	26.5	19	19.0	89.1	17.7	17	21.1	92.1	36.6	20
32	18.2	89.2	30.6	19	18.1	89.4	38.8	19	19.7	88.0	33.5	21
33	19.4	92.5	18.6	16	17.5	90.2	25.3	16	18.4	88.3	27.9	19
35	28.2	109.1	35.1	20	27.2	99.6	28.4	21	27.8	104.0	33.3	25
36	108.8	304.8	211.4	43	72.6	209.2	105.5	47	68.8	195.4	106.3	43
37	47.6	160.0	89.4	27	35.4	123.7	39.3	26	34.9	122.8	48.7	28
38	53.1	159.6	47.0	39	47.1	141.5	64.0	40	48.2	132.8	95.4	38
39	156.9	407.8	361.5	49	65.8	221.8	416.3	47	77.2	238.0	551.9	48
40	56.8	161.9	137.9	41	50.4	138.6	57.8	40	54.0	149.5	124.5	43
41	33.2	120.7	55.4	24	33.1	110.8	54.9	28	33.8	114.1	53.1	26
42	74.4	221.1	83.2	36	44.9	142.0	103.6	35	60.1	181.8	102.0	39
43	28.7	120.8	45.7	25	28.4	109.2	33.6	25	27.6	112.4	115.6	26
44	42.8	165.5	159.1	33	28.0	125.1	47.2	27	26.2	126.0	91.5	25
45	40.6	139.6	33.9	33	35.9	117.8	33.5	25	37.3	122.0	50.3	30
46	55.9	187.4	100.4	32	34.9	161.6	209.0	35	41.6	145.0	57.0	29
47	37.1	171.7	215.0	26	40.7	143.8	44.9	26	40.1	141.9	47.3	27
48	26.0	108.2	33.3	23	26.7	103.0	29.0	21	27.6	102.5	33.2	21
49	69.7	181.1	605.0	30	29.9	112.6	71.6	27	85.6	246.7	434.3	36
50	37.6	179.4	277.3	30	26.6	154.3	271.4	33	31.0	157.7	432.0	29

Table 2: 2x2 fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
51	62.9	217.2	342.8	34	38.3	136.1	45.1	32	38.8	161.0	224.3	35
52	100.0	277.0	185.2	37	59.1	166.9	33.4	35	57.4	167.4	102.8	36
53	92.6	278.9	297.2	40	39.6	163.8	349.9	37	45.2	152.8	232.6	34
54	21.1	137.3	118.9	25	19.7	129.5	91.9	26	21.4	134.1	122.6	28
55	81.7	219.1	454.4	33	66.0	186.4	75.6	39	44.8	137.4	74.8	36
56	115.2	314.1	303.6	36	57.4	181.4	161.0	34	54.8	199.5	356.8	38
57	31.1	118.2	72.4	22	32.1	109.5	21.5	20	31.0	108.2	49.0	24
58	17.0	240.4	682.3	39	36.4	126.4	142.4	35	34.1	119.7	270.2	36
59	29.7	115.2	58.6	28	28.0	107.5	73.2	30	30.8	108.0	80.4	32
60	26.9	103.0	29.4	21	30.1	99.7	22.7	22	25.6	96.9	30.1	21
61	27.9	108.3	32.0	20	28.0	102.6	30.1	24	28.7	103.2	25.2	20
62	36.3	120.5	84.0	27	26.4	102.0	50.5	22	30.1	107.6	39.4	23
63	53.0	195.4	127.4	35	37.7	140.0	54.3	32	40.0	134.7	51.9	37
64	71.8	202.8	60.6	21	41.3	125.0	53.4	23	42.7	134.7	25.0	27
65	60.2	225.6	271.9	36	24.3	159.3	277.1	30	26.4	162.3	617.2	40
66	39.6	139.1	52.1	24	28.4	110.7	27.4	25	80.0	240.0	0.0	-2
67	23.1	107.6	40.6	22	22.7	102.5	37.4	24	25.8	105.9	34.8	23
68	90.4	237.0	286.8	34	65.7	170.4	66.3	38	45.8	130.6	148.5	37
69	35.5	123.0	65.8	29	34.1	108.4	21.7	25	34.1	109.2	39.6	32
70	75.0	194.5	208.5	44	48.3	135.1	126.4	39	48.5	130.1	189.7	42
71	164.3	439.6	145.6	38	78.6	221.7	135.5	38	80.0	227.5	135.2	39
72	76.0	230.4	183.6	35	46.9	162.1	81.6	33	60.7	200.0	69.5	38
73	37.1	141.8	29.2	25	28.3	128.4	9.6	16	30.4	129.4	20.2	24
74	80.0	240.0	0.0	-2	42.8	158.0	57.1	24	51.0	185.0	41.1	31
75	50.4	181.0	49.8	34	50.9	179.8	59.1	28	54.5	185.8	44.8	31
76	27.2	281.6	430.7	48	32.5	130.4	42.2	22	46.9	172.7	127.4	32
77	30.4	111.0	17.8	19	27.8	119.6	23.7	19	24.5	121.6	36.1	19
78	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
79	41.8	162.6	42.7	29	35.3	155.9	23.6	26	726.9	-1.0	138.8	49
80	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
81	30.7	135.8	36.3	25	33.6	136.9	14.5	21	34.1	148.2	32.3	23
82	30.0	130.8	50.8	28	32.5	140.2	35.0	19	69.6	226.1	40.9	33
83	40.1	151.6	50.8	28	33.8	133.3	42.6	25	43.4	169.8	87.4	27
84	23.0	105.3	36.7	24	27.0	102.5	12.9	19	24.6	106.0	26.0	19
85	23.7	93.8	11.8	18	21.7	94.4	23.1	16	23.0	93.9	4.6	12
86	27.8	124.4	28.1	26	23.3	120.3	54.1	19	661.0	-1.0	152.1	49
87	38.4	145.2	32.1	26	31.6	134.6	26.0	24	40.5	152.3	24.3	28
88	33.1	134.9	48.6	27	36.4	139.0	18.5	20	33.3	137.9	32.2	25
89	35.9	143.0	33.1	29	36.5	146.7	44.8	23	34.2	144.0	30.9	26
90	50.2	173.1	67.4	34	51.5	191.1	38.6	39	47.4	174.4	49.5	33
91	44.7	161.9	462.9	33	31.4	128.2	80.2	32	377.0	952.8	209.6	46
92	26.1	115.3	59.8	23	25.6	110.6	14.3	19	29.4	125.4	32.9	21
93	24.9	115.1	48.0	27	30.2	125.2	35.7	27	29.1	115.4	36.8	30
94	27.6	106.9	32.0	24	23.3	103.5	29.1	14	10.0	274.8	206.6	42
95	24.9	100.3	29.1	23	21.0	92.4	7.4	10	27.1	102.1	16.4	19
96	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
97	26.6	120.5	39.5	23	26.6	126.4	21.9	20	29.2	127.7	32.7	22
98	52.7	177.8	142.1	44	53.8	179.0	50.9	31	39.1	147.3	44.9	27
99	54.6	204.3	157.7	38	47.0	195.7	56.8	31	28.2	291.1	319.6	48
100	44.9	159.0	90.3	32	45.2	165.5	49.8	29	42.3	158.9	32.2	31

Table 3: 2x2 fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
101	67.2	214.7	74.3	39	48.6	173.4	32.9	30	59.9	214.7	78.6	34
102	35.0	134.0	49.9	28	28.7	125.8	39.2	26	30.8	131.7	38.2	24
103	34.6	124.4	26.0	23	27.1	117.8	23.3	17	39.3	179.9	56.5	23
104	21.7	93.7	32.0	21	21.3	93.5	15.9	17	23.6	97.0	17.9	15
105	50.1	180.6	149.7	37	34.3	138.7	46.9	20	42.5	160.5	40.5	28
106	21.0	92.3	19.1	16	20.7	90.3	10.3	12	19.5	92.3	11.0	16
107	25.7	94.3	44.8	33	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
108	16.7	102.0	73.5	25	15.3	93.4	31.8	19	15.1	97.8	55.6	21
109	23.8	100.3	50.6	23	23.0	99.7	21.8	17	23.3	96.1	28.5	15
110	25.2	107.2	52.7	21	19.5	103.7	27.6	14	23.8	109.8	18.2	14
111	30.7	113.1	48.9	24	29.2	123.7	42.5	22	162.4	442.5	61.7	46
112	80.0	240.0	0.0	-2	24.9	89.9	65.5	19	26.1	98.6	39.7	21
113	20.9	95.7	21.5	18	25.8	99.9	4.1	13	80.0	240.0	0.0	-2
114	26.2	106.5	36.0	27	26.7	101.3	31.0	21	23.0	100.9	43.4	22
115	19.3	88.1	40.1	21	20.1	90.3	15.6	12	23.8	96.8	21.2	19
116	22.4	92.7	20.6	23	20.9	90.0	8.5	11	-1.0	-1.0	266.1	38
117	26.7	96.4	50.3	25	35.5	96.6	42.8	21	33.1	100.6	37.6	21
118	26.9	107.0	35.2	24	23.2	94.3	18.0	17	23.2	102.2	34.8	22
119	28.7	119.3	55.9	30	20.8	99.3	16.2	14	27.1	112.1	36.4	20
120	52.4	148.2	107.2	26	21.9	99.8	28.3	17	27.4	106.0	31.5	20
121	23.2	95.4	47.7	22	25.1	98.6	28.9	20	27.6	103.7	32.9	22
122	21.9	101.1	55.7	25	20.6	101.8	31.5	20	832.9	-1.0	244.8	52
123	22.1	94.4	33.9	25	23.7	96.3	19.8	19	25.5	103.3	39.1	22
124	26.3	89.6	45.2	27	23.1	85.6	26.7	18	22.1	92.9	59.3	25
125	21.4	99.5	19.8	18	23.1	98.7	15.3	9	26.3	102.8	19.9	13
126	36.5	144.1	109.8	25	26.6	121.3	22.0	21	30.5	130.4	31.2	20
127	29.5	94.5	49.1	26	28.3	90.8	23.1	16	30.7	96.5	24.5	25
128	26.8	120.4	33.8	21	36.4	151.7	24.7	23	34.8	143.9	34.7	26
129	21.3	100.9	32.4	25	24.1	100.3	19.4	16	25.8	104.3	10.8	15
130	24.5	113.0	57.7	24	20.6	105.3	16.7	19	80.0	240.0	0.0	-2
131	33.9	134.6	34.3	27	29.1	123.5	27.8	23	441.9	-1.0	596.3	51
132	62.7	187.0	113.1	38	53.9	166.6	57.9	27	43.5	136.8	111.3	31
133	26.1	99.1	30.2	24	32.3	111.1	17.1	21	28.6	141.9	71.9	26
134	40.1	145.9	74.1	34	28.2	117.4	19.3	23	595.0	-1.0	183.4	44
135	31.4	121.8	46.8	26	24.9	113.8	27.2	20	30.7	124.6	35.2	26
136	50.8	165.3	44.4	33	41.6	135.4	30.2	25	39.3	139.5	40.4	27
137	31.1	129.6	29.3	23	26.2	125.9	65.2	27	28.8	120.5	46.3	26
138	23.6	102.0	44.6	28	21.9	98.5	20.2	17	25.0	101.5	20.5	21
139	18.6	91.3	45.2	22	16.9	89.1	18.4	15	18.4	85.1	24.8	17
140	23.2	98.5	22.1	22	22.3	94.6	12.9	14	21.4	93.1	16.5	17
141	22.5	95.3	22.7	21	22.7	91.3	16.4	20	20.9	94.3	16.7	16
142	22.3	98.2	36.2	21	21.9	94.5	14.1	16	21.5	95.9	13.6	16
143	18.5	93.7	41.1	24	18.4	91.8	23.7	15	19.0	92.4	24.2	16
144	21.8	94.8	38.0	21	0.2	87.5	199.4	1	21.1	93.1	28.1	20
145	24.7	102.5	24.4	28	24.0	99.1	19.9	17	22.9	97.5	22.6	22
146	49.6	150.4	180.8	32	40.2	129.3	51.2	27	34.6	114.1	83.8	26
147	53.6	163.1	93.9	32	47.7	143.7	72.3	28	50.4	163.5	102.0	32
148	74.7	193.7	306.6	32	46.8	137.1	67.4	30	47.2	140.6	37.2	29
149	97.5	246.7	749.6	39	40.6	123.3	65.9	30	47.6	150.4	89.3	32
150	271.4	646.2	621.6	44	33.7	212.9	463.9	39	30.2	195.6	606.8	35

Table 4: 2x2 fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
151	37.6	132.3	116.6	35	33.2	116.2	51.6	28	35.3	120.2	42.7	30
152	45.9	138.9	116.7	34	34.1	107.7	23.5	26	35.3	111.7	27.5	27
153	101.6	284.2	341.0	40	89.7	221.0	98.6	34	100.5	251.4	135.8	32
154	45.0	133.2	27.5	32	37.3	106.7	22.8	28	33.3	105.8	20.4	24
155	96.7	260.8	223.9	35	42.3	124.1	37.1	29	42.6	129.8	55.2	32
156	48.8	161.1	227.4	30	25.5	145.0	300.4	27	35.6	126.6	33.2	28
157	34.1	113.0	87.2	28	26.1	99.0	72.2	23	28.7	101.5	44.8	29
158	46.6	136.1	267.3	27	32.8	103.8	26.7	21	24.2	98.3	35.4	19
159	58.9	184.3	168.3	35	41.3	131.2	40.1	31	36.4	126.5	37.8	27
160	90.5	339.7	264.2	38	37.4	203.5	283.6	37	37.5	204.1	329.2	34
161	83.9	258.8	80.9	36	53.5	168.0	92.6	33	60.8	182.6	162.7	32
162	41.2	297.1	606.0	49	59.6	194.1	308.6	40	61.8	218.9	404.2	45
163	19.6	90.8	24.2	17	18.4	86.0	29.9	20	19.7	87.9	24.0	18
164	26.9	105.9	36.5	22	24.8	94.1	19.3	20	23.0	94.5	24.9	24
165	38.6	125.7	48.3	26	31.3	102.5	18.4	23	29.8	103.6	25.5	21
166	51.0	177.5	103.2	29	31.2	126.6	52.4	24	26.9	134.8	189.7	28
167	44.6	140.8	80.9	24	29.0	102.4	46.7	23	33.9	110.6	29.5	24
168	64.2	185.5	83.0	30	41.0	125.0	35.8	26	42.6	134.6	67.6	33
169	72.6	226.3	152.5	33	36.9	148.8	162.7	31	38.9	125.0	45.7	28
170	51.3	148.4	215.5	39	30.2	105.2	60.5	33	36.9	116.4	103.3	35
171	84.7	306.5	290.6	36	32.1	174.1	274.0	38	26.7	170.7	321.6	35

Table 5: 2x2 fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
0	81.8	240.2	21.0	33	66.0	191.6	30.4	35	57.4	198.5	34.7	36
1	221.6	552.0	41.6	48	98.1	247.3	45.4	47	97.6	252.3	111.2	58
2	71.2	230.4	20.3	28	64.2	196.3	49.4	36	69.6	226.9	58.7	44
3	4.2	529.5	265.8	68	94.9	242.8	82.2	61	138.0	318.7	145.3	72
4	73.4	225.9	23.4	31	73.8	196.2	28.6	40	80.0	208.8	59.4	42
5	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
6	70.3	224.2	18.7	24	81.1	195.5	54.9	43	87.3	228.9	45.9	40
7	84.9	268.8	26.6	28	83.9	216.0	58.4	47	77.4	239.2	37.5	45
8	76.1	262.6	24.0	24	77.6	217.1	39.3	42	69.3	222.2	28.5	38
9	133.8	395.7	22.1	44	110.8	321.8	65.2	56	116.9	326.2	65.5	62
10	199.0	565.4	40.7	51	120.5	348.5	93.7	61	133.2	391.4	86.9	62
11	72.9	222.8	53.2	34	57.6	180.1	53.2	42	75.2	195.7	34.7	42
12	88.5	272.3	32.0	35	76.0	190.5	68.1	48	76.9	200.5	73.9	49
13	56.6	299.4	31.8	37	51.3	241.9	70.5	53	54.1	248.5	121.1	53
14	60.3	200.5	42.7	38	65.4	180.6	92.4	44	65.9	185.1	61.4	43
15	78.9	231.8	55.1	42	78.0	203.6	70.5	49	88.3	226.7	59.5	48
16	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
17	60.4	217.4	26.2	26	65.7	195.8	27.1	33	59.1	203.3	42.6	35
18	100.2	301.1	25.2	40	64.5	197.2	43.4	36	72.9	213.7	24.9	49
19	69.6	225.3	31.4	33	64.7	195.0	49.2	40	67.1	208.7	42.0	44
20	71.8	244.4	48.2	39	64.2	198.3	37.3	41	63.0	211.3	67.1	43
21	67.9	209.7	32.6	37	72.6	193.9	82.0	39	80.0	240.0	0.0	-2
22	63.9	204.6	27.9	41	63.8	189.5	64.0	44	82.3	206.9	64.0	45
23	69.4	223.8	50.8	39	68.6	196.2	42.9	44	72.8	212.0	70.2	44
24	190.2	554.1	44.4	42	81.2	293.7	58.0	46	93.7	273.9	50.3	47
25	91.9	262.7	42.0	45	87.0	223.0	73.1	50	83.6	231.8	59.6	54
26	58.4	222.8	18.9	24	68.9	208.4	35.7	38	73.3	219.5	34.7	40
27	69.7	254.5	33.2	31	67.0	223.7	41.5	38	70.8	237.6	44.2	44
28	68.6	216.6	34.7	35	70.2	188.4	52.3	42	77.7	209.2	82.3	51
29	78.6	240.3	38.6	41	62.8	188.8	73.9	40	102.3	197.0	60.8	47
30	74.4	257.8	17.6	24	90.0	225.7	45.7	42	72.8	233.8	39.7	42
31	58.9	225.2	31.3	25	53.4	204.3	34.1	31	58.4	216.9	38.4	35
32	79.0	248.2	31.6	34	89.8	229.3	44.0	40	88.6	244.7	41.5	43
33	72.2	222.1	36.1	36	76.0	205.6	35.1	41	72.3	217.3	33.8	45
34	70.1	233.1	28.3	28	-1.0	-1.0	164.7	92	-1.0	-1.0	177.5	96
35	86.1	261.9	22.2	31	72.0	209.9	35.6	40	71.3	230.0	27.6	37
36	216.7	623.9	47.8	62	182.4	472.0	65.1	81	168.4	444.4	146.3	88
37	134.4	389.4	64.2	58	101.5	253.0	59.2	58	104.3	265.1	81.4	64
38	151.1	422.6	99.3	72	126.7	328.3	104.2	78	109.2	274.6	68.9	65
39	597.5	1450.3	101.2	91	502.4	974.7	145.5	100	9.1	600.3	802.6	103
40	154.7	399.7	81.8	71	114.2	271.2	101.2	73	137.5	303.0	132.7	80
41	110.3	309.8	52.2	53	97.5	232.7	59.0	59	94.1	251.3	91.1	57
42	275.5	711.4	58.2	77	186.3	390.6	171.1	80	219.7	537.6	198.5	82
43	58.1	251.2	25.6	35	73.3	239.4	62.5	51	73.8	240.0	44.4	53
44	187.1	562.8	94.3	73	86.6	289.4	173.2	70	90.0	299.9	96.9	72
45	131.2	359.4	46.2	59	98.4	256.8	70.5	65	80.0	240.0	0.0	-2
46	187.3	542.2	57.5	59	170.3	468.8	167.1	78	136.0	347.3	101.5	70
47	110.8	442.4	30.7	45	99.9	319.1	52.9	56	109.9	341.0	53.0	61
48	85.6	262.0	29.3	36	69.6	209.8	64.6	43	67.5	214.5	41.5	38
49	221.8	511.5	69.3	51	80.9	219.8	117.9	59	278.2	646.7	208.9	78
50	860.7	2225.0	47.6	72	-1.0	-1.0	219.0	85	-1.0	-1.0	194.2	95

Table 6: 4x4c fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
51	0.3	21394.7	227.3	81	160.3	413.5	55.2	69	256.1	687.7	82.9	78
52	273.4	747.8	53.1	71	182.2	447.4	130.3	90	191.2	478.1	140.3	81
53	340.5	963.0	140.4	84	153.7	435.1	205.2	94	123.9	365.9	391.5	95
54	105.6	428.6	59.6	60	81.7	337.4	140.4	66	99.9	367.5	112.8	73
55	192.8	531.0	21.2	53	180.8	463.7	48.5	71	128.4	338.6	98.4	74
56	260.5	741.7	49.5	71	157.8	399.6	79.8	80	205.7	517.5	98.5	82
57	91.8	280.4	40.5	50	85.4	229.4	72.0	51	88.7	240.1	79.5	59
58	0.4	406.9	7302.4	53	118.9	305.3	104.2	61	139.9	351.4	144.7	66
59	92.0	272.6	45.8	43	93.9	229.8	84.2	52	103.0	252.5	79.0	59
60	72.4	258.6	15.7	20	83.6	243.3	23.7	33	69.7	228.1	57.1	44
61	74.4	245.8	20.2	36	88.3	220.0	75.6	52	76.4	211.7	54.8	48
62	129.5	352.3	16.7	33	87.9	233.9	42.1	47	88.1	261.9	26.9	43
63	196.1	604.6	32.4	56	94.1	301.4	88.8	65	135.2	314.4	81.3	71
64	230.0	583.3	10.4	31	120.0	283.7	38.6	51	167.0	378.9	78.9	60
65	231.1	697.3	43.4	59	114.6	430.8	170.5	73	0.0	313.6	946.9	74
66	124.9	342.4	20.9	34	75.3	243.7	25.1	34	87.6	258.6	45.5	37
67	84.6	252.9	21.8	21	67.8	211.3	40.6	40	88.2	242.3	53.4	43
68	223.2	566.7	29.0	49	175.6	397.4	86.8	75	142.3	317.2	148.5	75
69	114.5	331.0	39.3	43	84.5	230.9	56.5	50	88.4	244.6	40.7	50
70	128.0	345.1	16.2	39	104.3	264.4	72.5	60	97.1	255.7	115.5	59
71	3.7	447.5	64.2	36	172.6	473.0	53.6	57	209.0	531.1	55.0	62
72	163.1	476.0	13.9	36	106.7	333.7	21.0	30	118.1	390.5	16.8	38
73	101.7	341.5	6.7	16	93.1	298.6	6.9	15	116.6	321.3	1.8	12
74	106.3	401.0	8.7	28	127.2	376.1	14.2	26	146.5	462.0	21.6	36
75	172.4	522.1	7.9	28	152.2	457.9	12.8	23	0.0	325.8	106.0	38
76	200.8	609.5	3.7	18	141.0	394.0	7.0	10	154.7	476.4	22.8	43
77	97.9	279.4	14.0	27	81.6	259.5	13.6	23	90.8	279.2	18.0	23
78	89.7	288.3	8.8	21	92.4	255.8	3.6	14	39.1	346.7	22.3	24
79	111.3	372.0	2.2	14	108.9	361.9	8.6	18	133.1	555.9	33.9	36
80	117.3	318.9	4.3	13	354.3	375.7	1.5	3	98.2	297.1	1.2	6
81	104.1	331.8	3.0	10	80.5	282.8	2.9	8	93.2	328.2	4.4	16
82	94.6	298.7	15.7	26	84.3	282.9	4.7	17	0.9	308.3	286.0	44
83	101.2	370.9	13.5	36	86.9	304.7	30.6	38	130.6	443.5	44.6	47
84	103.9	343.8	7.5	17	99.6	291.4	4.8	13	105.5	322.3	2.1	13
85	91.7	240.8	42.4	36	96.8	244.3	24.9	37	85.6	228.3	16.1	23
86	367.4	385.2	0.3	5	48.9	219.2	12.4	8	61.5	392.2	49.2	33
87	97.6	323.1	19.1	23	87.9	284.5	22.4	26	107.6	328.2	22.1	34
88	96.6	323.8	15.9	31	89.8	307.8	12.8	20	102.3	332.1	46.9	39
89	106.0	342.7	1.6	10	93.0	308.6	4.4	10	105.2	337.6	10.5	22
90	136.5	414.0	12.6	37	146.3	441.0	17.8	37	121.2	385.5	19.4	39
91	102.7	354.1	5.3	23	95.3	298.1	8.7	11	160.2	576.5	21.2	42
92	87.5	309.7	24.5	29	77.0	251.5	7.9	14	97.8	318.7	14.8	30
93	94.4	318.3	10.8	26	107.1	333.4	8.6	17	83.7	268.4	15.1	28
94	116.3	297.2	22.2	31	188.5	273.5	6.5	12	51.9	355.1	43.5	40
95	88.4	259.0	15.7	26	103.3	219.6	8.2	18	76.2	218.3	11.9	28
96	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
97	103.3	340.7	7.3	15	94.1	326.3	4.4	10	111.0	350.7	8.6	25
98	171.3	462.5	57.1	60	155.8	438.3	44.6	51	107.4	332.1	74.5	52
99	130.7	506.7	16.7	37	143.4	496.6	30.3	40	105.2	471.9	80.1	56
100	150.6	464.8	25.1	47	111.1	382.2	23.3	44	125.2	414.9	38.3	53

Table 7: 4x4c fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
101	0.3	449.2	85.0	53	124.2	385.5	14.6	37	243.9	676.7	19.1	41
102	0.1	348.4	1894.0	50	117.4	387.8	25.1	40	143.1	454.8	36.3	53
103	121.8	320.2	2.5	14	99.0	276.6	4.8	16	92.1	290.8	11.5	21
104	80.0	240.0	0.0	-2	87.0	247.8	7.0	20	91.2	260.3	3.5	10
105	80.0	240.0	0.0	-2	87.4	283.9	6.2	16	95.6	321.4	7.8	23
106	80.0	240.0	0.0	-2	98.8	219.7	9.9	24	101.3	240.5	18.8	26
107	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
108	80.0	240.0	0.0	-2	84.4	270.6	26.5	29	92.4	295.6	37.0	25
109	80.0	240.0	0.0	-2	110.7	248.2	8.5	24	87.1	223.1	6.3	13
110	80.0	240.0	0.0	-2	146.1	264.6	0.4	7	93.4	260.4	3.1	9
111	80.0	240.0	0.0	-2	70.8	226.9	15.7	26	0.8	318.8	24382.7	53
112	80.0	240.0	0.0	-2	161.8	278.9	16.8	28	89.2	233.1	27.6	30
113	80.0	240.0	0.0	-2	113.6	254.9	15.5	22	80.0	240.0	0.0	-2
114	80.0	240.0	0.0	-2	130.0	263.7	5.7	17	113.4	274.0	11.1	27
115	80.0	240.0	0.0	-2	119.8	253.8	4.5	12	95.4	249.2	9.0	15
116	80.0	240.0	0.0	-2	101.5	235.1	8.6	22	50.7	303.1	28.9	29
117	80.0	240.0	0.0	-2	128.9	246.8	26.0	32	133.7	266.2	24.5	32
118	80.0	240.0	0.0	-2	112.6	274.9	3.5	17	105.6	272.3	5.0	20
119	80.0	240.0	0.0	-2	125.0	332.0	3.4	5	99.3	294.8	5.2	13
120	80.0	240.0	0.0	-2	-1.0	-1.0	0.3	2	179.8	283.1	6.4	10
121	80.0	240.0	0.0	-2	107.1	269.9	5.4	14	90.7	270.3	21.5	28
122	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
123	80.0	240.0	0.0	-2	121.6	264.7	5.1	16	103.3	256.1	5.6	17
124	80.0	240.0	0.0	-2	86.6	203.8	13.3	26	110.3	246.4	22.9	31
125	80.0	240.0	0.0	-2	121.6	278.1	1.6	8	117.5	267.7	6.4	15
126	80.0	240.0	0.0	-2	96.5	275.7	2.5	7	96.7	299.9	4.0	14
127	80.0	240.0	0.0	-2	102.5	238.4	11.7	20	91.5	232.8	13.8	30
128	80.0	240.0	0.0	-2	93.2	288.9	12.7	28	88.1	282.7	8.9	28
129	80.0	240.0	0.0	-2	132.6	263.9	7.4	15	103.1	247.9	4.5	10
130	80.0	240.0	0.0	-2	120.9	295.8	6.7	8	124.2	347.2	2.0	9
131	80.0	240.0	0.0	-2	64.9	260.8	17.8	25	61.5	405.7	55.5	36
132	80.0	240.0	0.0	-2	111.6	338.1	12.2	18	112.8	336.4	14.0	26
133	80.0	240.0	0.0	-2	97.9	261.2	9.6	26	86.6	338.8	50.2	42
134	80.0	240.0	0.0	-2	111.5	297.7	6.9	18	51.0	338.4	21.1	28
135	80.0	240.0	0.0	-2	103.5	265.8	3.3	14	92.7	271.8	11.0	20
136	184.5	525.9	12.9	43	144.1	356.8	54.6	58	137.4	364.5	41.5	57
137	0.5	319.5	418.0	35	116.7	384.6	29.9	48	116.6	356.7	27.7	47
138	91.5	290.6	24.9	38	79.8	233.2	28.8	38	73.8	234.0	57.1	43
139	59.9	219.5	56.0	37	62.4	192.8	45.4	32	80.4	217.6	43.7	45
140	73.0	224.6	32.4	45	68.2	186.3	51.4	38	69.7	206.5	48.6	42
141	72.6	218.9	53.8	47	64.7	187.6	51.6	38	52.5	184.6	47.5	38
142	67.8	256.4	15.5	26	62.2	201.8	22.1	31	50.5	204.0	26.9	24
143	71.3	236.1	27.9	36	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
144	84.4	242.7	59.5	40	76.2	180.8	58.5	40	88.2	193.9	47.0	43
145	67.7	231.6	36.8	33	65.7	201.6	25.0	37	70.7	196.3	72.5	46
146	135.5	377.9	95.6	53	92.4	268.0	66.9	50	87.0	243.2	61.9	51
147	142.8	412.5	45.8	57	126.0	334.1	55.7	55	140.8	401.4	60.3	62
148	240.1	596.7	88.0	67	146.3	335.2	123.7	73	139.6	353.0	104.8	73
149	282.5	720.1	79.8	61	114.3	277.9	123.3	62	137.1	347.3	93.1	65
150	494.3	1350.4	105.3	80	869.2	-1.0	126.4	88	392.7	904.9	282.3	81

Table 8: 4x4c fit result

	run276874				run281974				run289787			
#SM	width	mean	χ^2	NDF	width	mean	χ^2	NDF	width	mean	χ^2	NDF
151	156.2	439.7	132.8	75	105.4	287.9	67.0	58	106.4	299.9	96.6	63
152	130.1	345.2	156.1	77	93.0	219.3	61.0	54	96.7	241.1	74.2	57
153	2.2	631.6	175.8	66	266.4	642.1	60.7	56	321.8	775.6	57.8	57
154	138.1	322.0	77.7	64	98.0	210.6	64.7	63	95.7	222.2	77.3	58
155	1.0	508.1	528.3	84	106.4	259.7	98.2	69	123.4	280.6	107.5	76
156	201.4	545.0	65.1	69	148.8	396.6	133.7	81	103.1	294.5	66.0	64
157	104.6	294.3	48.7	47	62.0	213.3	71.7	43	81.6	227.7	35.6	49
158	138.7	367.8	25.5	43	82.9	225.4	70.0	42	67.4	213.5	43.5	46
159	1.0	453.0	326.9	79	113.2	284.2	80.7	71	107.3	277.2	76.6	65
160	-939.4	-2366.4	33.8	44	119.0	520.5	150.6	83	116.6	525.6	138.0	84
161	513.0	1324.8	11.4	35	356.3	762.3	67.0	75	338.1	790.1	63.2	73
162	641.0	1711.2	60.0	70	215.4	514.3	132.1	87	268.7	674.9	118.3	92
163	64.5	201.4	42.6	36	62.6	170.7	65.8	46	65.4	179.9	55.4	46
164	101.2	271.9	59.5	49	76.1	176.8	51.4	48	83.0	193.4	51.6	52
165	106.6	300.7	42.3	49	92.2	227.6	69.0	55	90.6	236.6	76.9	53
166	152.1	481.2	41.9	59	110.3	309.1	89.9	66	107.6	338.7	159.9	66
167	137.4	352.3	63.7	57	79.1	192.9	61.2	46	85.9	225.7	56.6	55
168	1.8	394.5	655.4	37	125.5	318.8	74.4	64	148.2	384.3	108.3	65
169	224.4	670.5	25.7	49	80.0	240.0	0.0	-2	80.0	240.0	0.0	-2
170	155.7	398.5	68.0	55	101.1	236.6	115.8	66	106.0	253.2	142.4	70
171	170.0	640.5	164.4	63	83.2	389.2	215.1	75	93.6	429.2	198.8	78

Table 9: 4x4c fit result

arm	sector	ytwr	ztwr
0	0	33	42
0	1	24	48
0	1	24	49
0	1	25	48
0	1	25	49
0	1	26	48
0	1	26	49
0	1	27	48
0	1	27	49
0	1	28	48
0	1	28	49
0	1	29	48
0	1	29	49
0	1	30	48
0	1	30	49
0	1	31	48
0	1	31	49
0	1	32	48
0	1	32	49
0	1	33	48
0	1	33	49
0	1	34	48
0	1	34	49
0	1	35	48
0	1	35	49
0	2	8	34
0	2	10	44
0	2	11	47
0	3	13	37
0	3	14	39
0	3	27	42
1	1	3	85
1	1	5	58
1	1	10	35
1	1	10	37
1	1	11	42
1	1	15	32
1	1	15	65
1	1	15	92
1	1	16	72
1	1	17	2
1	1	17	68
1	1	20	66
1	1	22	65
1	1	24	21
1	1	25	47
1	1	26	58
1	1	30	91
1	1	34	36
1	1	37	13
1	1	37	21

Table 10: EMCal hottwr_1

arm	sector	ytwr	ztwr
1	1	37	71
1	1	39	60
1	1	41	67
1	1	45	59
1	1	1	41
1	1	19	56
1	1	31	26
1	1	31	35
1	1	36	44
1	1	40	78
1	0	1	77
1	0	4	95
1	0	23	76
1	0	32	46
1	0	35	44
1	0	35	78
1	0	39	9
1	0	39	45
1	0	42	84
1	0	2	73
1	0	6	28
1	0	13	6
1	0	25	95
1	0	26	94
1	0	26	95
1	0	27	95
1	0	29	78
1	0	33	64
1	0	41	0
1	0	46	30
1	0	46	88

Table 11: EMCal hottwr_2

References

[1] TN404: ERT performance in Run3

[2] http://www.phenix.bnl.gov/WWW/trigger/pp/c-arm/Run3/run9.html

[3] http://www.phenix.bnl.gov/WWW/trigger/pp/c-arm/Run3/rich/watanabe_rich_ERT-status-Run9.pdf

[4] http://www.phenix.bnl.gov/WWW/trigger/pp/c-arm/Run3/rich/takahara_richtiming_ERT0318.pdf