chi square 分布 のまとめ.
normalized

3面 $f(t) = \frac{P1}{\sqrt{t}} e^{-\frac{t}{2\sigma_0^2}} \rightarrow \frac{P_1}{\sqrt{t}} \exp\left(-0.5 \times p2 \times t\right)$ $P2 = \frac{1}{\sigma_0^2}$

4面 $f(t) = P1\, e^{-\frac{t}{\sigma_0^2}} \rightarrow P1 \exp\left(-P2 \times t\right)$ $P_2 = \frac{1}{\sigma_0^2}$

5面 $f(t) = P1\sqrt{t}\, e^{-\frac{3}{2}\frac{t}{\sigma_0^2}} \rightarrow P1\sqrt{t} \exp\left(-1.5 \times p2 \times t\right)$ $P2 = \frac{1}{\sigma_0^2}$

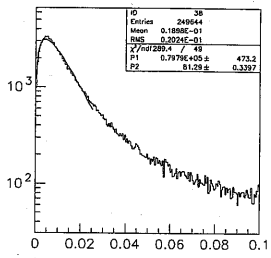
chi2_bf7_a7_r436.ana

```
c
c------ chi2_bf7_a7_r436.ana ------ r
c
c------ beam/hodoscope ------
analys
1
3
c all events
hst1
!0, 1,1,1,3, 500,0,2000,"A F12A"
!0, 1,2,2,3, 500,0,2000,"A F12B"
!0, 1,2,2,15, 4000,0,100,"TOF F12B"
!0, 1,5,5,15, 4000,0,100,"TOF F3"
!0, 1,6,6,15, 4000,0,100,"TOF F7"
!0, 3,1,7,3, 2000,0,2000,"A hod"
!0, 3,1,7,3, 400,800,1200,"A hod"
!0, 3,1,7,9, 625,-5,20,"TOF_hod"
!0, 3,1,7,9, 100,-1,2,"TOF_hod"
c select ZB=Zf=7
gate
1, 1,1,1,3, 440,560
2, 1,2,2,3, 400,600
3, 1,5,5,15, 9.0,11.5
4, 1,6,6,15, 9.0,11.5
11, 3,1,7,3, 940,1100
12, 3,1,7,9, -1,1
and
13, 1,2,3,4
14, 11
15, 13,14
stop
-15
c check Z=7 gate
hst1
!0, 1,1,1,3, 500,0,2000,"A F12A g"
!0, 1,2,2,3, 500,0,2000,"A F12B g"
!0, 1,2,2,15, 500,0,20,"TOF F12B g"
!0, 1,5,5,15, 500,0,20,"TOF F3 g"
!0, 1,6,6,15, 500,0,20,"TOF F7 g"
!0, 3,1,7,3, 2000,0,2000,"A hod g"
0, 3,1,7,3, 400,800,1200,"A hod g"
!0, 3,1,7,9, 625,-5,20,"TOF_hod g"
0, 3,1,7,9, 100,-1,2,"TOF_hod g"
!exit
c
c------ DC TDC, track fm1 events
c
analys
4
5
!6
7
eff
0
c
```

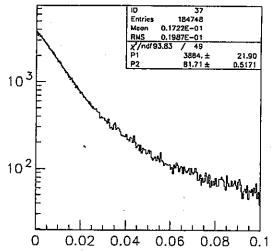
```
hst1
0, 6,11,11,5, 500,0,0.5,"chi2 Bx all"
0, 6,21,21,5, 500,0,0.5,"chi2 By all"
0, 6,31,31,5, 500,0,0.5,"chi2 F1x all"
0, 6,41,41,5, 500,0,0.5,"chi2 F1y all"
0, 6,51,51,5, 500,0,0.5,"chi2 F2x all"
0, 6,61,61,5, 500,0,0.5,"chi2 F3x all"
0, 6,71,71,5, 500,0,0.5,"chi2 F3y all"
hst1
0, 6,101,105,4, 200,-2.5,2.5,'dx Bx all'
0, 6,106,110,4, 200,-2.5,2.5,'dx By all'
0, 6,111,114,4, 200,-2.5,2.5,'dx F1x all'
0, 6,115,118,4, 200,-2.5,2.5,'dx F1y all'
0, 6,121,124,4, 200,-2.5,2.5,'dx F2x all'
0, 6,131,135,4, 200,-2.5,2.5,'dx F3x all'
0, 6,136,139,4, 200,-2.5,2.5,'dx F3y all'
hst1
0, 6,11,11,4, 6,-0.5,5.5,"np Bx all"
0, 6,21,21,4, 6,-0.5,5.5,"np By all"
0, 6,31,31,4, 6,-0.5,5.5,"np F1x all"
0, 6,41,41,4, 6,-0.5,5.5,"np F1y all"
0, 6,51,51,4, 6,-0.5,5.5,"np F2x all"
0, 6,61,61,4, 6,-0.5,5.5,"np F3x all"
0, 6,71,71,4, 6,-0.5,5.5,"np F3y all"
c
c gate on #planes
c  Bx       By       F1x   F1y   F2x   F3x      F3y
c  13,14,15 23,24,25 33,34 43,44 53,54 63,64,65 73,74
gate
13, 6,11,11,4, 2.5,3.5
14, 6,11,11,4, 3.5,4.5
15, 6,11,11,4, 4.5,5.5
23, 6,21,21,4, 2.5,3.5
24, 6,21,21,4, 3.5,4.5
25, 6,21,21,4, 4.5,5.5
33, 6,31,31,4, 2.5,3.5
34, 6,31,31,4, 3.5,4.5
43, 6,41,41,4, 2.5,3.5
44, 6,41,41,4, 3.5,4.5
53, 6,51,51,4, 2.5,3.5
54, 6,51,51,4, 3.5,4.5
63, 6,61,61,4, 2.5,3.5
64, 6,61,61,4, 3.5,4.5
65, 6,61,61,4, 4.5,5.5
73, 6,71,71,4, 2.5,3.5
74, 6,71,71,4, 3.5,4.5
c
hst1
13, 6,11,11,5, 600,0,0.3,"chi2 Bx p3"
14, 6,11,11,5, 600,0,0.3,"chi2 Bx p4"
15, 6,11,11,5, 600,0,0.3,"chi2 Bx p5"
c
23, 6,21,21,5, 600,0,0.3,"chi2 By p3"
24, 6,21,21,5, 600,0,0.3,"chi2 By p4"
25, 6,21,21,5, 600,0,0.3,"chi2 By p5"
c
33, 6,31,31,5, 600,0,0.3,"chi2 F1x p3"
34, 6,31,31,5, 600,0,0.3,"chi2 F1x p4"
c
43, 6,41,41,5, 600,0,0.3,"chi2 F1y p3"
44, 6,41,41,5, 600,0,0.3,"chi2 F1y p4"
c
53, 6,51,51,5, 600,0,0.3,"chi2 F2x p3"
54, 6,51,51,5, 600,0,0.3,"chi2 F2x p4"
c
63, 6,61,61,5, 600,0,0.3,"chi2 F3x p3"
64, 6,61,61,5, 600,0,0.3,"chi2 F3x p4"
65, 6,61,61,5, 600,0,0.3,"chi2 F3x p5"
c
73, 6,71,71,5, 600,0,0.3,"chi2 F3y p3"
74, 6,71,71,5, 600,0,0.3,"chi2 F3y p4"
c
exit
```

#plane で分ける

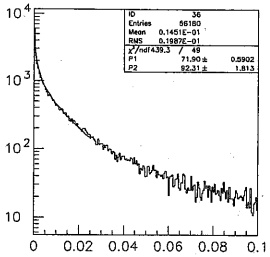
δ = 100μm	90%	95%	99%
3面	0.027	0.038	0.067
4面	0.023	0.030	0.046
5面	0.021	0.026	0.038



chi2 F3x p5



chi2 F3x p4



chi2 F3x p3

$\delta_0 = 0.1$
$P2 = 100$

F3x P3,P4,P5
≤ 0.025

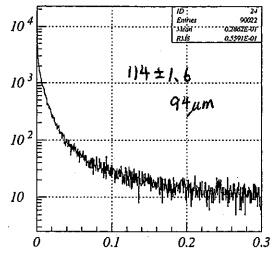
func_P3
P4 · f でfitした.
P5

fitのregionは ≤90%の領域です

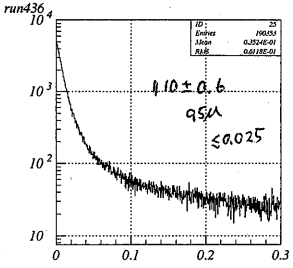
面の数によらずほぼ
一定の分解能を与える.
P101の式を見よ.

run436

Func_P3
P4 · f による fit
P5

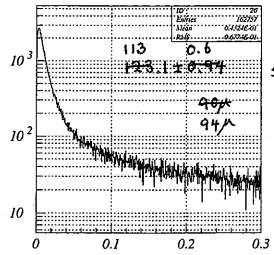


ID=24,N=90022
chi2 Bx p3

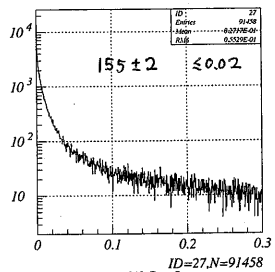


ID=25,N=190353
chi2 Bx p4

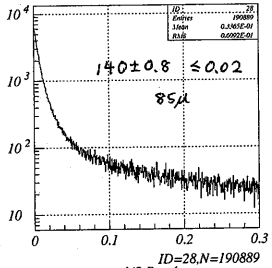
Bx 95μm



ID=26,N=162757
chi2 Bx p5

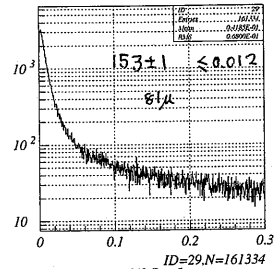


ID=27,N=91458
chi2 By p3

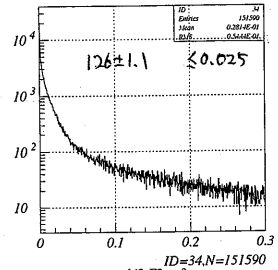


ID=28,N=190889
chi2 By p4

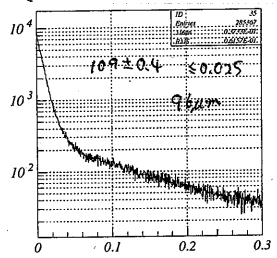
By 85μm



ID=29,N=161334
chi2 By p5



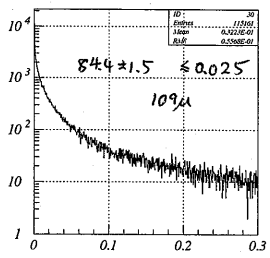
ID=34,N=151590
chi2 F2x p3



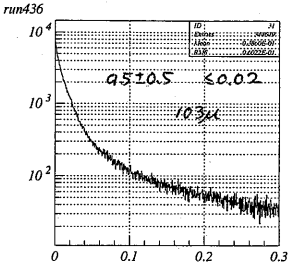
ID=35,N=285367
chi2 F2x p4

F2X 96μm

run436

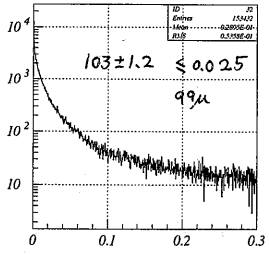


ID=30,N=115161
chi2 F1x p3

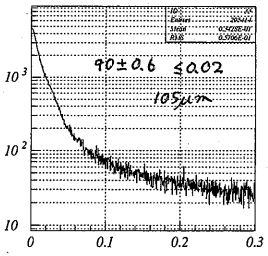


ID=31,N=344649
chi2 F1x p4

F1X 103μ

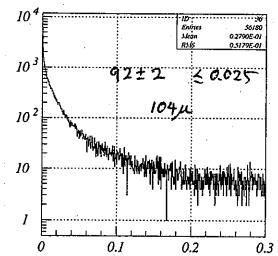


ID=32,N=153432
chi2 F1y p3

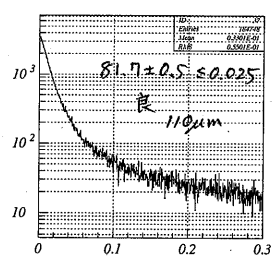


ID=33,N=295414
chi2 F1y p4

F1Y 90μm

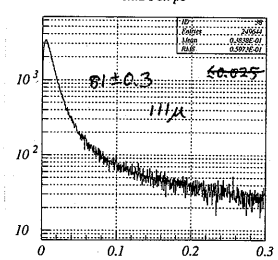


ID=36,N=56180
chi2 F3x p3

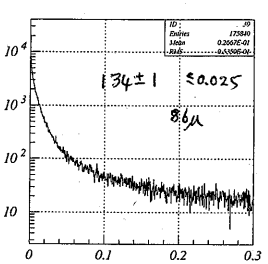


ID=37,N=184748
chi2 F3x p4

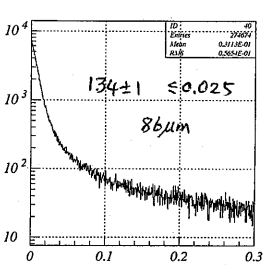
F3X ~110μm



ID=38,N=249644
chi2 F3x p5



ID=39,N=175840
chi2 F3y p3



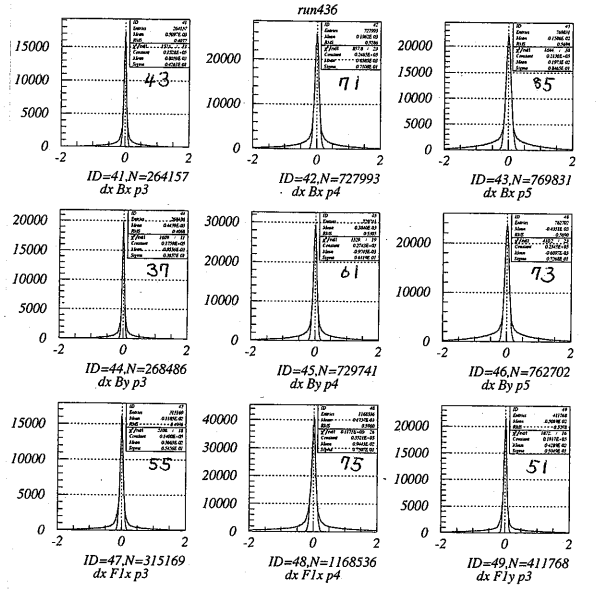
ID=40,N=274674
chi2 F3y p4

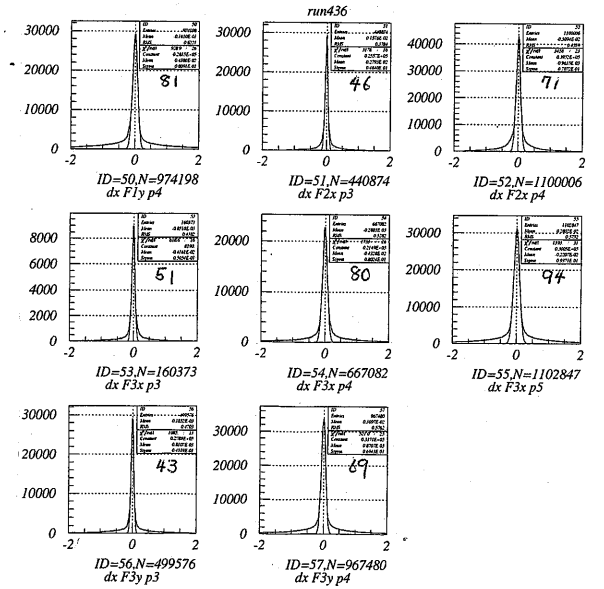
F3Y ~86μm

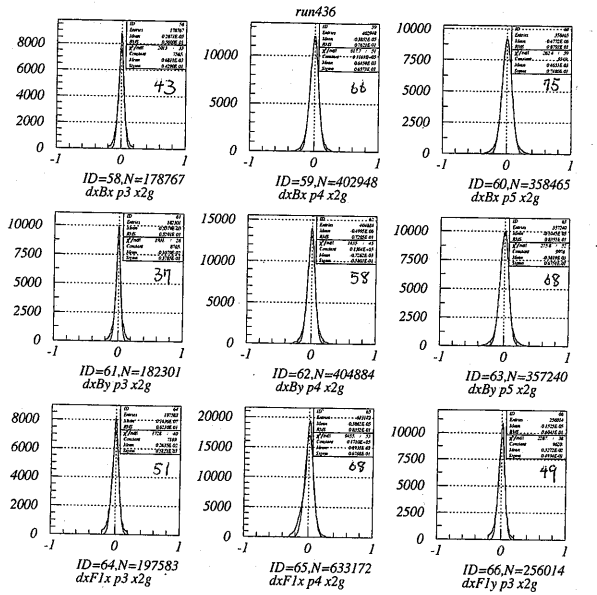
```
----- chi2_bf7_a7_r436.ana ------ r433-440

----- beam/hodoscope ------
alys


all events
t1
, 1,1,1,3, 500,0,2000,"A F12A"
, 1,2,2,3, 500,0,2000,"A F12B"
, 1,2,2,15, 4000,0,100,"TOF F12B"
, 1,5,5,15, 4000,0,100,"TOF F3"
, 1,6,6,15, 4000,0,100,"TOF F7"
, 3,1,7,3, 2000,0,2000,"A hod"
, 3,1,7,3, 400,800,1200,"A hod"
, 3,1,7,9, 625,-5,20,"TOF_hod"
, 3,1,7,9, 100,-1,2,"TOF_hod"
select ZB=Zf=7
te
 1,1,1,3, 440,560
 1,2,2,3, 400,600
 1,5,5,15, 9.0,11.5
 1,6,6,15, 9.0,11.5
 3,1,7,3, 940,1100
 3,1,7,9, -1,1
d
 1,2,3,4
 5
 7,8
op

check Z=7 gate
t1
, 1,1,1,3, 500,0,2000,"A F12A g"
, 1,2,2,3, 500,0,2000,"A F12B g"
, 1,2,2,15, 500,0,20,"TOF F12B g"
, 1,5,5,15, 500,0,20,"TOF F3 g"
, 1,6,6,15, 500,0,20,"TOF F7 g"
, 3,1,7,3, 2000,0,2000,"A hod g"
 3,1,7,3, 400,800,1200,"A hod g"
, 3,1,7,9, 625,-5,20,"TOF_hod g"
 3,1,7,9, 100,-1,2,"TOF_hod g"
xit

----- DC TDC, track fm1 events

alys



F




:1
 6,11,11,5, 500,0,0.5,"chi2 Bx all"
 6,21,21,5, 500,0,0.5,"chi2 By all"
 6,31,31,5, 500,0,0.5,"chi2 F1x all"
 6,41,41,5, 500,0,0.5,"chi2 F1y all"
 6,51,51,5, 500,0,0.5,"chi2 F2x all"
 6,61,61,5, 500,0,0.5,"chi2 F3x all"
 6,71,71,5, 500,0,0.5,"chi2 F3y all"
:1
 6,101,105,4, 200,-2,2,'dx Bx all'
 6,106,110,4, 200,-2,2,'dx By all'
 6,111,114,4, 200,-2,2,'dx F1x all'
 6,115,118,4, 200,-2,2,'dx F1y all'
 6,121,124,4, 200,-2,2,'dx F2x all'
 6,131,135,4, 200,-2,2,'dx F3x all'
 6,136,139,4, 200,-2,2,'dx F3y all'
:1
 6,11,11,4, 6,-0.5,5.5,"np Bx all"
 6,21,21,4, 6,-0.5,5.5,"np By all"
 6,31,31,4, 6,-0.5,5.5,"np F1x all"
 6,41,41,4, 6,-0.5,5.5,"np F1y all"
 6,51,51,4, 6,-0.5,5.5,"np F2x all"
 6,61,61,4, 6,-0.5,5.5,"np F3x all"
 6,71,71,4, 6,-0.5,5.5,"np F3y all"

ate on #planes
Bx       By       F1x    F1y    F2x    F3x       F3y
13,14,15 23,24,25 33,34  43,44  53,54  63,64,65  73,74

ate on chi square
11       21       31     41     51     61        71

oincidence
81,82,83  84,85,86  87,88  89,90  91,92  93,94,95  96,97
```

```
gate
 11, 6,11,11,5, 0.0,0.1
 21, 6,21,21,5, 0.0,0.1
 31, 6,31,31,5, 0.0,0.1
 41, 6,41,41,5, 0.0,0.1
 51, 6,51,51,5, 0.0,0.1
 61, 6,61,61,5, 0.0,0.1
 71, 6,71,71,5, 0.0,0.1
gate
 13, 6,11,11,4, 2.5,3.5
 14, 6,11,11,4, 3.5,4.5
 15, 6,11,11,4, 4.5,5.5
 23, 6,21,21,4, 2.5,3.5
 24, 6,21,21,4, 3.5,4.5
 25, 6,21,21,4, 4.5,5.5
 33, 6,31,31,4, 2.5,3.5
 34, 6,31,31,4, 3.5,4.5
 43, 6,41,41,4, 2.5,3.5
 44, 6,41,41,4, 3.5,4.5
 53, 6,51,51,4, 2.5,3.5


 54, 6,51,51,4, 3.5,4.5
 63, 6,61,61,4, 2.5,3.5
 64, 6,61,61,4, 3.5,4.5
 65, 6,61,61,4, 4.5,5.5
 73, 6,71,71,4, 2.5,3.5
 74, 6,71,71,4, 3.5,4.5
c
c chi_sq(#planes)
hst1
 13, 6,11,11,5, 200,0,0.1,"chi2 Bx p3"
 14, 6,11,11,5, 200,0,0.1,"chi2 Bx p4"
 15, 6,11,11,5, 200,0,0.1,"chi2 Bx p5"
c
 23, 6,21,21,5, 200,0,0.1,"chi2 By p3"
 24, 6,21,21,5, 200,0,0.1,"chi2 By p4"
 25, 6,21,21,5, 200,0,0.1,"chi2 By p5"
c
 33, 6,31,31,5, 200,0,0.1,"chi2 F1x p3"
 34, 6,31,31,5, 200,0,0.1,"chi2 F1x p4"
c
 43, 6,41,41,5, 200,0,0.1,"chi2 F1y p3"
 44, 6,41,41,5, 200,0,0.1,"chi2 F1y p4"
c
 53, 6,51,51,5, 200,0,0.1,"chi2 F2x p3"
 54, 6,51,51,5, 200,0,0.1,"chi2 F2x p4"
c
 63, 6,61,61,5, 200,0,0.1,"chi2 F3x p3"
 64, 6,61,61,5, 200,0,0.1,"chi2 F3x p4"
 65, 6,61,61,5, 200,0,0.1,"chi2 F3x p5"
c
 73, 6,71,71,5, 200,0,0.1,"chi2 F3y p3"
 74, 6,71,71,5, 200,0,0.1,"chi2 F3y p4"
c
c dx (#planes)
 13, 6,101,105,4, 400,-2,2,'dx Bx p3'
 14, 6,101,105,4, 400,-2,2,'dx Bx p4'
 15, 6,101,105,4, 400,-2,2,'dx Bx p5'
 23, 6,106,110,4, 400,-2,2,'dx By p3'
 24, 6,106,110,4, 400,-2,2,'dx By p4'
 25, 6,106,110,4, 400,-2,2,'dx By p5'
 33, 6,111,114,4, 400,-2,2,'dx F1x p3'
 34, 6,111,114,4, 400,-2,2,'dx F1x p4'
 43, 6,115,118,4, 400,-2,2,'dx F1y p3'
 44, 6,115,118,4, 400,-2,2,'dx F1y p4'
 53, 6,121,124,4, 400,-2,2,'dx F2x p3'
 54, 6,121,124,4, 400,-2,2,'dx F2x p4'
 63, 6,131,135,4, 400,-2,2,'dx F3x p3'
 64, 6,131,135,4, 400,-2,2,'dx F3x p4'
 65, 6,131,135,4, 400,-2,2,'dx F3x p5'
 73, 6,136,139,4, 400,-2,2,'dx F3y p3'
 74, 6,136,139,4, 400,-2,2,'dx F3y p4'
c
and
 81, 11,13
 82, 11,14
```

```
 83, 11,15
 84, 21,23
 85, 21,24
 86, 21,25
 87, 31,33
 88, 31,34
 89, 41,43
 90, 41,44
 91, 51,53
 92, 51,54
 93, 61,63
 94, 61,64
 95, 61,65
 96, 71,73
 97, 71,74
c
hst1
 81, 6,101,105,4, 400,-1,1,'dxBx p3 x2g'
 82, 6,101,105,4, 400,-1,1,'dxBx p4 x2g'
 83, 6,101,105,4, 400,-1,1,'dxBx p5 x2g'
 84, 6,106,110,4, 400,-1,1,'dxBy p3 x2g'
 85, 6,106,110,4, 400,-1,1,'dxBy p4 x2g'
 86, 6,106,110,4, 400,-1,1,'dxBy p5 x2g'
 87, 6,111,114,4, 400,-1,1,'dxF1x p3 x2g'
 88, 6,111,114,4, 400,-1,1,'dxF1x p4 x2g'
 89, 6,115,118,4, 400,-1,1,'dxF1y p3 x2g'
 90, 6,115,118,4, 400,-1,1,'dxF1y p4 x2g'
 91, 6,121,124,4, 400,-1,1,'dxF2x p3 x2g'
 92, 6,121,124,4, 400,-1,1,'dxF2x p4 x2g'
 93, 6,131,135,4, 400,-1,1,'dxF3x p3 x2g'
 94, 6,131,135,4, 400,-1,1,'dxF3x p4 x2g'
 95, 6,131,135,4, 400,-1,1,'dxF3x p5 x2g'
 96, 6,136,139,4, 400,-1,1,'dxF3y p3 x2g'
 97, 6,136,139,4, 400,-1,1,'dxF3y p4 x2g'
c
exit
```





$\chi^2 < 0.06$ → P102 page

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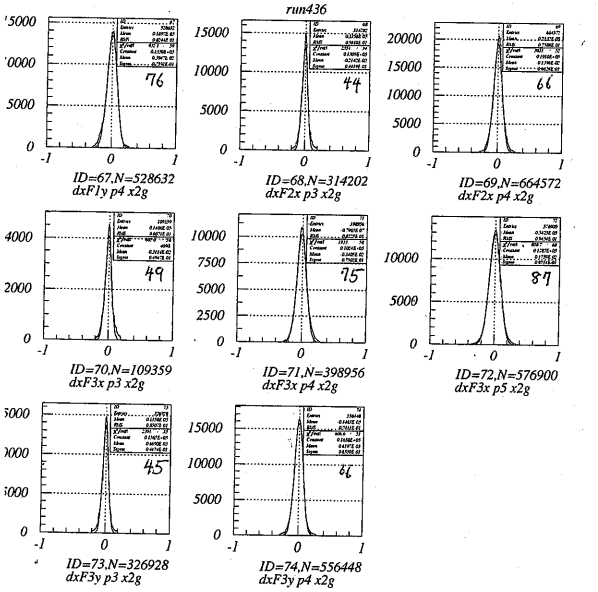
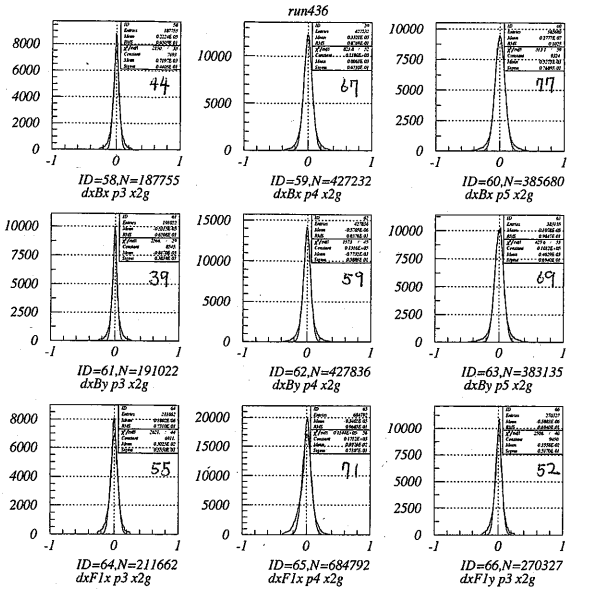


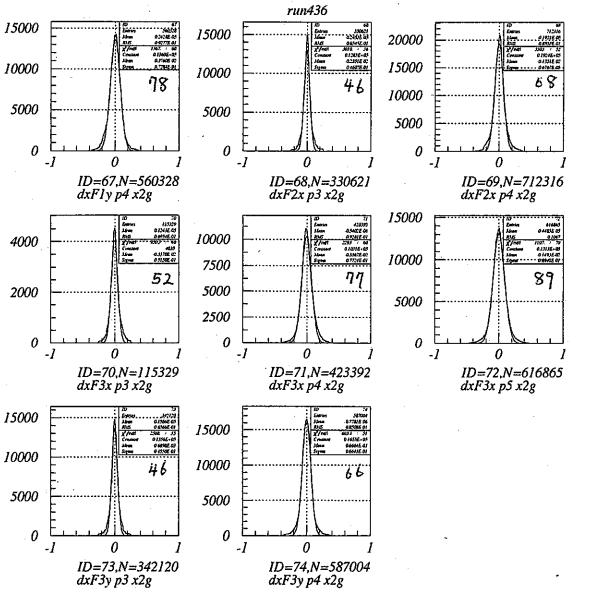
0.0426	55.0198	0.0001	0.0001	9.31 dx Bx p3
0.0711	52.8203	0.0001	0.0001	1.62 dx Bx p4
0.0847	44.1467	0.0001	0.0002	1.16 dx Bx p5
0.0366	63.4727	0.0001	0.0001	13.30 dx By p3
0.0612	60.7592	0.0001	0.0001	3.68 dx By p4
0.0727	50.7802	0.0001	0.0002	0.78 dx By p5
0.0546	46.2507	0.0001	0.0002	6.51 dx F1x p3
0.0751	63.6647	0.0001	0.0001	17.39 dx F1x p4
0.0505	55.8756	0.0001	0.0001	7.31 dx F1y p3
0.0809	52.9850	0.0001	0.0001	1.37 dx F1y p4
0.0464	66.4615	0.0001	0.0001	12.41 dx F2x p3
0.0707	67.8380	0.0001	0.0001	6.54 dx F2x p4
0.0505	36.4678	0.0002	0.0002	2.42 dx F3x p3
0.0802	46.7912	0.0002	0.0002	2.56 dx F3x p4
0.0937	50.6887	0.0001	0.0002	1.45 dx F3x p5
0.0432	72.4415	0.0001	0.0001	6.42 dx F3y p3
0.0694	60.8079	0.0001	0.0001	0.98 dx F3y p4
0.0412	55.3369	0.0001	0.0001	7.04 dx Bx p3 x2g
0.0646	53.3925	0.0001	0.0001	0.56 dx Bx p4 x2g
0.0742	43.2367	0.0002	0.0002	0.22 dx Bx p5 x2g
0.0359	63.5965	0.0001	0.0001	11.07 dx By p3 x2g
0.0559	62.1655	0.0001	0.0001	2.33 dx By p4 x2g
0.0667	48.4591	0.0001	0.0002	0.25 dx By p5 x2g
0.0499	48.6176	0.0001	0.0002	4.46 dx F1x p3 x2
0.0639	67.9404	0.0001	0.0001	12.44 dx F1x p4 x2
0.0477	57.3882	0.0001	0.0001	6.30 dx F1y p3 x2
0.0748	53.6422	0.0001	0.0001	0.65 dx F1y p4 x2
0.0426	70.8620	0.0001	0.0001	8.13 dx F2x p3 x2
0.0643	69.4829	0.0001	0.0001	4.23 dx F2x p4 x2
0.0466	38.4120	0.0002	0.0002	1.45 dx F3x p3 x2
0.0733	47.4208	0.0001	0.0002	2.10 dx F3x p4 x2
0.0860	48.6893	0.0001	0.0002	0.62 dx F3x p5 x2
0.0425	72.5186	0.0001	0.0001	4.48 dx F3y p3 x2
0.0653	61.5901	0.0001	0.0001	1.16 dx F3y p4 x2



$\chi^2 < 0.1$

数は～+10%でいて → ここまで広げなくてよい

2009/05/25 21



```
c gate on #planes
c  Bx        | By        | F1x    | F1y    | F2x    | F3x         | F3y
c  13,14,15  | 23,24,25  | 33,34  | 43,44  | 53,54  | 63,64,65    | 73,74
c
c gate on chi square
c  11        | 21        | 31     | 41     | 51     | 61          | 71
c
c coincidence
c  81,82,83  | 84,85,86  | 87,88  | 89,90  | 91,92  | 93,94,95    | 96,97
```

- TDCへのgate
- chi squareへのgate

} を考えなおす

limit
Fileが定義されていたら、

```
%% Kappa Commissioning MT exp_may09 %%
Read_beam: TDC:[  10,3900] tcal(1) ped(0) gain(1) dT_off(0) T_off(1)
Read_fera: prm/fera.map opened
           prm/fera.map read in, #def=  7
Read_fera: prm/file_fera opened
           hit(4) TDC(  10,2000) ped(0) gain(1) tcal(1) dt(1) tofoff(1)
Read_dclim: prm/dclim.prm opened
 TDC_limit_check_On0ff(1)
 ip -> limit#: | 1 1 1 1 1 1 1 1 1 1 1 | 2 2 2 2 2 2 2 2 0 0 | 3 3 3 3 0 0 0 0 0 0 | 4 4 4 4 4 4 4 4 4 4
 #def= 4 : (1800,2298) ( 975,2339) (1500,2213) (1450,2269) (
Read_Stc: start reading prm/file_stc
 2: IP_TO_DC(1:39) | 1 1 1 1 1 1 1 1 1 1 1| 2 2 2 2 2 2 2 2 0 0| 3 3 3 3 0 0 0 0 0 0| 4 4 4 4 4 4 4 4 4 4
 3: ICH_STC [ch]=  4000
 4: Read STC for DC( 1), #data= 4000 (1800:2298)  file=prm/stc_r436/bd04.stc
                DC( 2), #data= 4000 ( 975:2339)  file=prm/stc_r436/f103.stc
                DC( 3), #data= 4000 (1500:2213)  file=prm/stc_r436/f203.stc
                DC( 4), #data= 4000 (1450:2269)  file=prm/stc_r436/f302.stc
 4-kinds of STC parameters read in.
Read_dctrack:  tracking_on/off=  1 1 1 1 1 1 1
  save_deviation(1)  chi2_cut(1)
( 0.067 0.046 0.038) ( 0.067 0.046 0.038) ( 0.067 0.046 0.038) ( 0.067 0.046 0.038)
( 0.067 0.046 0.038) ( 0.067 0.046 0.038) ( 0.067 0.046 0.038)
```

run 441 reactiontrig 50kHz

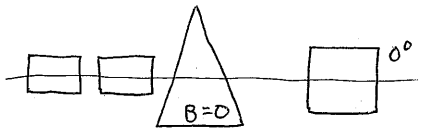
run 441 TDC limitなし

```
 #Events :     210282
 Next Raw Data File ? [y/n: n] > Name     : Sum(M) M1     M2     M3     M4     M5+    MW1    MW2    MW3    MW4+   MC
MC3    MC4+   :Tot/Ana : 210282 210282
BDCx1   :  80.92  43.36  22.24   9.64   3.74   1.94  52.29  22.79   5.07   0.77  60.97  15.87   3.36   0.72
BDCx2   :  84.37  43.44  23.40  10.63   4.38   2.51  52.22  24.63   6.36   1.16  62.24  17.58   3.72   0.84
BDCx3   :  87.53  43.46  24.58  11.62   4.83   3.03  51.36  27.07   7.59   1.52  64.17  18.49   4.01   0.87
BDCx4   :  88.92  44.20  25.22  11.69   4.90   2.92  52.79  27.25   7.45   1.43  64.85  19.14   4.04   0.89
BDCx5   :  91.49  44.02  26.22  12.51   5.40   3.33  52.17  29.12   8.40   1.79  66.39  19.87   4.29   0.94
BDCy1   :  84.48  43.06  23.34  10.97   4.43   2.68  50.55  25.33   7.19   1.40  63.39  16.87   3.47   0.76
BDCy2   :  87.35  43.60  24.43  11.57   4.78   2.97  51.45  26.71   7.67   1.52  65.14  17.76   3.65   0.80
BDCy3   :  89.17  44.36  25.03  11.72   4.99   3.07  52.09  27.42   8.01   1.65  66.47  18.13   3.77   0.79
BDCy4   :  89.94  44.81  25.28  11.84   4.95   3.05  53.47  27.34   7.65   1.48  66.76  18.34   3.96   0.88
BDCy5   :  88.76  46.61  24.77  10.80   4.29   2.28  55.71  25.65   6.40   1.00  66.74  17.63   3.63   0.75
FDC1x1  :  58.08  35.77  15.20   5.07   1.52   0.52  45.99  10.85   1.16   0.08  41.53  12.68   3.09   0.79
FDC1x2  :  59.64  34.66  15.67   6.16   2.19   0.96  42.90  14.94   1.71   0.09  44.24  12.27   2.56   0.58
FDC1x3  :  57.25  35.03  14.84   5.21   1.60   0.58  41.72  13.42   1.95   0.16  43.32  11.27   2.20   0.45
FDC1x4  :  60.71  36.12  16.17   5.95   1.80   0.68  46.63  12.51   1.48   0.09  42.57  13.64   3.54   0.95
FDC1y1  :  61.30  36.14  16.23   6.13   2.00   0.81  46.77  13.26   1.27   0.01  47.15  11.28   2.37   0.50
FDC1y2  :  68.23  36.60  18.36   8.16   3.30   1.81  44.94  19.25   3.77   0.27  50.98  13.65   2.94   0.67
FDC1y3  :  68.83  36.43  18.72   8.39   3.40   1.90  44.63  19.69   4.18   0.33  50.97  14.04   3.11   0.70
FDC1y4  :  56.25  34.67  14.47   5.06   1.51   0.54  45.36  10.11   0.76   0.02  42.06  10.99   2.61   0.60
FDC2x1  :  47.25  29.53  11.76   4.09   1.31   0.55  33.07  11.16   2.54   0.48  34.77   9.96   2.08   0.44
FDC2x2  :  48.22  29.47  12.23   4.51   1.44   0.58  33.07  11.71   2.90   0.56  34.83  10.57   2.35   0.48
FDC2x3  :  48.57  29.50  12.41   4.48   1.55   0.64  33.16  11.89   2.92   0.61  34.90  10.75   2.39   0.53
FDC2x4  :  49.18  29.17  12.68   4.91   1.68   0.75  32.93  12.35   3.22   0.68  34.90  11.07   2.65   0.57
FDC3x1  :  49.32  30.13  12.52   4.57   1.50   0.60  34.21  12.32   2.46   0.32  37.55   9.64   1.80   0.32
FDC3x2  :  50.52  30.26  12.77   5.00   1.70   0.80  34.49  12.54   2.98   0.51  36.98  10.62   2.39   0.53
FDC3x3  :  49.75  30.26  12.44   4.76   1.60   0.69  34.39  12.13   2.79   0.45  37.09  10.10   2.12   0.44
FDC3x4  :  49.45  29.97  12.46   4.76   1.57   0.70  33.79  12.36   2.83   0.47  37.06  10.06   1.95   0.37
FDC3x5  :  48.82  29.79  12.29   4.61   1.47   0.68  33.86  11.94   2.62   0.41  36.56   9.83   2.03   0.40
FDC3y1  :  50.89  30.21  13.06   5.05   1.73   0.83  34.48  13.14   2.84   0.43  38.49  10.07   1.94   0.38
FDC3y2  :  49.61  30.08  12.59   4.72   1.56   0.66  34.71  12.09   2.45   0.35  37.50   9.78   1.93   0.39
FDC3y3  :  49.32  30.00  12.48   4.63   1.52   0.69  34.60  11.92   2.46   0.35  37.38   9.67   1.90   0.38
FDC3y4  :  50.41  30.08  12.77   5.00   1.74   0.82  34.23  12.76   2.95   0.47  37.82  10.15   2.05   0.39
```

run441 TDC limit checkあり

```
 #Events :     210282
 Next Raw Data File ? [y/n: n] > Name     : Sum(M) M1     M2     M3     M4     M5+    MW1    MW2    MW3    MW4+   MC1
MC2    MC3    MC4+   :Tot/Ana : 210282 210282
BDCx1   :  70.31  56.28  11.87   1.86   0.25   0.05  58.81  10.38   1.03   0.10  63.71   6.18   0.40   0.02
BDCx2   :  75.51  58.52  14.04   2.52   0.36   0.07  61.18  12.73   1.45   0.14  67.54   7.43   0.51   0.03
BDCx3   :  80.20  60.12  16.38   3.13   0.49   0.09  62.78  15.30   1.93   0.19  70.55   8.88   0.73   0.05
BDCx4   :  82.08  61.48  16.83   3.19   0.50   0.07  64.21  15.78   1.90   0.19  72.22   9.11   0.70   0.05
BDCx5   :  85.73  62.10  19.10   3.81   0.63   0.10  65.07  17.98   2.43   0.25  74.05  10.76   0.87   0.05
BDCy1   :  75.63  57.63  14.78   2.72   0.42   0.08  60.23  13.65   1.58   0.18  67.63   7.43   0.54   0.03
BDCy2   :  79.94  60.00  16.24   3.11   0.51   0.08  62.87  15.08   1.79   0.19  71.10   8.18   0.62   0.03
BDCy3   :  82.30  61.73  16.83   3.16   0.50   0.09  64.58  15.65   1.88   0.20  73.10   8.53   0.64   0.03
BDCy4   :  83.42  62.91  16.91   3.05   0.46   0.08  66.09  15.42   1.74   0.16  74.28   8.49   0.60   0.04
BDCy5   :  81.30  64.15  14.50   2.32   0.29   0.04  67.07  12.83   1.30   0.10  73.33   7.47   0.49   0.02
FDC1x1  :  44.27  35.03   7.77   1.25   0.19   0.03  38.62   5.27   0.35   0.02  37.72   5.84   0.63   0.07
FDC1x2  :  45.99  35.30   8.65   1.70   0.29   0.06  39.12   6.42   0.44   0.02  39.13   6.10   0.69   0.08
FDC1x3  :  43.18  33.96   7.70   1.31   0.17   0.04  36.90   5.79   0.46   0.03  37.00   5.54   0.57   0.06
FDC1x4  :  47.71  36.69   9.08   1.65   0.24   0.05  40.82   6.41   0.46   0.02  39.91   6.89   0.83   0.09
FDC1y1  :  47.97  37.17   8.94   1.58   0.25   0.03  41.36   6.26   0.34   0.00  42.37   5.14   0.42   0.03
FDC1y2  :  57.05  40.88  12.54   2.88   0.61   0.14  45.58  10.36   1.06   0.05  47.94   8.07   0.94   0.10
FDC1y3  :  57.81  40.80  13.07   3.15   0.64   0.15  45.60  10.96   1.20   0.06  47.96   8.70   1.05   0.11
FDC1y4  :  41.42  33.23   6.92   1.11   0.14   0.02  36.84   4.39   0.19   0.00  36.76   4.32   0.32   0.01
FDC2x1  :  26.07  22.20   3.37   0.44   0.05   0.01  23.11   2.71   0.23   0.02  23.36   2.51   0.19   0.01
FDC2x2  :  27.37  23.01   3.77   0.51   0.07   0.01  24.00   3.04   0.29   0.03  24.30   2.82   0.22   0.02
FDC2x3  :  27.79  23.29   3.87   0.56   0.06   0.01  24.32   3.14   0.30   0.02  24.59   2.92   0.26   0.02
FDC2x4  :  28.62  23.65   4.24   0.64   0.07   0.01  24.78   3.46   0.35   0.03  25.18   3.13   0.29   0.02
FDC3x1  :  29.52  24.56   4.21   0.65   0.08   0.02  25.69   3.48   0.33   0.02  26.47   2.81   0.22   0.02
FDC3x2  :  30.95  25.33   4.67   0.81   0.12   0.02  26.51   3.96   0.44   0.05  27.31   3.29   0.33   0.02
FDC3x3  :  29.97  24.70   4.43   0.71   0.10   0.02  25.83   3.71   0.38   0.04  26.57   3.11   0.27   0.02
FDC3x4  :  29.78  24.42   4.48   0.74   0.11   0.02  25.55   3.80   0.39   0.04  26.35   3.13   0.28   0.02
FDC3x5  :  28.67  23.80   4.16   0.62   0.08   0.02  24.87   3.46   0.32   0.03  25.55   2.87   0.24   0.01
FDC3y1  :  31.44  25.68   4.76   0.83   0.13   0.04  26.88   4.06   0.44   0.05  27.98   3.17   0.27   0.02
FDC3y2  :  29.89  24.60   4.43   0.72   0.10   0.03  25.79   3.68   0.37   0.04  26.68   2.95   0.24   0.02
FDC3y3  :  29.47  24.28   4.39   0.68   0.10   0.03  25.49   3.61   0.33   0.04  26.29   2.94   0.23   0.02
FDC3y4  :  30.95  25.17   4.80   0.83   0.12   0.03  26.39   4.08   0.43   0.05  27.41   3.21   0.31   0.02
```

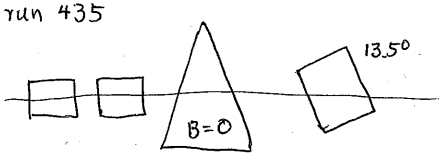
@ run433/434



$\theta_b(H) = -0.75$ mrad　$\sigma = 1.1$mrad

$\theta_b(V) = -0.29$ mrad　$\sigma = 0.57$ mrad

@ run 435



$\theta_b(H) = 236.9$mrad　$\sigma = 1.6$mrad

$\theta_b(V) = -0.30$mrad　0.57mrad

下流を 13.5° まわすと

$X_H' = 237.7 \times 10^{-3}$　実は tanθ.

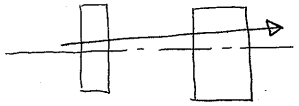
$= 13.37°$

0.13° off ＝ 2.3mrad　1000mm で　2.3mm

@ run 436

正式位置　B=1100A　13.5°

FDC2/FDC3 中の中心角度は.



$\langle\theta\rangle = -13.7$ mrad $= 0.79°$

$\sigma = 3.0$mrad

カロえて 14.2° bend が中心キドう

250MeV/A　14N ;

5+1mm ミシ寸　250 → 242 MeV/A

729MeV/c　713.9MeV/c

1454　1428

@ beam の phase space

X'　$\sigma = 2.5$mrad

Y'　$\sigma = 2.25$mrad

σ_x　11mm

σ_y　12mm

多重散乱の公式 ?

@ 上ミ流の散乱角度 (標的中)

	0	4m	8m	16m
	436	437	438	440
X_{obs}	0.802mrad	1.697	2.310	3.205
	(0)	(1.496)	(2.166)	(3.103)
Y	0.829mrad	1.711	2.315	3.194
	(0)	(1.497)	(2.162)	(3.085)

$L_r(CH_2) = 47.9$cm

$\sigma(250,140)$ cal　0　1.14　1.66　(3.34)

↑ × 0.766

1.3061倍

$f = \sqrt{a^2 - b^2} = (a^2-b^2)^{\frac{1}{2}}$

$\sigma_f^2 = \left(\frac{\partial f}{\partial a}\sigma_a\right)^2 + \left(\frac{\partial f}{\partial b}\sigma_b\right)^2 = \frac{a^2\sigma_a^2 + b^2\sigma_b^2}{f^2}$

$\frac{\partial f}{\partial a} = \frac{1}{2}(a^2-b^2)^{-\frac{1}{2}} 2a = \frac{a}{\sqrt{a^2-b^2}} = \frac{a}{f}$

$\frac{\partial f}{\partial b} = \frac{1}{2}(a^2-b^2)^{-\frac{1}{2}}(-2b) = \frac{b}{f}$

$\frac{\sigma_f}{f} = \frac{\sqrt{a^2\sigma_a^2 + b^2\sigma_b^2}}{f^2}$

$= \frac{\sqrt{a^2\sigma_a^2 + b^2\sigma_b^2}}{a^2-b^2}$

$= \frac{\qquad\qquad b^2}{\left(\frac{a}{b}\right)^2 - 1}$

θ[rad]

R [Mev/c] = $\frac{0.3 * BL * 1000}{11} / \theta$ [rad] → sinθに修正

本当は /sinθ

1.138 T m ← 右差場maxから出した

1400Mev/cで13.2° — 14.2°C

BL = $\frac{1400}{0.3} \frac{\sin 14.2}{1000} = 1.1448$

13.5°

サイン

$1454 = \frac{0.3 \times BL \times 1000}{\sin 13.58°}$ BL = 1.138

250Mev/A

229Mev/A ?

1.37%

R 436	1385 ±0.03	6.518 ~~6.84~~ ±0.0075	~~0.49%~~ 0.47%	これは250からのlossでなく229Mevからのloss
437 (19 Mev/c)	1386.1 0.0648	6.485 ~~6.84~~ ±0.067	0.47%	×0.986
21.2 (	1344.9 0.05	6.686 0.075	0.50%	1250 -1450
TOF 40 (	1304.3 ± ~~0.06~~ ~~0.09~~ 0.08	6.851 ±0.08	0.53%	

$a + \frac{1}{\beta}$

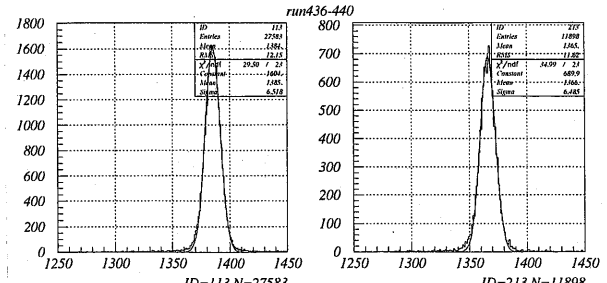
R∝Aβθ

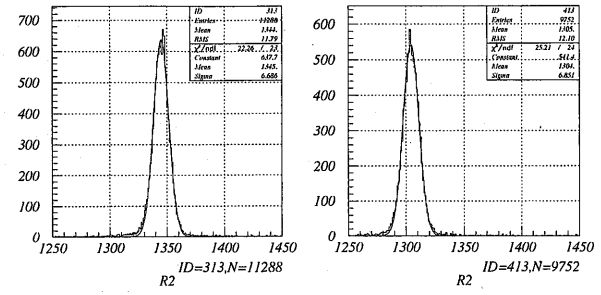
多重散乱の公式のfactor ?

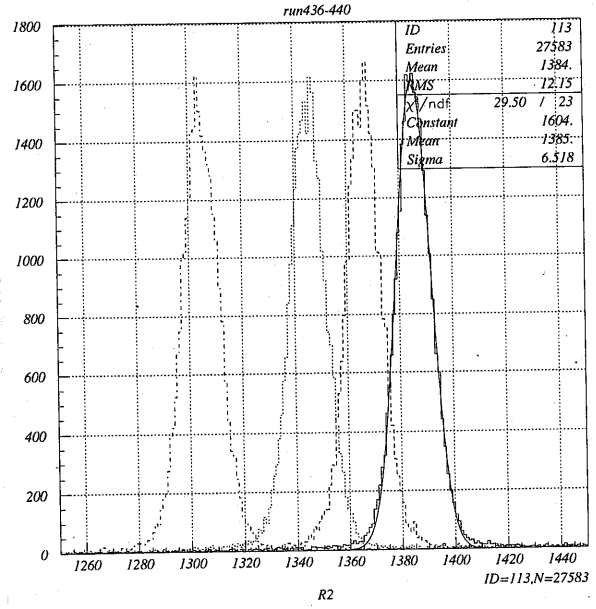
6% -1.4-

散乱角 X 0.78 mrad

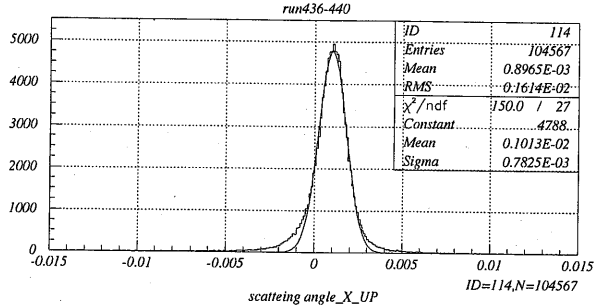
Y 0.81 mrad

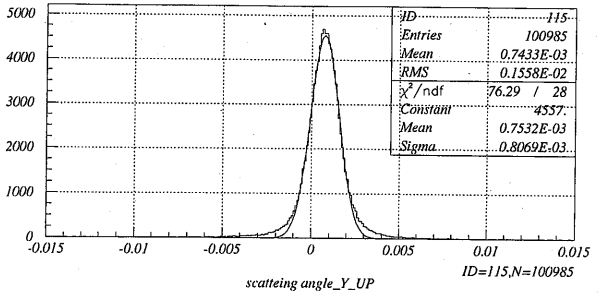


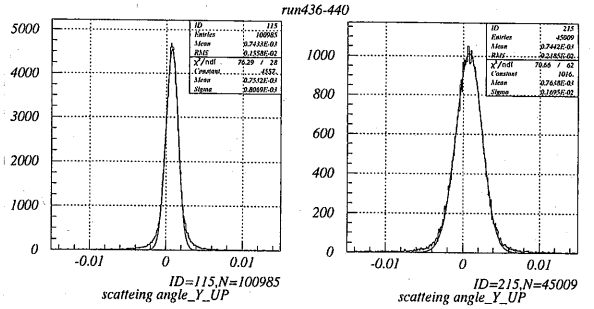


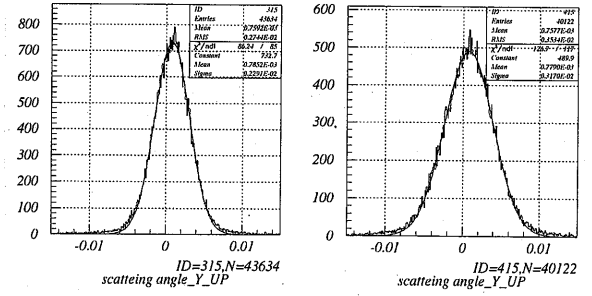


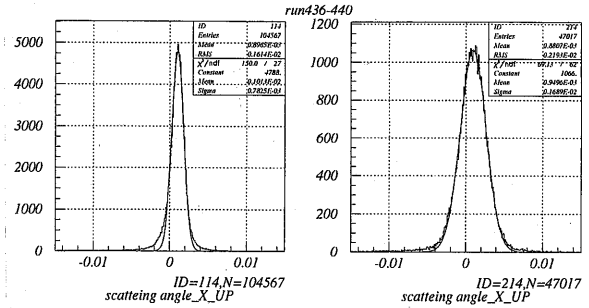
散乱角　0.78 / 0.81 mrad

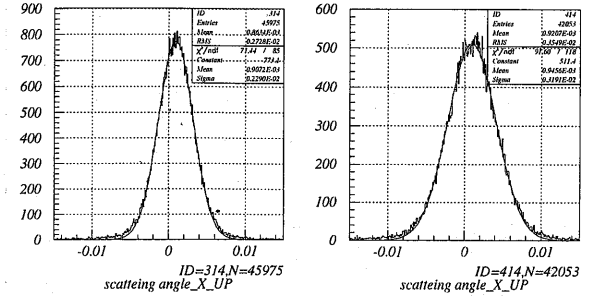












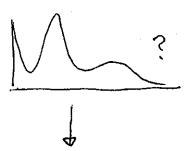
117 reaction trigger　　run4536.rdf　821k events

F12A　420~540　　ふれ11　　run04536r.rdf　194k events

B　400~600　　2山？

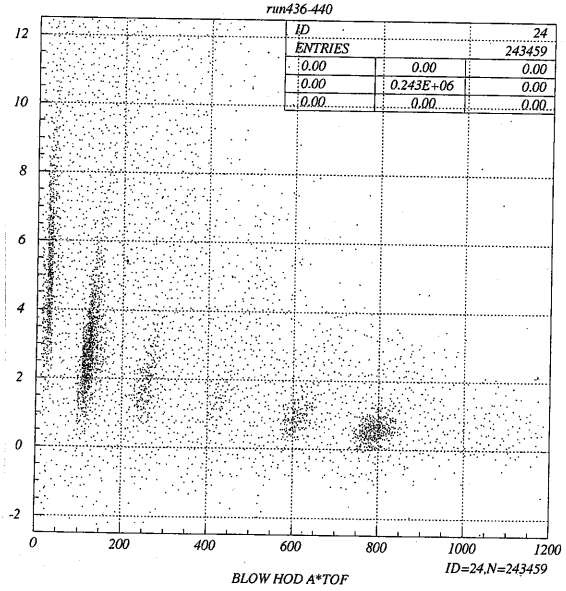
ΔEL　~~100~~ 125 ~ 1950

ΔER　125 ~ 1950
↑
100



Z=7がだいぶへる.

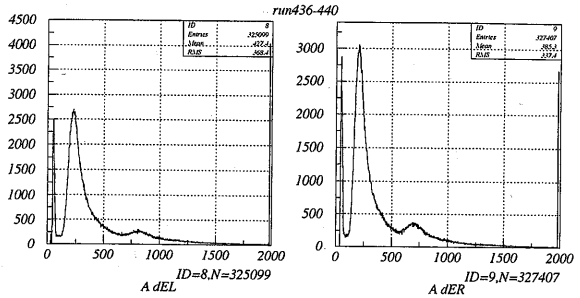
cutだと上のコブが消える.

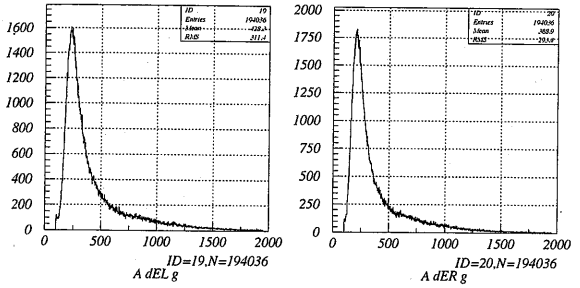


$$TOF = \frac{Lc}{\beta}$$

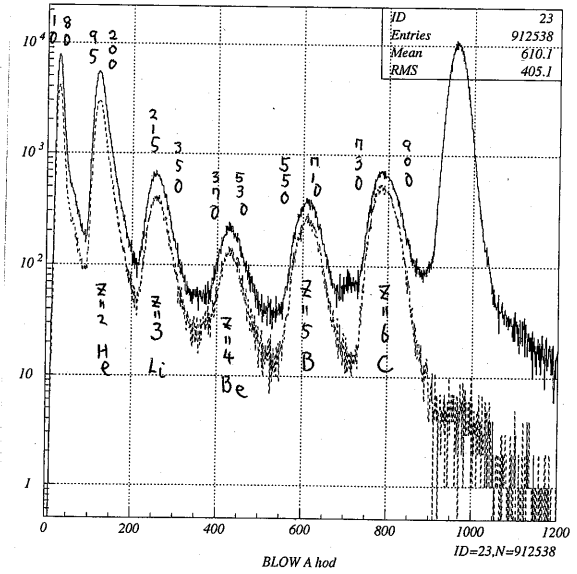
$$R = Am_0\beta\gamma = Am_0\frac{\beta}{\sqrt{1-\beta^2}} = Am_0\frac{1}{\sqrt{\frac{1}{\beta^2}-1}}$$

$$Am_0 = \frac{R[MeV/c]}{m_0}\sqrt{\frac{1}{\beta^2}-1}$$





2山目が消える？



ΔEのADC gateで Z=7が消える.

Z=6　0.13

5　0.12

4　0.10

3　0.9

 eff-Z123456.txt

------ z=6 ------ Tot/Ana : 193917 34004

BDCx1	:	97.58	79.61	15.50	2.21	0.26	0.01	83.45	13.10	0.99	0.04	89.31	7.82	0.43	0.02
BDCx2	:	98.46	77.77	17.39	2.90	0.34	0.05	81.45	15.49	1.43	0.10	89.61	8.30	0.51	0.04
BDCx3	:	98.63	75.89	18.86	3.31	0.49	0.07	79.48	17.28	1.73	0.14	89.11	8.87	0.61	0.04
BDCx4	:	98.59	76.36	18.30	3.37	0.50	0.05	79.96	16.72	1.77	0.14	89.35	8.57	0.65	0.03
BDCx5	:	98.57	74.39	19.87	3.75	0.46	0.10	78.01	18.39	1.99	0.19	88.20	9.63	0.72	0.02
BDCy1	:	98.60	76.96	18.26	2.85	0.46	0.06	80.63	16.31	1.54	0.12	89.60	8.47	0.50	0.03
BDCy2	:	98.70	75.69	18.95	3.47	0.53	0.07	79.20	17.47	1.92	0.12	89.34	8.75	0.59	0.03
BDCy3	:	98.59	76.00	18.51	3.50	0.51	0.07	79.38	17.22	1.84	0.15	89.30	8.68	0.60	0.01
BDCy4	:	98.48	76.30	18.30	3.32	0.51	0.05	79.92	16.65	1.80	0.10	88.98	8.80	0.65	0.04
BDCy5	:	97.63	78.79	16.34	2.28	0.20	0.02	82.35	14.13	1.11	0.04	89.13	8.00	0.48	0.02
FDC1x1	:	98.07	83.50	12.99	1.46	0.11	0.01	91.93	6.02	0.12	0.00	87.97	9.41	0.66	0.03
FDC1x2	:	97.80	81.15	14.35	2.04	0.24	0.02	90.47	7.21	0.13	0.00	86.83	10.09	0.82	0.06
FDC1x3	:	94.84	83.21	10.25	1.29	0.09	0.01	88.72	5.89	0.23	0.00	87.84	6.38	0.59	0.03
FDC1x4	:	98.37	81.40	14.63	2.12	0.21	0.02	91.90	6.34	0.13	0.00	86.48	10.81	1.02	0.06
FDC1y1	:	98.31	81.18	14.86	2.04	0.21	0.03	90.23	7.91	0.17	0.00	88.25	9.35	0.69	0.02
FDC1y2	:	98.25	76.71	17.75	3.23	0.48	0.07	86.07	11.69	0.48	0.02	85.81	11.20	1.11	0.12
FDC1y3	:	98.25	76.20	17.80	3.61	0.54	0.10	85.41	12.12	0.70	0.02	85.62	11.31	1.21	0.11
FDC1y4	:	97.79	83.69	12.51	1.47	0.11	0.00	91.78	5.91	0.11	0.00	88.74	8.45	0.59	0.01
FDC2x1	:	95.26	82.88	11.26	1.05	0.06	0.01	86.95	7.91	0.39	0.01	87.50	7.37	0.38	0.01
FDC2x2	:	95.83	82.34	12.22	1.20	0.07	0.00	86.47	8.85	0.49	0.01	87.41	7.95	0.45	0.01
FDC2x3	:	96.06	82.06	12.56	1.31	0.11	0.01	86.43	9.02	0.57	0.04	87.27	8.29	0.48	0.02
FDC2x4	:	96.42	80.88	13.87	1.51	0.14	0.01	85.89	9.85	0.65	0.02	86.79	9.08	0.54	0.02
FDC3x1	:	99.80	85.27	12.80	1.58	0.14	0.01	89.97	9.37	0.46	0.01	91.71	7.56	0.50	0.03
FDC3x2	:	99.75	83.38	14.28	1.87	0.20	0.02	88.11	10.86	0.74	0.04	90.52	8.58	0.60	0.05
FDC3x3	:	99.71	84.30	13.54	1.70	0.16	0.01	88.88	10.20	0.63	0.01	90.88	8.30	0.51	0.02
FDC3x4	:	99.49	83.32	14.01	1.93	0.20	0.04	88.05	10.65	0.76	0.04	90.05	8.78	0.61	0.06
FDC3x5	:	99.49	84.86	12.83	1.64	0.15	0.01	89.11	9.70	0.66	0.01	91.13	7.83	0.51	0.01
FDC3y1	:	99.83	83.54	14.17	1.89	0.19	0.04	88.15	10.91	0.72	0.05	90.93	8.35	0.51	0.04
FDC3y2	:	99.17	83.54	13.79	1.63	0.20	0.01	88.17	10.43	0.56	0.02	90.56	8.03	0.55	0.04
FDC3y3	:	99.23	84.31	13.21	1.56	0.14	0.01	88.95	9.73	0.54	0.01	90.92	7.83	0.45	0.03
FDC3y4	:	99.46	82.71	14.47	2.00	0.25	0.04	87.60	11.16	0.67	0.04	89.94	8.77	0.71	0.04

------ z=5 Tot/Ana : 193917 16767

BDCx1	:	97.07	79.19	15.57	2.12	0.16	0.03	83.06	13.06	0.89	0.05	88.69	7.93	0.43	0.02
BDCx2	:	98.31	77.96	17.25	2.62	0.44	0.04	81.53	15.34	1.34	0.10	89.46	8.28	0.53	0.04
BDCx3	:	98.47	75.65	18.97	3.30	0.50	0.04	79.11	17.41	1.83	0.12	89.01	8.84	0.60	0.01
BDCx4	:	98.50	76.32	18.70	3.01	0.42	0.05	80.06	16.71	1.62	0.11	89.04	8.89	0.54	0.03
BDCx5	:	98.44	74.53	19.74	3.58	0.52	0.08	77.96	18.39	1.94	0.14	88.42	9.18	0.79	0.04
BDCy1	:	98.46	76.26	18.45	3.18	0.49	0.08	79.85	16.79	1.68	0.14	89.09	8.79	0.54	0.05
BDCy2	:	98.70	75.85	18.55	3.70	0.51	0.09	79.58	16.91	2.03	0.18	88.98	9.04	0.66	0.03
BDCy3	:	98.73	75.60	18.96	3.48	0.58	0.10	79.30	17.24	2.02	0.17	88.95	9.10	0.65	0.03
BDCy4	:	98.47	76.31	18.25	3.48	0.39	0.04	79.84	16.79	1.74	0.11	89.20	8.71	0.55	0.01
BDCy5	:	97.59	78.63	16.28	2.31	0.37	0.01	82.08	14.31	1.14	0.05	89.18	7.85	0.53	0.02
FDC1x1	:	96.21	83.66	11.15	1.28	0.11	0.00	90.56	5.46	0.17	0.01	87.49	8.11	0.57	0.03
FDC1x2	:	96.34	82.63	11.98	1.57	0.14	0.02	89.83	6.36	0.14	0.01	87.25	8.40	0.66	0.03
FDC1x3	:	91.56	81.02	9.39	1.03	0.11	0.02	85.91	5.45	0.20	0.00	85.01	6.06	0.45	0.04
FDC1x4	:	96.73	81.68	13.29	1.59	0.14	0.02	90.08	6.49	0.16	0.00	86.48	9.40	0.78	0.07
FDC1y1	:	96.56	82.15	12.80	1.48	0.11	0.02	89.60	6.81	0.15	0.01	88.04	8.03	0.47	0.02
FDC1y2	:	97.19	79.02	15.31	2.40	0.40	0.06	86.41	10.16	0.61	0.02	86.90	9.45	0.78	0.07
FDC1y3	:	97.18	78.65	15.69	2.52	0.29	0.04	86.13	10.53	0.49	0.03	86.84	9.54	0.76	0.05
FDC1y4	:	96.27	83.61	11.50	1.07	0.07	0.02	90.80	5.36	0.11	0.01	88.19	7.64	0.42	0.02
FDC2x1	:	92.20	82.69	8.71	0.71	0.09	0.00	85.85	6.00	0.34	0.02	85.87	6.01	0.30	0.02
FDC2x2	:	93.19	83.01	9.35	0.78	0.04	0.01	86.27	6.57	0.32	0.03	86.43	6.44	0.32	0.01
FDC2x3	:	93.56	82.65	9.92	0.88	0.08	0.02	86.43	6.64	0.47	0.02	86.17	7.01	0.36	0.02
FDC2x4	:	93.77	81.52	11.00	1.12	0.11	0.02	85.51	7.74	0.50	0.03	85.65	7.63	0.47	0.03
FDC3x1	:	98.90	87.80	9.97	1.04	0.08	0.01	91.32	7.21	0.35	0.03	92.45	6.07	0.37	0.01
FDC3x2	:	99.04	86.46	11.11	1.28	0.17	0.02	90.12	8.36	0.52	0.05	91.47	7.11	0.42	0.04
FDC3x3	:	98.84	87.03	10.56	1.17	0.06	0.02	90.59	7.75	0.47	0.02	91.57	6.77	0.48	0.02
FDC3x4	:	98.07	86.09	10.53	1.31	0.13	0.02	89.75	7.74	0.54	0.03	90.92	6.66	0.45	0.04
FDC3x5	:	98.34	87.12	10.03	1.09	0.09	0.01	90.49	7.46	0.36	0.04	91.46	6.39	0.46	0.03
FDC3y1	:	99.13	86.01	11.52	1.43	0.16	0.02	90.08	8.44	0.59	0.02	91.40	7.17	0.52	0.04
FDC3y2	:	97.73	85.68	10.69	1.24	0.11	0.01	89.46	7.81	0.44	0.03	90.71	6.63	0.36	0.02
FDC3y3	:	97.41	85.92	10.32	1.06	0.10	0.01	89.62	7.37	0.41	0.02	90.61	6.46	0.33	0.02
FDC3y4	:	98.46	85.51	11.58	1.25	0.10	0.03	89.32	8.64	0.47	0.02	90.81	7.14	0.47	0.04

------ z=4 Tot/Ana : 193917 9077

BDCx1	:	96.67	79.38	14.89	2.14	0.25	0.01	82.33	13.30	0.99	0.06	88.93	7.21	0.52	0.02
BDCx2	:	97.65	76.36	18.09	2.73	0.40	0.08	80.49	15.64	1.38	0.14	88.08	8.97	0.56	0.04
BDCx3	:	98.11	75.33	18.95	3.27	0.50	0.06	78.85	17.31	1.80	0.15	88.36	9.12	0.62	0.01
BDCx4	:	98.29	74.67	19.59	3.42	0.51	0.11	78.31	18.01	1.85	0.12	88.48	9.20	0.62	0.00
BDCx5	:	98.42	73.63	20.55	3.75	0.40	0.11	77.28	18.98	1.97	0.19	87.84	9.88	0.63	0.08
BDCy1	:	98.18	75.36	18.86	3.50	0.37	0.09	78.92	17.43	1.70	0.13	88.65	8.95	0.54	0.04
BDCy2	:	98.50	75.30	18.66	3.86	0.53	0.15	78.46	17.70	2.10	0.23	88.92	8.95	0.59	0.04
BDCy3	:	98.37	75.70	19.05	3.03	0.53	0.07	79.16	17.34	1.75	0.12	89.30	8.55	0.48	0.03
BDCy4	:	98.13	75.51	18.87	3.23	0.45	0.07	79.64	16.57	1.81	0.11	88.13	9.45	0.52	0.02
BDCy5	:	97.40	77.99	16.61	2.49	0.31	0.00	81.69	14.48	1.20	0.03	88.80	8.11	0.48	0.01
FDC1x1	:	89.24	76.41	11.34	1.37	0.11	0.01	82.36	6.56	0.31	0.01	80.69	7.84	0.67	0.03
FDC1x2	:	90.07	75.29	13.00	1.64	0.14	0.00	81.51	8.32	0.24	0.00	81.27	8.15	0.64	0.01
FDC1x3	:	68.16	58.85	8.45	0.82	0.04	0.00	63.25	4.74	0.18	0.00	61.34	6.38	0.41	0.03
FDC1x4	:	91.85	76.26	13.54	1.89	0.14	0.01	83.55	8.02	0.28	0.00	81.27	9.76	0.74	0.08
FDC1y1	:	90.93	75.06	14.04	1.62	0.22	0.00	82.03	8.67	0.23	0.00	82.30	8.14	0.47	0.02
FDC1y2	:	92.86	72.05	17.36	2.92	0.43	0.10	79.18	12.92	0.75	0.01	81.41	10.33	1.00	0.11
FDC1y3	:	93.51	71.70	18.30	2.96	0.47	0.08	78.98	13.84	0.69	0.00	81.24	11.27	0.93	0.08
FDC1y4	:	89.19	77.40	10.55	1.12	0.11	0.00	83.18	5.83	0.19	0.00	82.25	6.54	0.39	0.01
FDC2x1	:	82.77	74.80	7.23	0.67	0.07	0.00	77.46	5.01	0.26	0.03	76.81	5.59	0.35	0.02
FDC2x2	:	84.62	75.92	8.02	0.63	0.04	0.01	78.70	5.67	0.22	0.02	78.09	6.15	0.36	0.02
FDC2x3	:	84.97	75.13	8.87	0.87	0.09	0.01	78.25	6.19	0.46	0.07	77.37	7.19	0.41	0.00
FDC2x4	:	85.33	74.75	9.51	0.97	0.10	0.00	77.91	7.01	0.41	0.00	77.46	7.36	0.51	0.00
FDC3x1	:	92.55	82.98	8.76	0.78	0.01	0.02	85.59	6.56	0.39	0.02	85.88	6.35	0.33	0.00
FDC3x2	:	94.15	82.70	10.32	1.09	0.02	0.01	85.27	8.39	0.47	0.01	86.58	7.13	0.44	0.00
FDC3x3	:	93.14	82.20	10.06	0.80	0.07	0.01	85.07	7.67	0.35	0.04	85.67	7.15	0.30	0.02
FDC3x4	:	90.49	79.68	9.83	0.89	0.08	0.01	82.12	7.95	0.41	0.01	83.25	6.79	0.42	0.03
FDC3x5	:	91.01	80.91	9.21	0.78	0.11	0.00	83.09	7.60	0.28	0.04	84.21	6.33	0.45	0.01
FDC3y1	:	94.36	82.62	10.52	1.15	0.08	0.00	85.35	8.51	0.48	0.02	86.54	7.34	0.47	0.01
FDC3y2	:	91.03	80.60	9.33	1.00	0.08	0.02	83.21	7.40	0.35	0.07	84.22	6.40	0.39	0.02
FDC3y3	:	89.70	79.64	9.09	0.88	0.08	0.01	82.28	7.02	0.39	0.01	82.78	6.62	0.26	0.03
FDC3y4	:	92.81	80.62	10.99	1.04	0.13	0.02	83.16	9.13	0.47	0.04	84.46	7.83	0.48	0.03

------ z=3 Tot/Ana : 193917 21758

BDCx1	:	95.79	78.06	15.51	1.99	0.19	0.05	81.63	13.07	1.03	0.07	87.32	8.05	0.42	0.01
BDCx2	:	97.27	76.19	17.52	3.13	0.39	0.06	79.89	15.58	1.66	0.15	88.00	8.70	0.56	0.02
BDCx3	:	97.89	75.18	18.86	3.36	0.45	0.04	78.29	17.67	1.81	0.11	88.48	8.84	0.55	0.02
BDCx4	:	97.95	75.67	18.32	3.40	0.52	0.04	79.34	16.60	1.91	0.10	88.31	9.04	0.57	0.03
BDCx5	:	98.27	73.56	19.89	4.10	0.63	0.10	77.05	18.78	2.25	0.19	87.60	9.90	0.72	0.06
BDCy1	:	97.42	75.66	18.11	3.17	0.40	0.08	79.15	16.46	1.68	0.13	88.13	8.69	0.58	0.02
BDCy2	:	97.92	74.79	19.17	3.47	0.44	0.05	78.48	17.45	1.86	0.13	88.47	8.87	0.56	0.02
BDCy3	:	97.99	74.84	19.18	3.45	0.44	0.09	78.50	17.54	1.78	0.17	88.21	9.08	0.66	0.04
BDCy4	:	97.90	75.64	18.39	3.37	0.46	0.04	79.31	16.72	1.76	0.11	88.34	8.98	0.55	0.03
BDCy5	:	96.91	78.21	16.28	2.11	0.27	0.04	81.89	13.89	1.05	0.07	88.48	7.96	0.44	0.02
FDC1x1	:	65.60	55.76	8.73	1.01	0.09	0.00	59.96	5.41	0.23	0.00	59.12	6.01	0.43	0.04
FDC1x2	:	71.63	59.44	10.81	1.21	0.14	0.02	64.31	7.12	0.20	0.01	64.24	6.90	0.47	0.02
FDC1x3	:	49.79	42.74	6.29	0.71	0.04	0.00	45.97	3.67	0.15	0.00	44.36	4.97	0.44	0.03
FDC1x4	:	74.93	61.23	11.84	1.65	0.19	0.02	66.40	8.15	0.36	0.02	66.38	7.72	0.75	0.07
FDC1y1	:	72.06	59.35	11.12	1.46	0.12	0.01	64.59	7.22	0.25	0.00	65.26	6.30	0.48	0.02
FDC1y2	:	79.03	61.07	15.39	2.22	0.32	0.02	66.90	11.51	0.61	0.01	69.40	8.88	0.70	0.04
FDC1y3	:	79.68	60.41	16.30	2.47	0.42	0.07	66.20	12.80	0.68	0.00	69.22	9.49	0.86	0.11
FDC1y4	:	65.58	56.75	8.00	0.74	0.09	0.01	60.84	4.57	0.16	0.00	60.41	4.90	0.26	0.00
FDC2x1	:	48.91	44.77	3.79	0.31	0.04	0.00	45.82	2.90	0.17	0.02	45.75	2.99	0.16	0.00
FDC2x2	:	55.11	49.70	5.00	0.36	0.04	0.02	51.31	3.62	0.16	0.02	50.58	4.28	0.22	0.03
FDC2x3	:	57.39	51.43	5.46	0.44	0.04	0.02	53.15	4.05	0.17	0.03	52.55	4.57	0.25	0.03
FDC2x4	:	61.01	54.07	6.31	0.56	0.05	0.02	55.99	4.73	0.25	0.04	55.29	5.36	0.33	0.03
FDC3x1	:	65.08	58.84	5.82	0.39	0.03	0.00	60.15	4.77	0.16	0.00	60.33	4.51	0.23	0.02
FDC3x2	:	71.49	63.51	7.25	0.65	0.05	0.02	65.07	6.00	0.39	0.03	65.45	5.73	0.27	0.03
FDC3x3	:	67.40	60.57	6.26	0.51	0.05	0.00	61.88	5.22	0.28	0.02	62.12	4.98	0.29	0.01
FDC3x4	:	66.25	59.42	6.18	0.58	0.04	0.02	60.87	5.01	0.34	0.02	60.99	4.98	0.25	0.02
FDC3x5	:	61.55	55.75	5.29	0.46	0.03	0.02	56.91	4.38	0.25	0.02	57.22	4.11	0.21	0.02
FDC3y1	:	72.24	64.15	7.30	0.73	0.04	0.01	65.79	6.12	0.30	0.03	66.43	5.46	0.35	0.00
FDC3y2	:	66.71	59.54	6.50	0.63	0.03	0.01	61.04	5.40	0.25	0.02	61.62	4.78	0.30	0.01
FDC3y3	:	64.73	58.21	5.91	0.58	0.03	0.01	59.71	4.73	0.28	0.01	60.09	4.40	0.23	0.01
FDC3y4	:	71.16	63.17	7.21	0.70	0.06	0.02	64.85	5.95	0.32	0.04	65.40	5.39	0.35	0.02

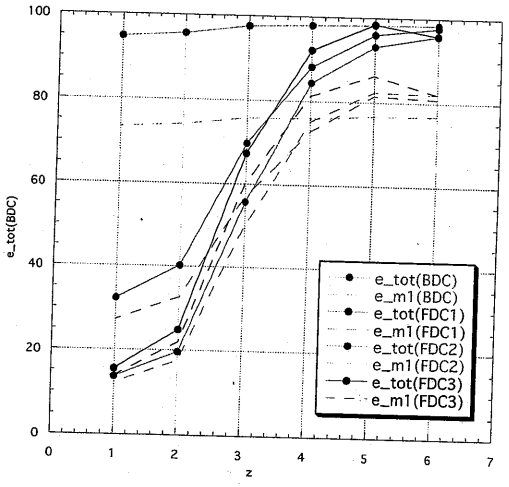
------ z=2 Tot/Ana : 193917 76698

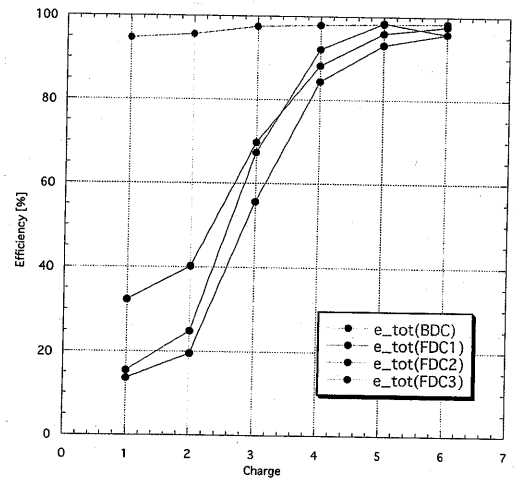
BDCx1	:	92.15	75.06	14.73	2.07	0.25	0.03	78.41	12.64	0.99	0.10	84.17	7.53	0.43	0.01
BDCx2	:	94.62	73.95	17.33	2.94	0.35	0.05	77.49	15.52	1.50	0.10	85.56	8.50	0.54	0.02
BDCx3	:	95.85	73.15	18.78	3.32	0.51	0.08	76.63	17.20	1.85	0.17	86.00	9.22	0.60	0.04
BDCx4	:	96.37	73.85	18.60	3.38	0.47	0.06	77.39	17.03	1.83	0.12	86.72	8.99	0.64	0.03
BDCx5	:	97.07	72.82	19.71	3.88	0.57	0.09	76.29	18.40	2.18	0.20	86.64	9.65	0.73	0.04
BDCy1	:	95.10	73.15	18.16	3.25	0.46	0.08	76.53	16.68	1.71	0.18	85.71	8.76	0.59	0.03
BDCy2	:	96.22	73.34	18.70	3.58	0.53	0.07	76.92	17.26	1.89	0.16	86.66	8.89	0.62	0.04
BDCy3	:	96.60	73.79	18.86	3.37	0.51	0.07	77.19	17.34	1.91	0.15	87.13	8.85	0.58	0.04
BDCy4	:	96.58	74.49	18.36	3.27	0.42	0.05	78.17	16.67	1.64	0.11	87.29	8.66	0.60	0.03
BDCy5	:	95.71	77.35	15.79	2.28	0.27	0.02	80.83	13.69	1.12	0.08	87.33	7.85	0.51	0.02
FDC1x1	:	32.43	27.62	4.27	0.49	0.04	0.01	29.45	2.86	0.11	0.01	29.31	2.89	0.20	0.02
FDC1x2	:	38.35	31.81	5.74	0.74	0.06	0.01	34.21	4.00	0.13	0.00	34.42	3.62	0.30	0.01
FDC1x3	:	32.68	27.72	4.47	0.45	0.04	0.00	29.73	2.84	0.12	0.00	28.82	3.56	0.28	0.03
FDC1x4	:	41.11	33.40	6.70	0.91	0.08	0.02	36.03	4.85	0.22	0.01	36.16	4.50	0.43	0.03
FDC1y1	:	40.71	33.62	6.20	0.77	0.10	0.01	36.22	4.34	0.15	0.00	36.99	3.47	0.23	0.02
FDC1y2	:	52.25	39.89	10.53	1.59	0.22	0.03	43.44	8.35	0.44	0.02	45.32	6.32	0.55	0.05
FDC1y3	:	53.52	40.41	11.04	1.78	0.25	0.03	44.17	8.75	0.59	0.01	45.88	6.95	0.63	0.05
FDC1y4	:	30.63	26.48	3.72	0.38	0.04	0.00	28.24	2.32	0.07	0.00	28.32	2.18	0.12	0.01
FDC2x1	:	16.14	14.70	1.33	0.10	0.01	0.00	15.04	1.04	0.05	0.01	14.98	1.11	0.04	0.00
FDC2x2	:	19.26	17.27	1.82	0.15	0.01	0.00	17.73	1.46	0.07	0.01	17.64	1.53	0.09	0.00
FDC2x3	:	20.33	18.10	2.02	0.19	0.02	0.01	18.59	1.62	0.10	0.02	18.53	1.69	0.11	0.01
FDC2x4	:	22.43	19.78	2.37	0.25	0.02	0.01	20.32	1.96	0.13	0.01	20.22	2.04	0.16	0.01
FDC3x1	:	22.93	20.37	2.34	0.19	0.02	0.01	20.85	1.96	0.10	0.01	20.95	1.87	0.10	0.00
FDC3x2	:	27.24	23.90	3.02	0.26	0.03	0.02	24.48	2.58	0.14	0.03	24.55	2.54	0.13	0.01
FDC3x3	:	24.25	21.40	2.55	0.26	0.02	0.02	21.91	2.17	0.15	0.02	21.94	2.15	0.15	0.01
FDC3x4	:	24.24	21.37	2.61	0.23	0.02	0.02	21.92	2.17	0.12	0.03	21.93	2.18	0.12	0.01
FDC3x5	:	21.15	18.91	2.03	0.18	0.01	0.01	19.32	1.70	0.10	0.02	19.37	1.67	0.10	0.00
FDC3y1	:	27.97	24.45	3.13	0.33	0.03	0.02	25.18	2.59	0.16	0.04	25.38	2.42	0.16	0.00
FDC3y2	:	24.83	21.92	2.62	0.25	0.02	0.02	22.51	2.18	0.12	0.03	22.70	2.02	0.10	0.01
FDC3y3	:	23.75	21.05	2.41	0.24	0.03	0.02	21.63	1.98	0.12	0.02	21.78	1.86	0.10	0.01
FDC3y4	:	27.67	24.23	3.07	0.31	0.03	0.03	24.89	2.60	0.15	0.04	25.15	2.35	0.16	0.01

------ z=1 Tot/Ana : 193917 59623

BDCx1	:	91.15	73.92	14.69	2.24	0.25	0.04	77.22	12.69	1.15	0.09	83.08	7.58	0.47	0.01
BDCx2	:	93.65	73.20	17.11	2.85	0.44	0.05	76.71	15.32	1.48	0.15	84.65	8.41	0.54	0.05
BDCx3	:	94.95	72.59	18.48	3.31	0.49	0.08	75.97	17.00	1.83	0.17	85.40	8.91	0.60	0.04
BDCx4	:	95.62	73.35	18.35	3.39	0.46	0.07	76.82	16.81	1.85	0.14	86.14	8.82	0.64	0.03
BDCx5	:	96.62	72.66	19.46	3.80	0.59	0.11	76.01	18.27	2.12	0.22	86.04	9.76	0.78	0.04
BDCy1	:	93.76	72.15	17.87	3.14	0.51	0.10	75.51	16.28	1.76	0.21	84.49	8.63	0.61	0.04
BDCy2	:	94.94	72.46	18.44	3.41	0.55	0.08	75.92	17.01	1.84	0.16	85.63	8.67	0.60	0.04
BDCy3	:	95.60	73.24	18.46	3.28	0.55	0.07	76.59	16.97	1.87	0.17	86.23	8.76	0.59	0.03
BDCy4	:	95.85	74.01	18.24	3.13	0.41	0.06	77.82	16.26	1.62	0.14	86.36	8.87	0.59	0.03
BDCy5	:	95.37	76.72	16.00	2.34	0.27	0.04	80.31	13.77	1.22	0.07	86.68	8.13	0.54	0.02
FDC1x1	:	28.01	24.33	3.26	0.37	0.04	0.01	25.80	2.12	0.09	0.01	25.42	2.39	0.19	0.01
FDC1x2	:	29.95	25.70	3.77	0.43	0.05	0.01	27.46	2.40	0.08	0.01	26.96	2.79	0.20	0.01
FDC1x3	:	26.86	23.33	3.15	0.34	0.03	0.01	24.73	2.01	0.11	0.00	24.19	2.45	0.20	0.02
FDC1x4	:	31.85	27.06	4.19	0.51	0.07	0.02	28.89	2.81	0.14	0.01	28.41	3.14	0.26	0.03
FDC1y1	:	32.40	27.66	4.22	0.47	0.05	0.01	29.59	2.72	0.08	0.00	29.72	2.50	0.17	0.01
FDC1y2	:	41.62	33.66	6.85	0.97	0.12	0.02	36.42	4.92	0.27	0.01	36.55	4.64	0.42	0.01
FDC1y3	:	42.81	34.46	7.09	1.09	0.14	0.03	37.23	5.26	0.31	0.01	37.47	4.84	0.46	0.04
FDC1y4	:	24.61	21.85	2.50	0.24	0.02	0.00	23.11	1.45	0.05	0.00	23.00	1.54	0.07	0.01
FDC2x1	:	12.15	11.06	0.97	0.11	0.01	0.01	11.40	0.69	0.05	0.01	11.35	0.74	0.06	0.00
FDC2x2	:	13.54	12.24	1.19	0.09	0.01	0.00	12.60	0.88	0.05	0.01	12.60	0.91	0.03	0.00
FDC2x3	:	13.95	12.50	1.30	0.12	0.02	0.02	12.92	0.94	0.07	0.02	12.87	1.01	0.05	0.01
FDC2x4	:	14.95	13.27	1.51	0.13	0.02	0.01	13.77	1.10	0.06	0.02	13.71	1.17	0.06	0.01
FDC3x1	:	14.75	13.31	1.27	0.14	0.02	0.01	13.67	0.99	0.08	0.01	13.79	0.92	0.04	0.01
FDC3x2	:	16.53	14.69	1.65	0.16	0.02	0.02	15.16	1.26	0.09	0.02	15.25	1.23	0.05	0.00
FDC3x3	:	15.33	13.75	1.39	0.16	0.01	0.02	14.14	1.10	0.07	0.02	14.22	1.02	0.09	0.00
FDC3x4	:	15.10	13.49	1.39	0.18	0.02	0.02	13.88	1.10	0.09	0.03	13.92	1.09	0.09	0.01
FDC3x5	:	14.11	12.71	1.25	0.12	0.02	0.01	13.03	1.00	0.06	0.02	13.15	0.90	0.06	0.00
FDC3y1	:	16.84	14.94	1.66	0.19	0.03	0.03	15.42	1.30	0.09	0.03	15.61	1.15	0.07	0.00
FDC3y2	:	15.42	13.76	1.44	0.17	0.02	0.03	14.19	1.13	0.07	0.04	14.36	1.00	0.06	0.00
FDC3y3	:	14.96	13.41	1.33	0.15	0.02	0.04	13.79	1.05	0.07	0.04	13.93	0.95	0.06	0.01
FDC3y4	:	16.25	14.40	1.60	0.20	0.02	0.03	14.84	1.27	0.10	0.04	15.04	1.11	0.09	0.00

Efficiency def0.ana





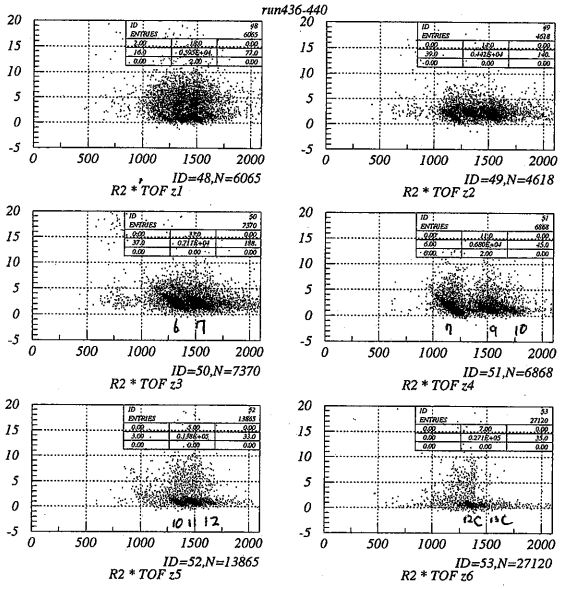
z=17 を加えたものを作ること.

def.ang.

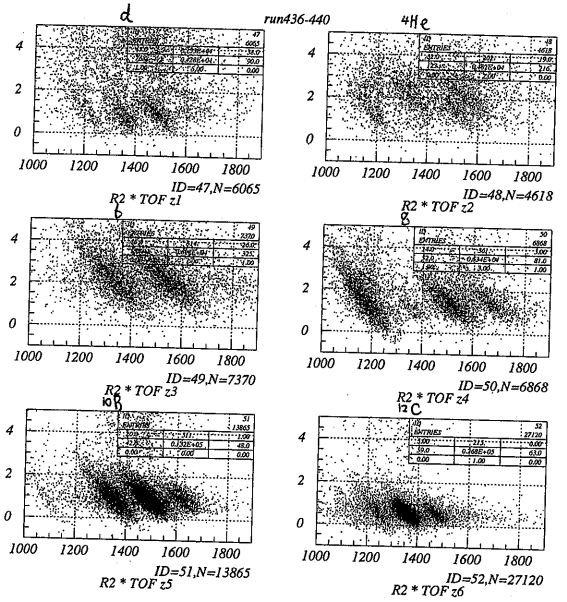
① χ^2 (cut あり)

→ eventが少なすぎる

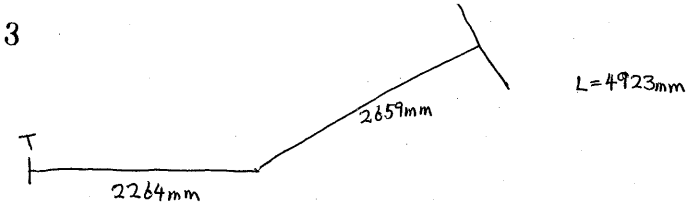
② χ^2 cut なし



-1~5



def2



run 453 ~ 456

<A>hod 910 ~ 1040 ⟶ <TOF> = 0.4101 nsec

σ = 77.3 psec

4mm target

R = 1366 MeV/c σ = 6.871 MeV/c

↓

P_0 = 683 MeV/c 223.5 MeV/A $\beta = \frac{0.5911}{0.5399}$

‖

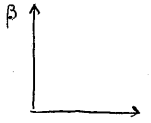
$(\gamma-1)m_0$ $\gamma = 1.2398 = \frac{1}{\sqrt{1-\beta^2}}$ $1-\beta^2 = \frac{1}{1.2398^2}$

$TOF = \frac{492.3\,cm}{30\,cm/nsec\,\beta} = 27.76\,nsec$ $\frac{\ell}{v} = \frac{\frac{\ell}{c}}{\frac{v}{c}}$

<TOF> = <TOF>$_0$ + 27.35 nsec

$\beta = \frac{492.3}{30}\frac{1}{TOF[nsec]}$

46.5009	42.915	46.7732	46.2262	48.5937	47.2817	47.6359
19.15	15.57	19.42	18.88	21.24	19.93	20.29

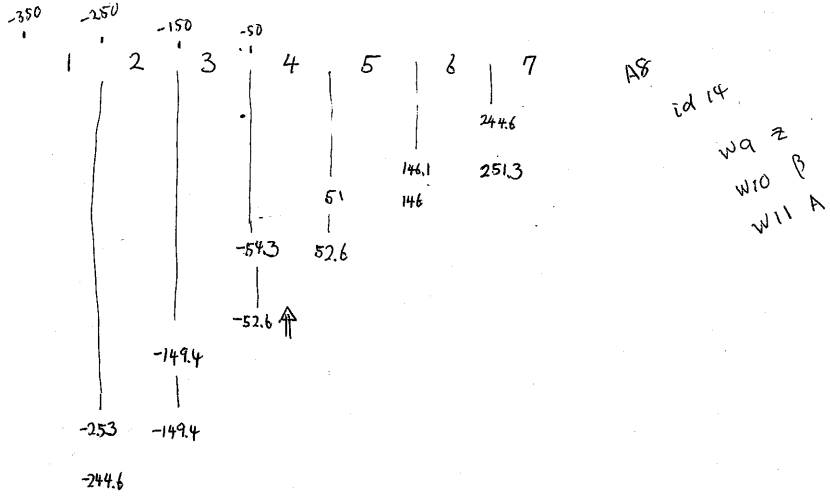


$X = \frac{(A)m_0\beta\gamma}{Z}$ $A = \frac{R}{m_0\beta\gamma}$ $\beta\gamma = 0.73$

hod 10 β

11 $\sqrt{Z^2}$ (0.3819)

12 Z mod



1	1.0246
2	2.2767
3	3.4036
4	4.5096
5	5.4487
6	6.2834

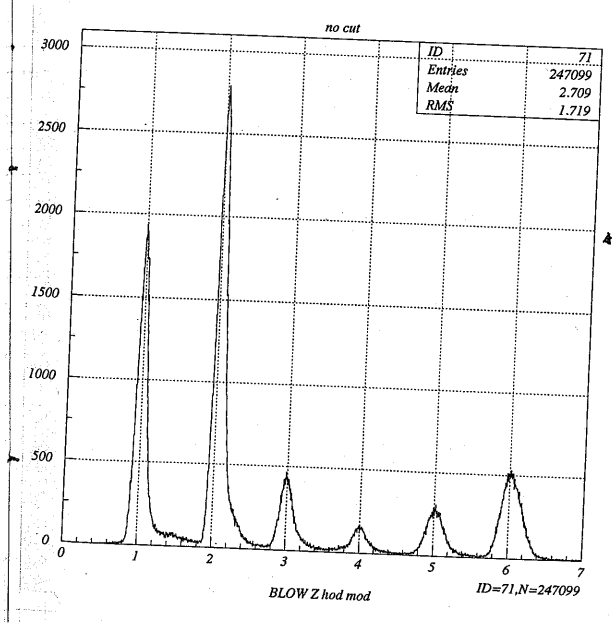
0.1149

+0.89301X

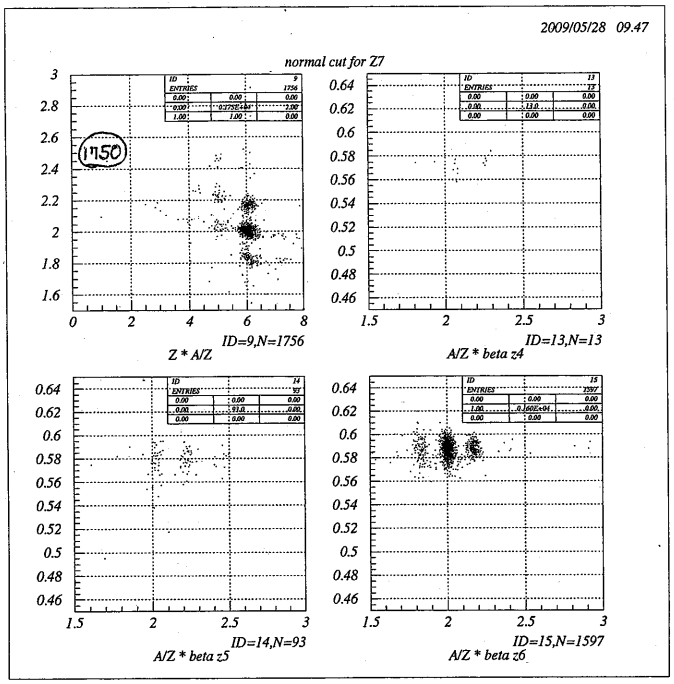
−0.042132 X^2

+0.0078496 X^3

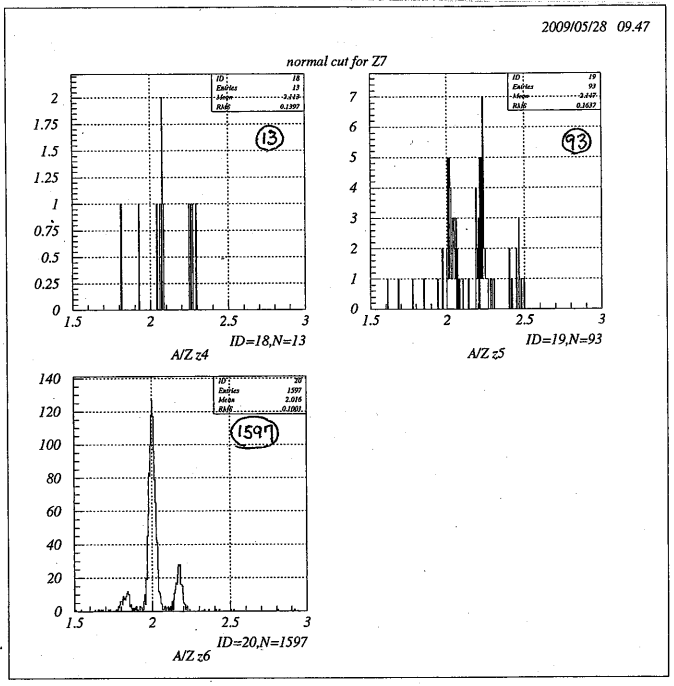
Z=1までとれる



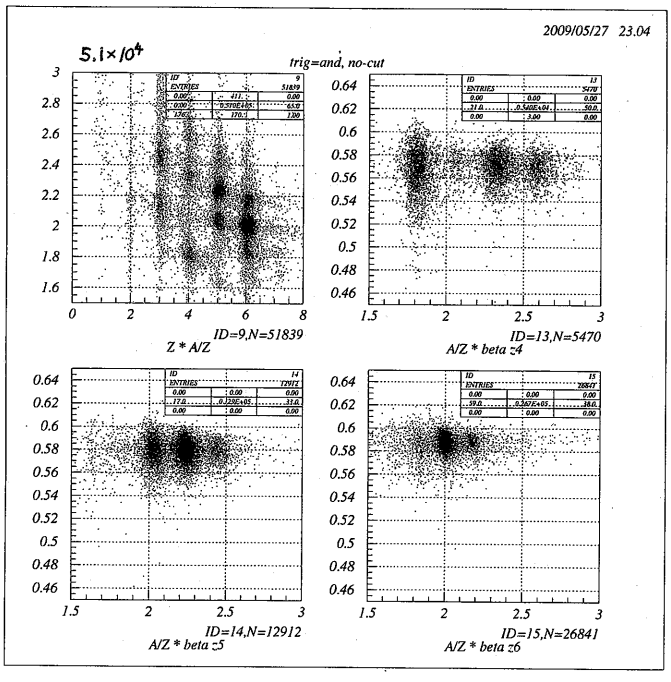
← reaction triggerのZ分布



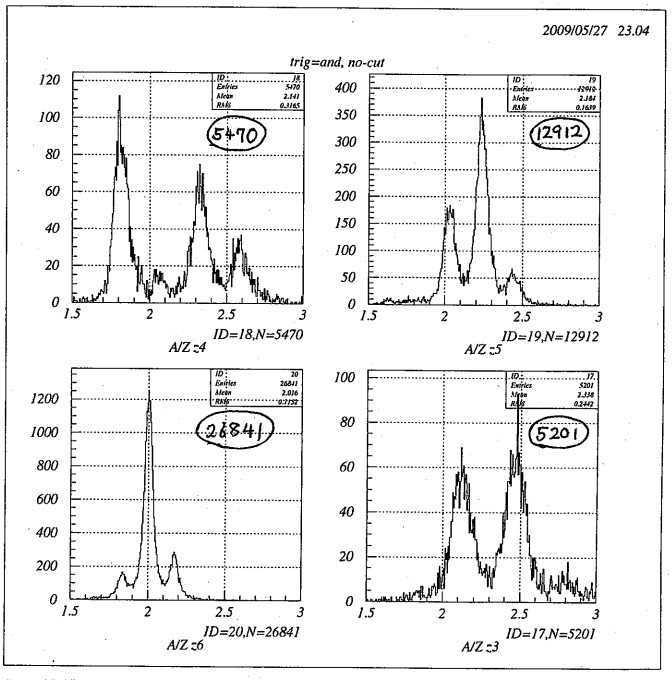
Z=7 と同じ条件　TDC limitあり, χ^2 cut あり
STC(Z7)

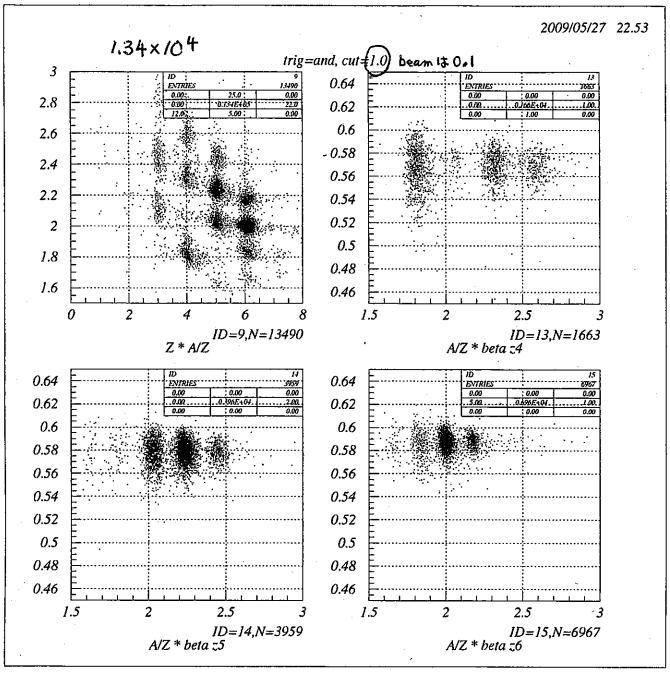


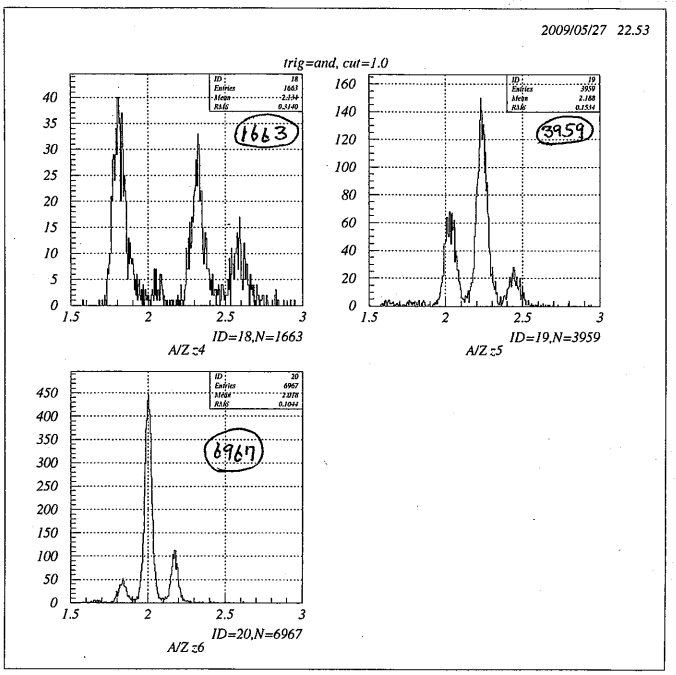
defl.ang



STC(Z7)　χ^2 cut なし
コミ 99し.





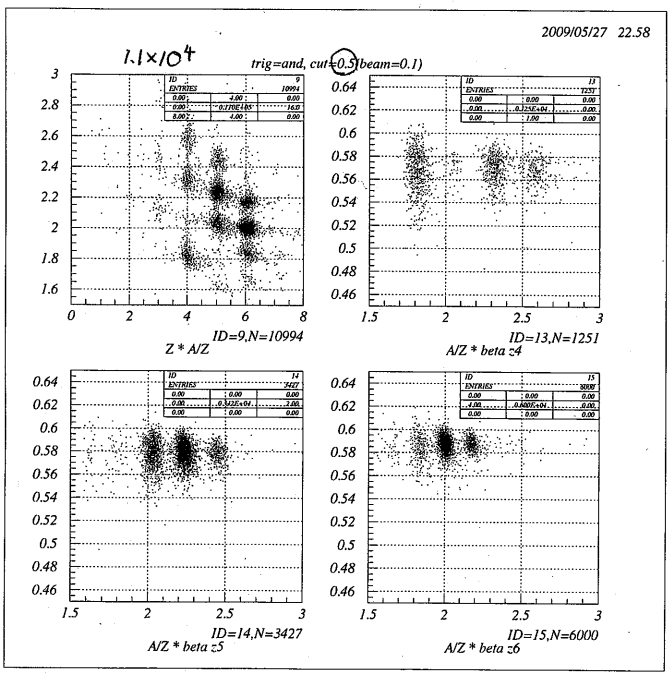


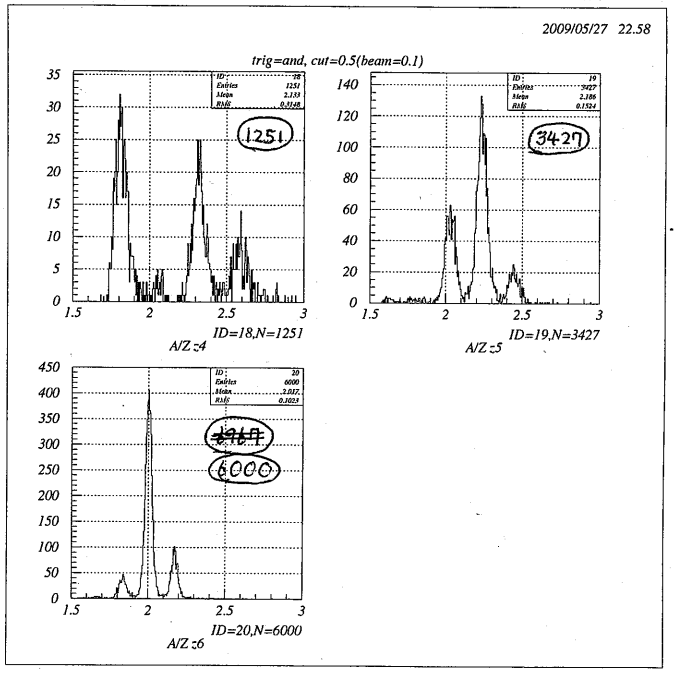
STC(ZT)

χ^2cut (beam=0.1, 他 1.0)

↑ mass 分解能はあまり変わらない

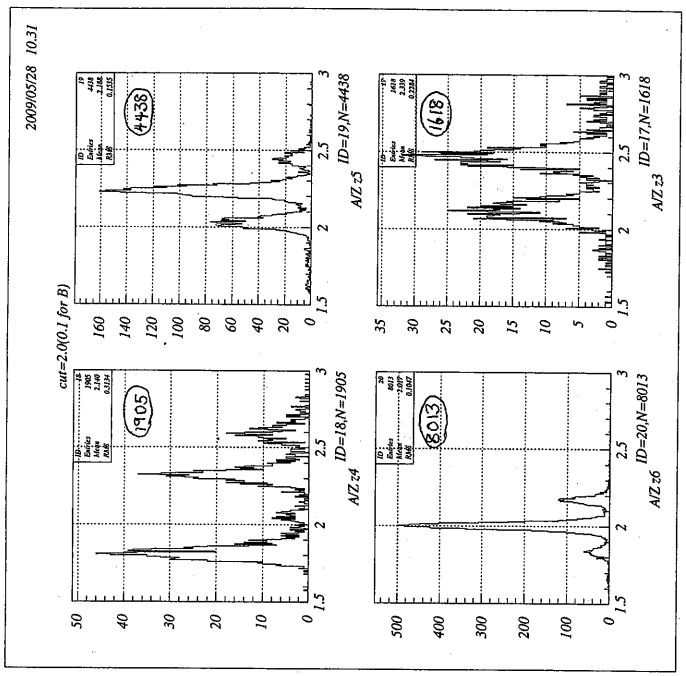
数は ≈+20% ?

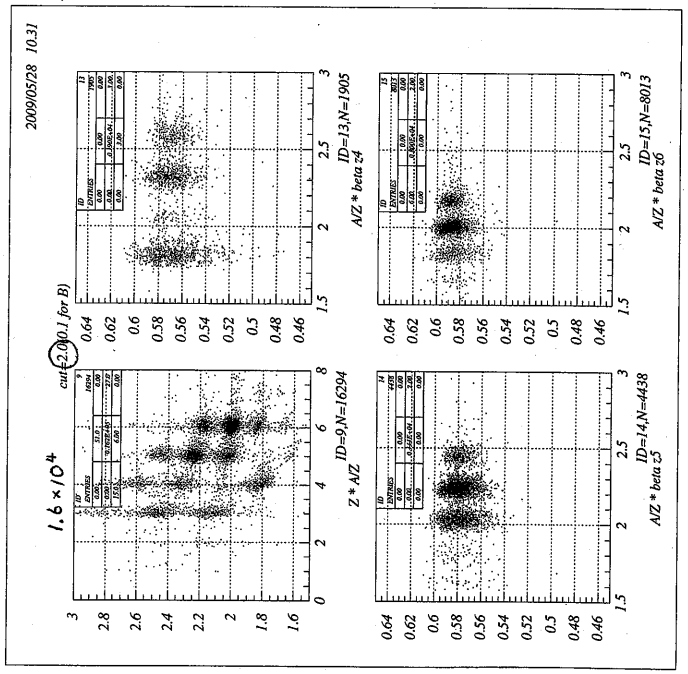




STC(ZT)

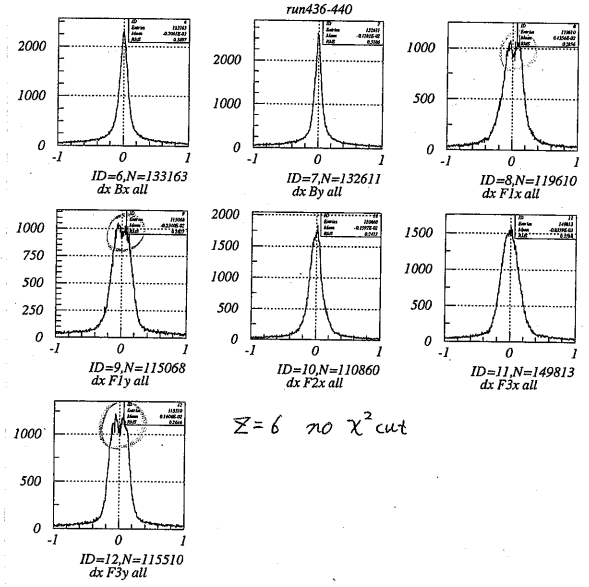
χ^2cut (beam=0.1, 他 0.5 かて.)





① 2track event がけっこうあるようだ。 ⟶ かくにん

② Z=6, 5, 4 --- の STC を作ってみる.



Z=6 no χ^2 cut

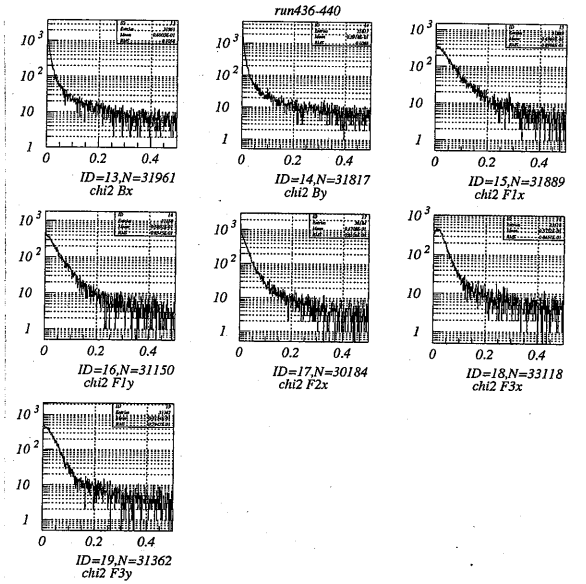
~30K events

Z=7 で Z=6 を解析すると以下のようになる.

STC_Z7

file_stc_r436.

2009/05/27 10



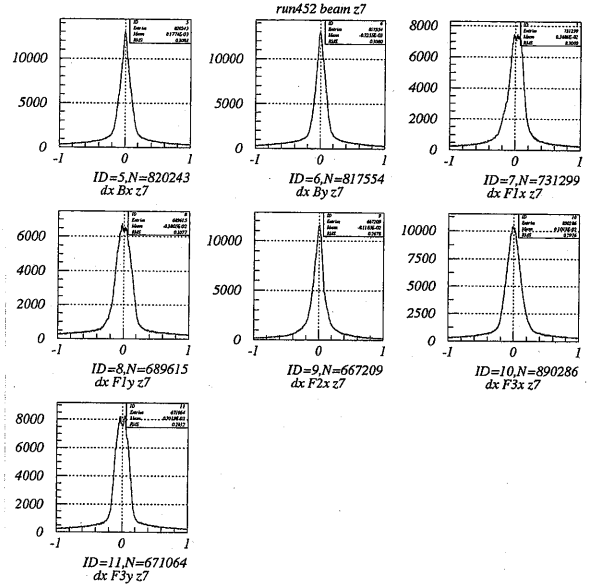
131 Z=7のstc file_stc_r436 を用いて、reaction run (453~456) を解析

x^2 cut は はずす。

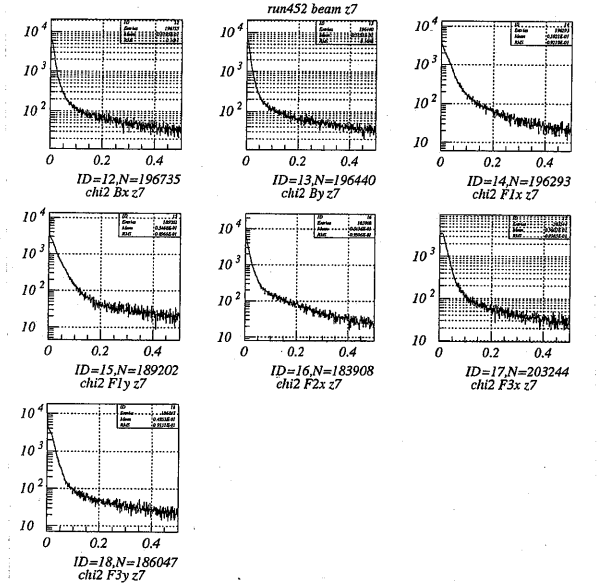
def2.ang

run452 beam trig

(M15)



gold



run452 beam trig

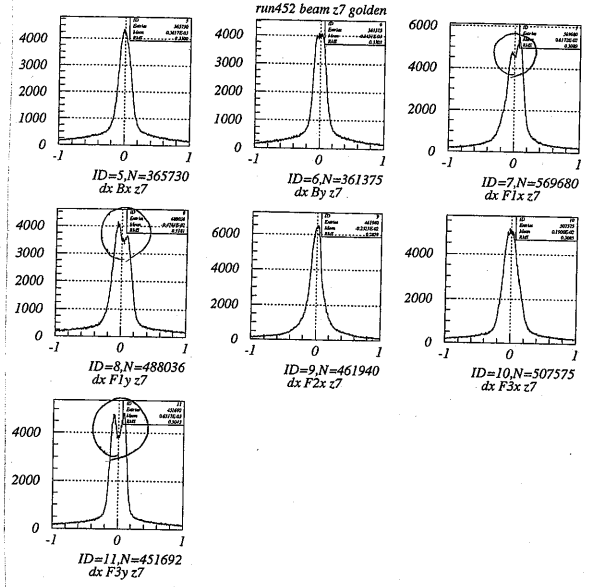
golden exact

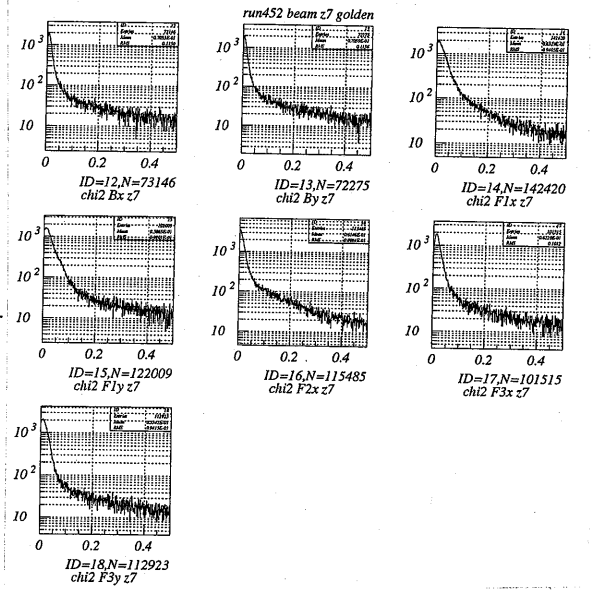
132

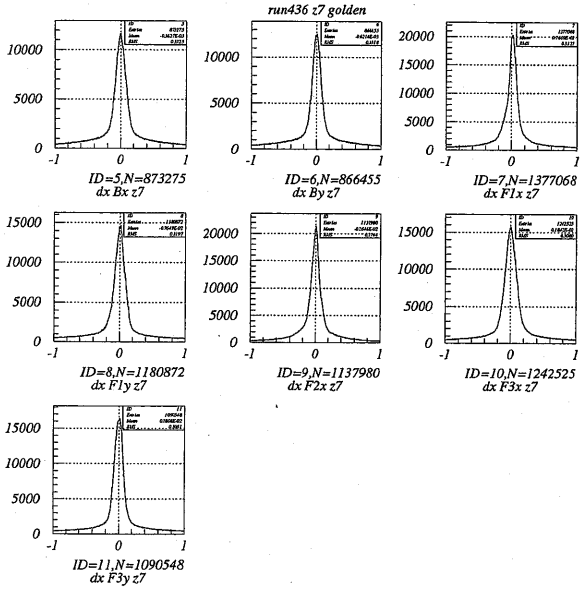
run436であわせたはずのものがずれている。?

2山になった

→ TDCがうごいた?







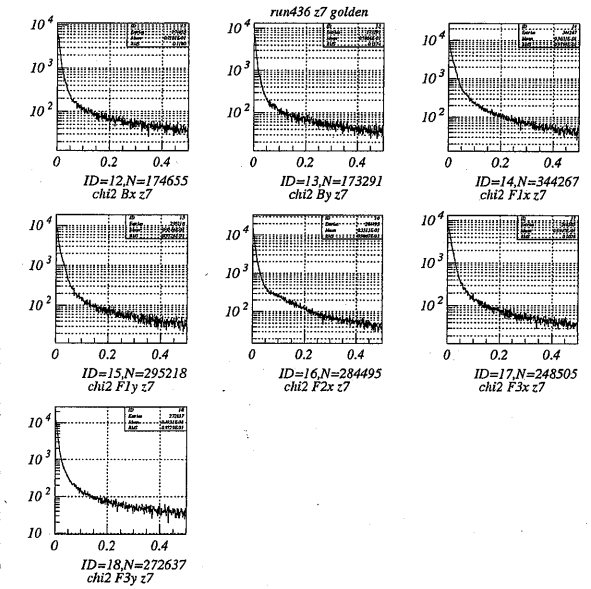
r436 beamtrig golden

かかってない.

⇓

TDCがdriftした? ?

2009/05/28 11.



run452を使って z=7の calibration をする.

dctdc452.ana

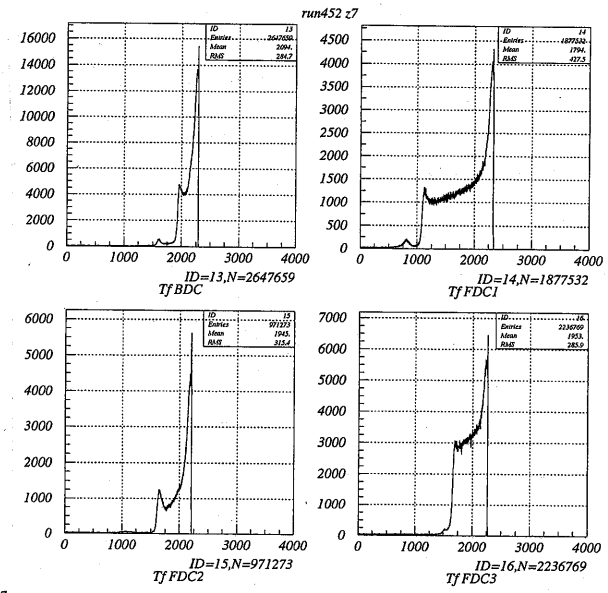
① TDC limit off
② χ^2 cut off.

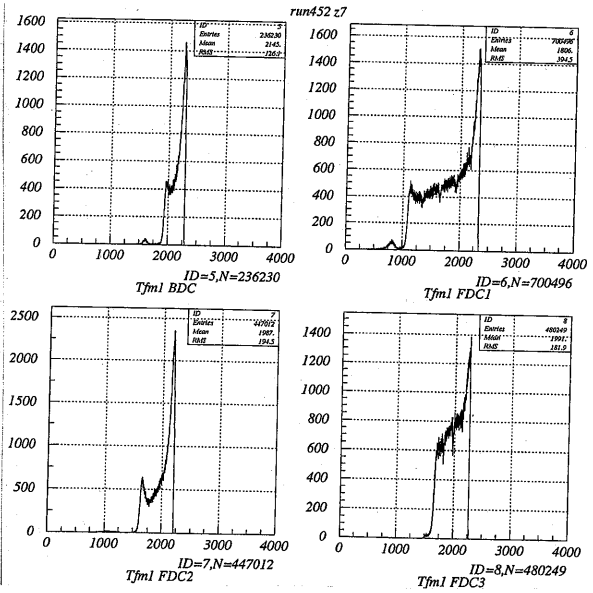
dctdc452_r452.hbook

(5) B 1800 ~ 2300
~~X~~→14 f1 ~~1450~~ 1000 ~ 2340
15←~~X~~ f2 1500 ~ 2220
~~X~~→16 f3 ~~1600~~ 1550 ~ 2270

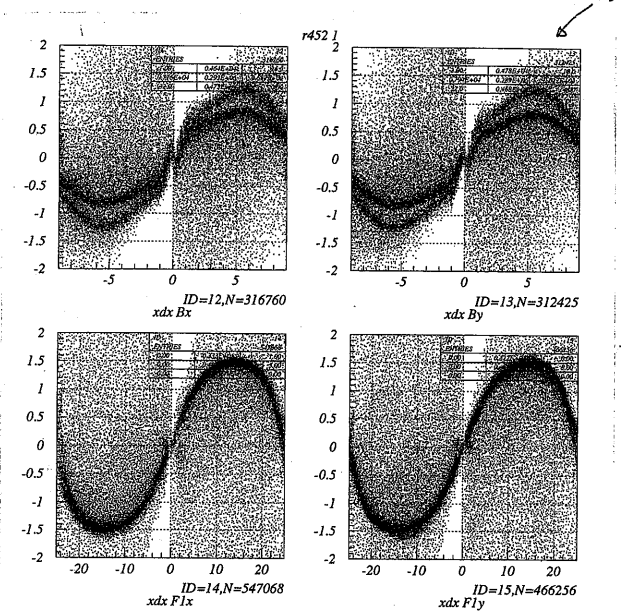
8D01.stc
f101.stc
f201.stc
f301.stc

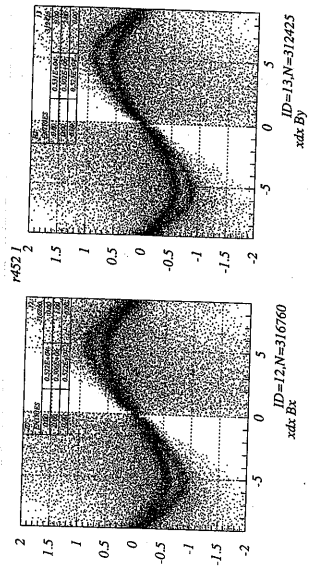
← fm1は

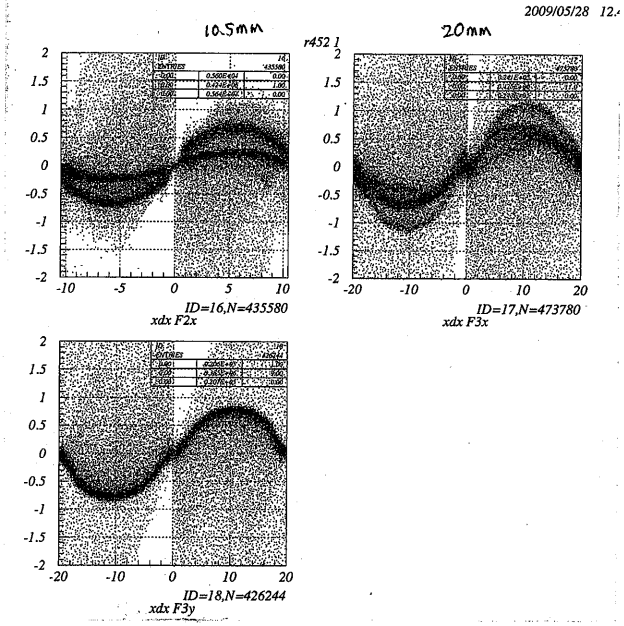


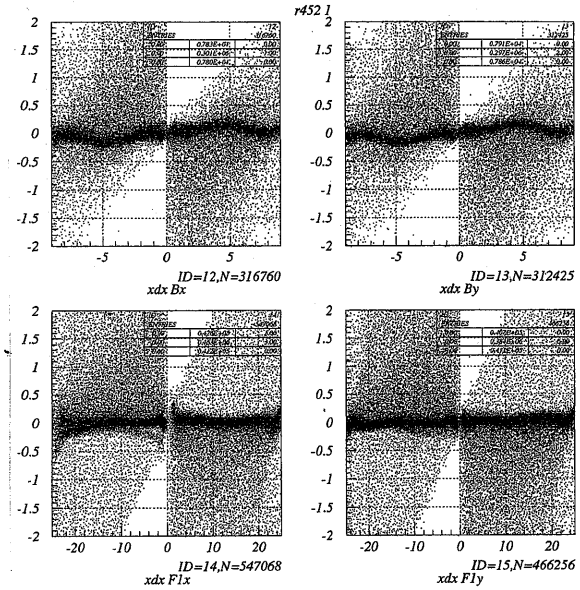


BD01.stc	xdxbd01.tdr	BD02.stc	xdxbd02.tdr	bd03.stc		
f101.stc	xdxf101.tdr	f102.stc	xdxf202.tdr	f103,stC		
f201.stc	xdff201.tdr	f202.stc	xdxf202.tdr	f203.stC	xdff203.tdr	f204.stc
f301.stc	xdff301.tdr	f302.stc	xdxf302.tdr	f303.stC		

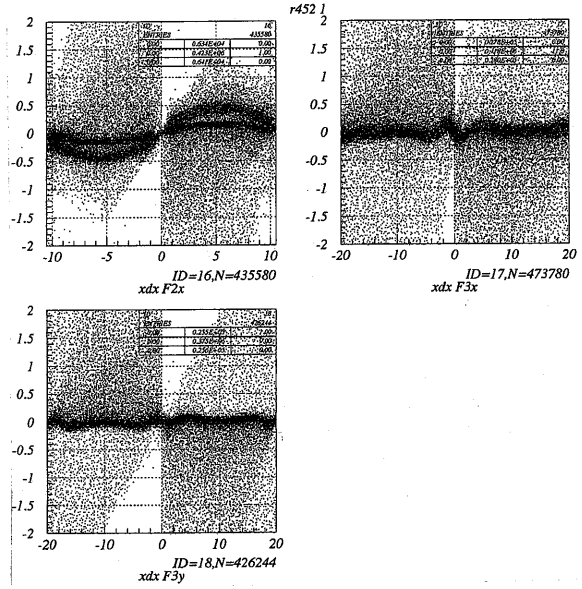


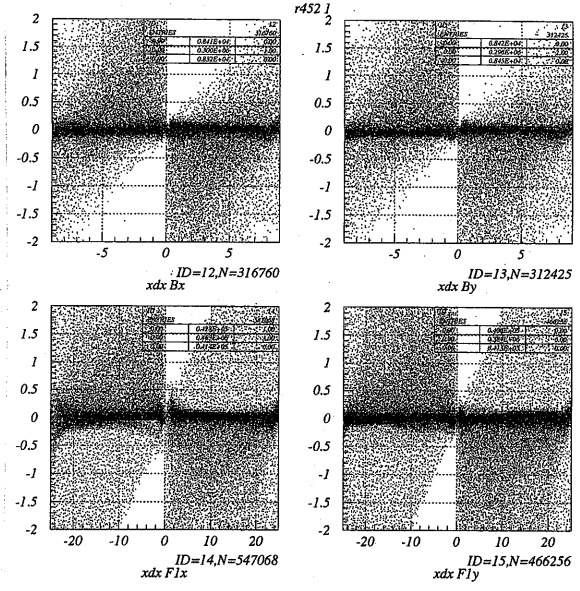




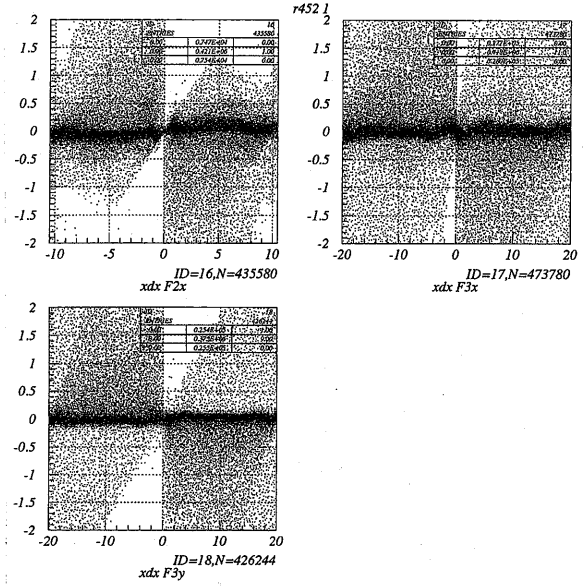


2009/05/28 16.

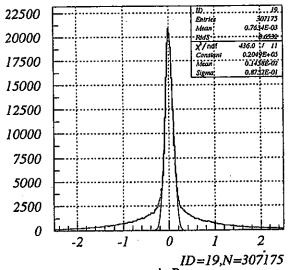




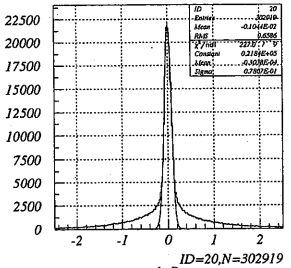
2009/05/28 1



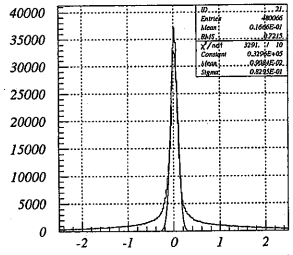
r452 1



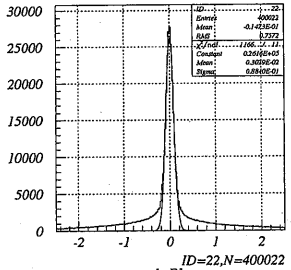
ID=19,N=307175
dx Bx



ID=20,N=302919
dx By



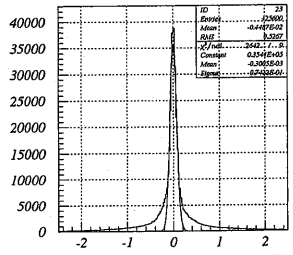
ID=21,N=480066
dx F1x



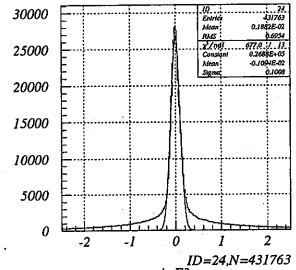
ID=22,N=400022
dx F1y

2009/05/28 18.0

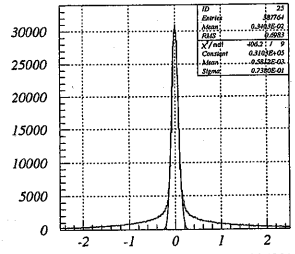
r452 1



ID=23,N=425600
dx F2x

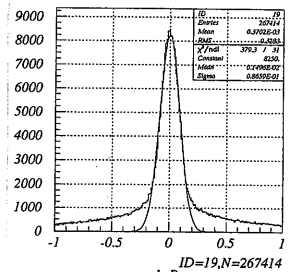


ID=24,N=431763
dx F3x

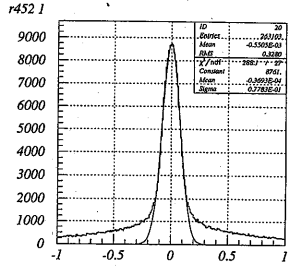


ID=25,N=387764
dx F3y

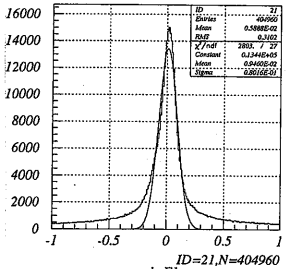
r452 1



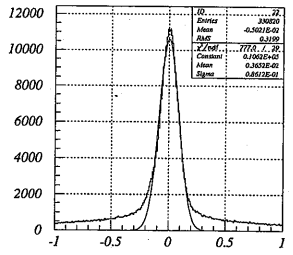
ID=19,N=267414
dx Bx



ID=20,N=263103
dx By



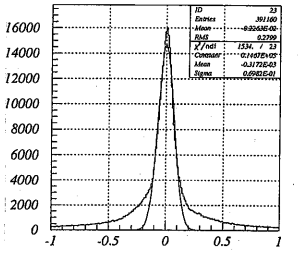
ID=21,N=404960
dx F1x



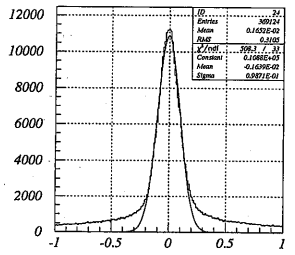
ID=22,N=330820
dx F1y

2009/05/28 18.

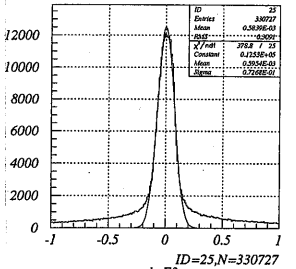
r452 1



ID=23,N=391160
dx F2x



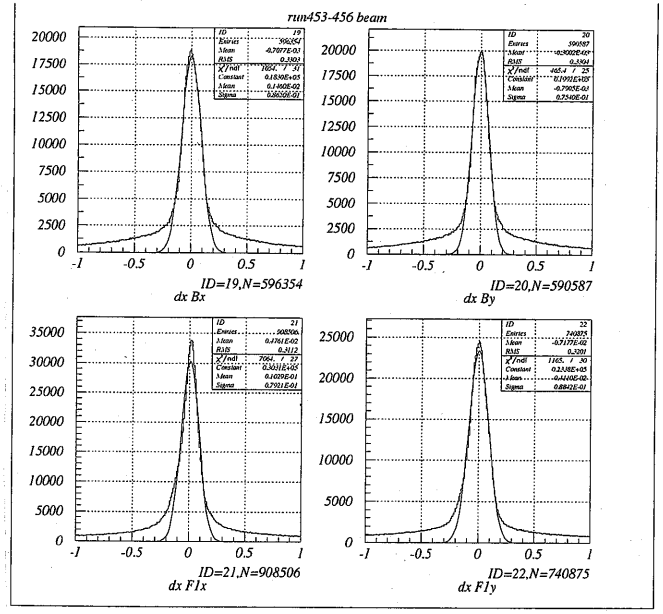
ID=24,N=369124
dx F3x



ID=25,N=330727
dx F3y

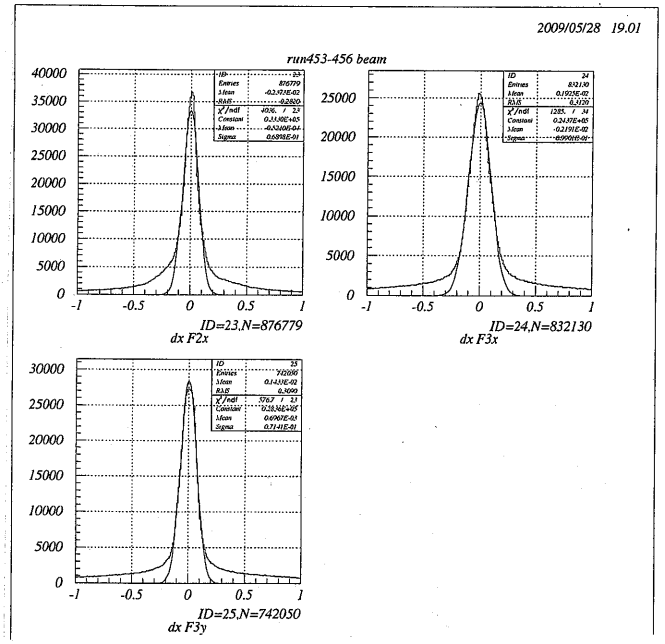
ここまでゼロ
r452 beam trigger

453-456 Z=7

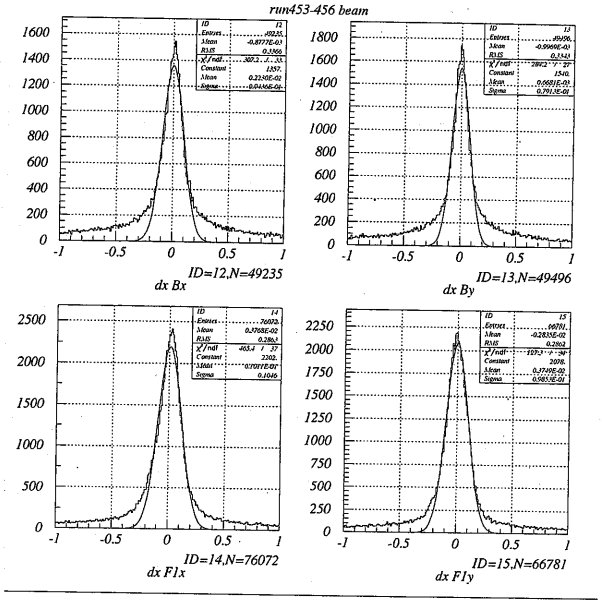


run453-456 beam では うまくいきません.

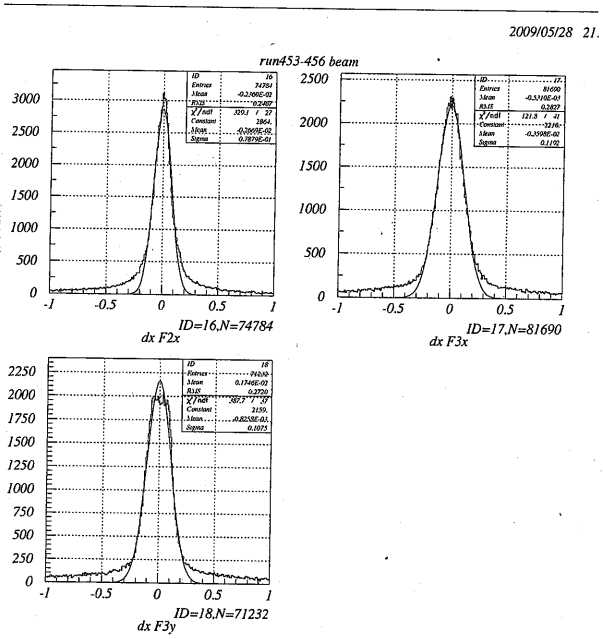
Z=7

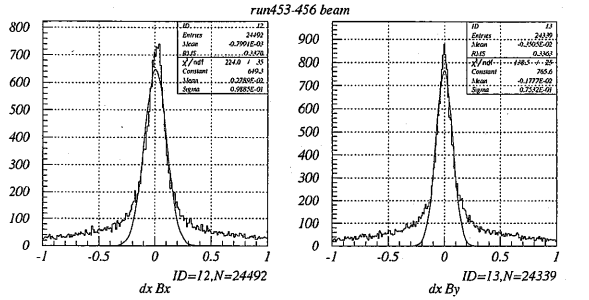


xdst-ana



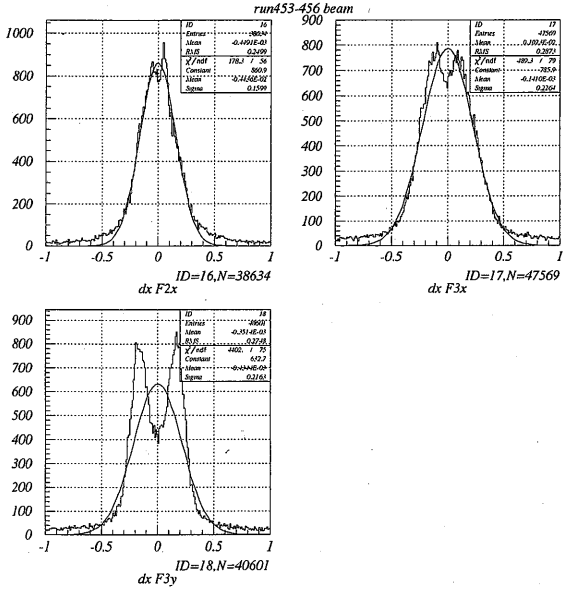
Z=6

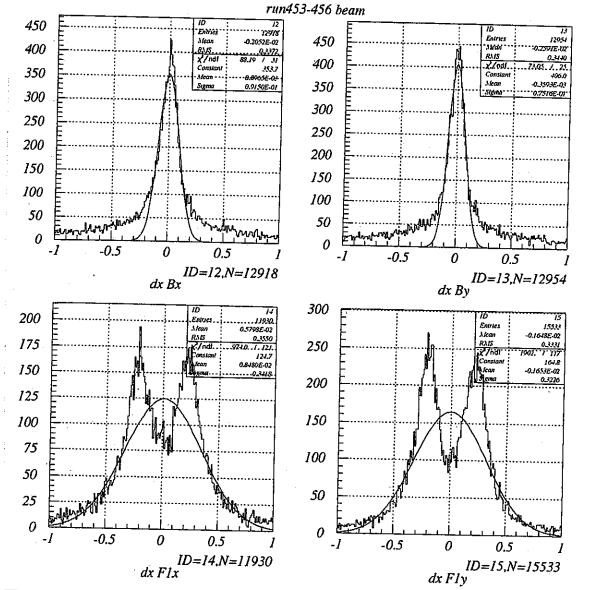




Z=5

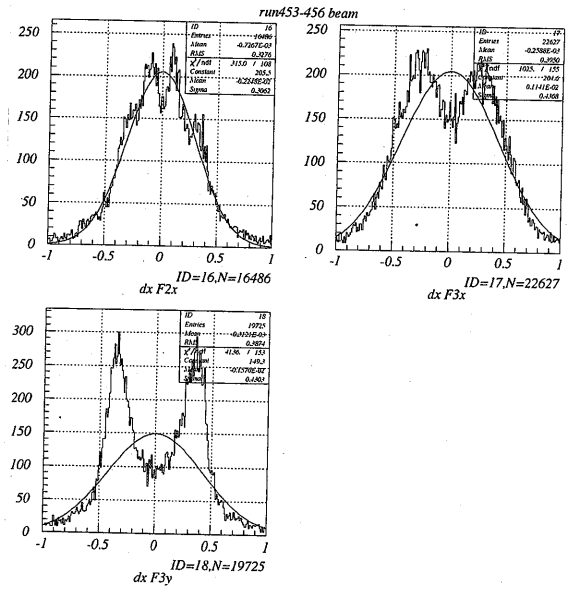
2009/05/28 21

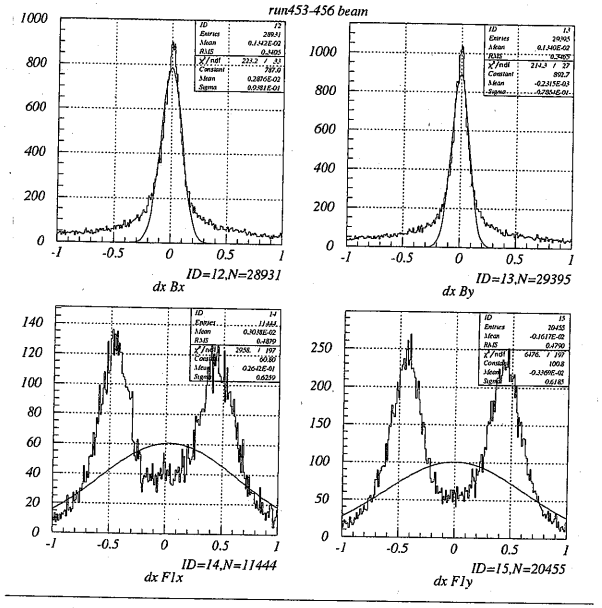




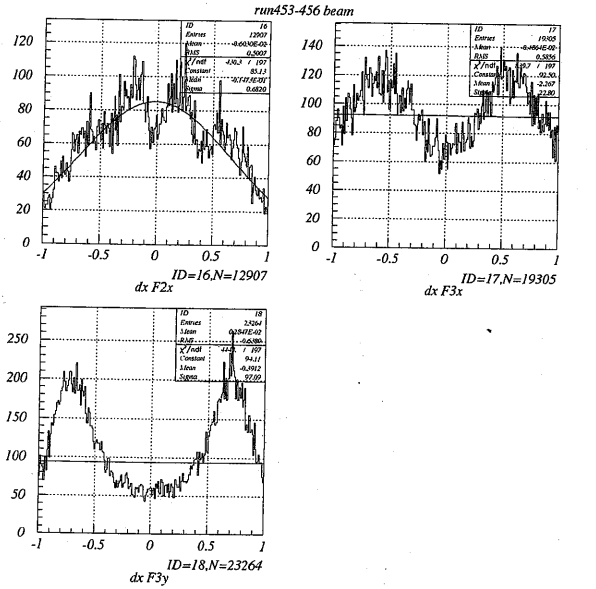
Z=4

2009/05/28 21.





Z=3



$$P = m\beta\gamma = m\beta(1-\beta^2)^{-\frac{1}{2}}$$

$$\frac{\partial P}{\partial \beta} = m(\quad)^{-\frac{1}{2}} + m\beta\left(-\tfrac{1}{2}\right)(1-\beta^2)^{-\frac{3}{2}}(-2\beta) = \frac{m}{\sqrt{\quad}} + \frac{m\beta^2}{\sqrt{\quad^3}} = \frac{1-\beta^2+\beta^2}{\sqrt{\quad^3}}\, m$$

$$= \frac{m}{\sqrt{1-\beta^2}^3}$$

$$\sigma_P = \frac{\partial P}{\partial \beta}\Delta\beta = m\gamma^3\sigma_\beta$$

$$\frac{\sigma_P}{P} = \frac{m\gamma^3\sigma_\beta}{m\beta\gamma} = \gamma^2\frac{\sigma_\beta}{\beta} = 1.608\,\frac{\sigma_\beta}{\beta}$$

$250 = (\gamma-1)\,932 \qquad \gamma = 1.2682$

$\frac{\sigma_P}{P} = 0.43\%$

47　6/22(月)

~15:00　仙台発　　鈴木号　　小林, 内田, 鈴木, 大島

~19:00　理研着

20:00~

① 下流架台

hodは BDC3 から ~24cm 下流

hod架台キャスターは、+440mm 13.5°　◯ 黒丸

hodを下流へずらす.

- FDC3 のプラスチック製ものさしをとる.
- ASD-PS の NIM Bin off.

② アルコールバブラー

バブラー + テフロンチューブ + ピスコ 6φ

リザーバー　〃

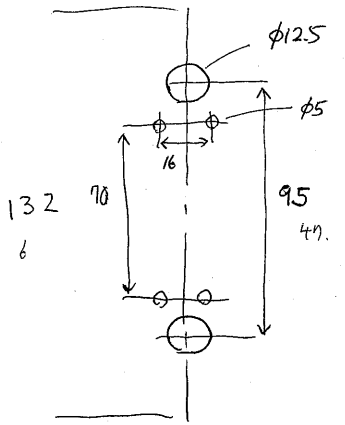
冷蔵本体に穴2ケ　+ RTVで固定　→一晩かかす　放置

③ 流量計

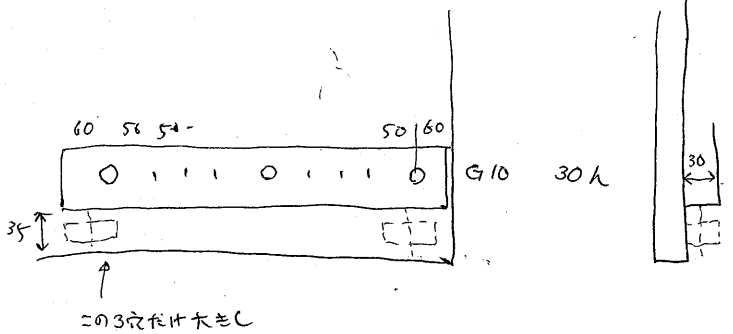
Ar 100cc/min

新型バブラー

3Uパネルを使い　流量計+バブラー　→ 穴あけ OK.



④ FDC3 ケーブルをはずす



6/22　23:20 ↓

6/23(火)

7:30 res. 一応OK

温度計がへん.

FDC3の両側にホゴ板をつける. 固定ネジ 6+1本は ふくろにいれて 上面におく.

光もしのテストの用意

HVモジュール
HVケーブル SHV-SHV
-MHV
BNCケーブル
50Ω
黒シート.
黒テープ
オシロ
焼中電灯.

VP09 を前左から

^{137}Cs 中央 100mV @1800V

SP. 15mV まわりがくろくせいかし、ぬずるしく のように見える.

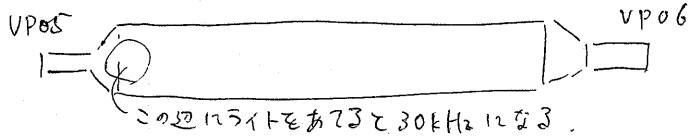
オシロ Vth = 2mV 4~5kHz

^{137}Cs を遠い所にあてて、100mVの大きさの信号のところで、線源をはずしてライトをあてて変化がないことをたしかめる.

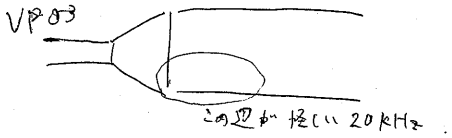
VP09 -1900mV. オシロ Vth=-2.0mV
ノイズ 20mV 6kHz~7kHz.
ライトをあてても変化しない.

VP07 -1950mV オシロ Vth=-2.0mV
ノイズ 25mV 5kHz~6kHz

VP05 -1750mV オシロ Vth=-2.0mV
ノイズ 20mV 5kHz程度.



VP03 -2100mV オシロ Vth=-2.0mV
ノイズ 20mV 4~5Hz



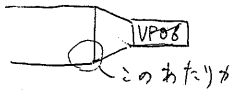
VP01 -1950mV オシロ Vth=-2.0mV
ノイズ 20mV 3~4kHz

この辺 15kHz程度.
↓
この辺にシールしまいたら直った(3~4kHz)

VP10 −1850V　　オシロ Vth=−2.0mV
ノイズ 20mV　4~5kHz
ライトあてても変化なし

VP08 −1950V　　オシロ Vth=−2.0mV
ノイズ 20mV　5~6kHz
ライトをあてても変化なし.

VP06 −1850V　　オシロ Vth=−2.0mV
ノイズ 20mV　6kHz



このあたりが怪しい. 100kHz.

VP04 −2200V　　オシロ Vth=−2.0mV
ノイズ 20mV　5~6kHz

裏面がとがっかがタメ 数MHz.

VP02 −2050V　　オシロ Vth=−2.0mV
ノイズ 20mV　4~5kHz
ライトをあてても変化なし.

VP01

ココに黒テープを2周.

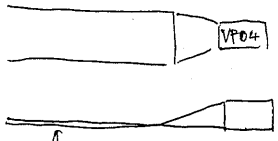
VP03

ココに黒テープ10mmくらい.

VP05

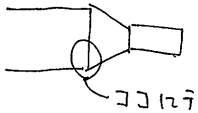
VP01と同様に2周

VP04



ココらへんに穴ありテープで補修

VP06

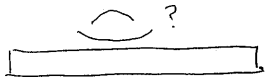

ココにテープを貼って補修.

これで全てライトをあてても変化しなくなった。

架台 - 応 くみたて レ

① たてバー 用 上部ケガキ ✓

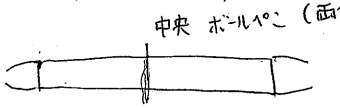
②

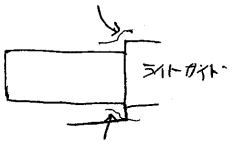


シンチ

① 一応 光もれを ~~4本~~ 8本 見る

②

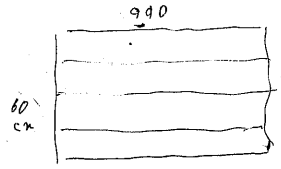




PMTは常に ラベルが上

③ スペーサー

910×600×20t

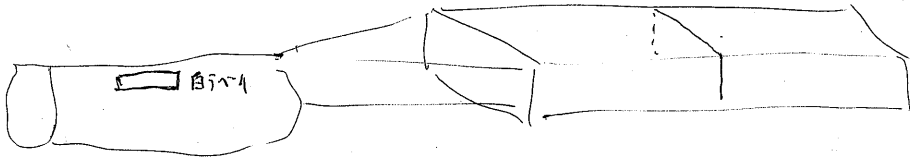


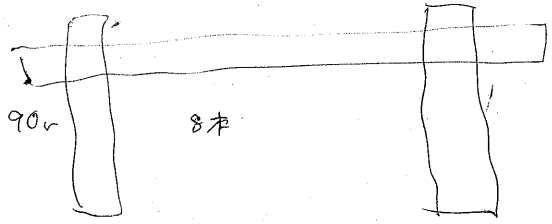
15cm×4

4枚 → 16本 8セット

8本/set

H1949 と H1161 分ケ





◦ 光もれ check

^{137}Cs をシンチ中心において、200mVの大きさの所で線源をはずして

ライトをあてる。

◦ LB05 (H1949) ~~1500mV~~ ~~1850mV~~ −1900mV

オシロ V_{fh} = −15.5mV

ノイズ 1~1.5kHz

ライトあてても変化なし

光もれなし

ライトあてても変化なし.

◦ LB17 (H1949) 線源有 : −1900V で 200mV

ノイズ: 1~1.5 ~~kHz~~ kHz

ライトあてて変化なし

◦ TH52 (H1161) 線源有 : −2200V で 200mV

ノイズ: 1~1.5 kHz

ライトあてて変化なし.

◦ TH71 (H1161) 線源有 : −2150V で 200mV

ノイズ: ~2kHz

ライトあてて変化なし.

2625
1318

2695
1338

×18

	上	下		上	下	
✓LB04	~~OK~~	~~✓~~	LB24	~~OK~~	✓	ミゾ
✓TK11	✓	✓	TK19	X	✓	
TK17	✓	✓	TK16	ホレX	ホレX	
LB25	✓	✓	LB01	✓	✓	
LB18	✓	✓	LB19	X	✓	
LB44	✓	X	LB14	✓	X	
LB34	X	X	LB48	—	—	
TK06	OK	OK	TK30	OK?	OK?	テープが厚いので
?(LB22	OK	OK	LB15	OK	X	?
赤LB23)	OK	OK	LB51	OK	OK	?
TK01	OK	X	TK22	?	OK	
LB30	OK	OK	LB06	OK	X	
TK23	ホレX	OK?	TK07	多分OK	OK	
TK29	OK	OK (tape厚)	TK32	OK	OK	テープ厚
LB26	OK	X >1mm	LB29	OK?	OK	
TK05	OK	X	TK26	OK	OK	
LB40	OK	OK	LB39	X	X	
LB56	#OK	OK	LB03	OK	OK	

H1949 43 16×2=32 +11本 311本2
H1161 ×21
64

34
30

×16

	上	下		上	下	
TH51	✓	✓	TH62	✓	✓	
TH02	✓	?	TH40	OK	OK	
TH08	OK	OK	TH09	X	X ホレ	
TH69	OK	OK	TH42	OK	OK	
TH61	X大	OK	TH44	OK	OK	
TH60	OK	OK	TH35	OK	OK	
~~TK01~~	~~OK~~	~~X~~	丰			
TH18	OK	OK	TH19	OK	OK	テープ厚
TH58	X	X	TH48	OK	OK	
TH37	OK	OK テープ厚	TH15	OK	OK テープ厚	
TH57	X テープ厚	X	TH72	OK	OK	
TH68	OK	OK テープ厚	TH39	OK	OK テープ厚	
TH30	OK	OK	TH70	OK	OK	
TH67	X (斜め)	X	TH66	OK	OK	
TH31	X?	OK	TH54	OK	OK	
TH53	X	X	TH07	OK	OK	
TK24	OK	OK?	TK12	OK	OK (テープ厚)	

TH71
上 X 下 X

LB05
上 ✓ 下 ✓

TK02
上 ✓ 下 ✓

LB41
上 ✓ 下 ✓

LB28
上 X 下 X

TK09
上 ✓ 下 ✓

TH43
上 ✓ 下 ✓

LB45
上 ✓ 下 ✓

TH25
上 ✓ 下 ✓

LB52
上 ✓ 下 ✓

TK27
上 ✓ 下 X

LB49
上 X 下 ✓

TH63
上 X 下 ✓

TK08
上 X 下 X

TK10
上 ✓ 下 ✓

TH52
上 ✓ 下 ✓

LB17
上 X 下 ✓

TK03
上 X 下 ✓

LB08
上 X 下 ✓

LB54
上 ✓ 下 ✓

TK28
上 ✓ 下 X

TH47
上 ✓ 下 ✓

LB20
上 X 下 X

TH27
上 ✓ 下 ✓

LB21
上 X 下 X

TK20
上 ✓ 下 X

LB35
上 ✓ 下 X

TH29
上 X 下 X

TK31
上 X 下 X

TK15
上 X 下 X

TH33
上 X 下 X

LB10
上 ✓ 下 ✓

TH06
上 X 下 X

LB09
上 ✓ 下 ✓

TK13
上 ✓ 下 ✓

LB37
上 ✓ 下 ✓

LB38
上 X 下 X

TK25
上 ✓ 下 ?

LB53
上 X 下 X

TK14
上 X 下 ✓

LB27
上 ✓ 下 ✓

LB12
上 ✓ 下 ✓

LB46
上 X 下 ✓

LB33
上 X 下 ✓

LB13
上 ✓ 下 ✓

TH45
上 ✓ 下 ✓

LB36
上 X 下 ✓

TH32
上 ✓ 下 X

LB16
上 X 下 X

TK21
上 X 下 X

LB50
上 ✓ 下 X

LB47
上 ✓ 下 ✓

TK04
上 ✓ 下 X

LB55
上 ✓ 下 ✓

TK18
上 ✓ 下 ✓

LB11
上 ✓ 下 X

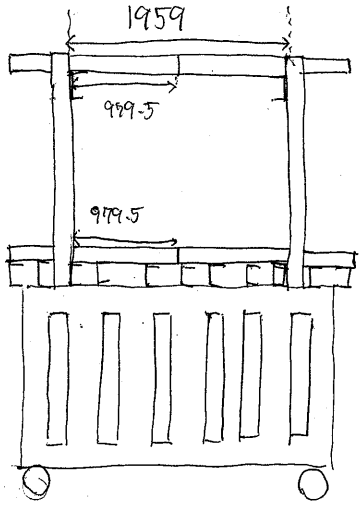
LB31
上 X 下 X

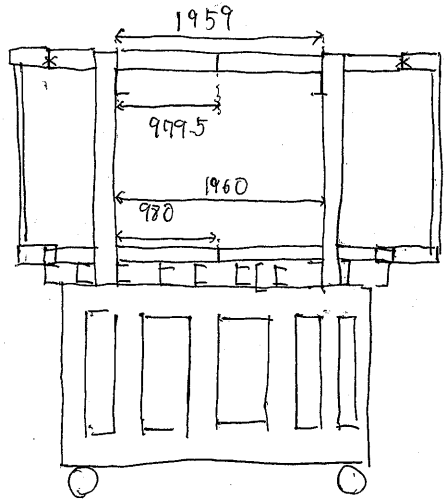
LB32
上 ✓ 下 ✓

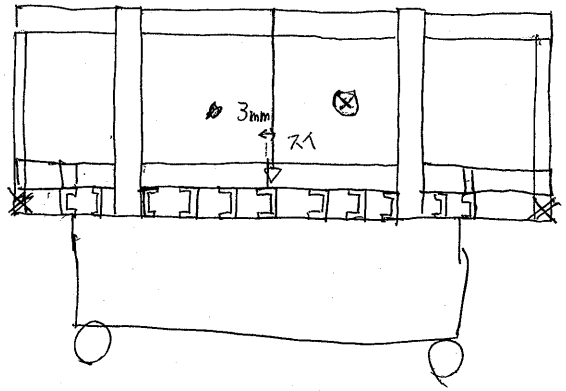
LB43
上 ✓ 下 ✓

LB07
上 X 下 ✓

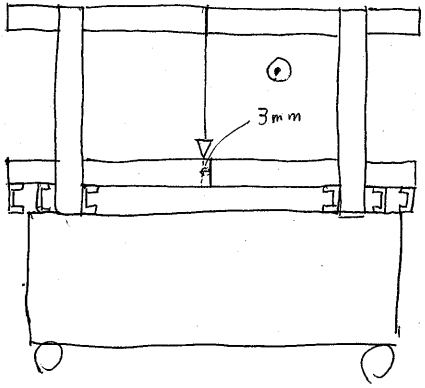
中性子検出器荷台　ケガキ線



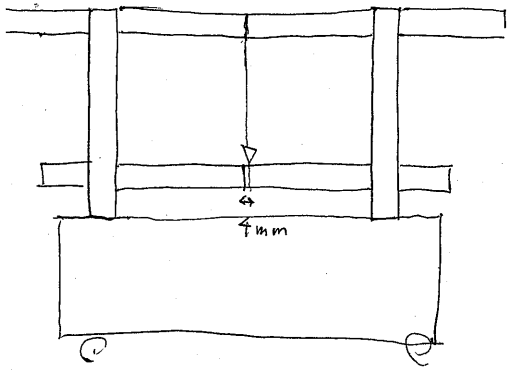




上のケガキ線からスイをたらし
下のケガキ線の3mm右に
スイがくる。



上のケガキ線からスイたらす、
下のケガキ線の3mm左にス



上流から1列目の検出器
おく台のケガキをみる.

上のケガキからスイたらす
↓
下のケガキの4mm右にスイ

LB12	LB31
LB53	LB55
TK13	TK21
LB09	LB16
TK10	TK15
TK08	TK31
LB35	LB49
TK20	TK27
LB28	LB45
LB28	LB54
TK16	TK17

H1949

光電子増倍管のペア

2008.12.28 小林

Pair for H1949

1-10	1	LB51	LB23		
1-20	2	LB26	LB29		
1-30	3	LB10	LB36		
1-40	4	LB30	LB06		
1-50	5	LB19	LB18		
2-12	6	LB34	LB48		
1-60	7	LB05	LB17		
	8	LB16	LB02		
1-70	9	LB04	LB24		
1-80	10	LB01	LB25		
1-90	11	LB37	LB50		
2-13	12	LB52	LB21		
2-14	13	LB14	LB44		
1-100	14	LB33	LB43		
1-110	15	LB13	LB07		
1-120	16	LB46	LB32		
2-15	17	LB40	LB39		
3-4	18	LB09	LB16		
1-130	19	LB41	LB08		
3-5	20	LB54	LB28		
2-16	21	LB38	LB47		
1-140	22	LB11	LB27		
3-6	23	LB53	LB55		
3-7	24	LB31	LB12		
1-150	25	LB56	LB03		
3-8	26	LB49	LB35		
3-9	27	LB20	LB45		
	28	LB42	LB22		
1-160		LB22	LB15		

29	TK32	TK29	
30	TK09	TK28	
31	TK16	TK17	
32	TK02	TK03	
33	TK20	TK27	
34	TK21	TK13	
35	TK14	TK18	
36	TK25	TK04	
37	TK05	TK26	
38	TK10	TK15	
39	TK31	TK08	
40	TK06	TK30	
41	TK12	TK24	
42	TK11	TK19	
43	TK01	TK22	
44	TK07	TK23	

Pair for H1161

3-1	45	TH02	TH40
4-1	46	TH08	TH09
4-9	47	TH06	TH32
3-2	48	TH35	TH60
4-8	49	TH07	TH53
4-9	50	TH48	TH58
3-3	51	TH30	TH70
3-1	52	TH39	TH68
4-1	53	TH42	TH69
4-1	54	TH18	TH19
4-6	55	TH15	TH37
4-1	56	TH57	TH72
4-5	57	TH31	TH54
4-1	58	TH52	TH71
4-4	59	TH43	TH47

4-1	60	TH51	TH62
4-3	61	TH33	TH45
4-1	62	TH29	TH63
4-2	63	TH66	TH67
4-1	64	TH25	TH27
4-1	65	TH61	TH44

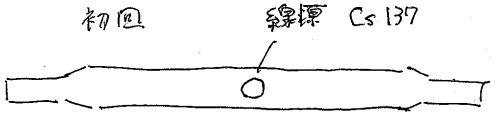
#2 64 ↑上
62
60
58
56
54
46
49

#1 49
50
55
57
59
61
63
65 ↓上

計11本

? HA49とH1161のtiming? 差

1 LB51



mV) 10mV−5nS — HV = −1735 V 波高 100 mV
10kHz

~~LB23~~ HV = −1745 V

LB23

100 mV — 5nS 10mV (2mV)
10kHz

-2 LB26

線源有 波高100mV HV=−1760V

10mV−5nS
10kHz 光もれなし

-3 LB36 ×○

線源有 HV = −1780 V

10mV−5nS
10kHz ○K

LB29

~~100m~~ −1768 V

10mV−5nS
10kHz ○K

目 LB10 ○○
HV=−1765V

10mV−5nS
10kHz ○K

-4 LB30 ○○

HV = −1782V

10mV−5nS
20kHz ○K

LB06 ○×

HV = −1795V

10mV−5nS
20kHz ○k

-5 LB19 ○ ×○

HV = −1793V

10mV−5nS
10kHz OK

LB~~18~~ 19 ×○

HV = −1781V

10mV−5nS
10kHz Ok

6 LB~~05~~ 17 ×○

HV = −1820 V

10mV−5nS
10kHz ○K

LB 05 ○○

HV = −1802V

10mV−5nS
10kHz ○K

1-7 LB24 ~~×~~ ○○

HV = −1795 V

10mV−5nS
10kHz OK

1-8 LB01 ○○

HV = −1811 V

10mV−5nS
10 kHz ○K

1-9 LB50 ○X
確認(○X)

スペーサ2枚 1-9下

HV = −1790 V

10mV−5nS
10~14kHz ○K

1-10 LB33 XO
(XO)

LB04 ○○

HV=−1809V

10mV−5nS
15kHz OK

LB25 ○○

HV: −1786V

10mV−5nS
10kHz ○k

↴全

LB37 ○○
(○○)

1本(下; LB37の下)

HV = −1804 V

10mV−5nS
10kHz OK

LB43 ○○
(○○)

～10本 程度 積んで わかったのは

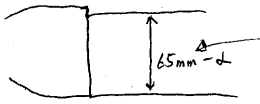
● 個体 差が 大きい

接着

たとえば 削りのみ ×

シム 65mm 側の厚さ
接着 自体

テープ のまき方



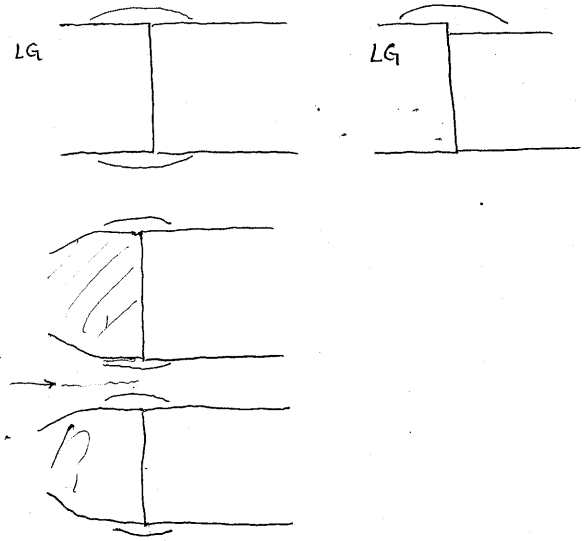
⋮

など

⇓

ライトガイドに 荷重は かけたくない。

下の方は、調整してないので。 再度 mount する。

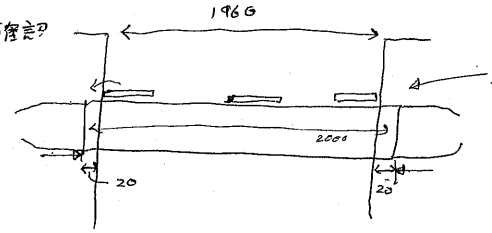


① set を 書く.

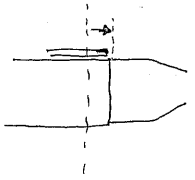
設定 data

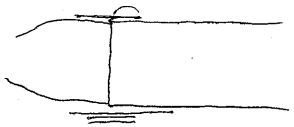
↓

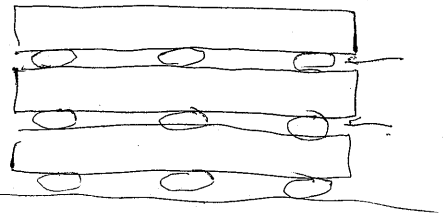
再石度認

② 

場合によっては 外側に,







1820 × 910

18 × 9 = 162 枚

324 枚.

~~65 × 200~~

6.5 × 200 × 10 = 13000 g 13kg

2000

PMT 50g

13kg × 16 = 178kg.

180kg / bay

3 × 16 × 4

48 × 4 = 192

2

13
16
98
13
198

繋ぎ回し

LB51 ○○ (○○)		LB23 ○○ (○○)
2枚		2枚
LB26 ○× (○×)		LB29 ○○ (○○)
2枚		2枚
LB36 ×○ (○×)		LB10 ○○ (○○)
2枚		2枚
4 LB30 ○○ (○○)		LB06 ○× (○×)
1		1
5 LB19 ×○ (×○)		LB18 ○○ (○○)

ここで中断

スペーサーを作る

spacer 910×1820×1mm^t 塩化ビニル

9×18 = 162枚/枚 } 2枚で 324枚

必要な数

1枚ずつつむとして 3×16×4 = 192枚 (48, 3) ← 2倍はない

0.5^t 910×600

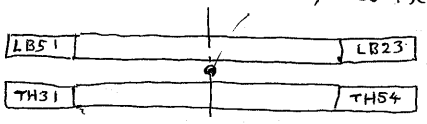
54枚/1枚

2枚切る ↓

108枚あり

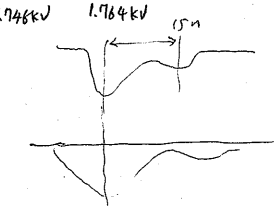
H1161とH1949のtiming.

^{60}Co, ^{137}Cs 中央.



#1 LB51とLB23 ~100mV @0.5MeV ^{137}Cs

1.746kV 1.764kV

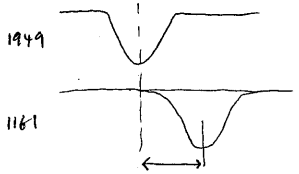


Bは広がって見える.

^{60}Coに対応 100mV(^{137}Cs) ⟶ ~200mV(^{60}Co)

#2 LB51とTH54 ^{60}Co @200mV

1.746kV 1920V

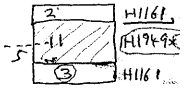


≈7nsec

5~7nsec

L1
L2 } H1949

L3



L4 H1161

H1161は、H1949より ≈7nsec おそい

↓

同じlayerにまぜても、特に問題点なし

6/27 (土) 再度 install

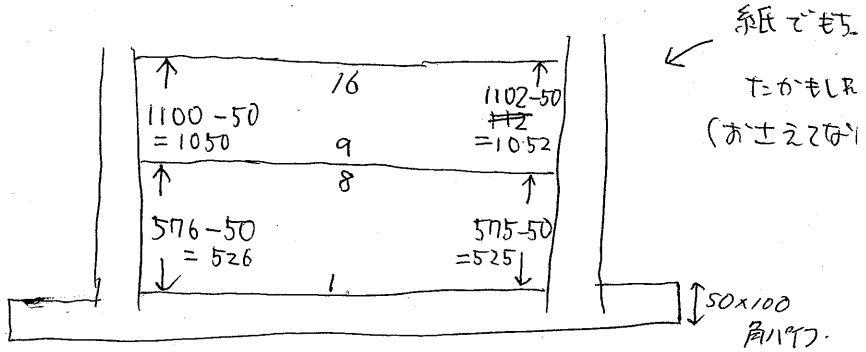
ビーム

	2枚	2枚× → 2.5
	✓	✓
1-5	~~LB18~~ ~~LB19~~	LB19 ~~LB18~~
	1	1
-4	LB30 ✓	✓ LB06
	2	2
1-3	LB36 ✓	✓ LB10
	2	2
1-2	LB26 ✓ ○×	✓ LB29 ○○
	2	2
1-1	LB51 ○○	✓ LB23 ○○

	2	2
	HV : -1791 V 10mV - 5nS 8~10 kHz OK	HV : -1794 V 10mV - 5nS 10 kHz OK
1-11	LB07 ~~LB13~~	13 ~~LB01~~
	1	1
	HV:- 1807 V Vth = -2.0mV 光もれ 10mV - 5nS OK 10kHz	HV : - 1796 V Vth = -2.0mV 10mV - 5nS OK 10kHz
1-10	LB33	LB43
	~~1-10~~ 1	1
1-9	LB50	LB37
	2	2
1-8	LB01	LB25
	1	1
1-7	LB24	LB04
	2	2
1-6	LB17	LB05

	HV：−1770 V 10mV−5nS 15〜20kHz OK	HV：−2030 V 10mV−5nS 10kHz OK
-16	LB15 ~~LB22~~ ~~LB21~~ ○ (×) ○ (	LB22 ~~LB15~~ ○ (○) ○ ×
	2	2
	HV：−1915 V 10mV−5nS 10kHz OK	HV：−1880 V 10mV−5nS 10kHz OK
-15	LB ~~54~~ 03 ○ (○) ○ (○)	LB ~~33~~ 56 ○ (○ ×テープ厚) ○
	1	1
	HV：−1839 V 10mV−5nS 10〜15kHz OK	HV −1889 V 10mV−5nS 15〜20kHz OK
-14	LB11 ○× (○○)	LB27 ○○ (○×) テープ厚
	2	2
	HV：−1817 V 10mV−5nS 10kHz OK	HV：−1818 V 10mV−5nS 10kHz OK
-13	LB ~~41~~ 08 ×○ ~~○○~~ (×○)	LB ~~08~~ 41 ○○ ~~×○~~ (×○)
	1.5	1
	HV −1814 V 10mV−5nS 10kHz OK	HV −1803 10mV−5nS 10kHz OK
-12	LB ~~46~~ 32 ○○ (○○) ~~××~~	LB ~~32~~ 46 ×○ (××) ~~○○~~

一層目 高さ



65×16 = 1040

1/2mm = 520

1	1	1.5	1.5
HV = −1895V 10mV−5nS 10kHz OK -6 TK26 ○(○)	HV = −1847V 10〜15mV−5nS 15〜20kHz OK TK05 ○(×) ×(×) PMT ガタガタ	HV = −1776V 10mV−5nS 10〜15kHz OK 2-12 LB34 ×(×)	HV = −1738V 10mV−5nS 5kHz OK LB48 ○(○)
1	1	2	2
HV = −1850V 10mV−5nS 8〜10kHz OK -5 TK04 ○(○ テープ厚)	HV = −1850 10mV−5nS 5〜10kHz OK TK25 ○(○)	HV = −2148V 10mV−5nS 8kHz OK 2-11 TK23 ×(○)	HV = −2109V 10mV−5nS 9kHz OK TK07 ○(○)
1.5	1.5	2	2
HV = −1817V 10mV−5nS 10kHz OK -4 TK18 ○(○)	HV = −1830V 10mV−5nS 10kHz OK TK14 ×(×)	HV = −2101V 10mV−5nS 10−15kHz OK 2-10 TK01 ○(○ テープ厚)	HV = −2129V 10mV−5nS 8kHz OK TK22 ?(× テープ厚)
1.5	1.5	2	2
HV = −1782V 10mV−5nS 10kHz OK -3 TK02 ○(○)	HV = −1816 10mV−5nS 10kHz OK TK03 ×(×)	HV = −2026V 10mV−5nS 9kHz OK 2-9 TK11 ○(○)	HV = −2043V 10mV−5nS 10kHz OK TK19 ×(×)
1.5	1.5	1	1
HV = −1747V 10mV−5nS 10kHz OK -2 TK28 ○(○)	HV = −1758 10mV−5nS 10kHz OK TK09 ○(○)	HV = −1960V 10mV−5nS 6〜8kHz OK 2-8 TK24 ○(○)	HV = −1960V 10mV−5nS 10kHz OK TK12 ○(○)
2	2	1.5	1.5
HV = −1735V 10mV−5nS 10kHz OK -1 TK29 ○(○)	HV = −1712V 10mV−5nS 10kHz OK TK32 ○(○)	HV = −1970V 10mV−5nS 10kHz OK 2-7 TK30 ○(× テープ厚)	HV = −1940V 10mV−5nS 10〜15kHz OK TK06 ○(○)

HV = −1860V 10mV −5ns 9kHz OK 2-16 LB47 ○ (○) ○ (○)	HV = −1836V 10mV −5ns 10kHz OK LB38 ✕ (✕) ✕ (✕)
1.5	1.5
HV = −1829V 10mV −5ns 10kHz OK 2-15 LB39 ✕ (✕) ✕ (✕)	HV = −1830V 10mV −5ns OK 10kHz LB40 ○ (○) ○ (○)
2	2
HV = −1800V 10mV −5ns 10~15kHz OK 2-14 LB14 ○ (○) ✕ (✕)	HV = −1786V 10mV −5ns 10kHz OK LB44 ○ (○) ✕ (✕)
2	2
HV = −1804V 10mV −5ns 10kHz OK 2-13 LB~~1~~52 ○ (○) ○ (○)	HV = −1822V 10mV −5ns 9kHz OK LB21 ✕ (✕) ✕ (✕)

1.5	1.5
HV = −1869V 10mV −5ns → LB55にテープまいた 35kHz ↓ 10kHz OK 3-6 LB55 ○ (○) ○ (○)	HV = −1861V 10mV −5ns → 56kHz ↓ 10kHz OK LB53 ✕ (✕) ✕ (✕)
1.5	1.5
HV = −1866V 10mV 5ns 4~5kHz OK 3-5 LB54 ○ (○) ○ (○)	HV = −1876 10mV 5ns 10kHz OK LB28 ✕ (✕) ✕ (✕)
1.5	1.5
HV = −1844V 10mV −5ns 7~10kHz OK 3-4 LB16 ✕ (✕) ✕ (○)	HV = −1816 10mV −5ns 9kHz OK LB09 ○ (○) ○ (○)
1.5	1.5
HV = −1803V 10mV −5ns 8~10kHz OK 3-3 TH70 ○ (○) ○ (○)	HV = −1788V 10mV −5ns 5~10kHz OK TH30 ○ (○) ○ (○)
1	1
HV = −17~~3~~23V 10mV −5ns 8kHz OK 3-2 TH60 ○ (○) ○ (○)	HV = −1710V 10mV −5ns 9kHz OK TH35 ○ (○ テープ厚) ○ (✕)
1	1
HV = −1706V 10mV −5ns ~~8~~7~9kHz OK 3-1 TH40 ○ (○) ○ (○)	HV = −1741V 10mV −5ns 10kHz OK TH02 ○ (○) ? (○)

2	2
HV: −1810V 10mV −5nS 8~12kHz OK 3−12 TK21 × (×) × (×)	HV: −1821V 10mV −5nS 7~10kHz OK TK13 ○ (○) ○ (○)
1.5	1.5
HV: −1835V 10mV −5nS 5~8kHz OK 3−11 TK27 ○ (○) × (×)	HV: −1804V 10mV −5nS 8~10kHz OK TK20 ○ (○) × (×)
1.5	1.5
HV: −1759V 10mV −5nS 10kHz OK 3−10 TK17 ○ (○) ○ (○)	HV: −1781V 10mV −5nS 10kHz OK TK16 × (×テープ厚) × (×テープ厚)
1.5	1.5
HV: −1917V 10mV −5nS 10kHz OK 3−9 LB45 ○ (○) ○ (○)	HV: −1928V 10mV −5nS 10kHz OK LB20 × (×) × (×)
1.5	1.5
HV: −1906V 10mV −5nS 7~9kHz OK 3−8 LB49 × (×) ○ (○)	HV: −1903V 10mV −5nS 10kHz OK LB35 ○ (○) × (×)
2	2
HV: −1881V 10mV −5nS 30kHz → 3列側のPMTに当てるところにテープ ↓ 10kHz OK 3−7 LB31 × (×) × (×)	HV: −1874V 10mV −5nS 50kHz → 〃 ↓ OK LB12 ○ (○) ○ (○)

HV: −1839V 10mV 5nS 10kHz OK 3−16 TH42 ○ (×テープ厚) ○ (×テープ厚)	HV: −1878V 10mV 5nS 10kHz OK TH69 ○ (○) ○ (○)
1.5	1.5
HV: −1832V 10mV 5nS 5~7kHz OK 3−15 TH39 ○ (○) ○ (○)	HV: −1832V 10mV, 5nS 7~10kHz OK TH68 ○ (○) ○ (○)
2	2
HV: −1917V 10mV 5nS 7~10kHz OK 3−14 TK31 × (×テープ厚) × (×テープ厚)	HV: −1951V 10mV 5nS 8~10kHz OK TK08 × (× テープ) × (× テープ)
1.5	1.5
HV: −1912V 10mV −5nS 10~15kHz OK 3−13 TK15 × (×) × (×)	HV: −1901V (PMTダクガ) 10mV −5nS 8−11kHz OK TK10 ○ (○) ○ (○)

179　2層目

	R	L	
上	1103−50 = 1053	1102−50 = 1052	← 上からおさえてない

3層目

	R	L	
上	1098−50 = 1048	1099−50 = 1049	← 上からおさえて測定
中央	576−50 = 526	中 574−50 = 524	

1.5	1.5
HV = −1911V 10mV. 5nS 9kHz　OK 4−5 TH37 ○ (○ ○)	HV = −1944V 10mV. 5nS 10kHz　OK TH15 ○ (○ ○)
2	2
HV = −2000V 10mV. 5nS 10kHz　OK 4−6 TH31 ○ (○ ○)	HV = −1912V 10mV. 5nS 10kHz　OK TH54 ○ (○ ○)
1	1
HV = −2160V 10mV. 5nS 10kHz　OK 4−3 TH43 ○ (○ ○)	HV = −2070V 10mV. 5nS 9kHz　OK TH47 ○ (○ ○)
2	2
HV = −1696 10mV. 5nS 8kHz　OK 4−2 TH45 ○ (○ ○)	HV = −1622V 10mV. 5nS 8kHz　OK TH33 × (× テープ)
1	1
HV = −1670V 10mV. 5nS 8kHz　OK 4−1 TH67 × (× テープ)	HV = −1673V 10mV. 5nS 8kHz　OK TH66 ○ (○ ○)
4−15へ 4−1 TH44 ○ (○ ○)　PMT 接触不良 X	2本目のアノードへのハンダ付不良 → 修理OK HV = −1573V 10mV 5nS 8kHz　OK TH61 × (× ○)

1.5

HV = −1961 V
10mV 5nS
8kHz OK

4−11 TH57 X (X テ−7°)
X X

2

HV = −1875 V
10mV 5nS
8kHz OK

4−10 TH18 ○ (○)
○ ○

2

HV = −1680 V
10mV 5nS
8kHz OK

チ−9 TH09 X (X)
X X

2

HV = −1708 V
10mV 5nS
9kHz OK

チ−8 TH32 ○ (○)
X (X チ−7°)

2

HV = −1755 V
10mV 5nS
9kHz OK

チ−17 TH53 X (X)
X X

2

HV = −1824 V
10mV
9~13kHz OK

チ−6 TH58 X (X)
X X

1.5

HV = −1899 V
10mV 5nS
5~9kHz OK

TH72 ○ (○)
○ ○

2

HV = −1814 V
10mV 5nS
8kHz OK

TH19 ○ (○)
○ (X)

2

HV = −1655 V
10mV 5nS
20kHz OK

TH08 ○ (○)
○ ○

2

HV = −1706 V
10mV 5nS
8kHz OK

TH06 X (X)
X X

2

HV = −1709 V
10mV 5nS
8kHz OK

TH07 ○ (○)
○ ○

2

HV = −1758 V
10mV
15kHz OK

TH48 ○ (○)
○ ○

HV = −1585 V
10mV 5nS
8kHz OK

4−16 TH62 ○ (○)
○ ○

2

HV = −1530 V
10mV 5nS
8kHz OK

4−15 TH44 ○ ○ ○

2

HV = −1696 V
10mV 5nS
6~9kHz OK

14
4−15 TH25 ○ (○)
○ ○

1.5

HV = −1639 V
10mV 5nS
13 6~10kHz OK

4−14 TH29 X (X)
X X

2

HV = −1585 V
10mV 5nS
8~8kHz OK

4−13 TH62 ○ (○)
○ ○

4

HV = −2021 V
10mV 5nS
7−10kHz OK

4−12 TH71 X (X)
X X

直らなかった…
HV = −1600 V
Cs137で 12~13mV 2kHz
TH51 ○ (X テ−7°)
○ ○

2

HV = −1572 V
10mV 5nS
8kHz OK

− TH61 X (X)
○ ○

2

HV = −1695 V
10mV 5nS
8kHz OK

TH27 ○ (○)
○ ○

1.5

HV = −1662 V
10mV 5nS
6~8kHz OK

TH63 X (X)
○ (○)

2

@PMT TH62 で信号 飽でい 信号み けビキ

TH51 ○ (X テ−7°)
○ ○

4

HV = −2066 V
10mV 5nS
8~11kHz OK

TH52 ○ (○)
○ ○

4層目

	R	L
上	1101-50 =1051	1106-50 =1056
中央	574-50 =524	577-50 =527

1層目

	R	L
上	1102-50 =1052	1100-50 =1050
中央	576-50 =526	575-50 =525

2層目

	R	L
上	1103-50 =1053	1102-50 =1052
中央		

3層目

	R	L
上	1098-50 =1048	1099-50 =1049
中央	576-50 =526	574-50 =524