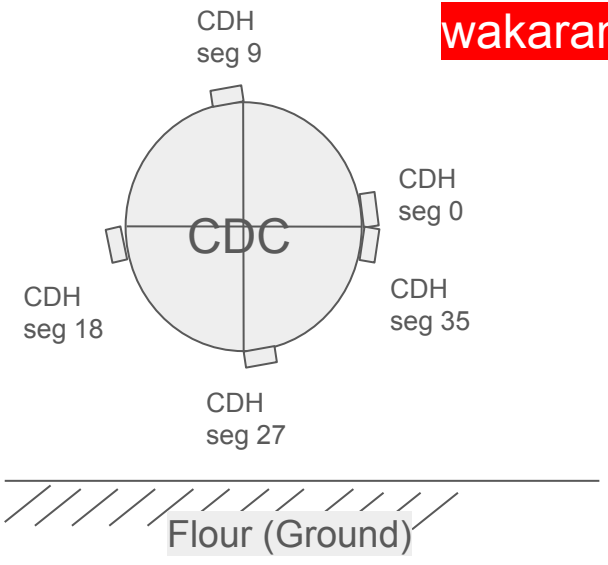
weekly meeting

J-PARC E80

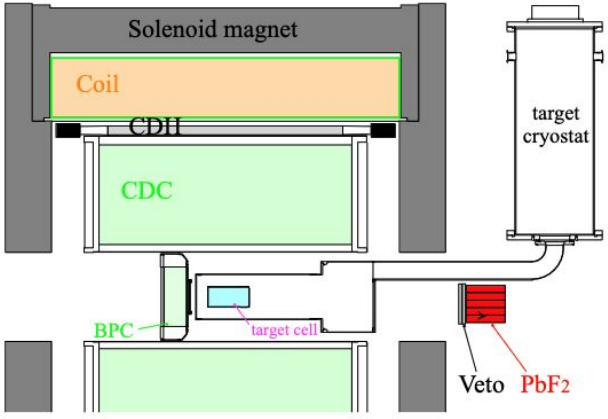
- CDC Layer Efficiency
- CDC dt vs residual, chi2

2024/7/8 Yuto Kimura, RARiS, J-PARC E80

BLDC



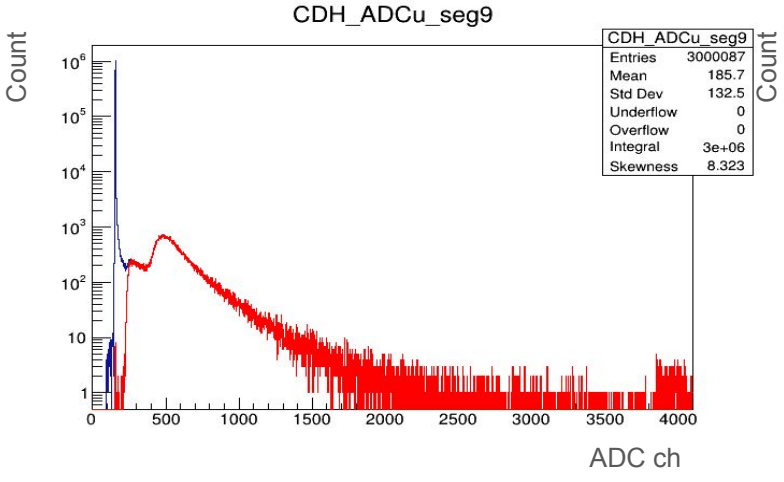
wakaranai karyu?

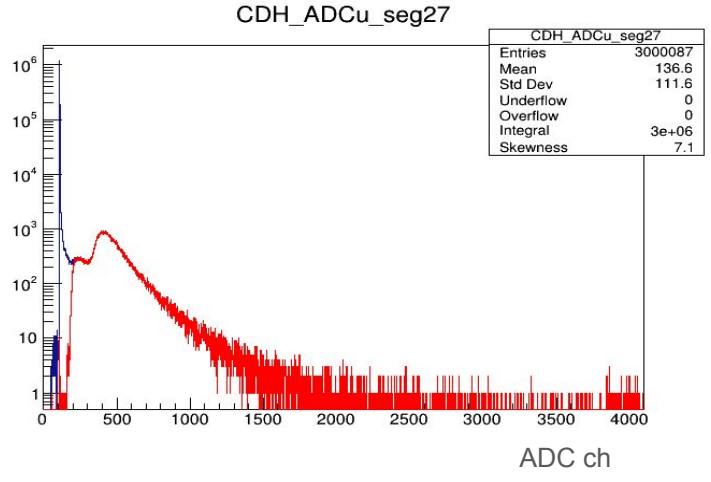


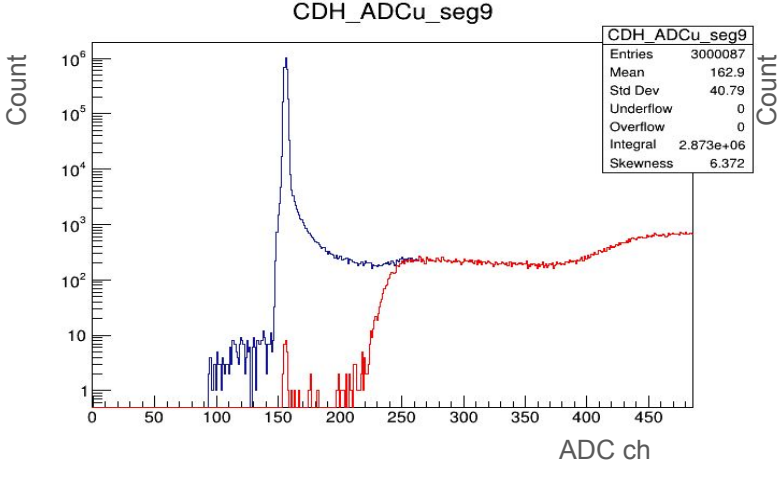
CDH

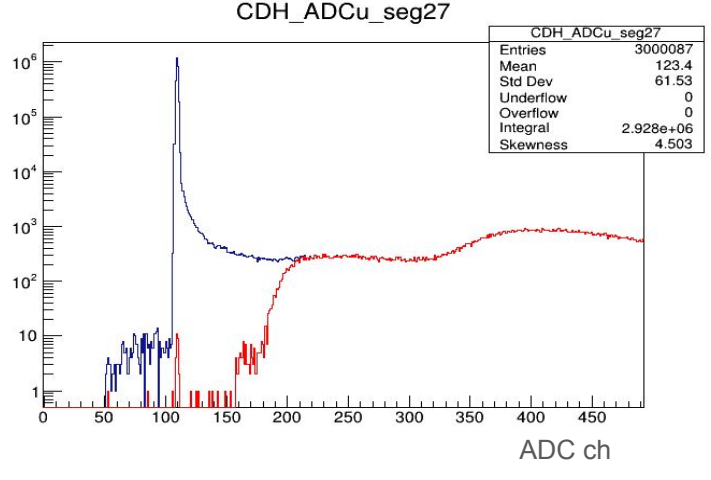
- want to decide events hitting seg9 and seg27 at the same time

- Run607, cosmic, w/o mag, ~3,000,000 events
- CDH ADC, Blue: raw, Red: Requiring TDC Hit
- Anyway, I will not cut off events by ADC.



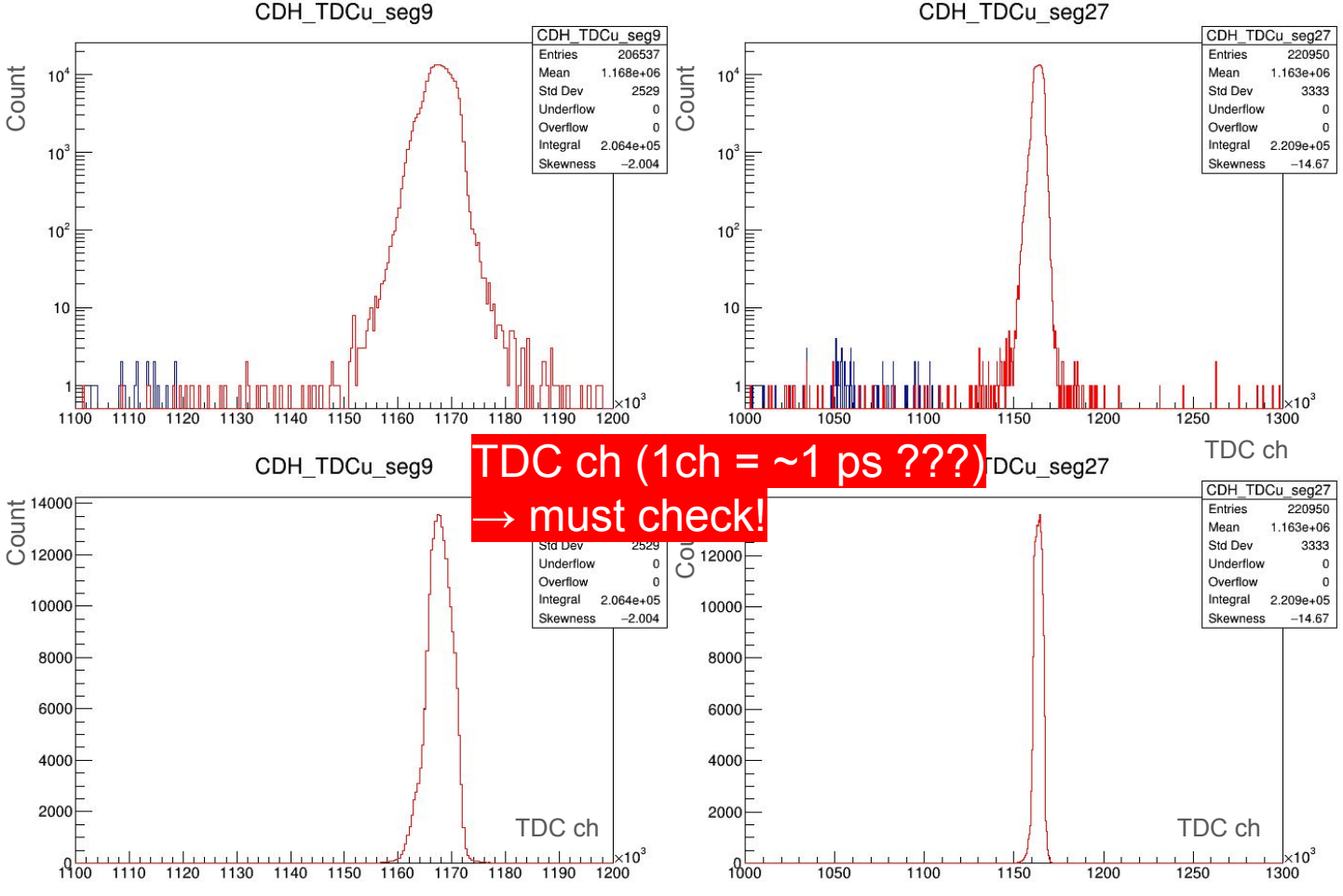






- Run607, cosmic, w/o mag, ~3,000,000 events
- CDH TDC, Blue: raw, Red: TDC First Hit
- Anyway, I will not cut off events by TDC value.

"1 hit" = "Having TDC"

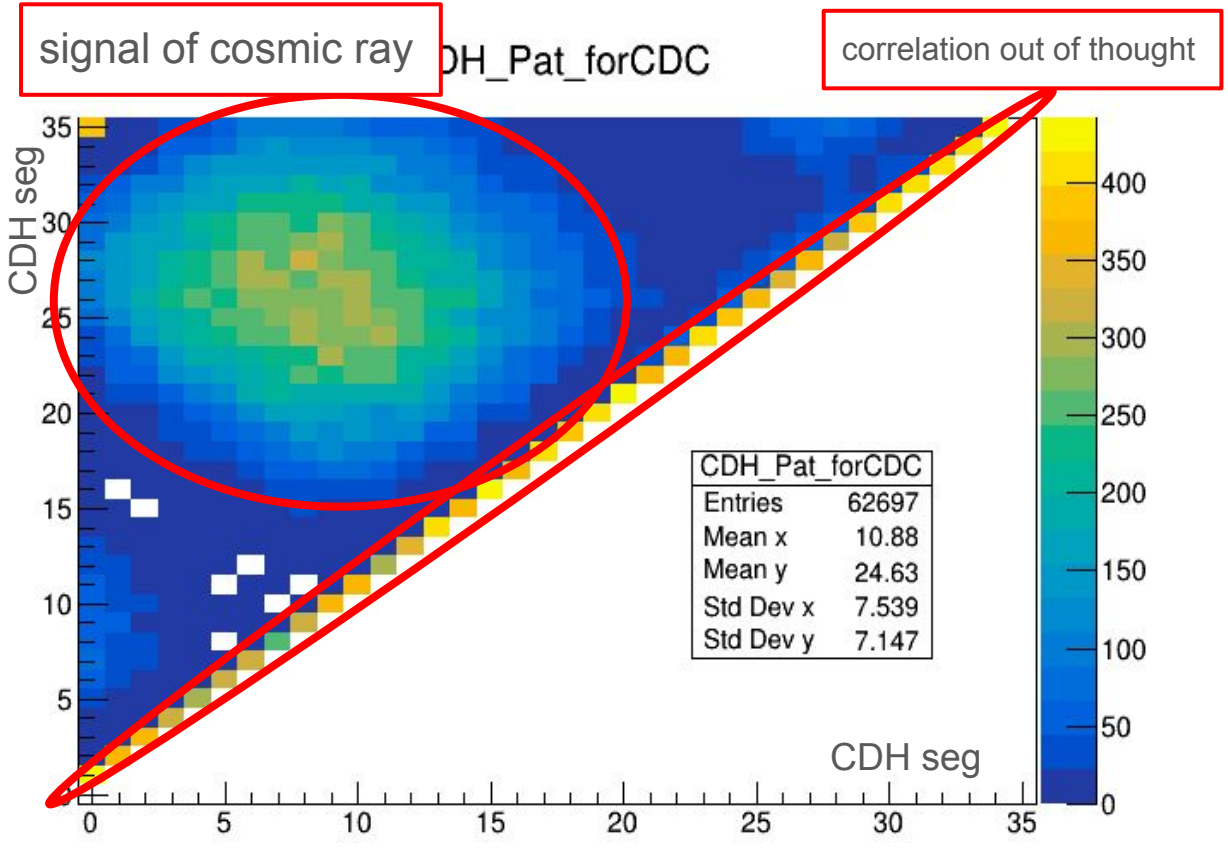


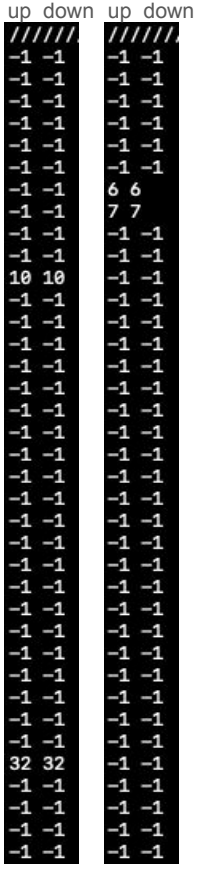
- Run635, cosmic, w/o mag, 100,000 events
- CDH Hit correlation
  - need “multiplicity == 2”

- checked segments (cdhUseg[36], cdhDseg[36]) by “std::cout”
- Left: cosmic signal event?
- Right: strange corr event (“SCE”)
- somehow in SCE,
  we can see cdhU(D)seg[i]==i, cdhU(D)seg[i+1]==i+1.

signal of cosmic ray

correlation out of thought



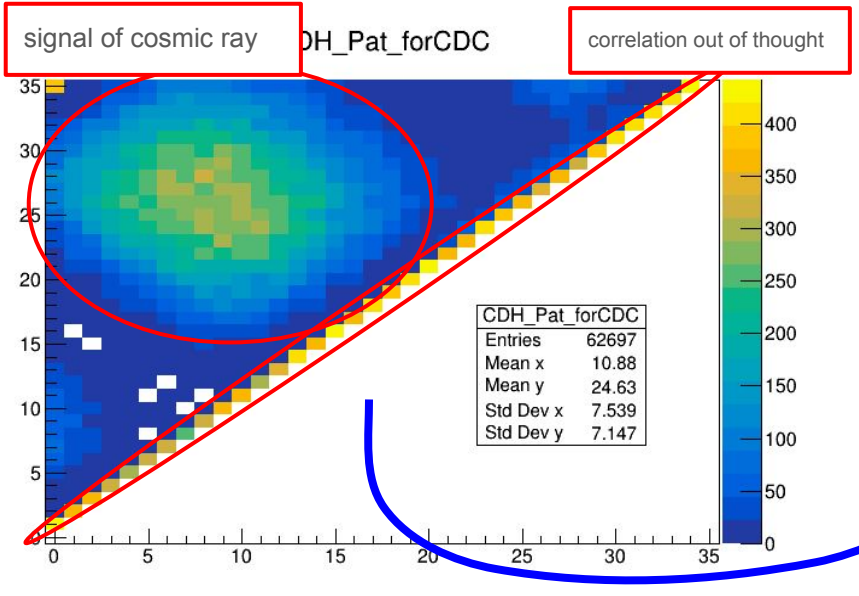


- Run635, cosmic, w/o mag, 100,000 events
- CDH Hit correlation
  - need “multiplicity == 2”
- This color map was generated by C++ code rightside.

What is this correlation?
→ Cluster, ok.

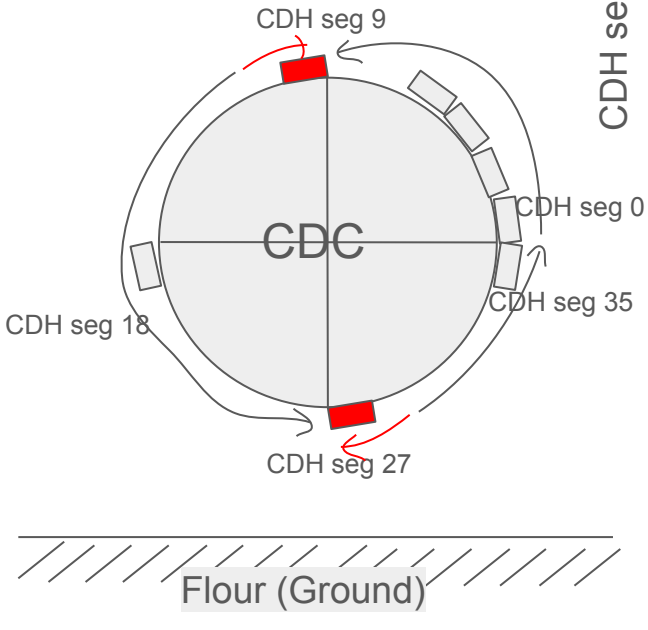
signal of cosmic ray

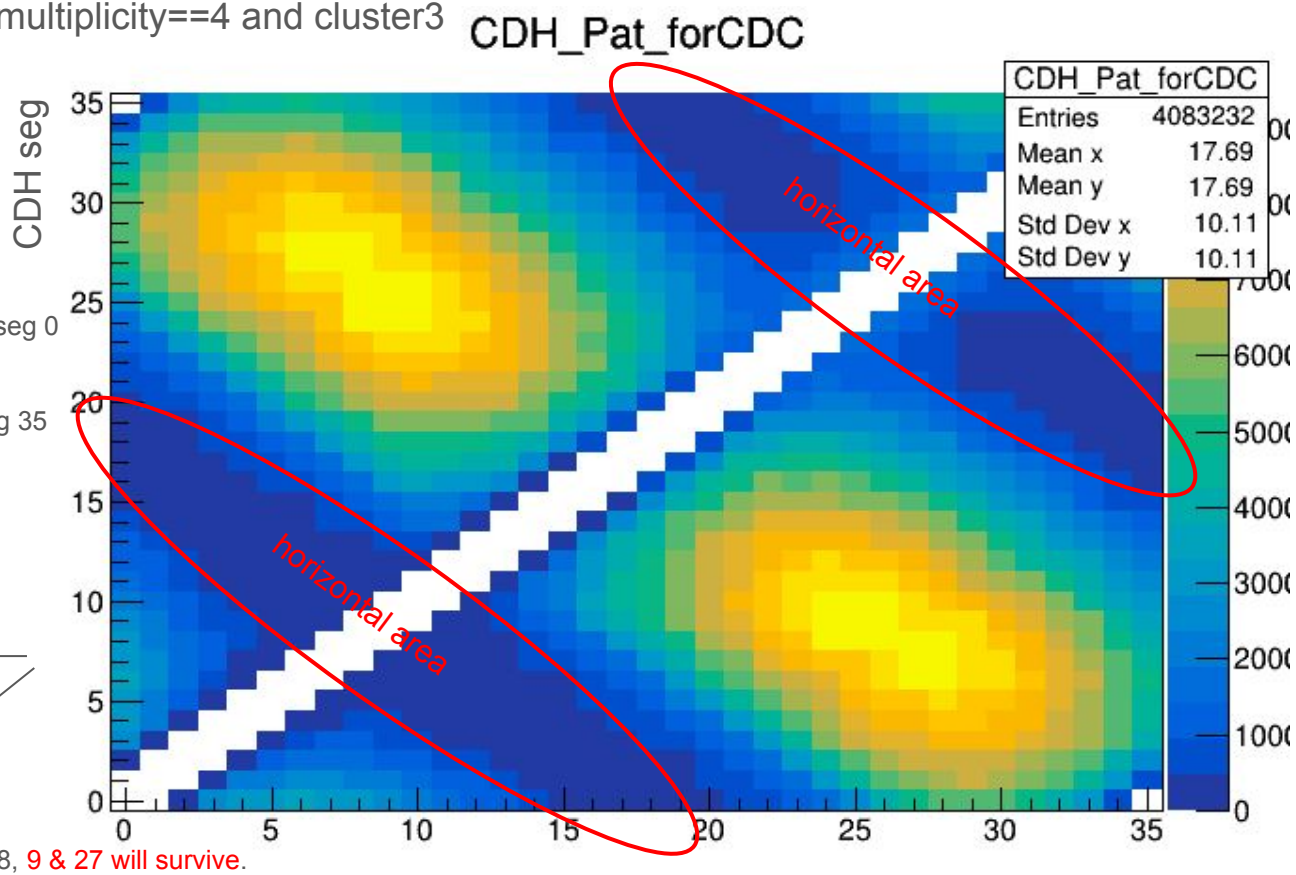
correlation out of thought




```
int cdhUseg[37],cdhDseg[37],cdhSeg1=-1,cdhSeg2=-1;
for(int vw=0;vw<37;vw++){
  cdhUseg[vw]=-1;
  cdhDseg[vw]=-1;
}
const HodoRHitContainer &cont = rawData->GetHodoRawHC(cid);
int nh = cont.size();
std::cout<<nh<<std::endl;
for( int i=0; i<nh; ++i ){
  HodoRawHit *raw = cont[i];
  if(!raw) continue;
  int seg = raw->SegmentId();
int ntu=raw->GetSizeTdcUp();
int ntd=raw->GetSizeTdcDown();
if(ntu>0){
  hist::H1(Form("%s_Patu",tmpname.Data()),seg,patbins);
  hist::H1(Form("%s_ADCwTu_seg%d",tmpname.Data(),seg),au,adcbins);
  cdhUseg[i] = seg;
  mulu++;
}
if(ntd>0){
  hist::H1(Form("%s_Patd",tmpname.Data()),seg,patbins);
  hist::H1(Form("%s_ADCwTd_seg%d",tmpname.Data(),seg),ad,adcbins);
  cdhDseg[i] = seg;
  muld++;
}
if(mulu==2&&muld==2){
  bool first = true;
  std::cout<<"///////////////"<<std::endl;
  for(int a=0;a<37;a++){
    std::cout<<cdhUseg[a]<<" "<<cdhDseg[a]<<std::endl;
    if(first&&cdhUseg[a]>-1&&cdhUseg[a]==cdhDseg[a]){
      cdhSeg1=cdhUseg[a];
      first = false;
    }
    else if(!first&&cdhUseg[a]>-1&&cdhUseg[a]==cdhDseg[a]){
      cdhSeg2=cdhUseg[a];
      hist::H2(Form("%s_Pat_forCDC",tmpname.Data()),cdhSeg1,cdhSeg2,patbins,patbins);
    }
  }
}
```

- Run581, cosmic, w/o mag, 3,000,000 events
- CDH Hit correlation
  - need “multiplicity” == 2
  - build clusters, include multiplicity==4 and cluster3
- can see cosmic signal

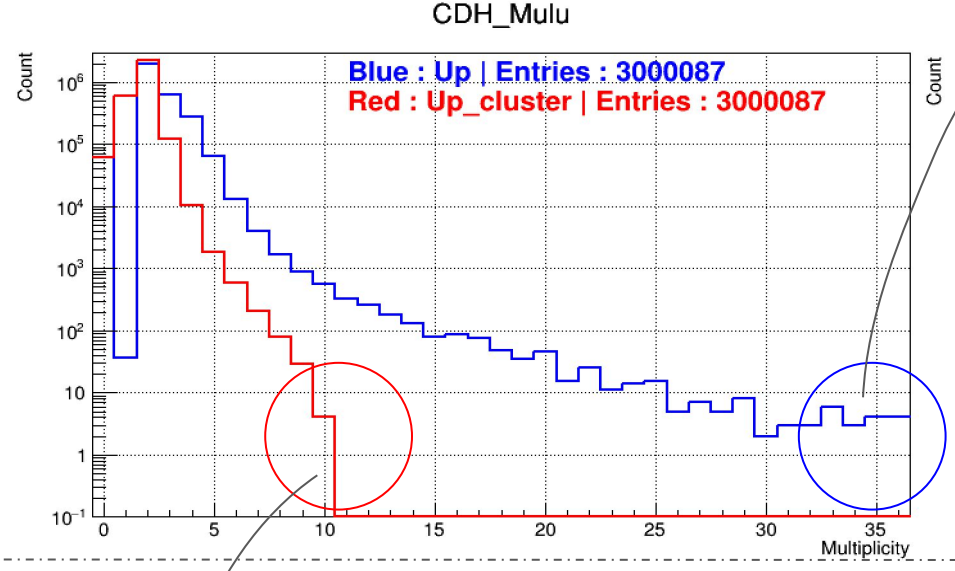


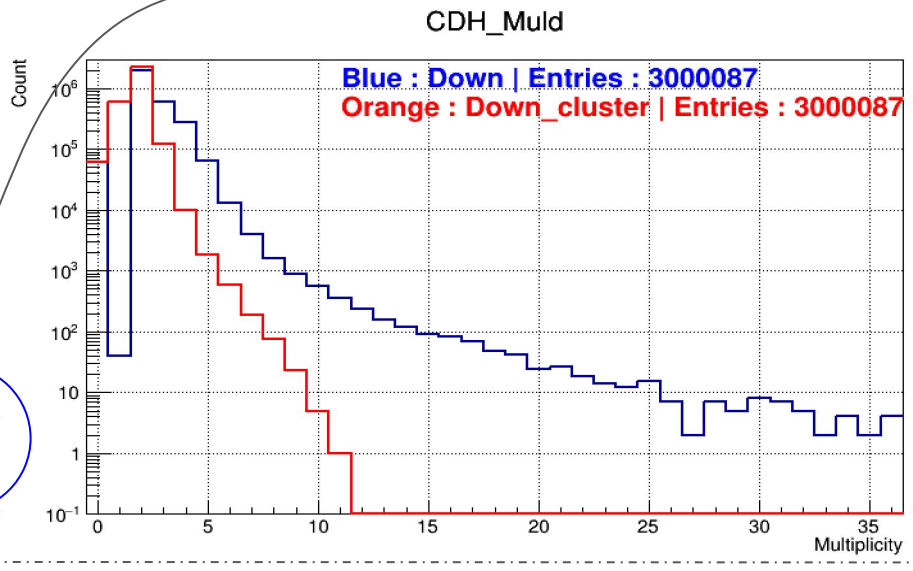


cluster rule; Bigger seg num will survive.
In the case of 9 vs 10 and 27 vs 28, 9 & 27 will survive.
In the case of 35 vs 0, 35 will be killed if 0 was killed or alive, but 35 will alive if 35 is dead.

- Run607, cosmic, w/o mag, ~3,000,000 events
- CDH multiplicity for all segments, Blue: raw, Red: after clustering

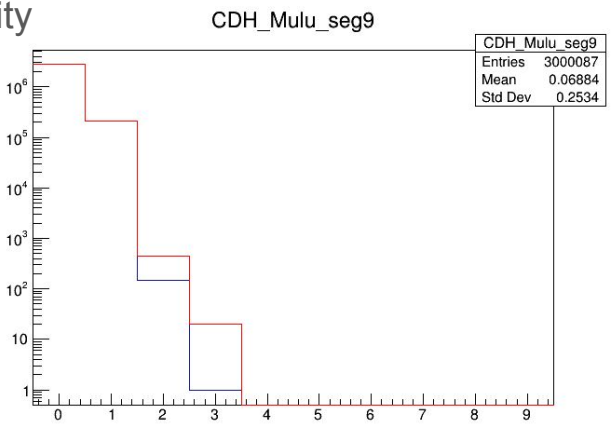
event disp

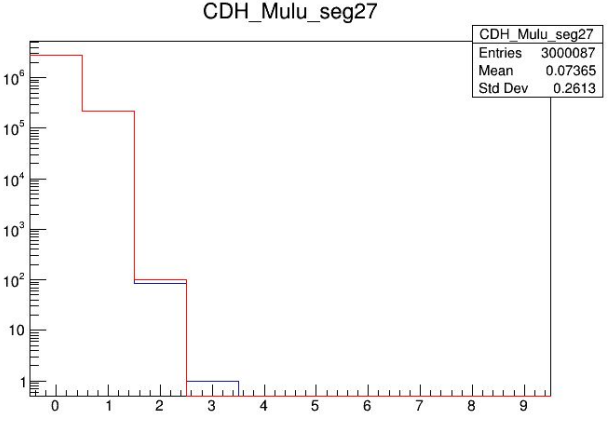




- seg9 & seg27 Multiplicity

event disp

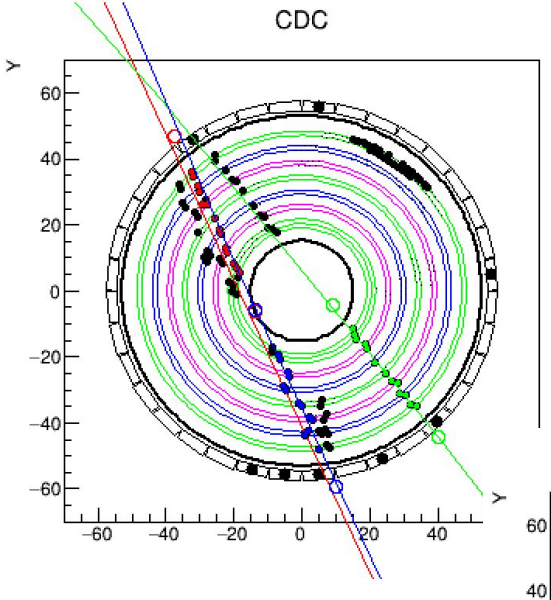




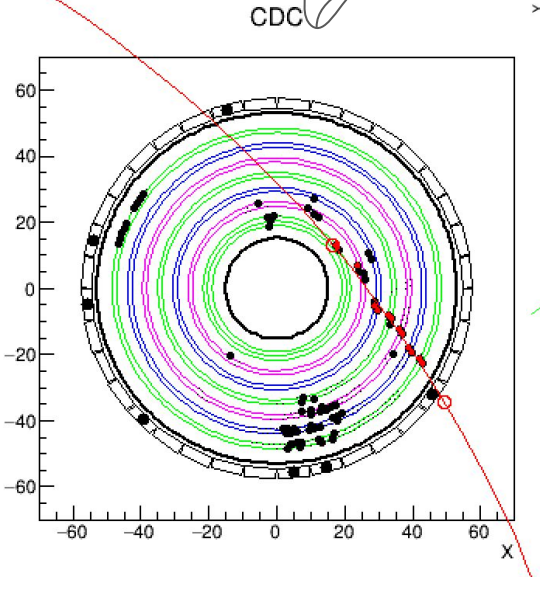
- Run608, cosmic, w/o mag
- CDH multiplicity, check by Disp

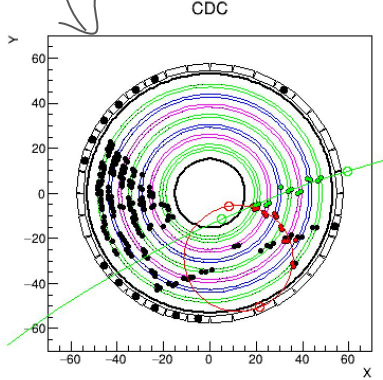
```
#D EventReader::open()  data stream /gpfs/group/had/knucl/e
15/e73_data/Run91/run00608.dat.gz
#D GUnpacker skipped 0 events
#D GUnpacker::initialize() ----> finished
after cluster : evnum = 2541 | mulu2 = 6 | muld2 = 6
after cluster : evnum = 7059 | mulu2 = 6 | muld2 = 6
#D UnpackerManager::show_event_number()
   (daq root data) 10000 (0x2710)
   (counter)       10000 (0x2710)
after cluster : evnum = 16829 | mulu2 = 6 | muld2 = 7
#D UnpackerManager::show_event_number()
   (daq root data) 20000 (0x4e20)
   (counter)       20000 (0x4e20)
after cluster : evnum = 21027 | mulu2 = 7 | muld2 = 7
after cluster : evnum = 23438 | mulu2 = 6 | muld2 = 5
after cluster : evnum = 25820 | mulu2 = 6 | muld2 = 6
after cluster : evnum = 28027 | mulu2 = 6 | muld2 = 5
```

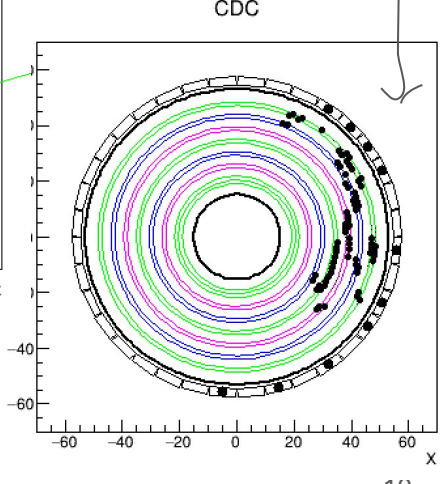
ok



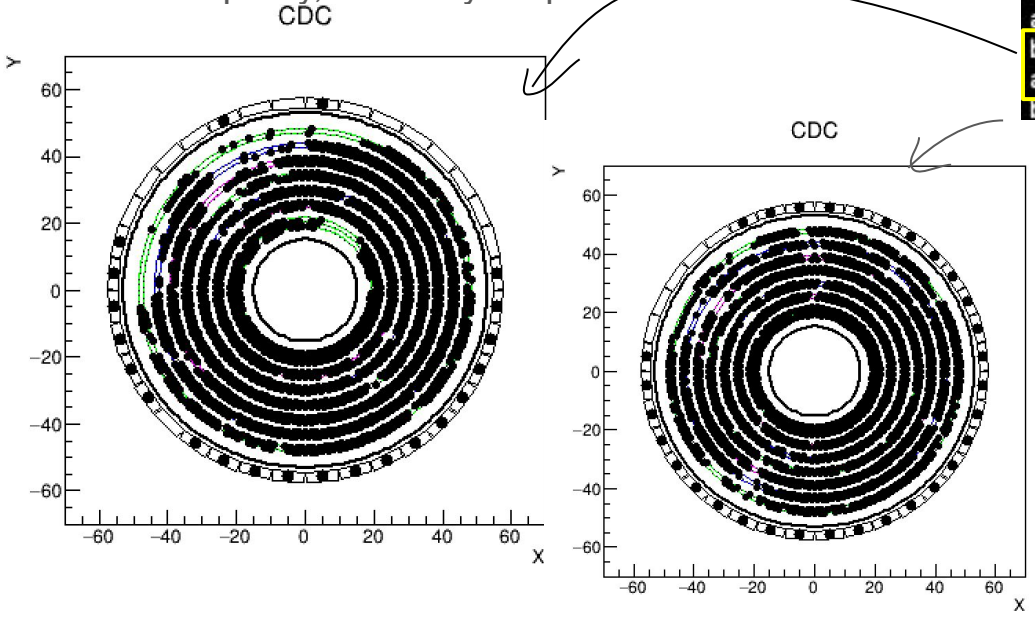
ok







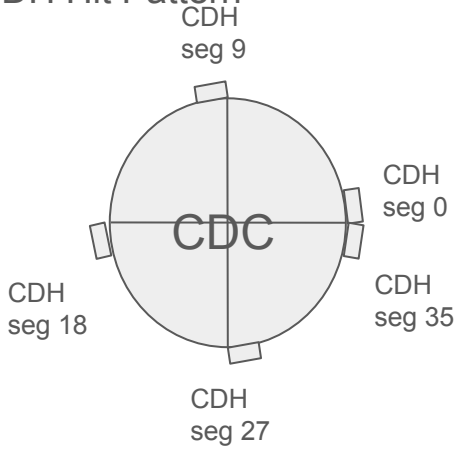
- Run608, cosmic, w/o mag
- CDH multiplicity, check by Disp

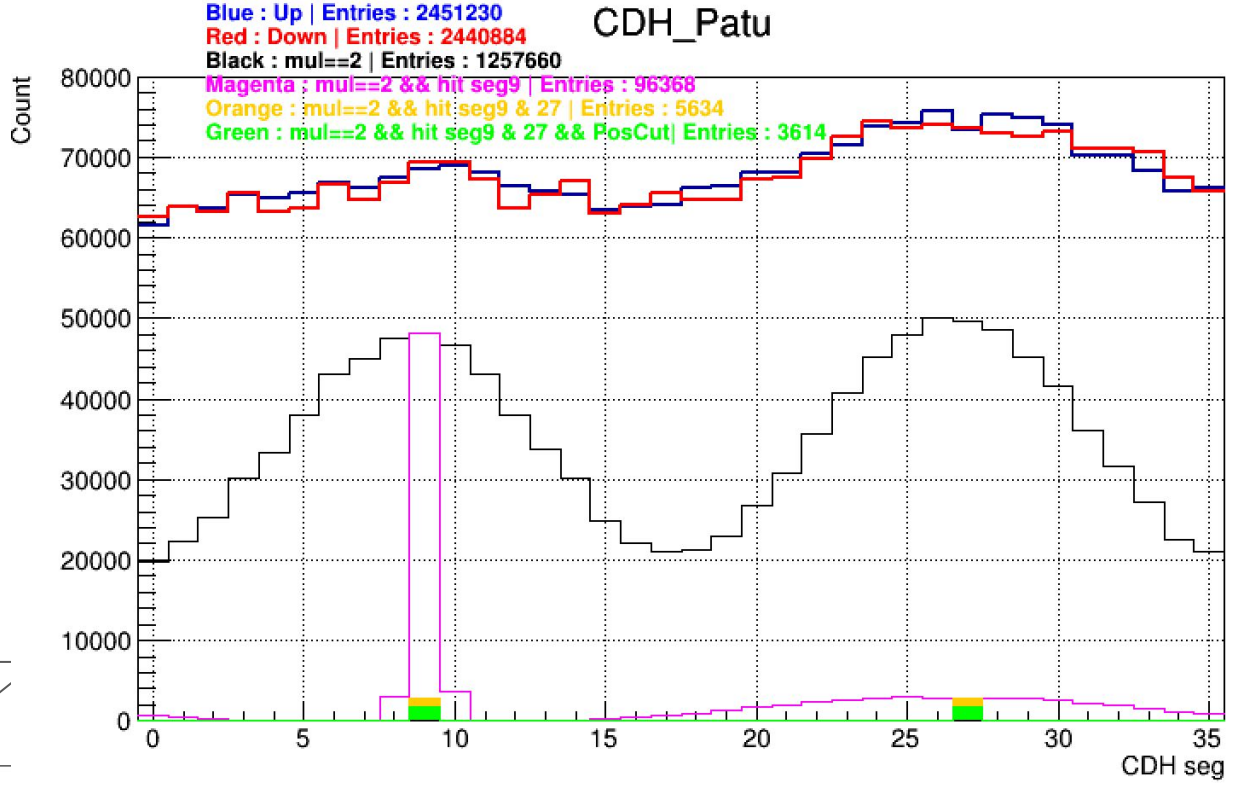


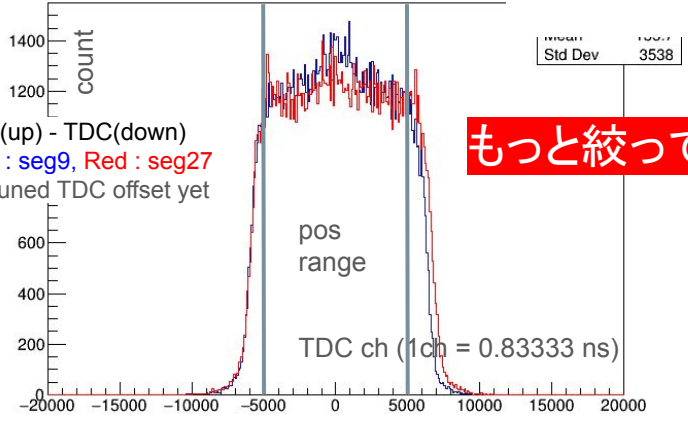

```
#D UnpackerManager::show_event_number()
   (daq root data) 450000 (0x6ddd0)
   (counter)       450000 (0x6ddd0)
after cluster : evnum = 455568 | mulu2 = 6 | muld2 = 6
after cluster : evnum = 455667 | mulu2 = 6 | muld2 = 6
before cluster : evnum = 457946 | mulu = 23 | muld = 23
after cluster : evnum = 457946 | mulu2 = 6 | muld2 = 4
before cluster : evnum = 459111 | mulu = 33 | muld = 33
```

```
//////////////////          //////////////////
event 457946                event 457946
//////////////////          //////////////////
ADCup(0) = 517 | seg = 0     ADCdown(0) = 580 | seg = 0
ADCup(2) = 206 | seg = 2     ADCdown(8) = 271 | seg = 8
ADCup(8) = 229 | seg = 8     ADCdown(11) = 303 | seg = 11
ADCup(11) = 331 | seg = 11   ADCdown(16) = 289 | seg = 16
ADCup(16) = 221 | seg = 16   ADCdown(17) = 305 | seg = 17
ADCup(17) = 207 | seg = 17   ADCdown(18) = 1937 | seg = 18
ADCup(18) = 2196 | seg = 18  ADCdown(19) = 4038 | seg = 19
ADCup(19) = 4038 | seg = 19  ADCdown(20) = 2702 | seg = 20
ADCup(20) = 2778 | seg = 20  ADCdown(21) = 390 | seg = 21
ADCup(21) = 332 | seg = 21   ADCdown(22) = 173 | seg = 22
ADCup(23) = 460 | seg = 23   ADCdown(23) = 454 | seg = 23
ADCup(24) = 1075 | seg = 24  ADCdown(24) = 1524 | seg = 24
ADCup(25) = 796 | seg = 25   ADCdown(25) = 1059 | seg = 25
ADCup(26) = 1293 | seg = 26  ADCdown(26) = 1356 | seg = 26
ADCup(27) = 2302 | seg = 27  ADCdown(27) = 3046 | seg = 27
ADCup(28) = 4038 | seg = 28  ADCdown(28) = 3954 | seg = 28
ADCup(29) = 4038 | seg = 29  ADCdown(29) = 4038 | seg = 29
ADCup(30) = 4038 | seg = 30  ADCdown(30) = 4038 | seg = 30
ADCup(31) = 1681 | seg = 31  ADCdown(31) = 2470 | seg = 31
ADCup(32) = 669 | seg = 32   ADCdown(32) = 736 | seg = 32
ADCup(33) = 1437 | seg = 33  ADCdown(33) = 2315 | seg = 33
ADCup(34) = 1129 | seg = 34  ADCdown(34) = 1322 | seg = 34
ADCup(35) = 601 | seg = 35   ADCdown(35) = 637 | seg = 35
before cluster : evnum = 4579before cluster : evnum = 457946
after cluster : evnum = 45794after cluster : evnum = 457946
```

- Run606, cosmic, w/o mag, 1,000,000 events
- CDH Hit Pattern

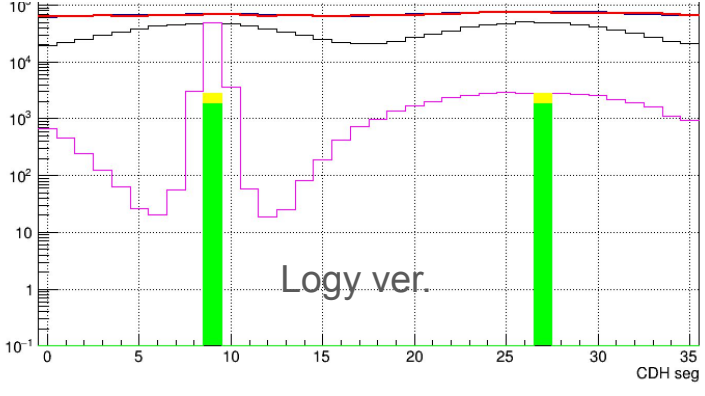






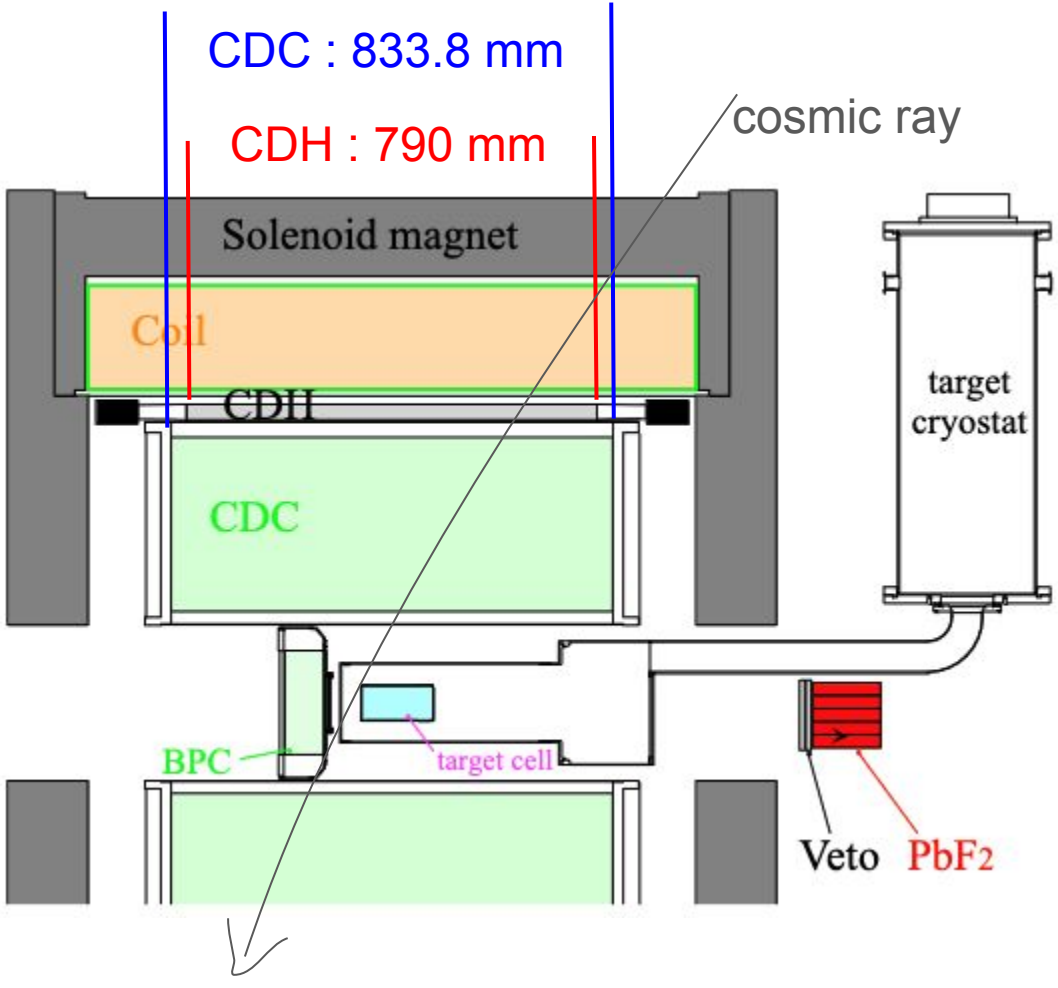
- TDC(up) - TDC(down)
- Blue : seg9, Red : seg27
- not tuned TDC offset yet

もっと絞ってもいい

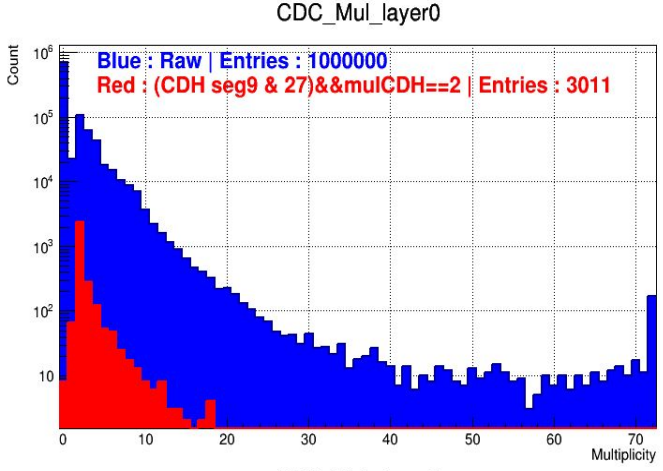


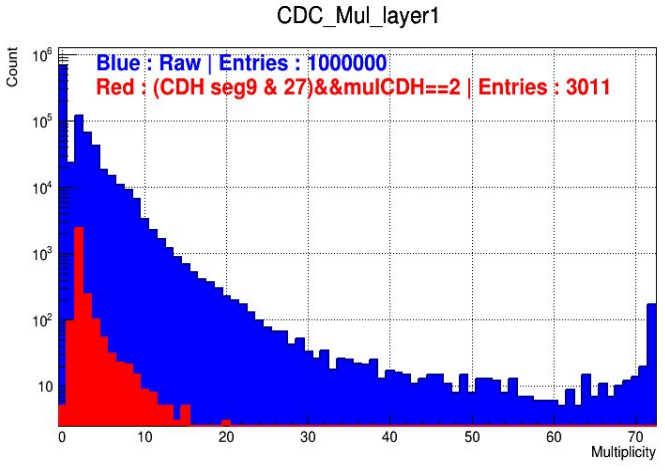
CDC

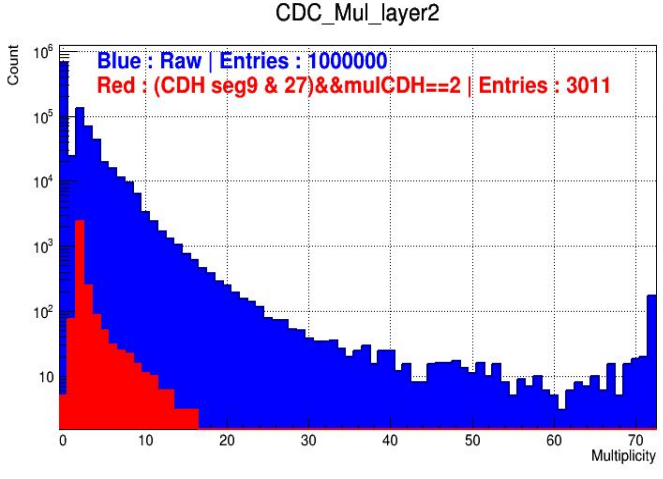
Not need to limit the hit range of CDH, for deriving CDC layer efficiency,
but cutted off CDH edge events just in case (like p.8)



- CDC Multiplicity comparison
- Run582, cosmic, w/o mag, 1,000,000 events
- Of course, even after event selection, a lot of mul > 2 was left.



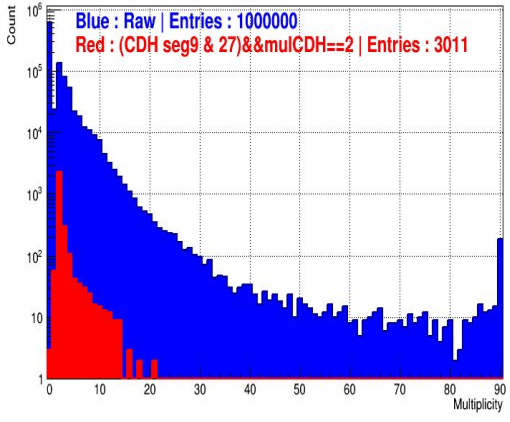




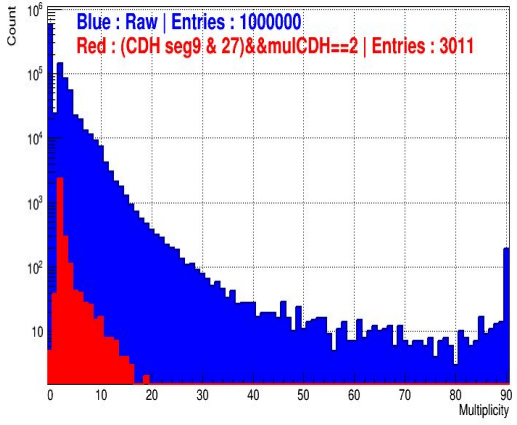
Super-layer	layer	Wire direction	Radius (mm)	Cell width (degree)	Cell width (mm)	Stereo angle (degree)	Signal channels
A1	1	X	190.5	5.00	16.7	0	72
	2	X'	204		17.8	0	72
	3	X	217.5		19	0	72
U1	4	U	248.5	4.00	17.3	−3.55	90
	5	U'	262		18.3	−3.74	90
V1	6	V	293	3.60	18.4	3.77	100
	7	V'	306.5		19.3	3.94	100
A2	8	X	337.5	3.00	17.7	0	120
	9	X'	351		18.4	0	120
U2	10	U	382	2.40	16	−3.28	150
	11	U'	395.5		16.6	−3.39	150
V2	12	V	426.5	2.25	16.7	3.43	160
	13	V'	440		17.3	3.54	160
A3	14	X	471	2.00	16.4	0	180
	15	X'	484.5		16.9	0	180

- CDC Multiplicity comparison
- Run582, cosmic, w/o mag, 1,000,000 events
- Of course, even after event selection, a lot of mul > 2 was left.

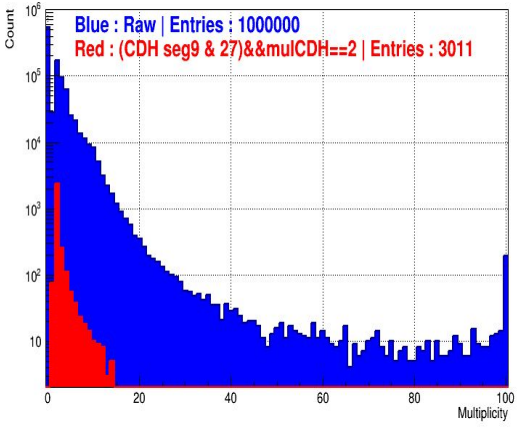
CDC_Mul_layer3



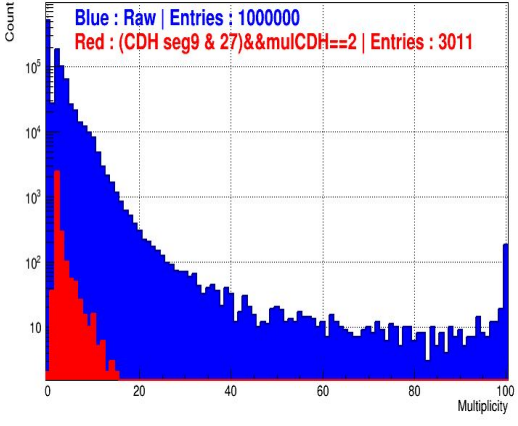
CDC_Mul_layer4



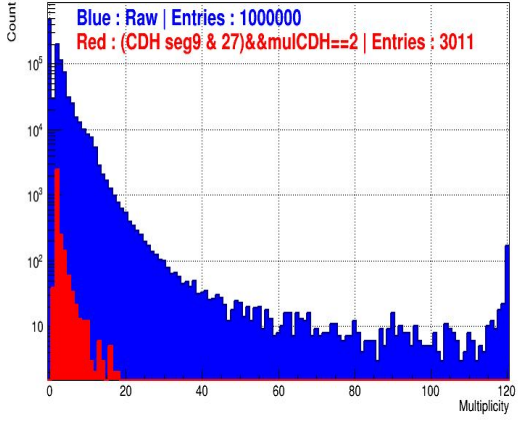
CDC_Mul_layer5



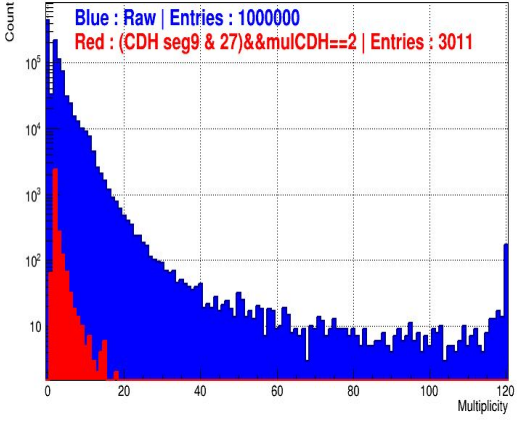
CDC_Mul_layer6



CDC_Mul_layer7



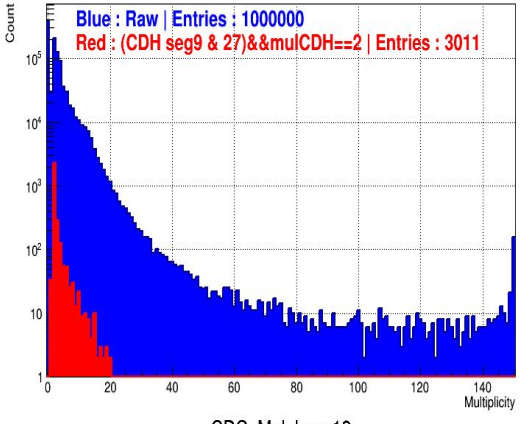
CDC_Mul_layer8



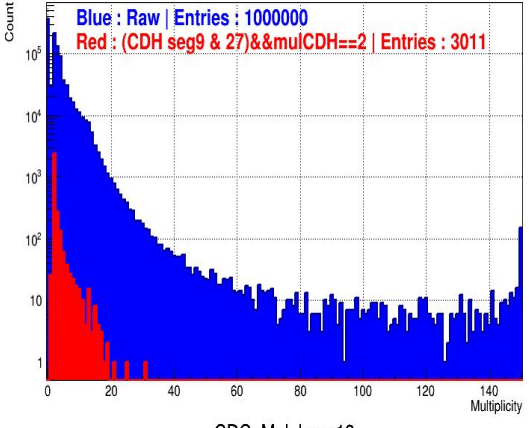
- CDC Multiplicity comparison
- Run582, cosmic, w/o mag, 1,000,000 events
- Of course, even after event selection, a lot of mul > 2 was left.

have to make clusters

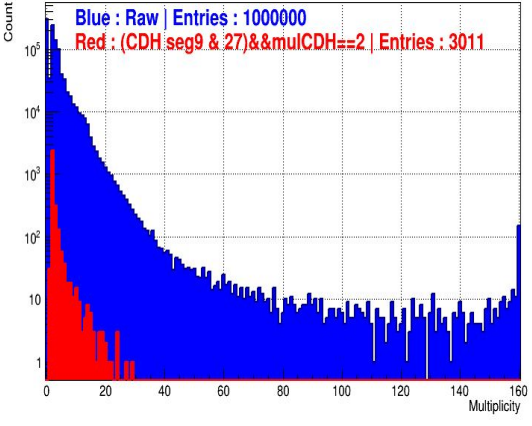
CDC_Mul_layer9



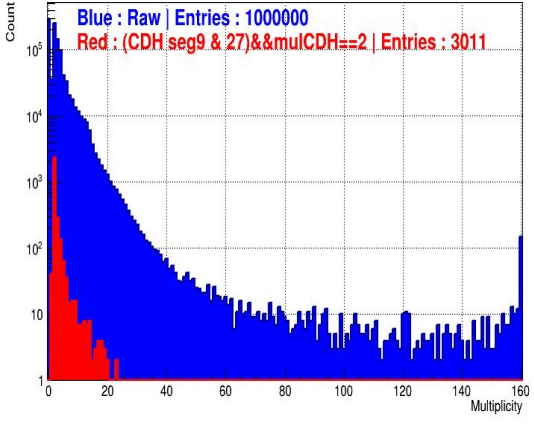
CDC_Mul_layer10



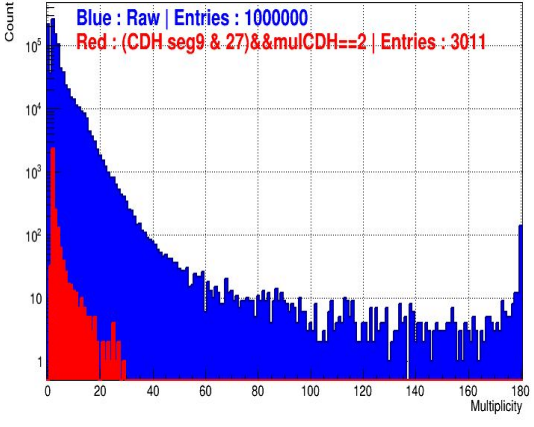
CDC_Mul_layer11



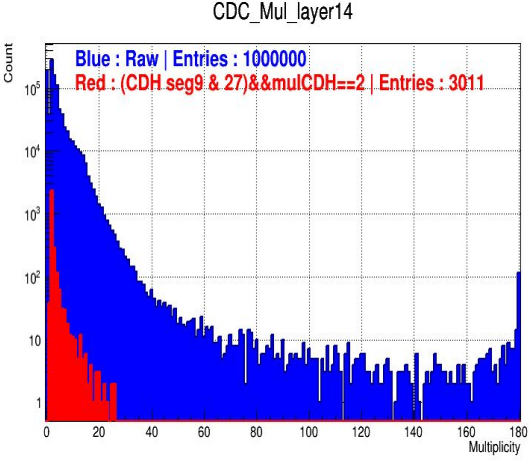
CDC_Mul_layer12



CDC_Mul_layer13

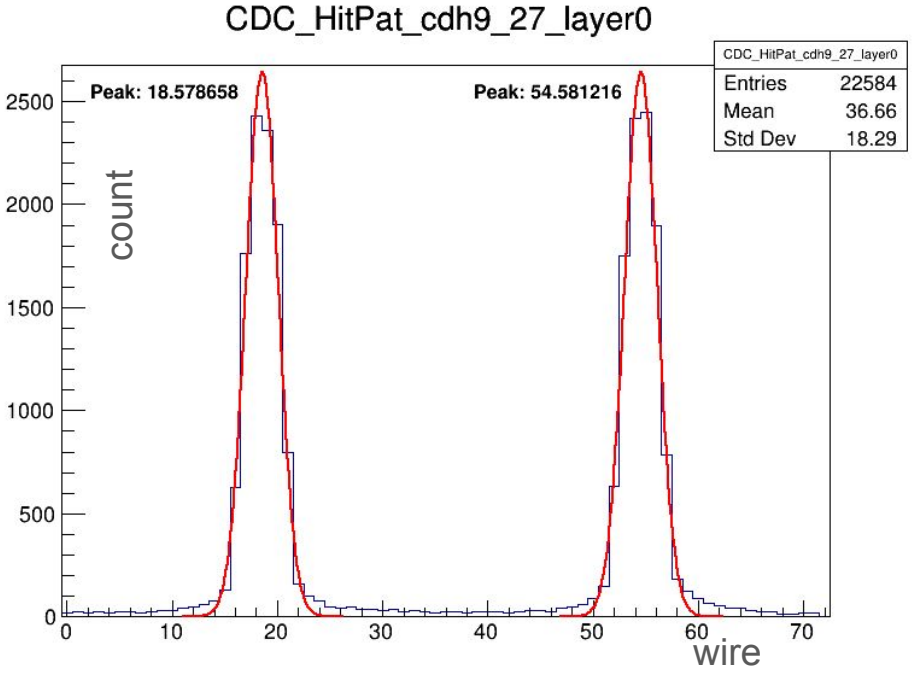


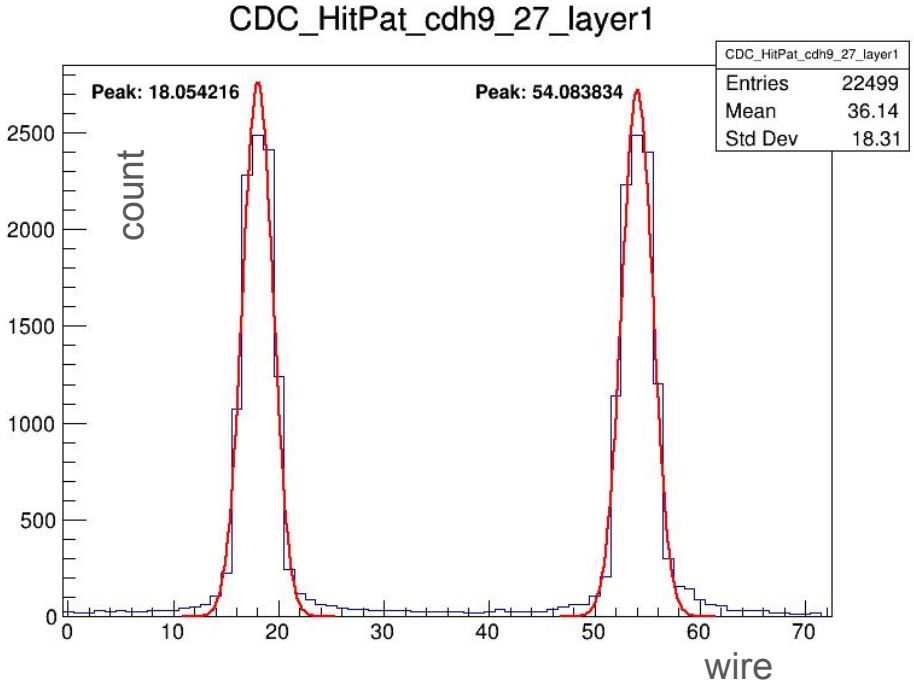
CDC_Mul_layer14



Need to decide the wire to be hitted

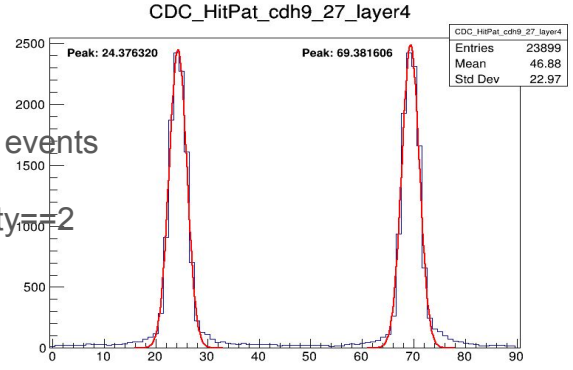
- Run582, cosmic, w/o mag, ~3,000,000 events
- CDC HitPat
  - CDH seg 9 & 27, CDH multiplicity==2
- To compare CDC wire with CDH seg

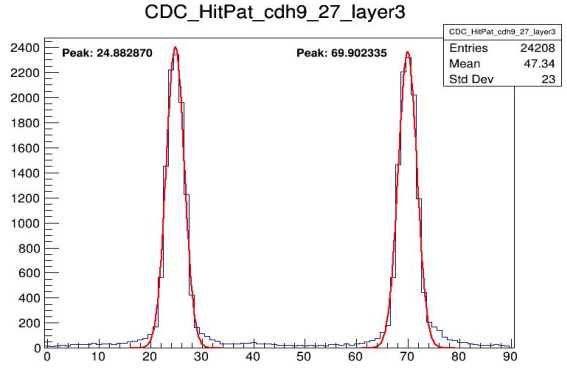


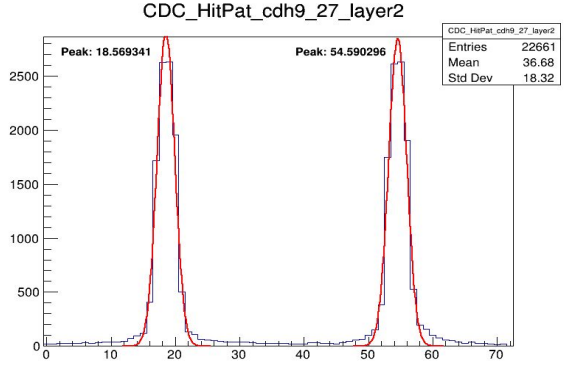


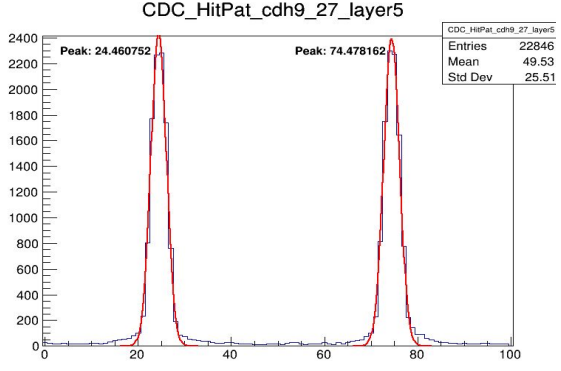
fit range = peak ± 5 sigma

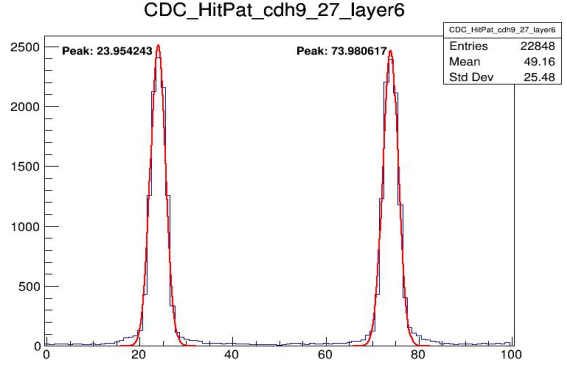
- Run582, cosmic, w/o mag, ~3,000,000 events
- CDC HitPat
  - CDH seg 9 & 27, CDH multiplicity==2
- To compare CDC wire with CDH seg

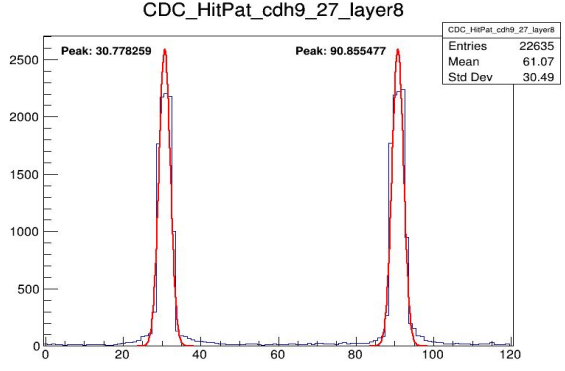


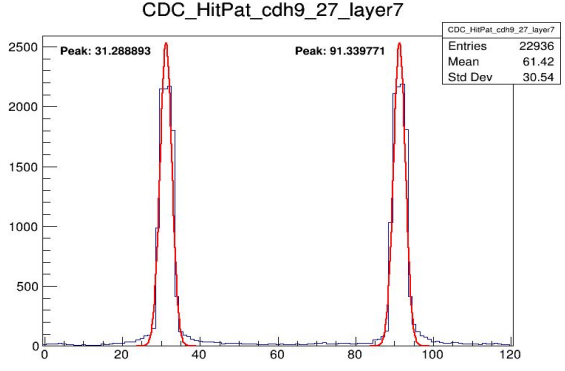


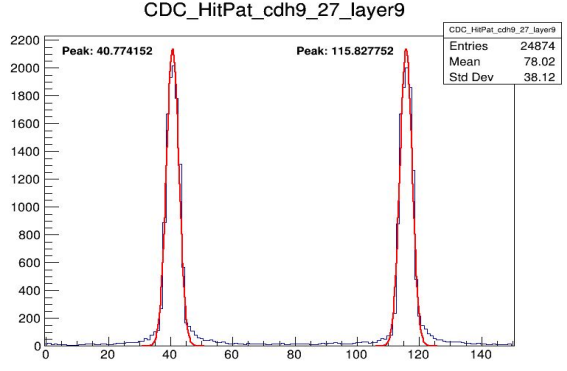












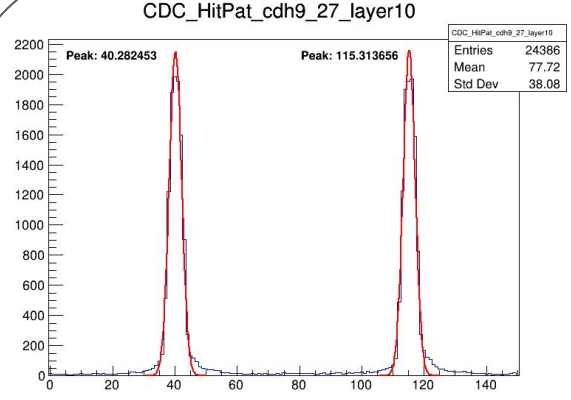
- Run582, cosmic, w/o mag, ~3,000,000 events
- CDC HitPat
  - CDH seg 9 & 27, CDH multiplicity==2
- To compare CDC wire with CDH seg

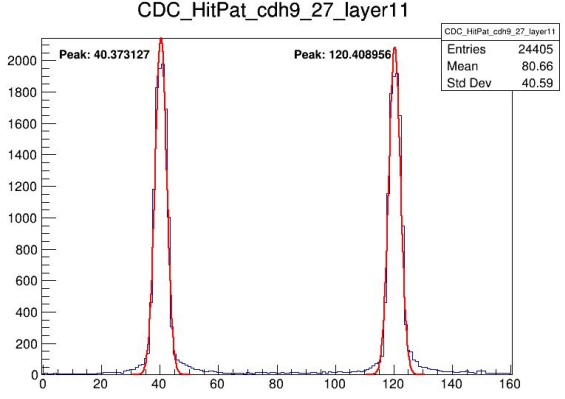
peak value and signal channel

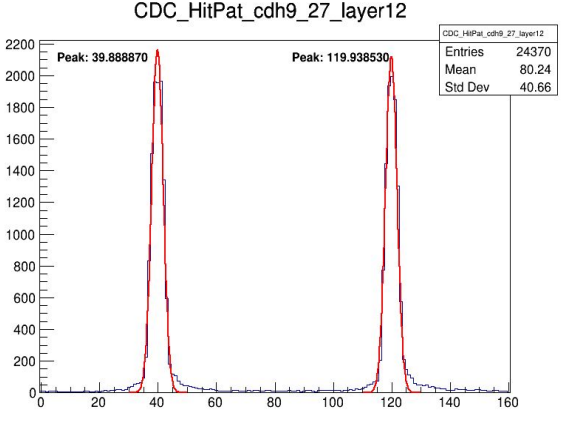
```
X   0 18.5787 54.5812
X'  1 18.0542 54.0838   72
X   2 18.5693 54.5903
U   3 24.8829 69.9023
U'  4 24.3763 69.3816   90
V   5 24.4608 74.4782
V'  6 23.9542 73.9806   100
X   7 31.2889 91.3398
X'  8 30.7783 90.8555   120
U   9 40.7742 115.828
U'  10 40.2825 115.314  150
V   11 40.3731 120.409
V'  12 39.8889 119.939  160
X   13 47.3154 137.38
X'  14 46.778 136.822   180
peak_values_582.txt (END)
```

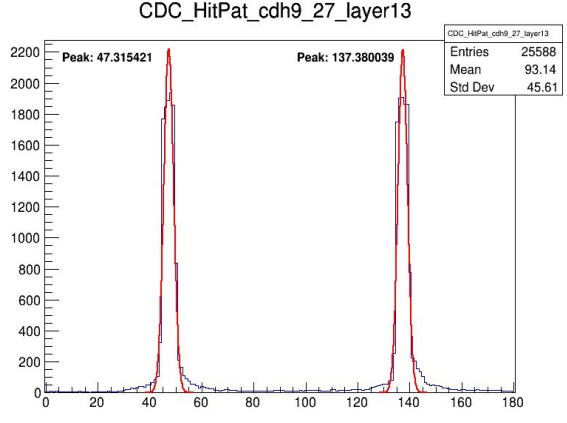
using for event selection

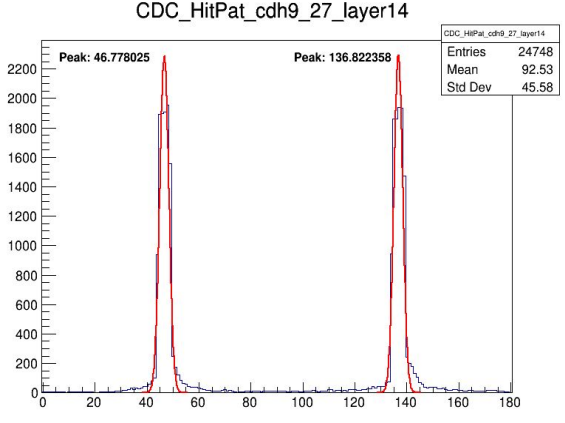
```
int ww[15]={17,17,17,22,23,22,22,29,29,38,38,38,37,45,44};
int mm[15]={20,20,20,26,27,26,26,33,33,43,43,43,42,50,49};
```





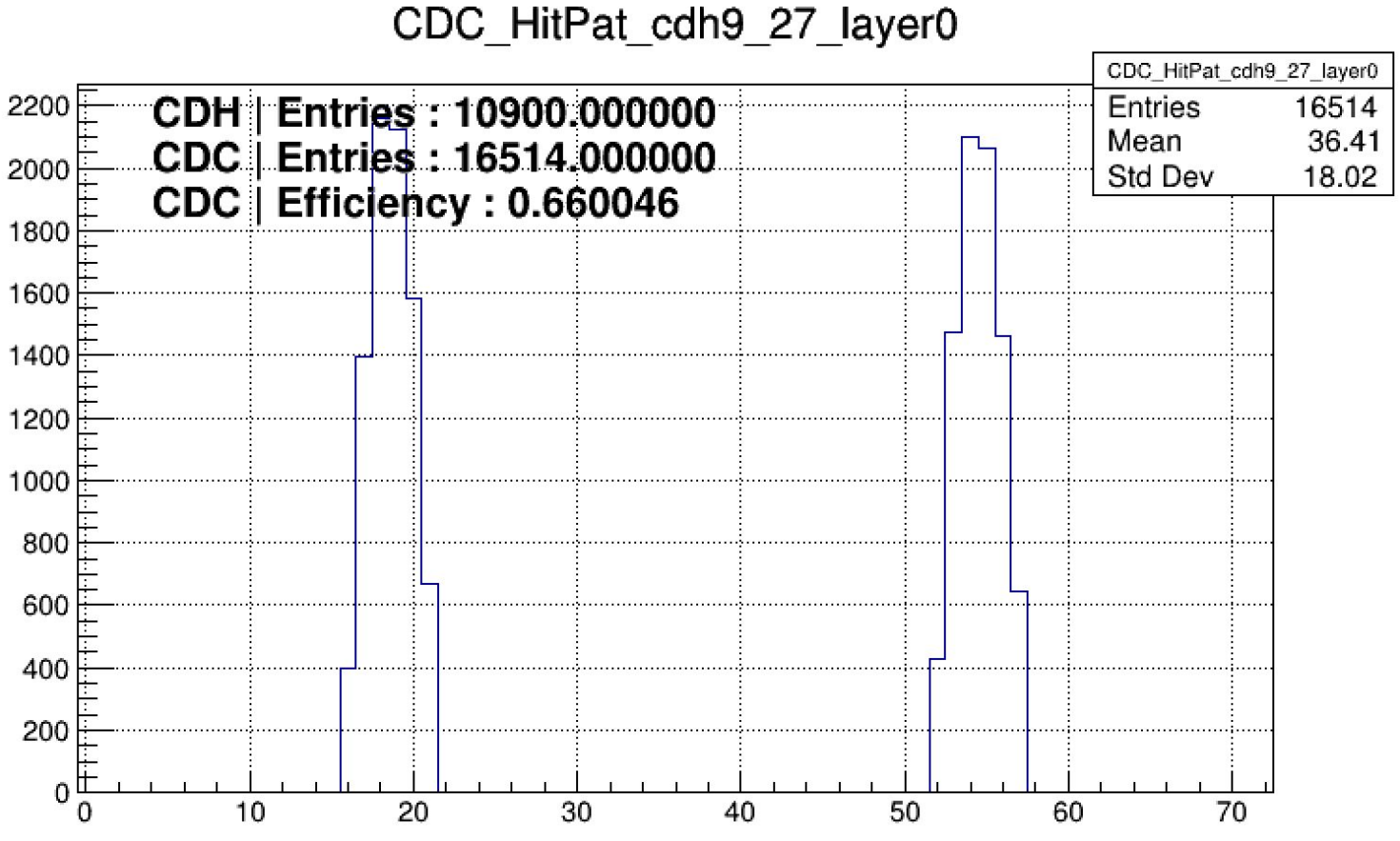






```
int ww[15]={17,17,17,22,23,22,22,29,29,38,38,38,37,45,44};
int mm[15]={20,20,20,26,27,26,26,33,33,43,43,43,42,50,49};
```

- Run607, cosmic, w/o mag, ~3,000,000 events
- CDC HitPat
  - CDH seg 9 & 27, CDH multiplicity==2



Status

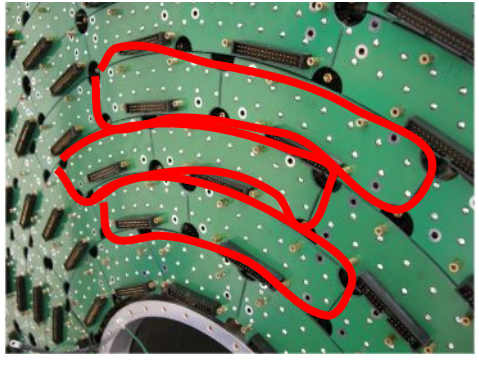
- checked the validity of BLDC param (Layer dependense, chi2, dt vs resid…)
- looked the histograms of CDCRaw
  - HitPat, Multiplicity, TOT, TDC
- To Do by next meeting
  - look HitPat after cutting by CDH segments
  - (decide the XT parameters of CDC by each layer)
  - check the validity of the XT parameters
    - dt vs resid, dl vs resid, chi2, wire dependence
  - look the number of tracks

CDCとBLDCの違いを考えろ。
(まずはaxial)
結果をいきなり
XTは無視
まずresid vs dt
Efficiency=適当に定義
分母CDH各レイヤーにHitがあるか

~ 7/10 : output the residual, tracking eff of CDC, for GPPU exam

こういう配置でASD. トリガーの掛け方.

上下シンチだとアクセプタンスが小さすぎるか、、、
中にもシンチ？-->やめた方がいいかも
ASD boardの形ってどうだったっけ？-->一意



Schedules

- June 13 ~ Jul. 20 : Sendai (intensive lecture 7/1~3, 7/10~12, 7/17~19), **GPPU deadline Jul. 16 ~ 19**
- Jul. 21 ~ Aug. 3 : Tokai, work for new CDC (← **GPPU exam (unclear)**) ← 宿（ドミトリー）確保
- Aug. 4 ~ 7 : Sendai（intensive lecture　8/5~7）
- お盆 : Sendai or Aomori
- Aug. 18 ~ Sep. 13 : Tokai, work and study for new CDC
- Sep. 14 : Sendai
- Sep. 15 ~ 20 : JPS in Hokkaido, Talk about CDC with ArCO2 (by cosmic data)
- Sep. 21 ~ : Tokai, study for new CDC
- Oct. 10 : Sendai or Tokai : Zasshi-kai of RARiS
- Nov. ~ ? : Tokai, J-PARC E73_2’
- Jan. : 後期課程進学願書提出