weekly meeting

J-PARC E80

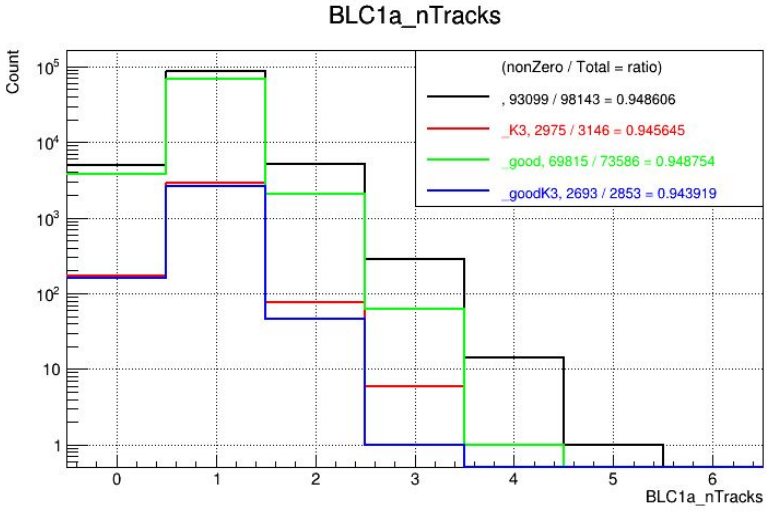
- check the validity of BLDC residuals
- looked the histograms of CDC Raw Hist

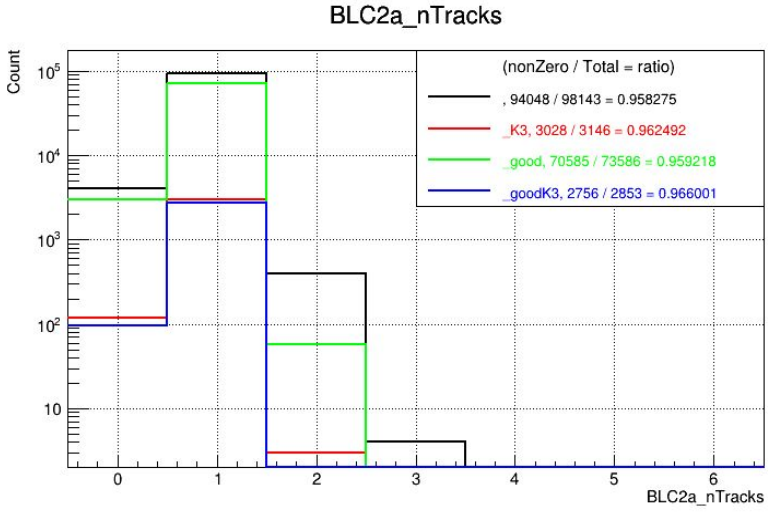
2024/7/1 Yuto Kimura, RARiS, J-PARC E80

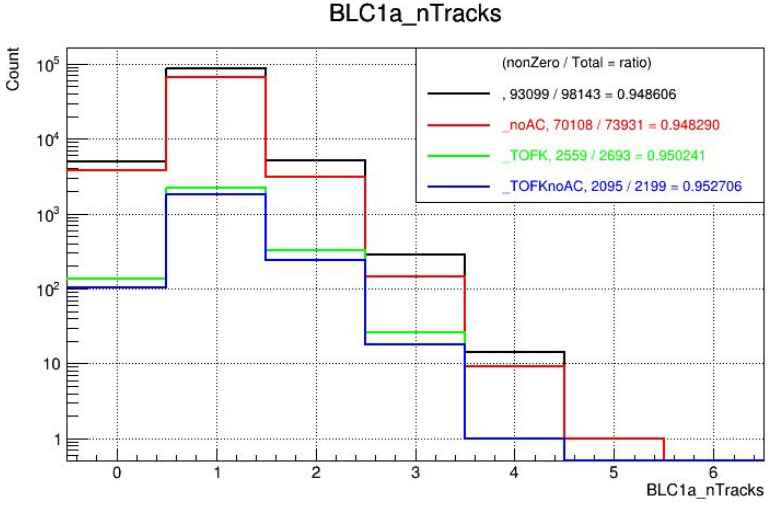
BLDC

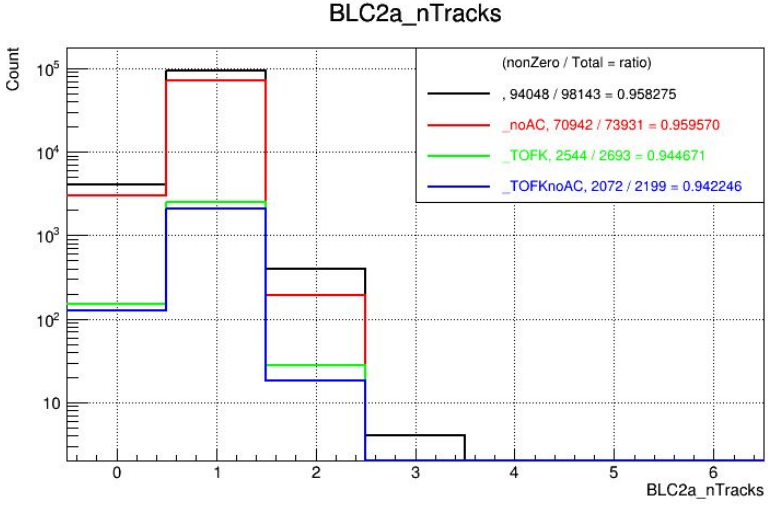
The number of tracks

- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~100,000 events



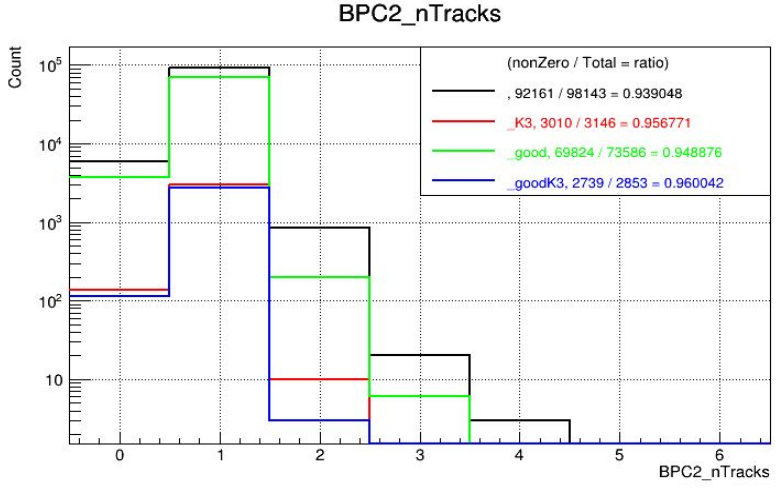


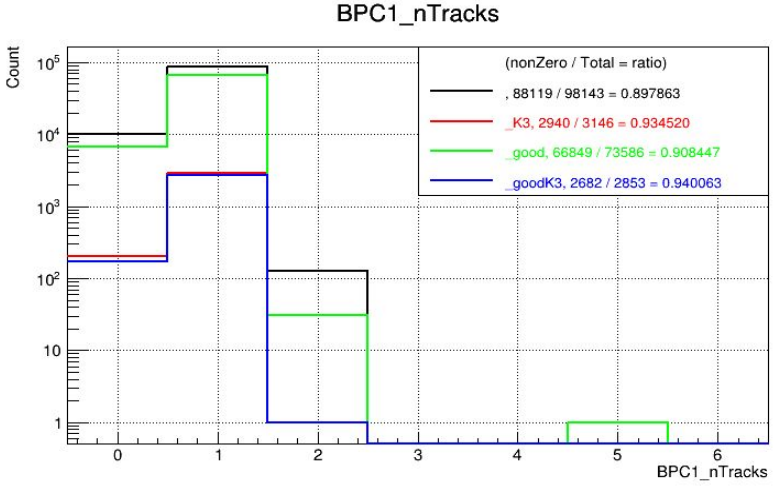


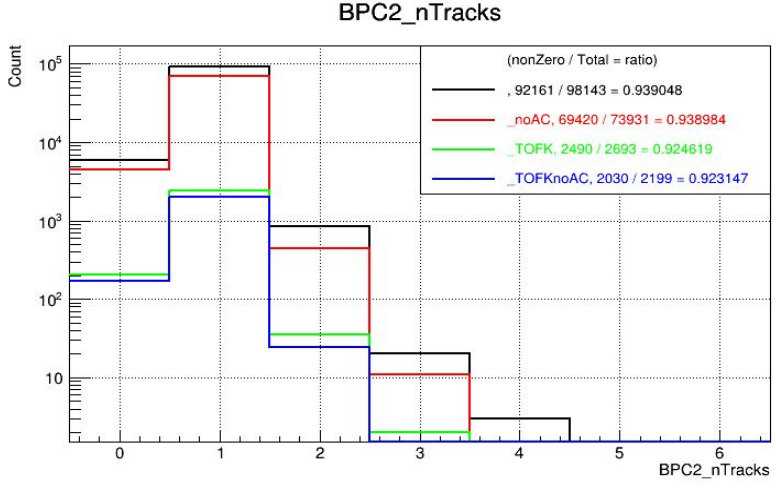


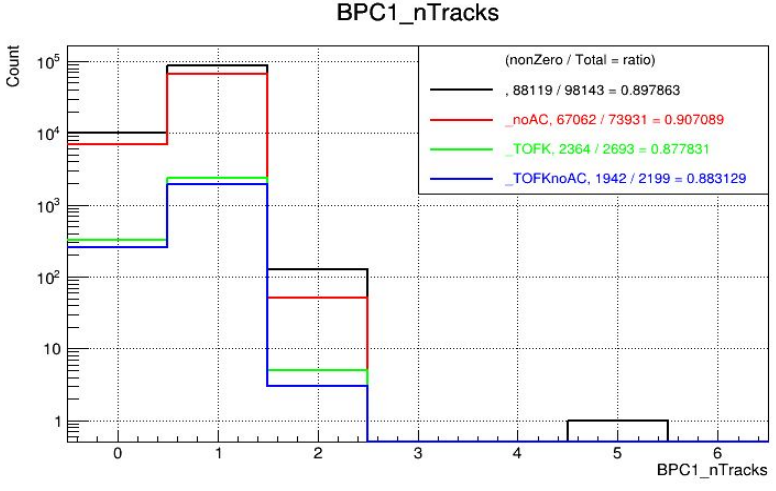
The number of tracks

- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~100,000 events





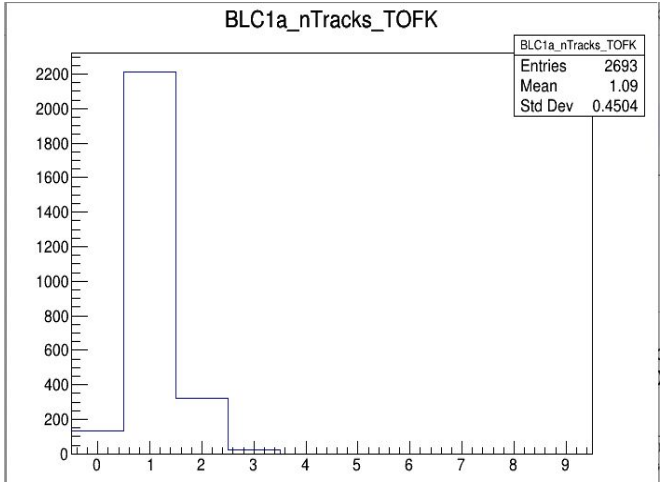


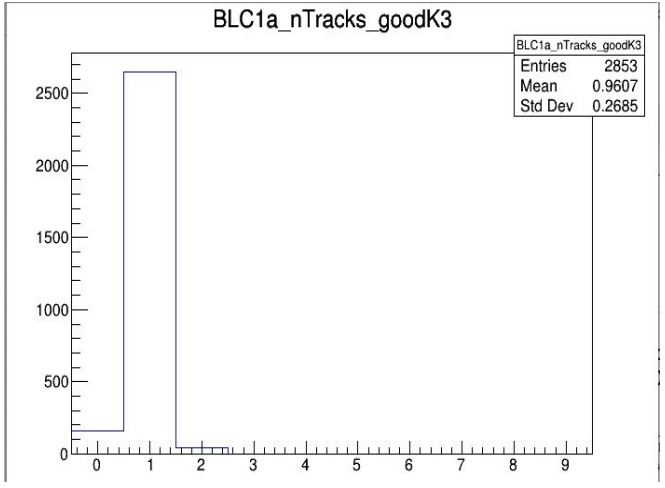


The number of tracks

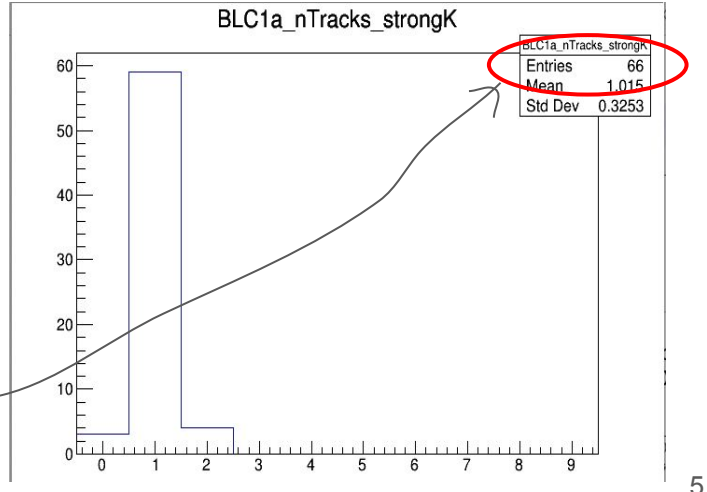
- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~100,000 events
- “strongK” means “TOFK && GoodBeam && K3”

?





- Intuitively, in venn diagram, area of TOFK and area of goodK3 are overlapped each other, namely, they are not independent.
- But they look independent from these histograms.
- Because,
  P(TOFK) = 0.027, P(goodK3) = 0.029
  → if they are independent,
  we can guess P(strongK) = P(TOFK) × P(goodK3) = 0.00078
  → 100,000 events × 0.00078 = 78 events of “strongK”

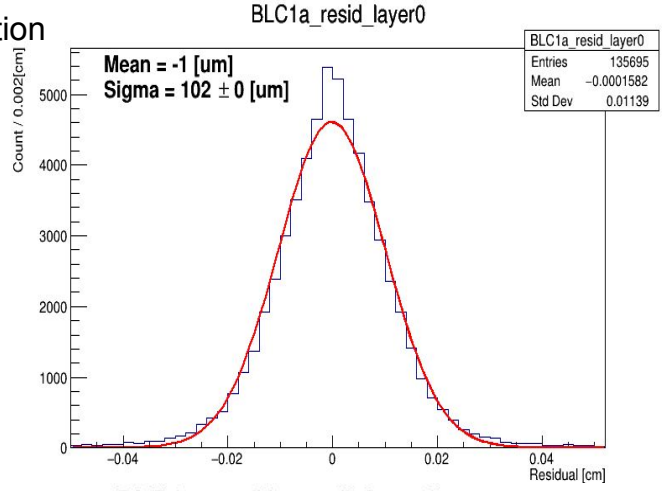


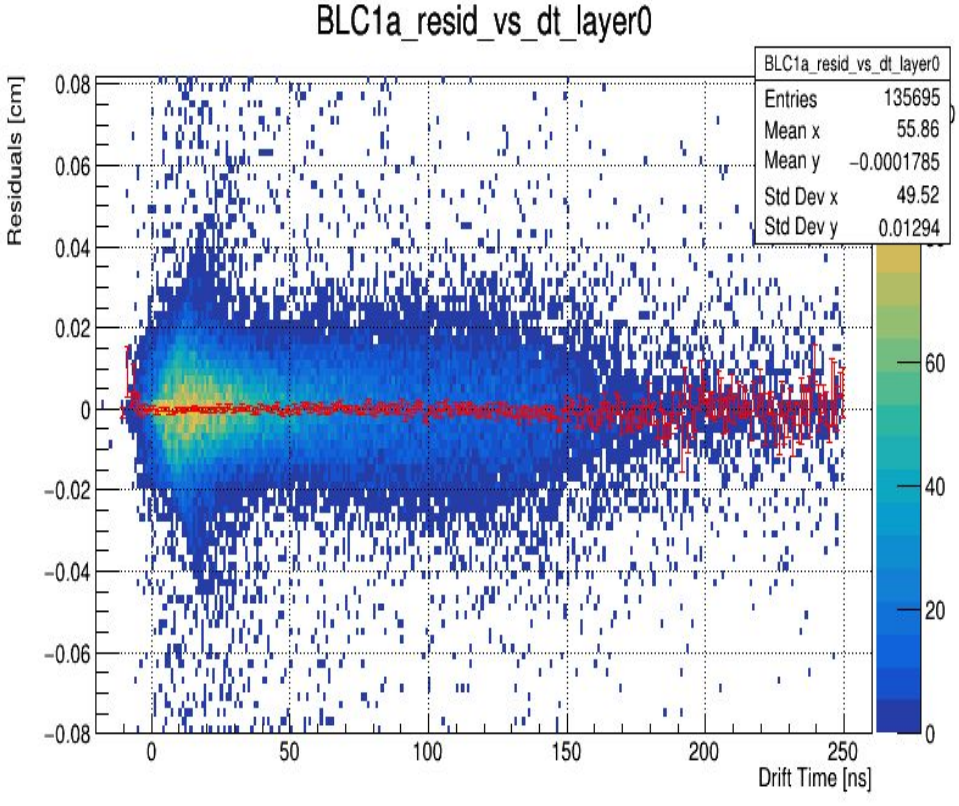
- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop 1,000,000 events

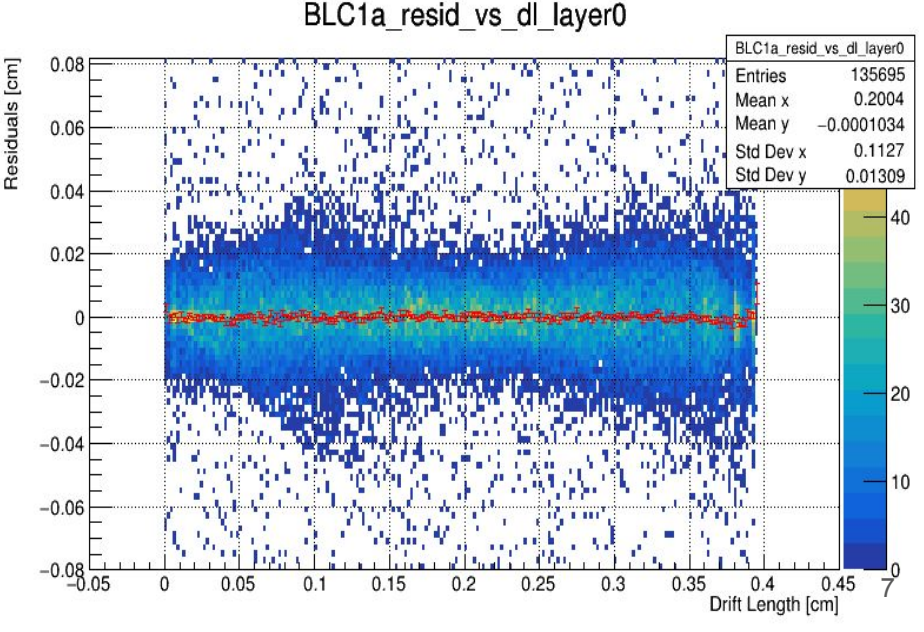
in UserDC.cc,
added them
to make hist of dt_vs_resid

```
#endif
      for(int itr=0;itr<ntra;itr++){
        LocalTrack* track=DCAna->GetTrack(cid,itr);
#if 0
        for(int i=0;i<track->nclustertimes();i++){
          std::cout<<i<<"  "<<track->clustertime(i)<<std::endl;
        }
        std::cout<<"Time: "<<track->GetTrackTime()<<std::endl;
        std::cout<<"RMS:  "<<track->GetTrackTimeRMS()<<std::endl;
#endif
        hist::H1(tmpname+"_time",    track->GetTrackTime(),2000,-200,200);
        hist::H1(tmpname+"_timerms",track->GetTrackTimeRMS(),1000,0,200);
      }
      if(ntra==1&&Single[ichm]){
        LocalTrack* track=DCAna->GetTrack(cid,0);
        hist::H1(tmpname+"_chi2all",track->chi2all(),1000,0,100);
        hist::H1(tmpname+"_chi2xz",track->chi2xz(),1000,0,100);
        hist::H1(tmpname+"_chi2yz",track->chi2yz(),1000,0,100);
        double x,y;
        track->XYLocalPosatZ(0,x,y);
        hist::H2(tmpname+"_XYLocal",x,y,posbins2);
        hist::H2(tmpname+"_AB",track->gdx(),track->gdy(),100,-0.1,0.1,100,-0.1,0.1);
        for(int xy=0;xy<2;xy++){
          for(int i=0;i<track->nhit(xy);i++){
            double resid=track->resid(xy,i);
            int layer=track->layer(xy,i);
            double dt=track->hit(xy,0).dt;
            hist::H1(tmpname+"_resid"+Form("_layer%d", layer ), resid, residbins);
            hist::H2(tmpname+"_EvNum_dE"+Form("_layer%d", layer ),event_number,resid,evresidbins);
            hist::H2(tmpname+"_resid_vs_dt"+Form("_layer%d", layer ),dt,resid,500,-100,400,100,-0.1,0.1)
          }
        }
```

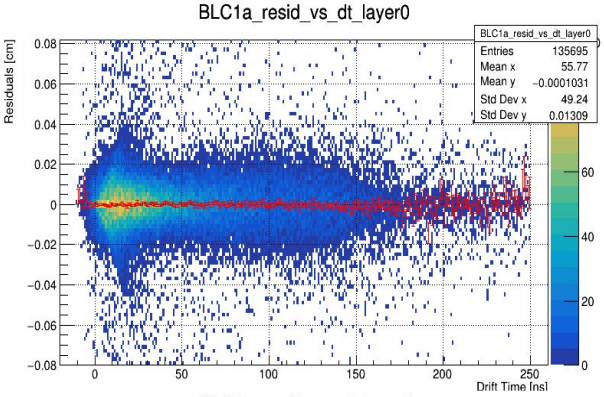
- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop 1,000,000 events, the number of tracks =1 && Single[each detector]
- BLC1a, Layer0
- Drift Time vs Residual, and Mean of Residual in each x-bins (left)
- Drift Length vs Residual, and Mean of Residual in each x-bins (left)
- Gaussian fit result (upper right)
- almost flat and one peak → XT param OK

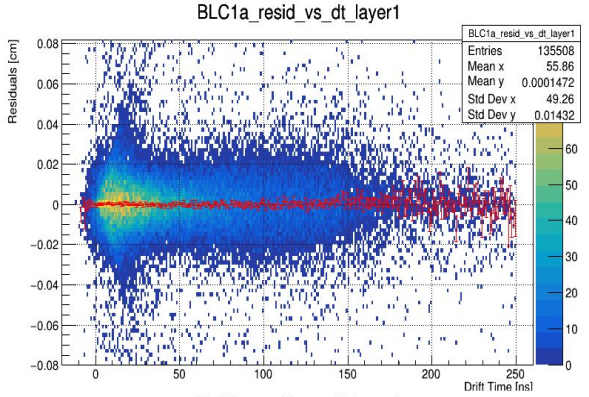


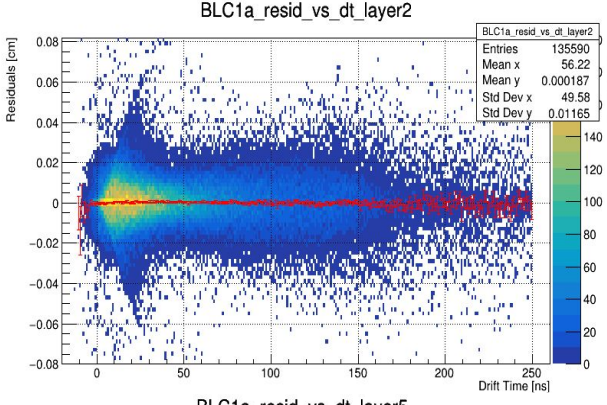


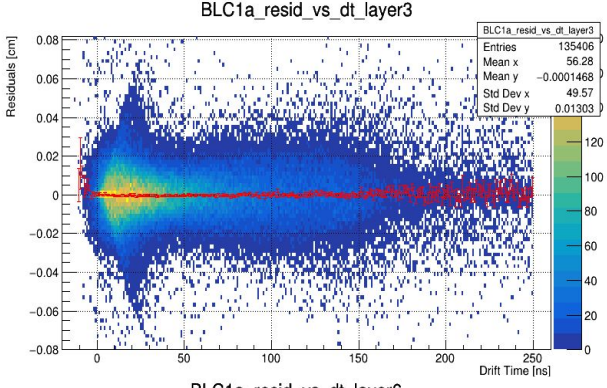


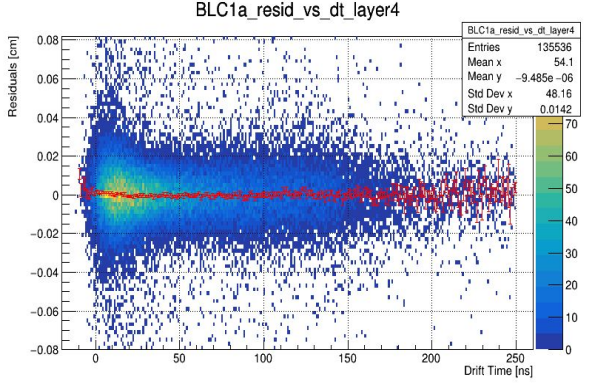
Drift Time vs Residual BLC1a

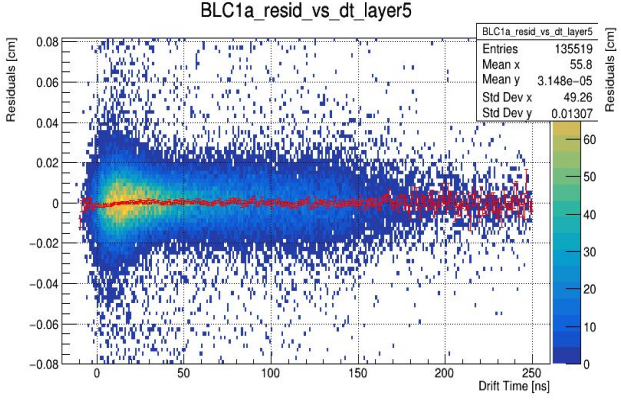


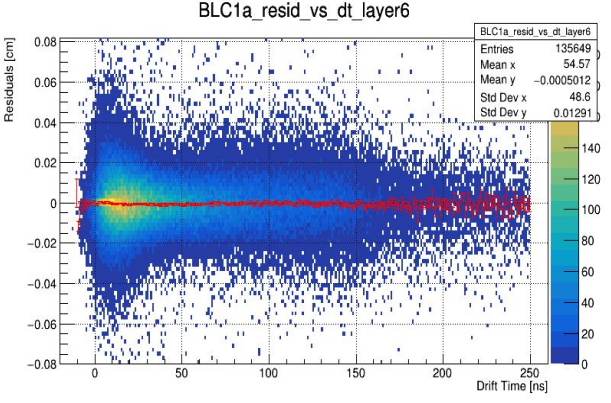


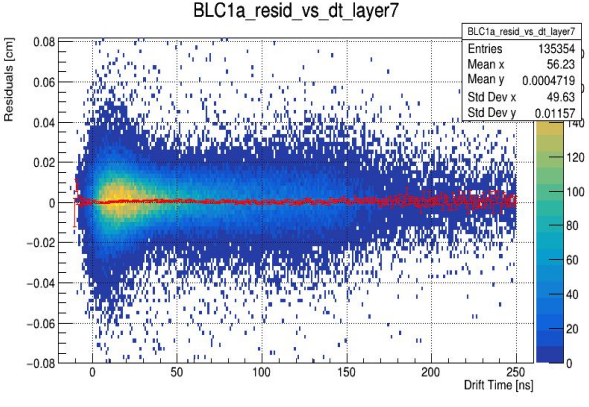




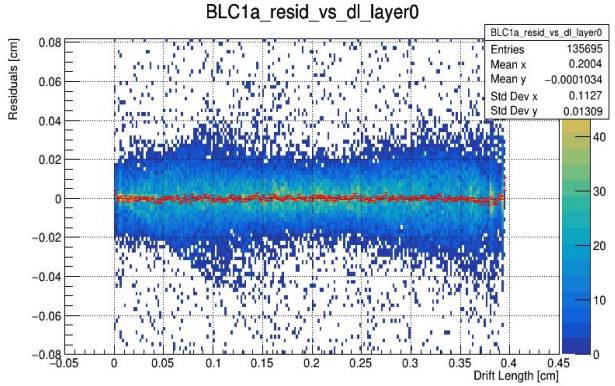


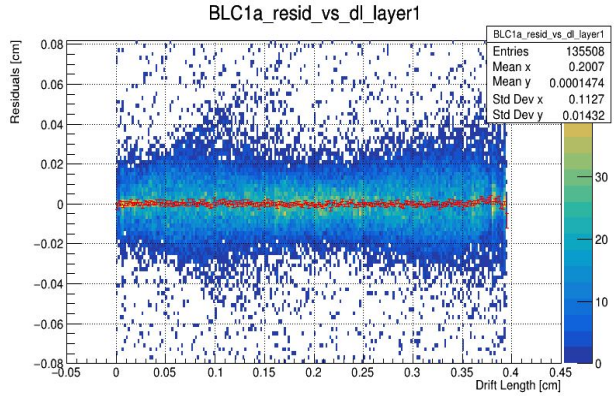


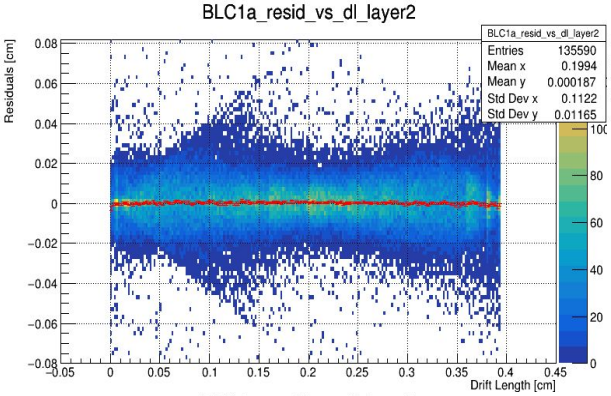


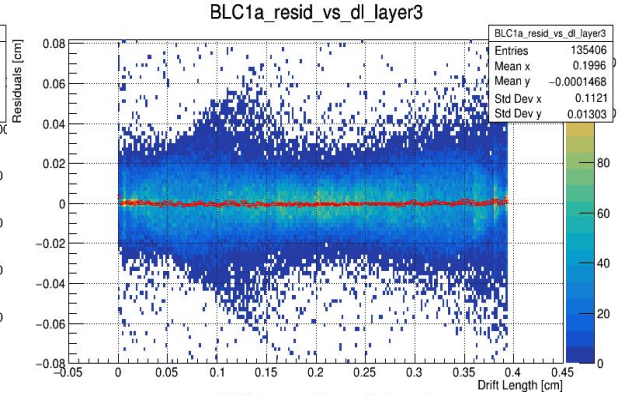


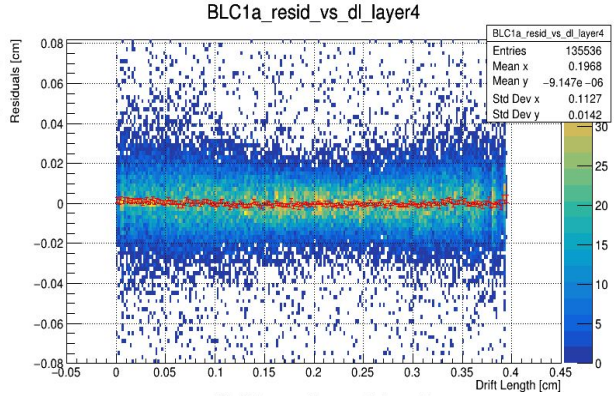
Drift Length vs Residual BLC1a

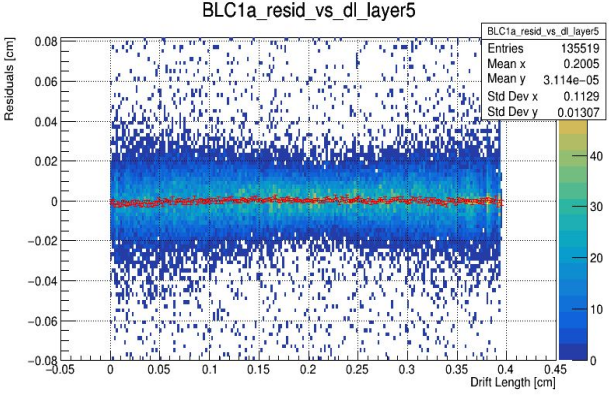


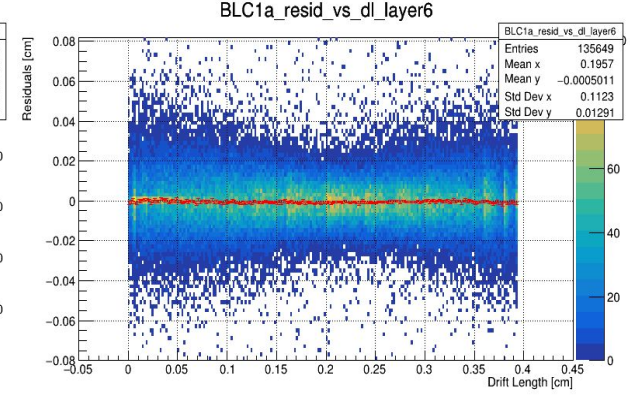


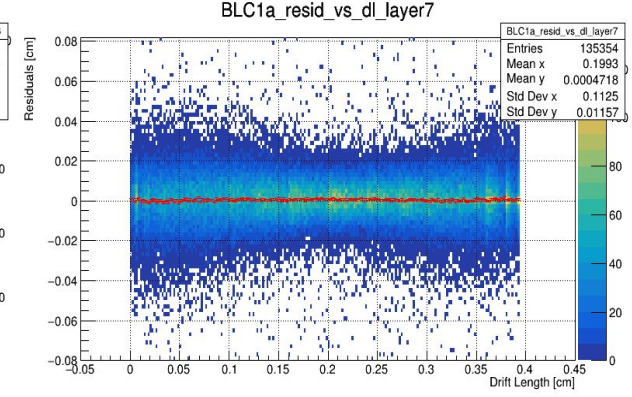




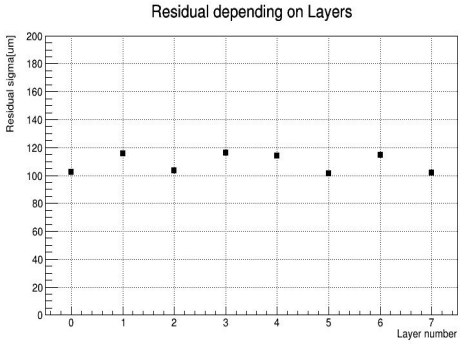


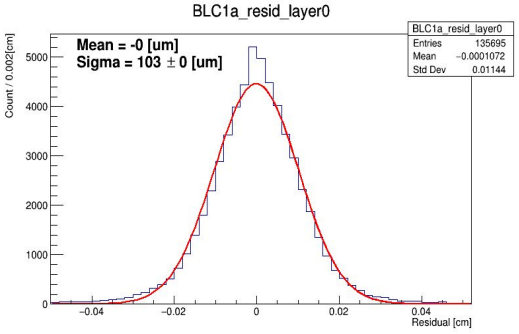


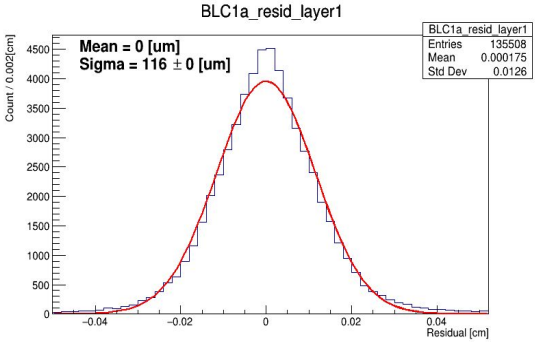


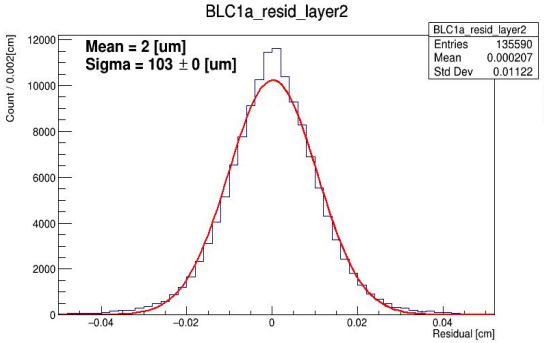


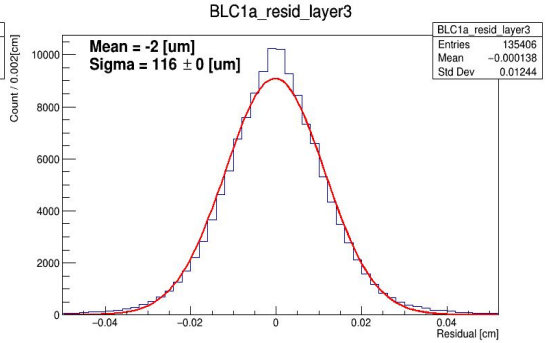
Residual BLC1a

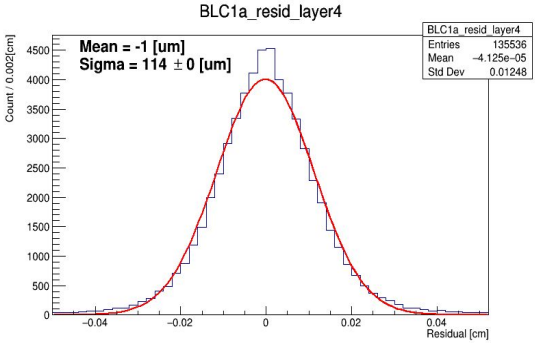


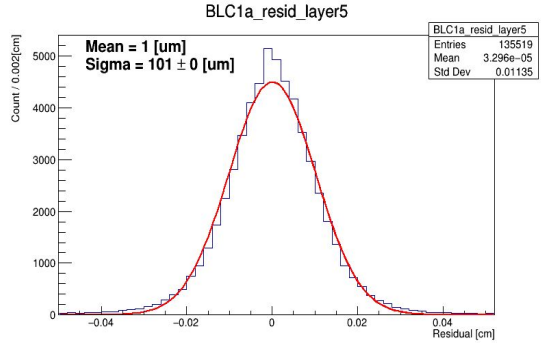


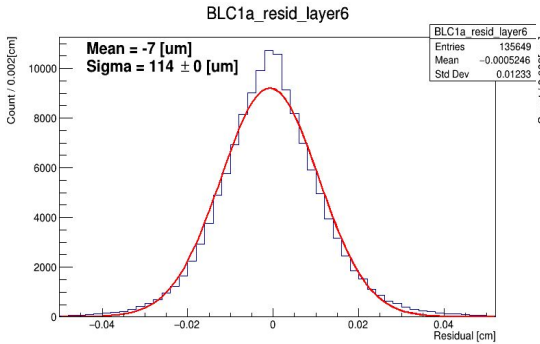


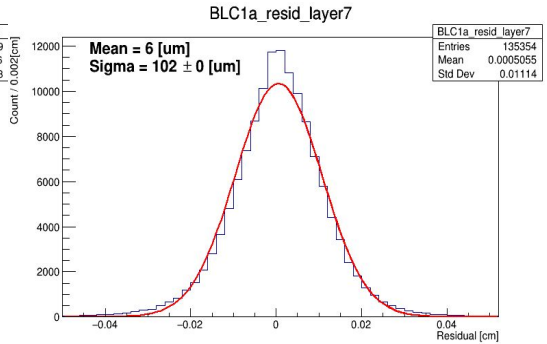




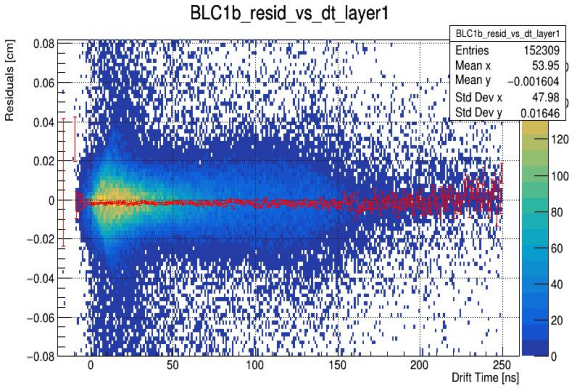


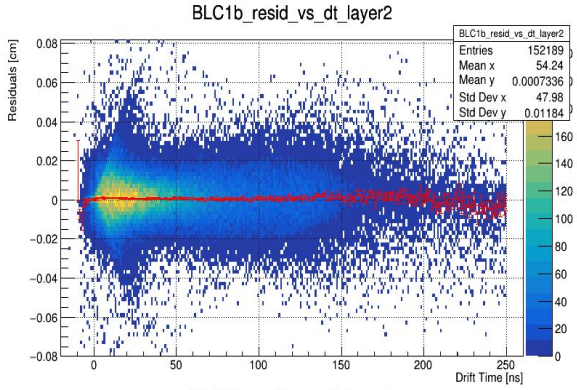


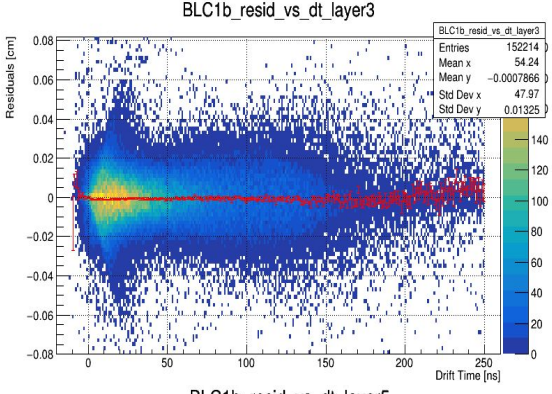


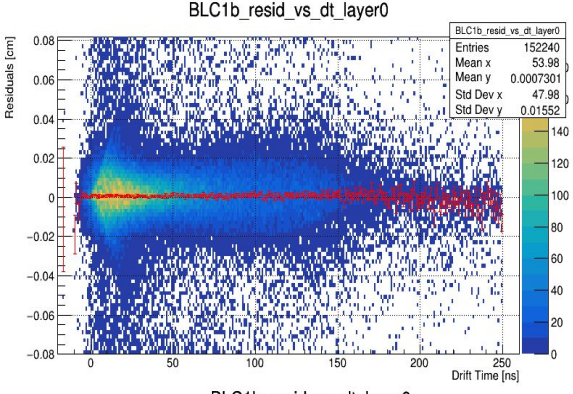


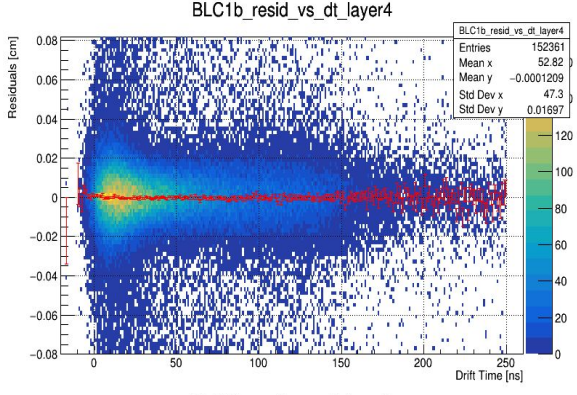
Drift Time vs Residual BLC1b

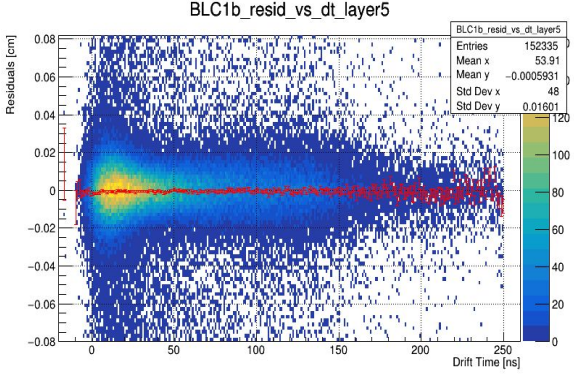


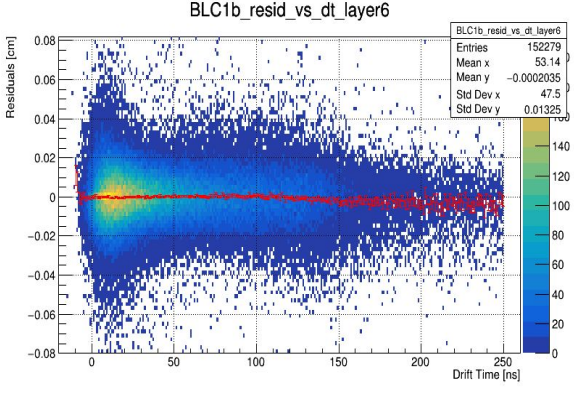


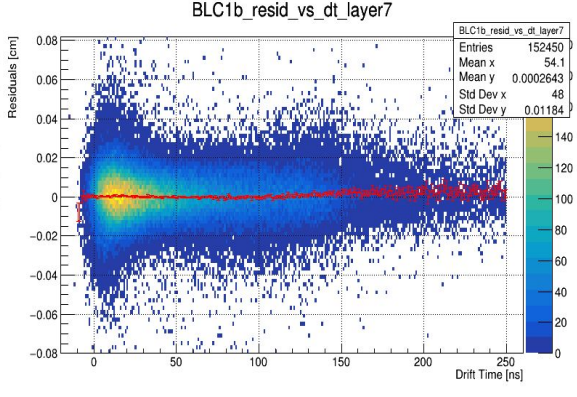




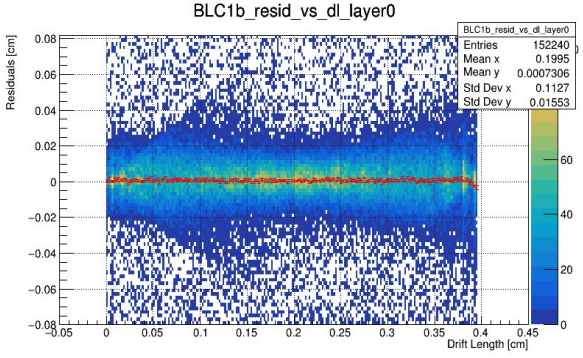


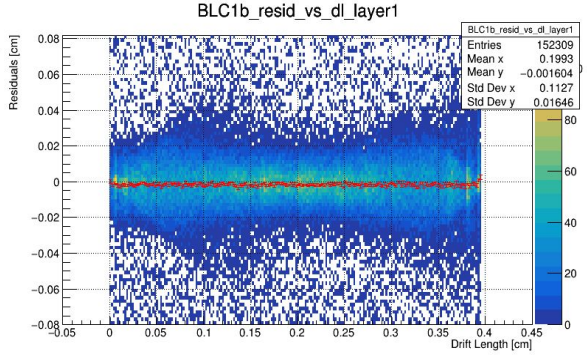


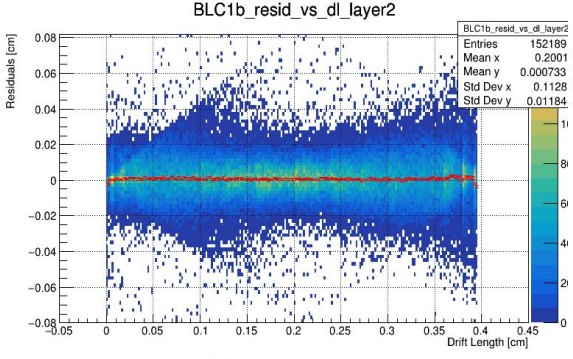


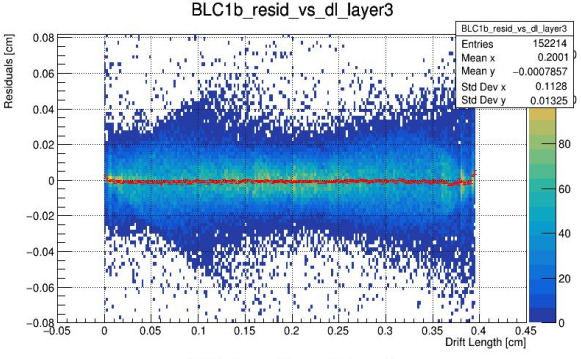


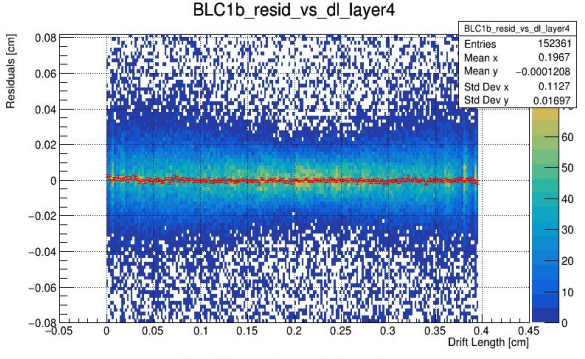
Drift Length vs Residual BLC1b

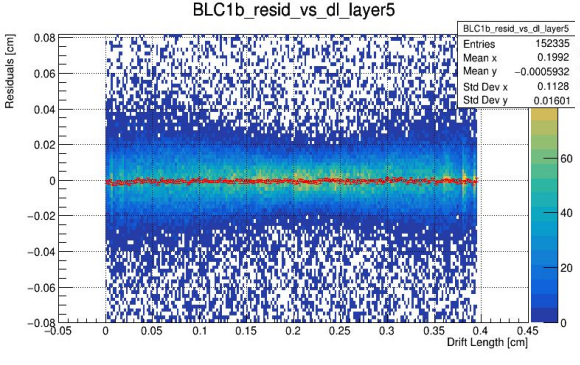


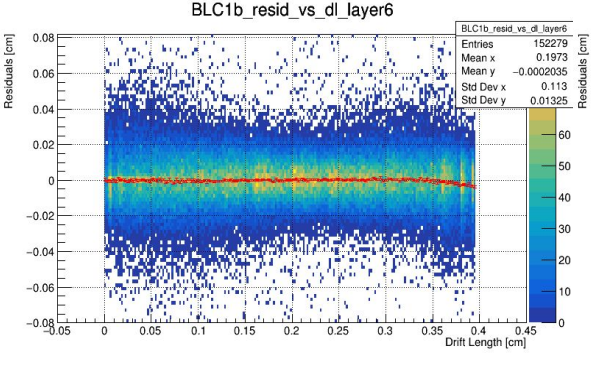


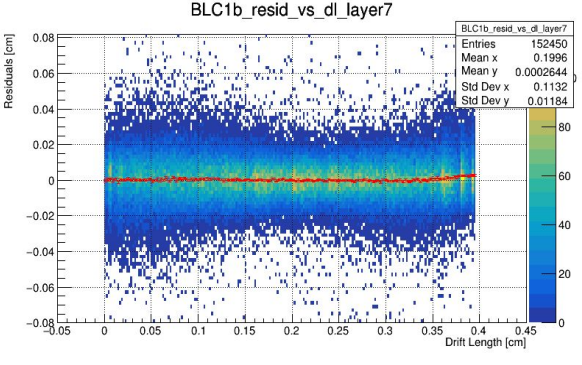




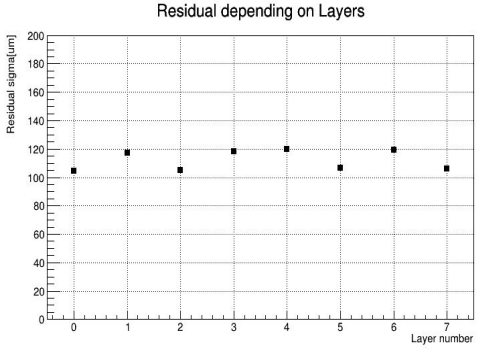


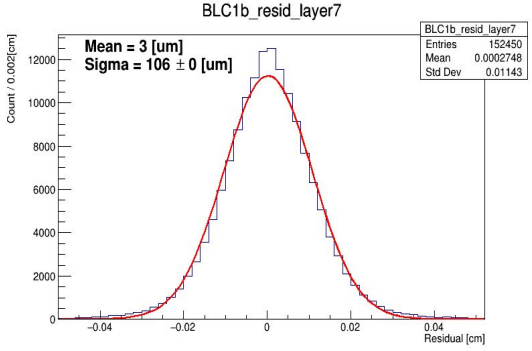


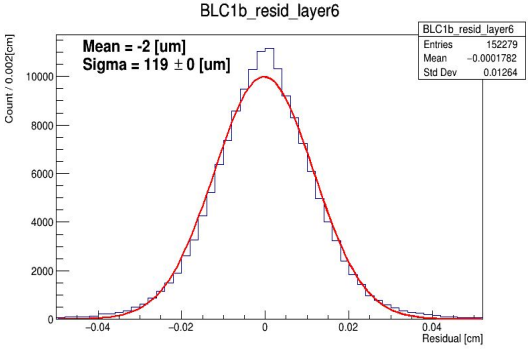


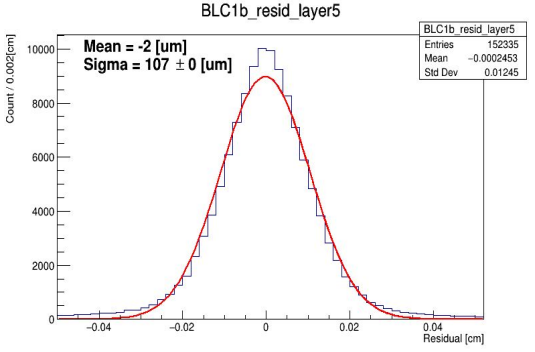


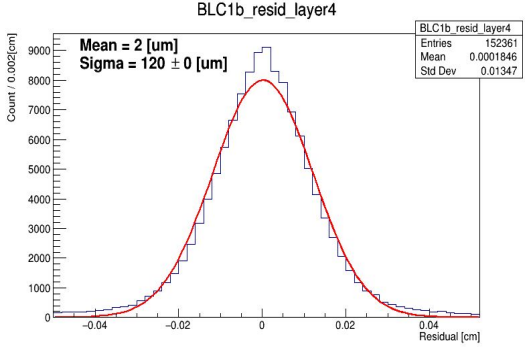
Residual BLC1b

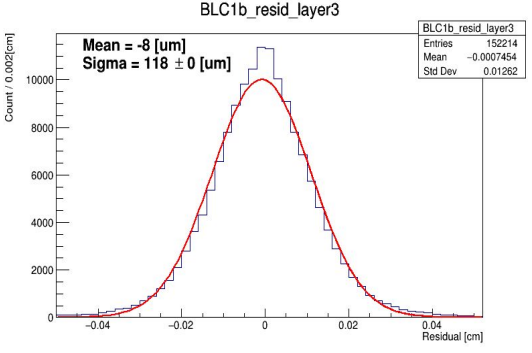


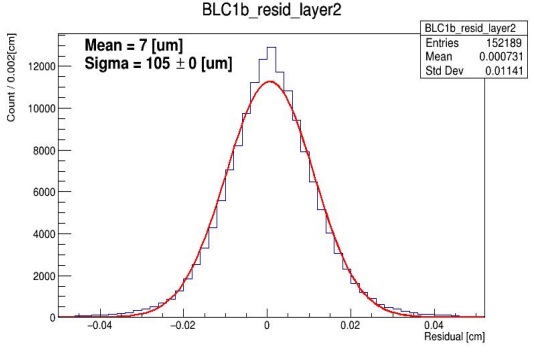


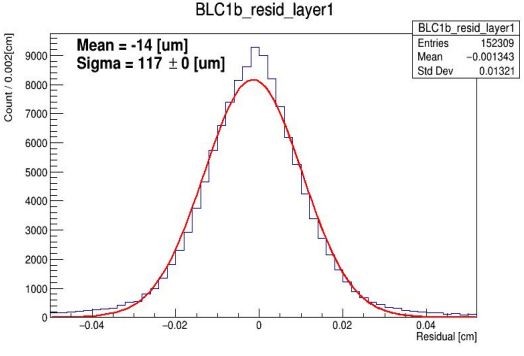


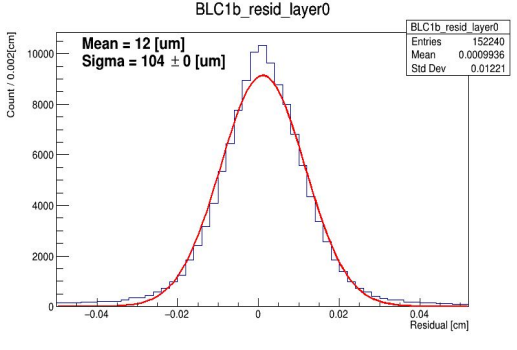




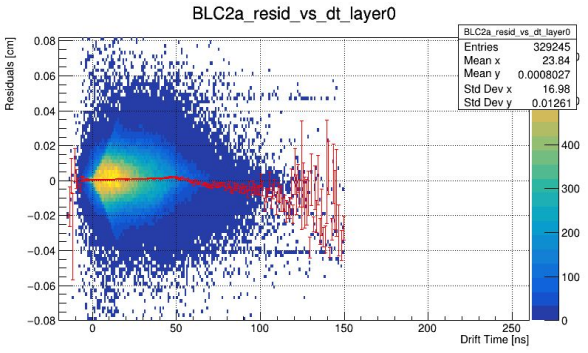


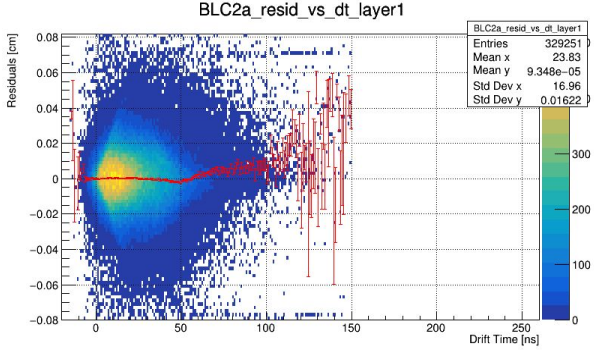


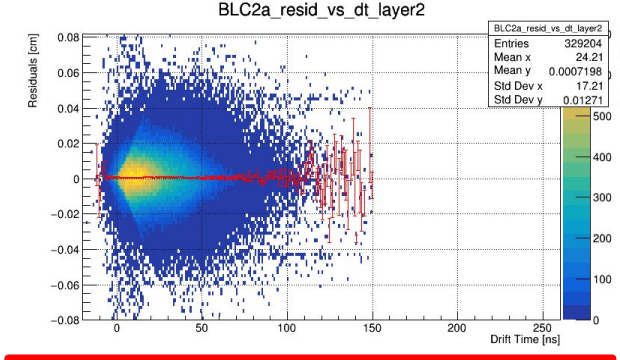


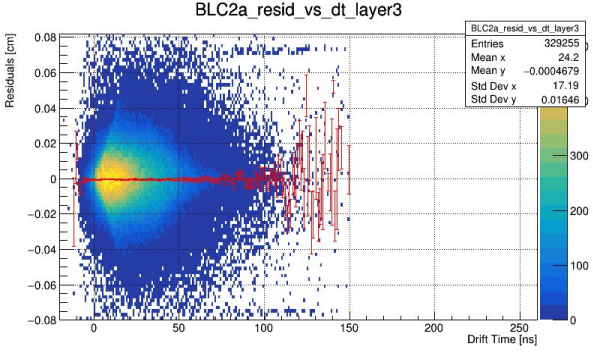


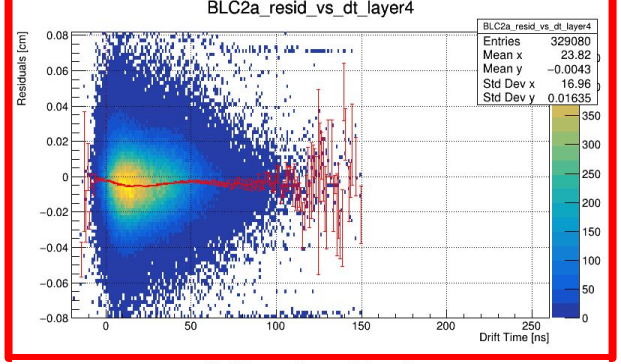
Drift Time vs Residual
BLC2a
layer4,5 is bad?

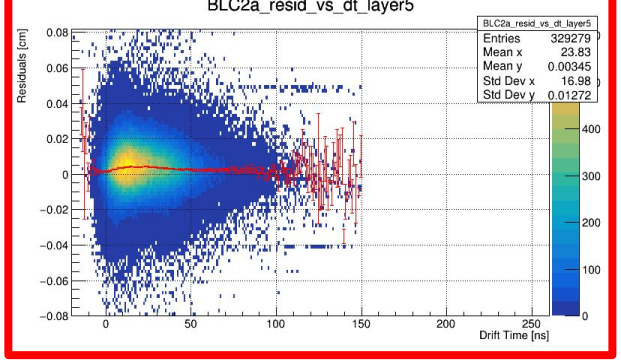


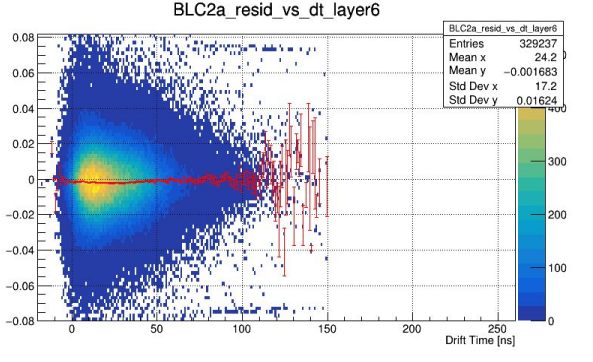


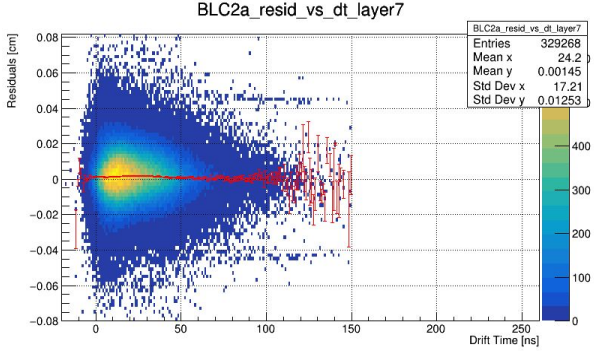




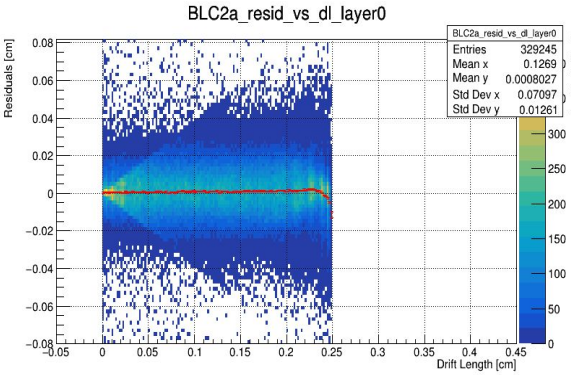


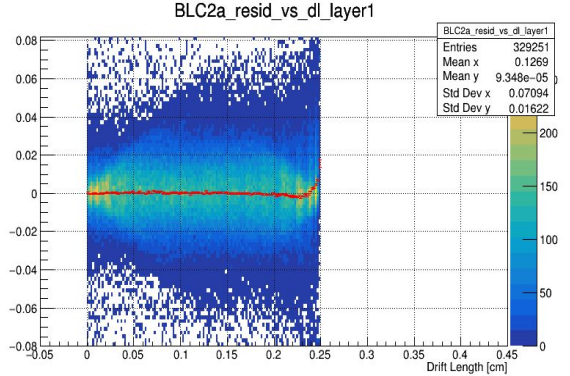


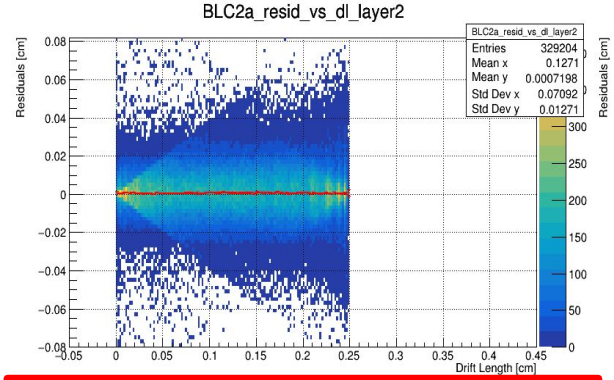


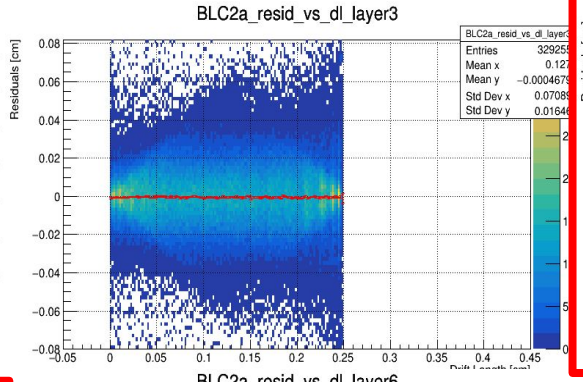


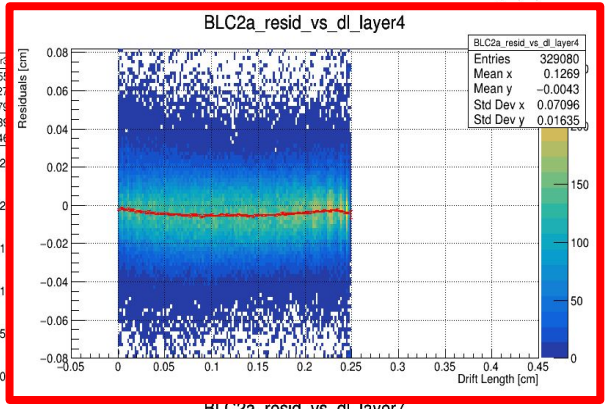
Drift Length vs Residual
BLC2a
layer4,5 is bad?

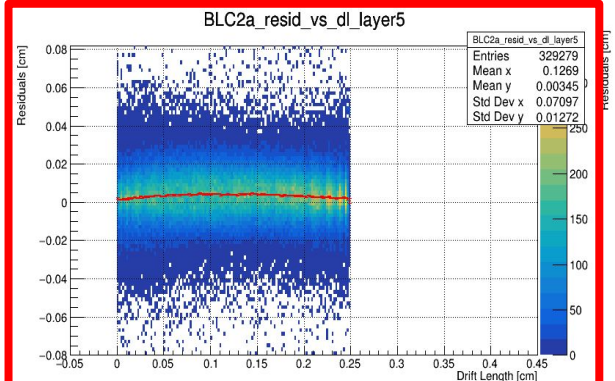


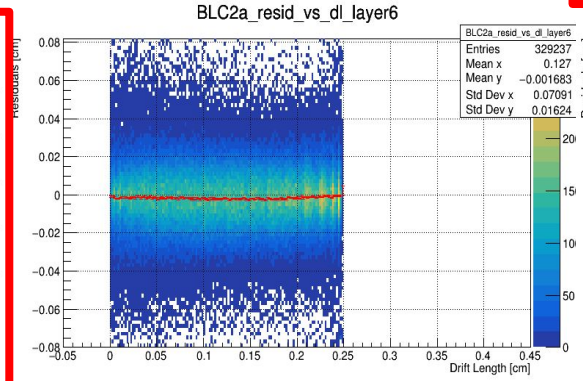


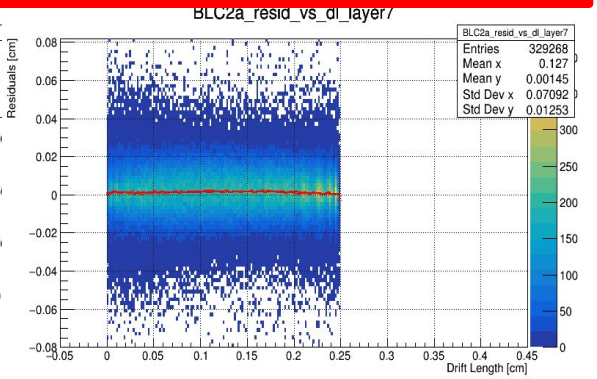




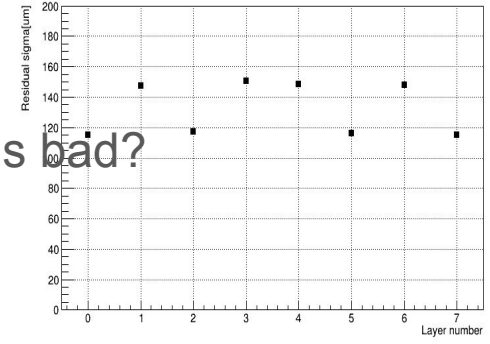


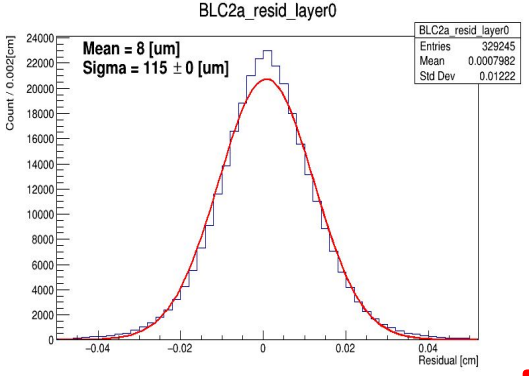


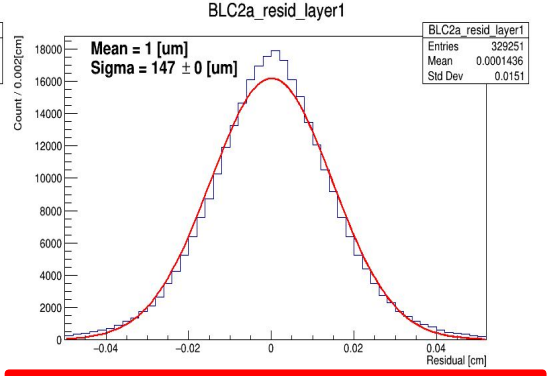


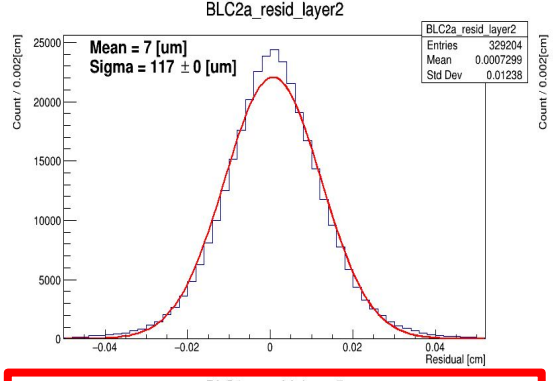


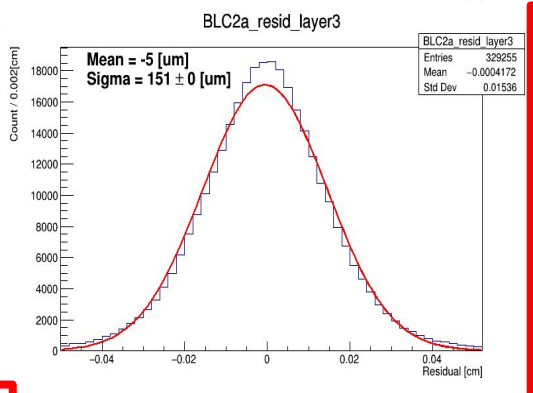
Residual BLC2a layer4,5 is bad?

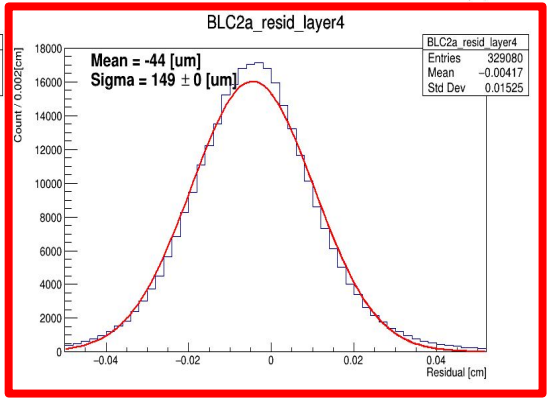


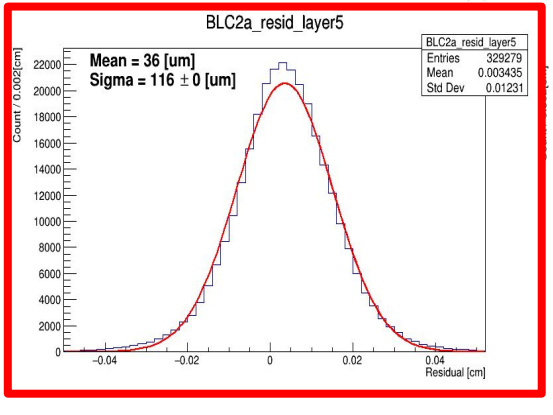


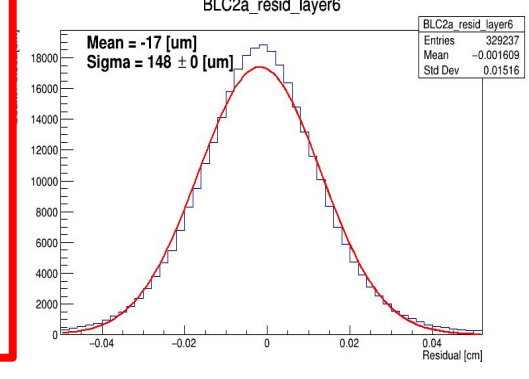


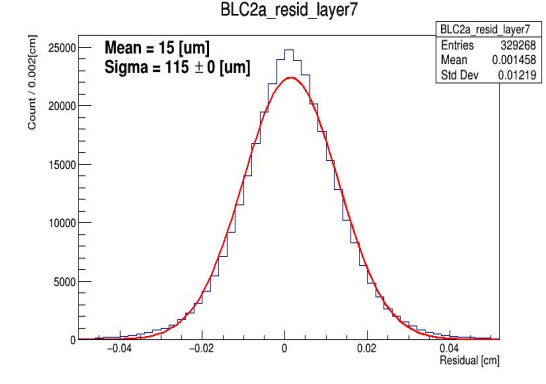




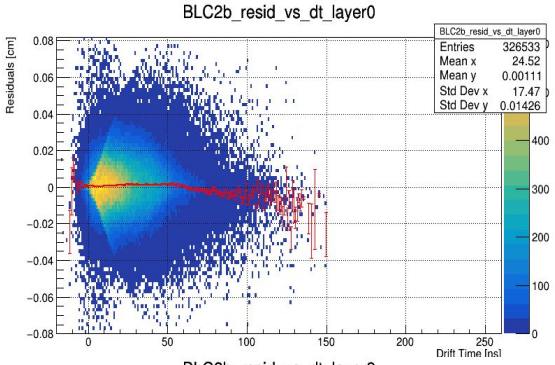


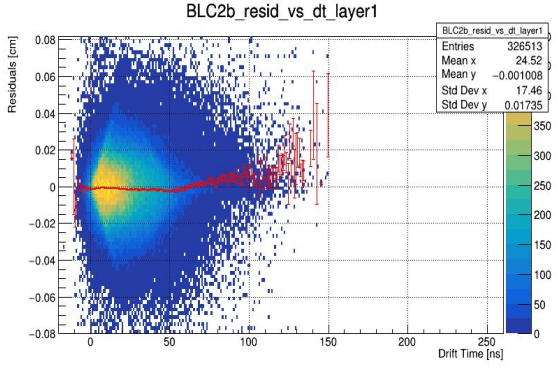


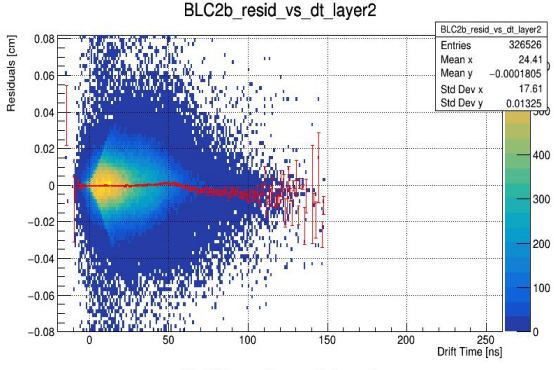


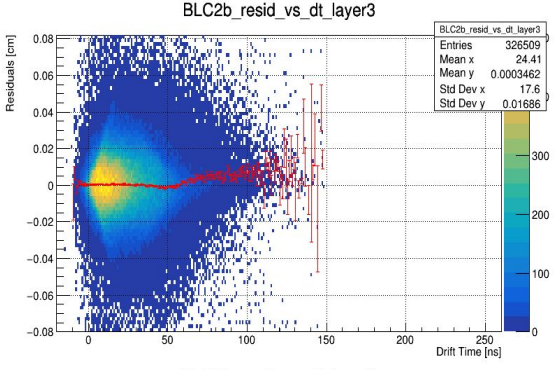


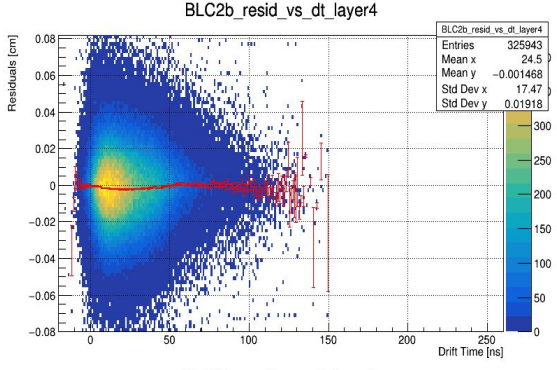
Drift Time vs Residual
BLC2b

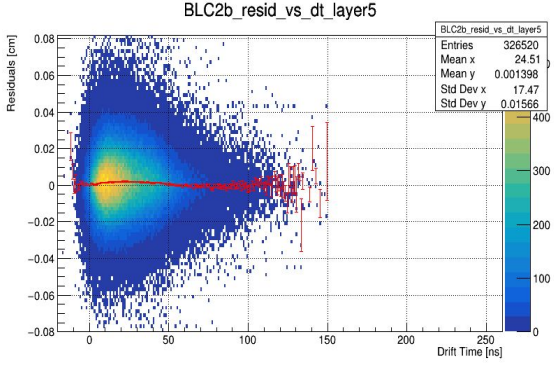


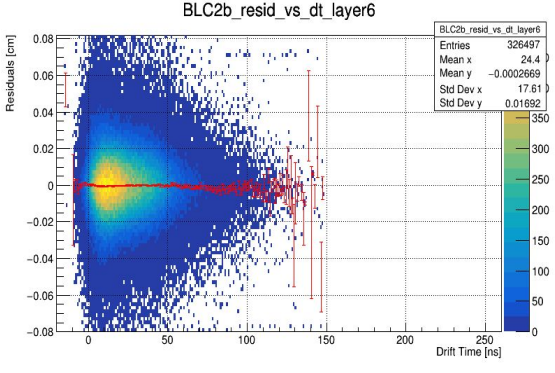


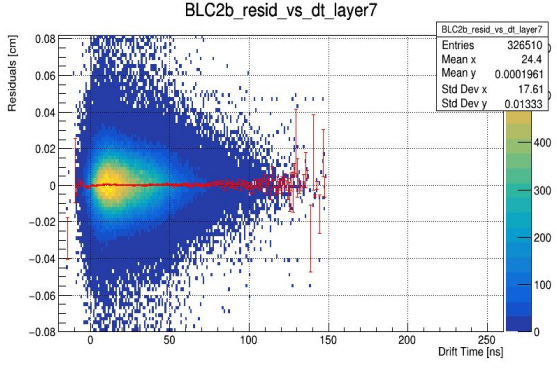




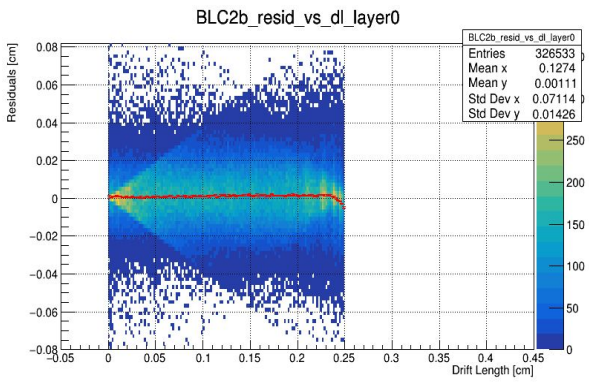


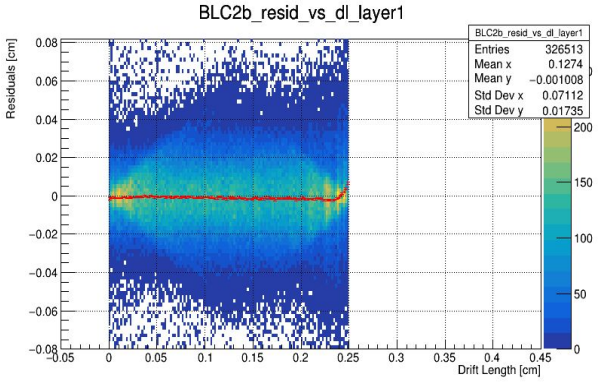


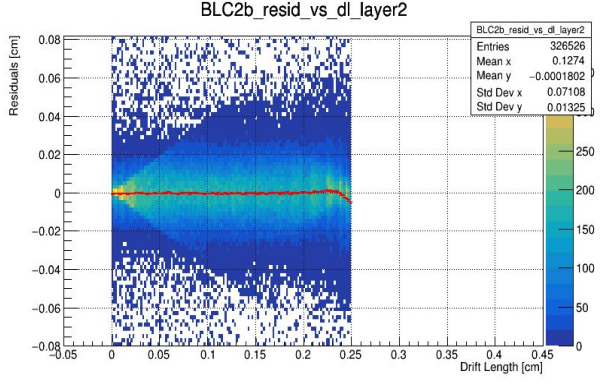


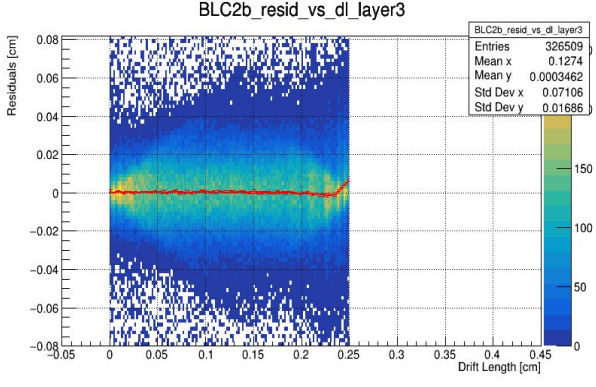


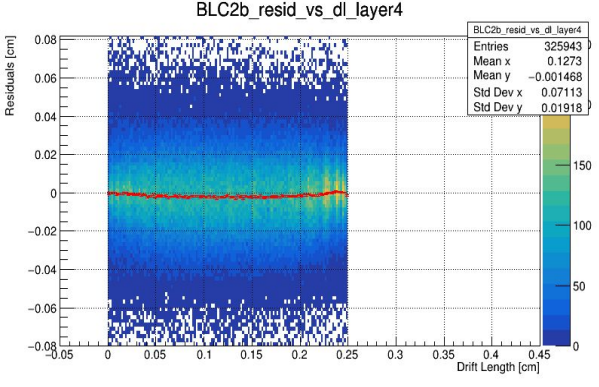
Drift Length vs Residual BLC2b

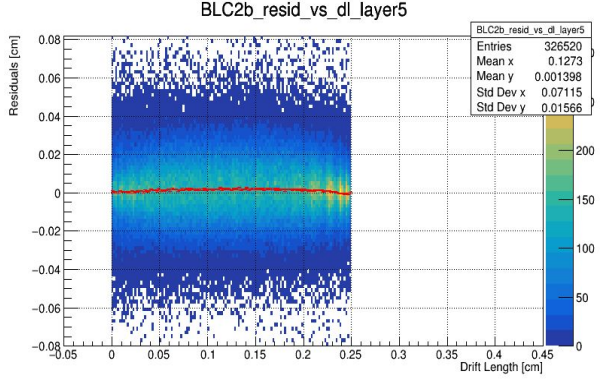


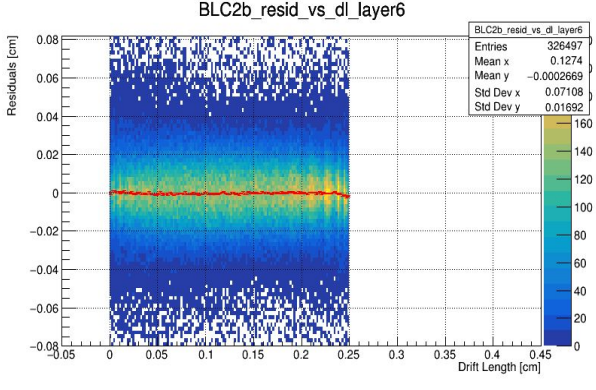


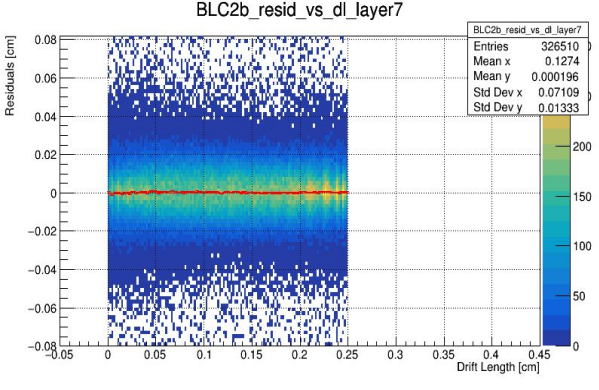




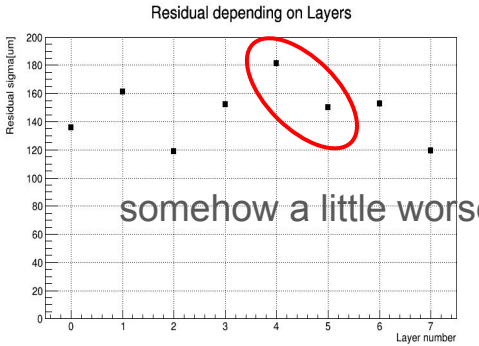




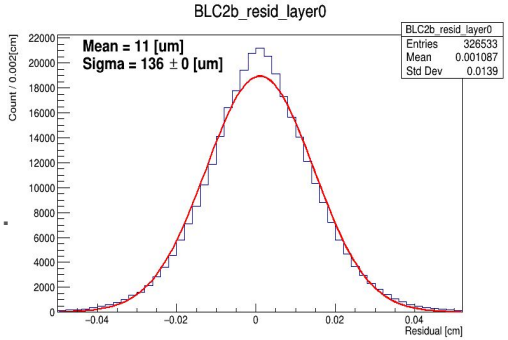


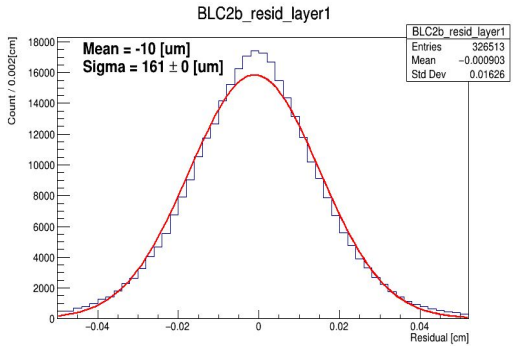


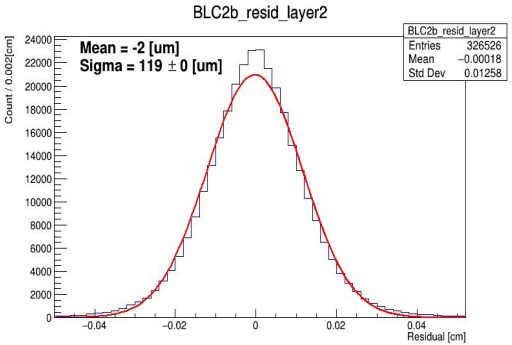
Residual BLC2b

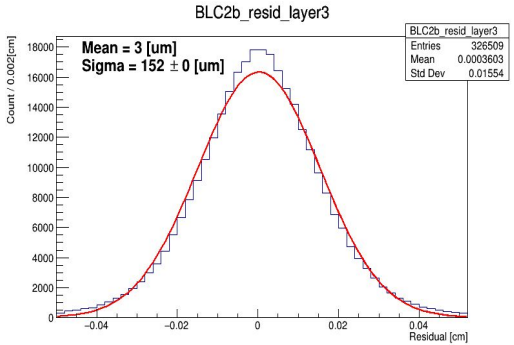


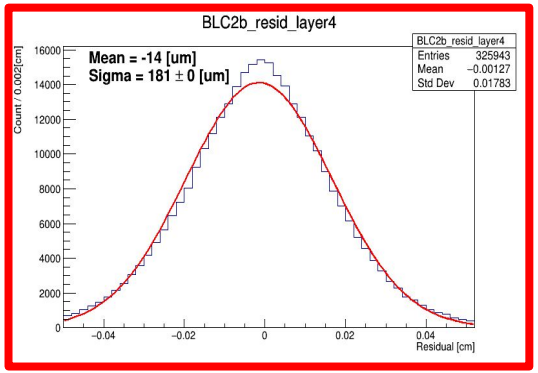
somehow a little worse…

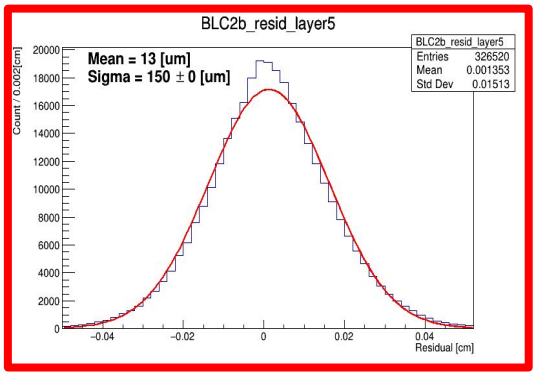


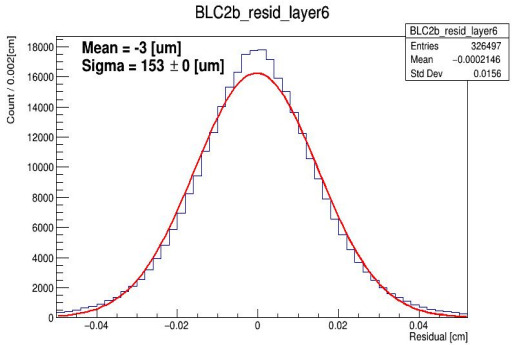


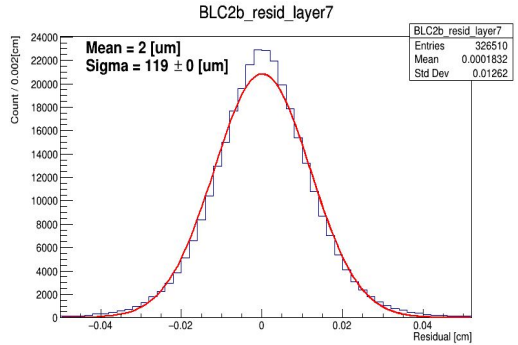




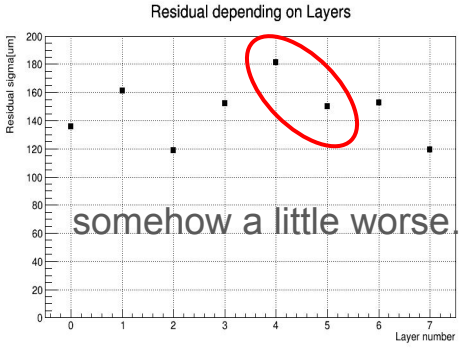








Residual BLC2b



The same problem as Akaishi-san's analysis?

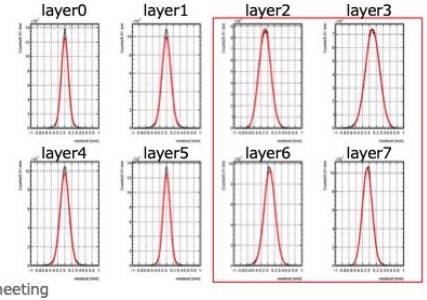
BLC2a residuals

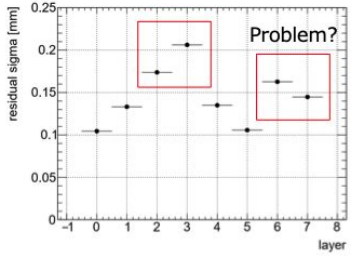
- T77 data
  - Run00094(production run)
  - Event selection
    - ✓TOFK
    - ✓T0 single hit
    - ✓DT: -50 – 400 ns, TOT: 60 – 400 ns
    - ✓1 wire hit for each layer
    - ✓Tracking required more than 3 layers each X, Y

Run85
BLC1, BLC2 HV 1250 V
BPC HV 1500 V

Run78
pion
BLC1, BLC2 HV 1250 V
BPC HV 1450 V
BLC1a resid: ~ 0.14 mm
(Kawasaki-san analysis 20180227)

Residual distribution





T77 meeting 2020/11/30 3

BLC2a residuals

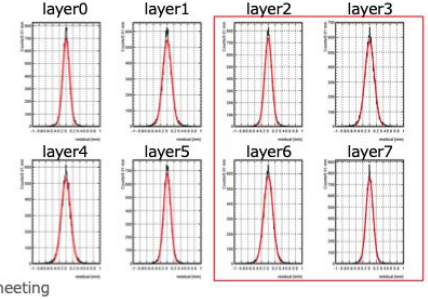
- T77 data
  - Run00094(production run)

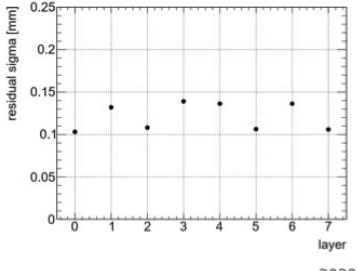
✓swapped layer3 with layer7…
In cable connected BLC2a ASD output

Run85
BLC1, BLC2 HV 1250 V
BPC HV 1500 V

Run78
pion
BLC1, BLC2 HV 1250 V
BPC HV 1450 V
BLC1a resid: ~ 0.14 mm
(Kawasaki-san analysis 20180227)

Residual distribution





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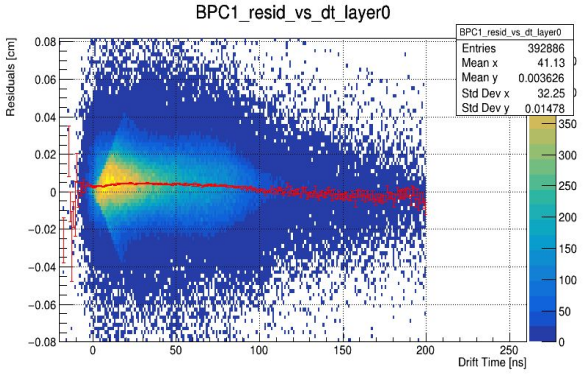
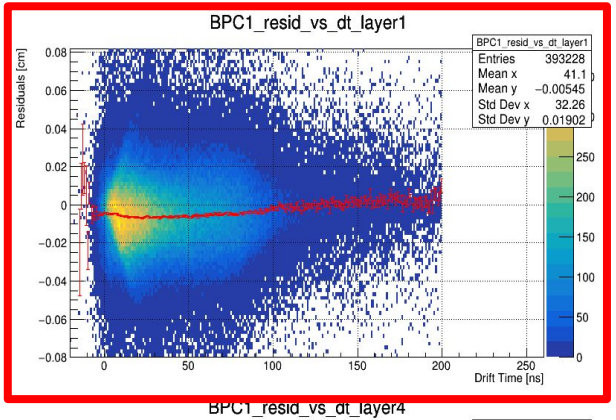
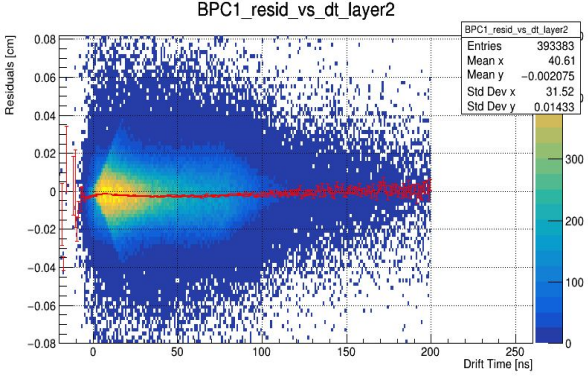
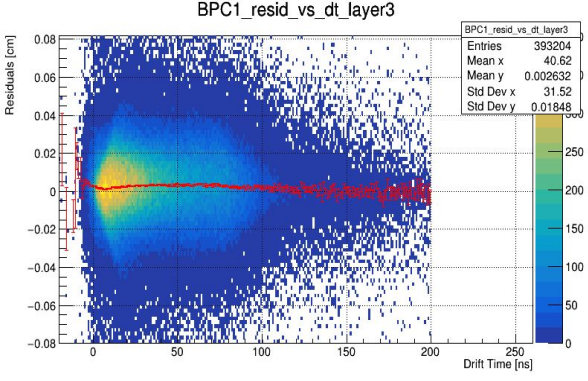
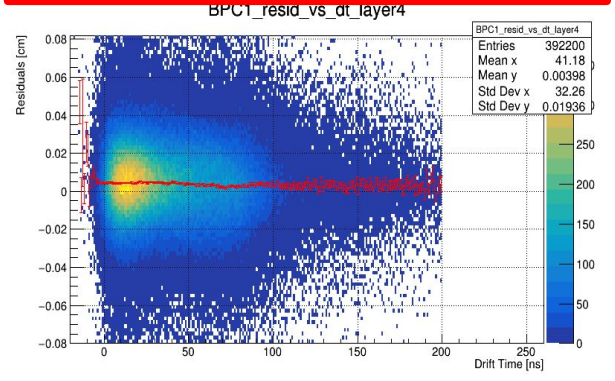
Drift Time vs Residual
BPC1
Layer1 is especially worse

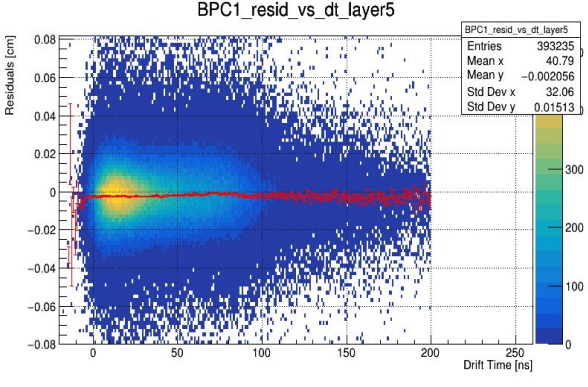


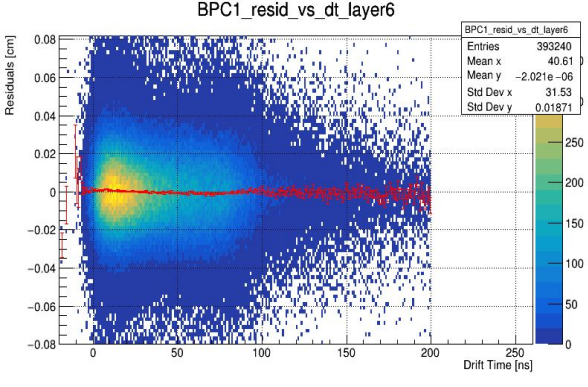


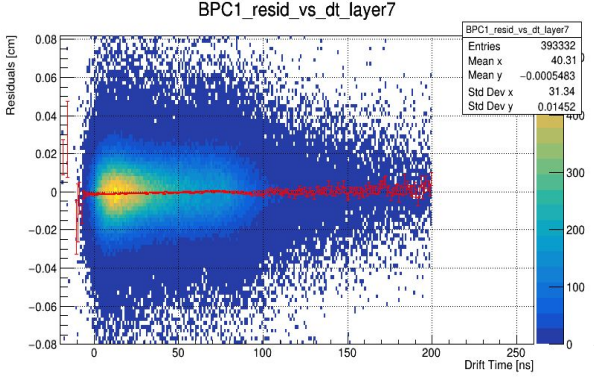




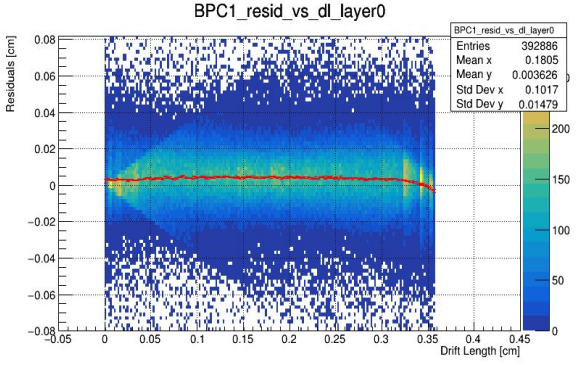


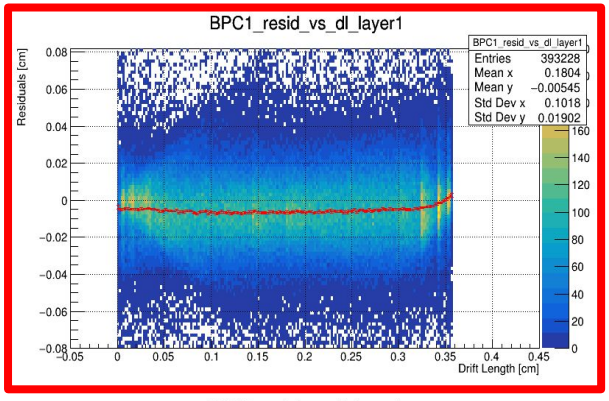


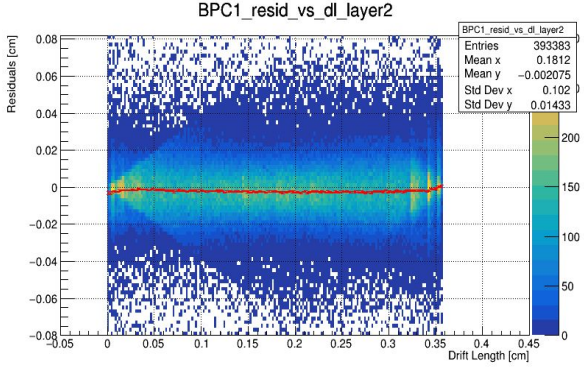


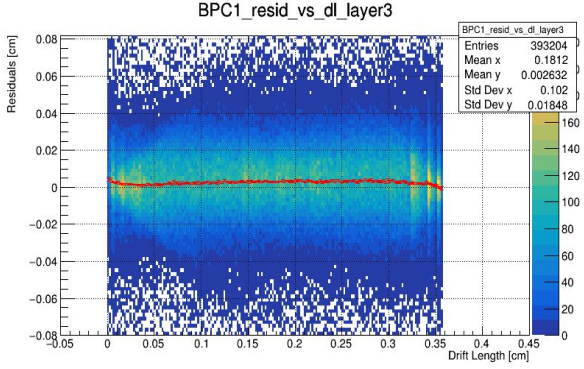


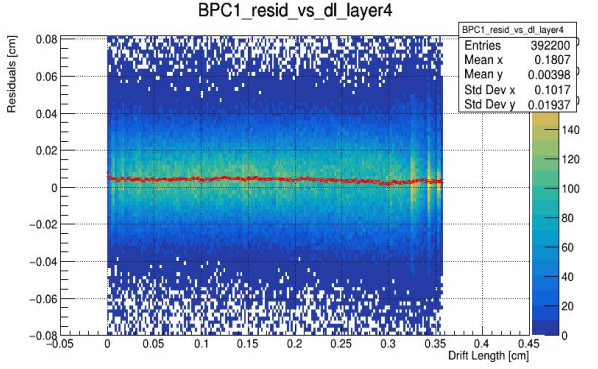
Drift Length vs Residual
BPC1
Layer1 is especially worse

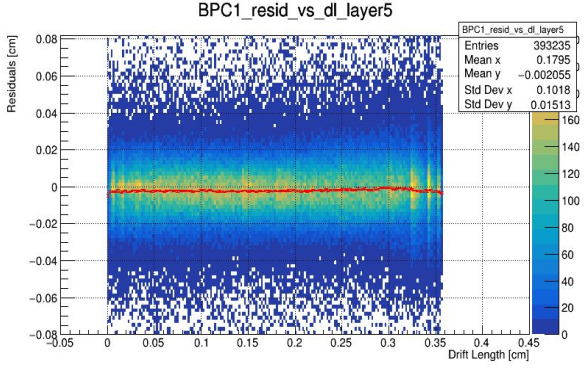


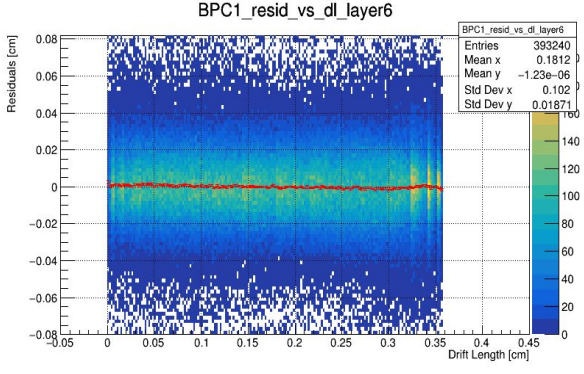


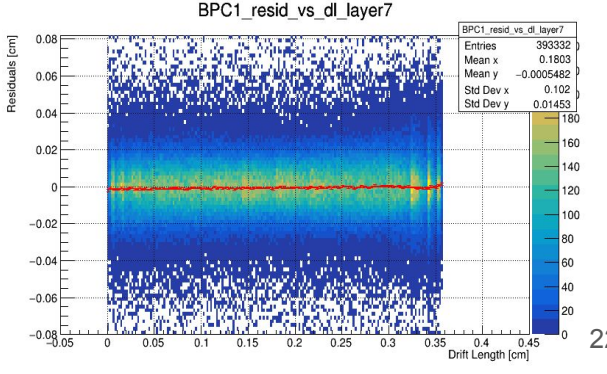




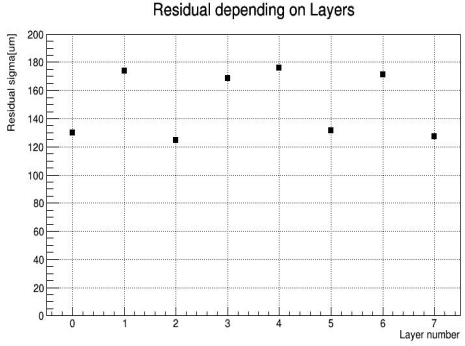


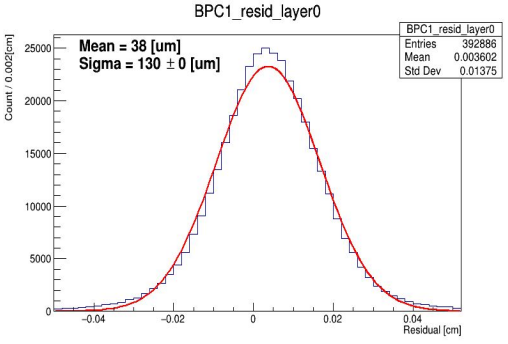


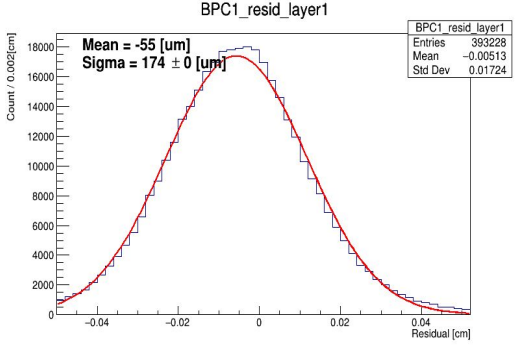


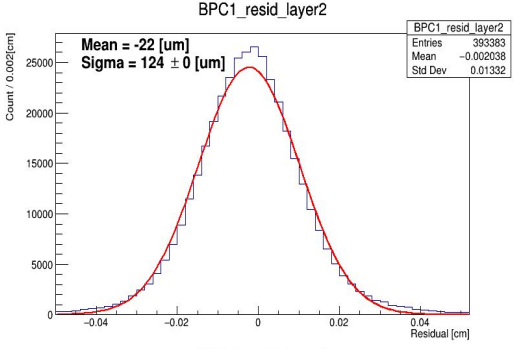


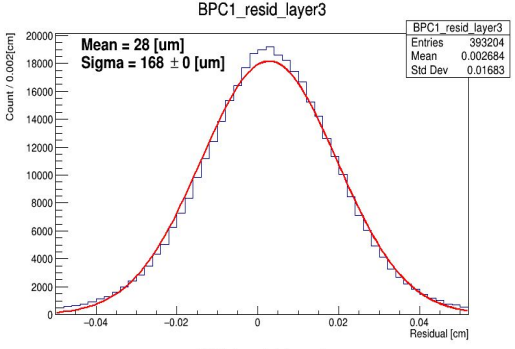
Residual BPC1

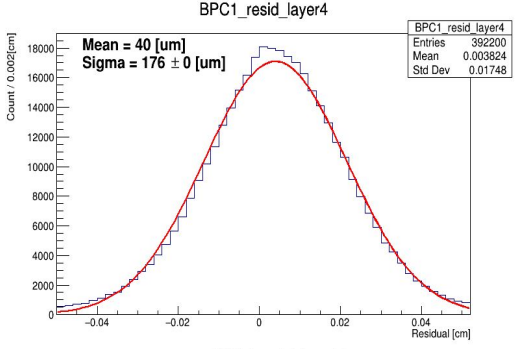


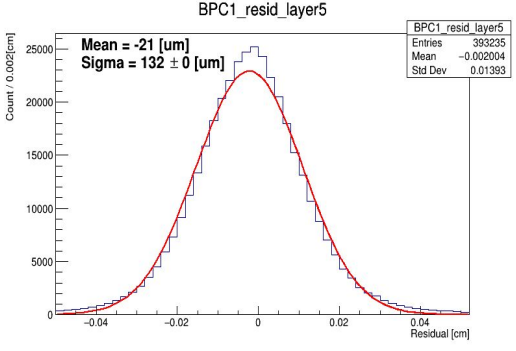


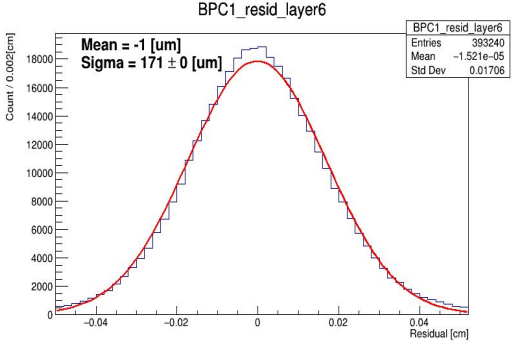


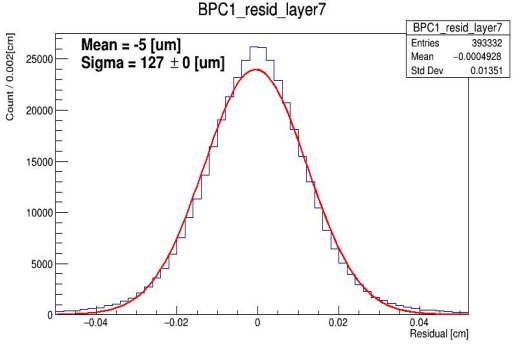




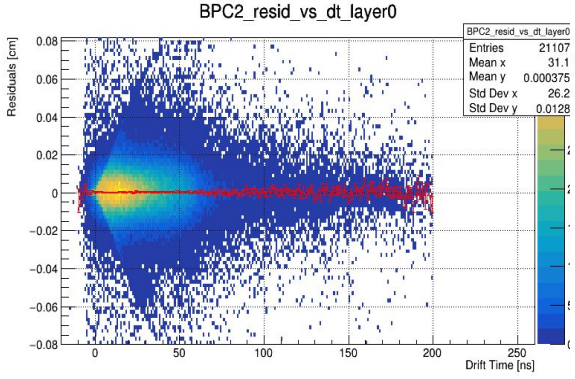


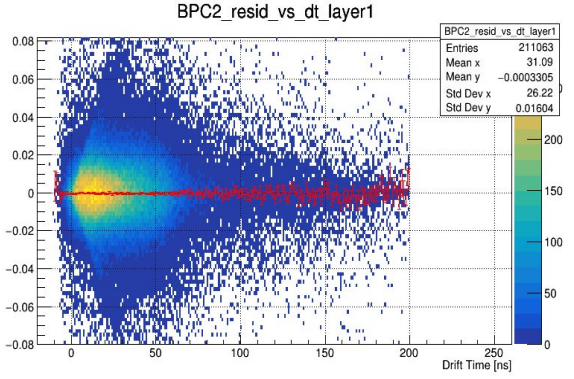


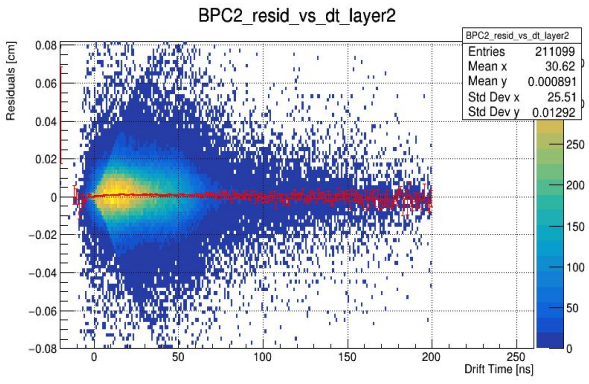


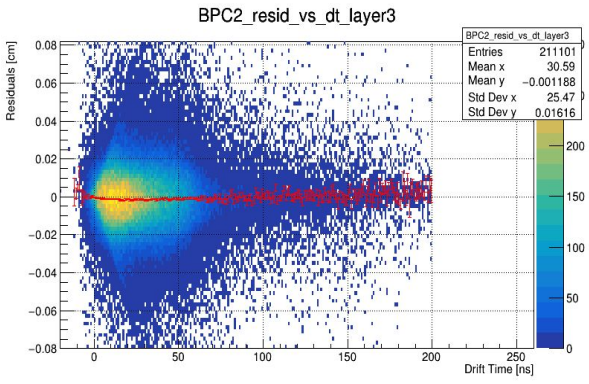


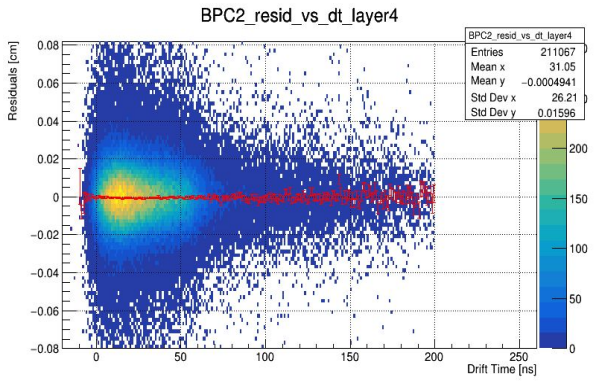
Drift Time vs Residual BPC2

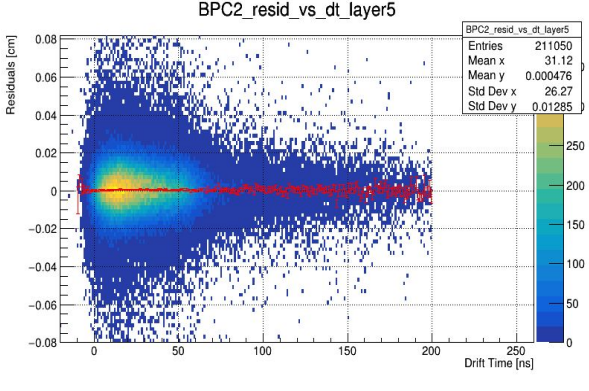


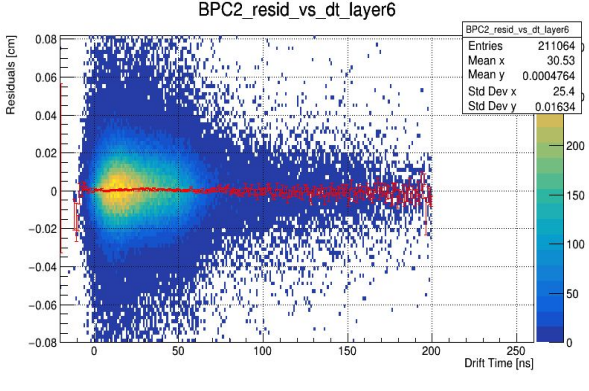


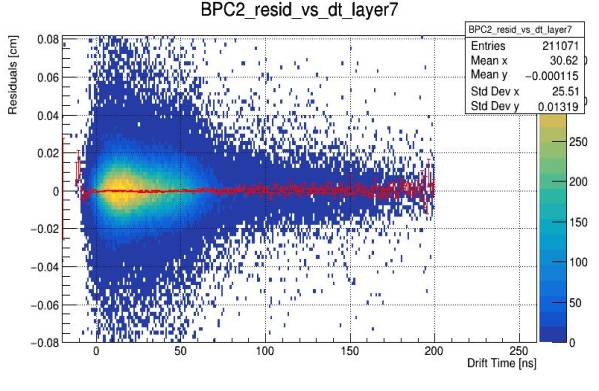




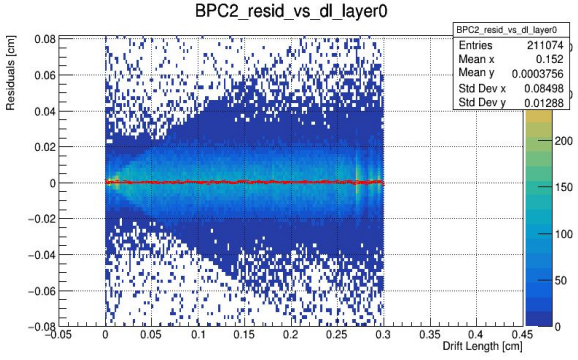


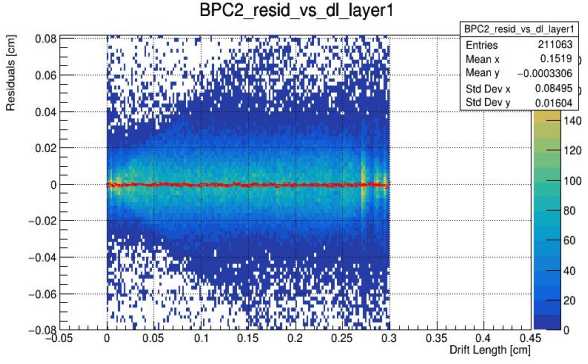


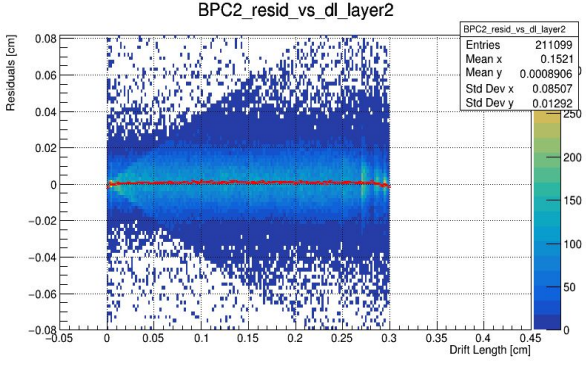


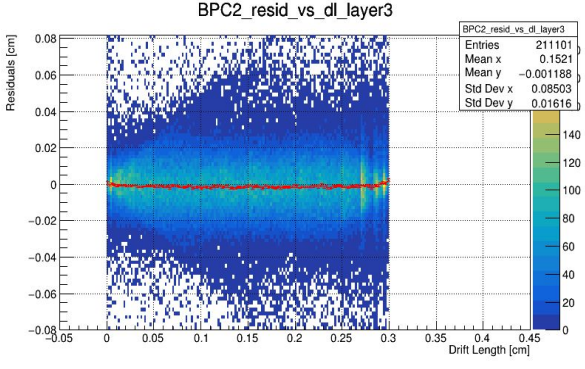


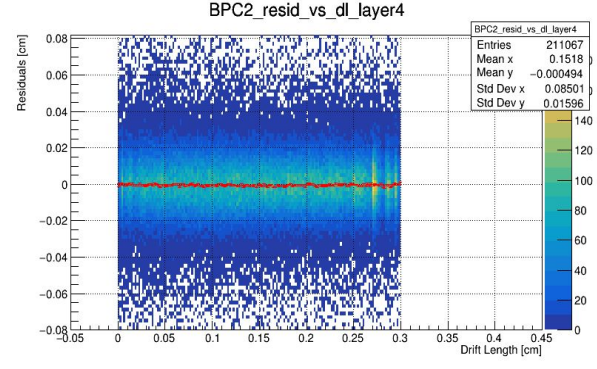
Drift Length vs Residual BPC2

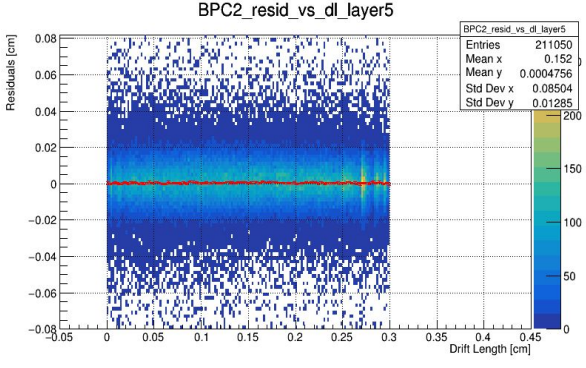


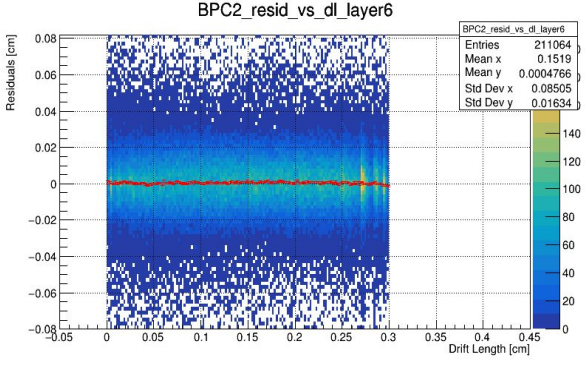


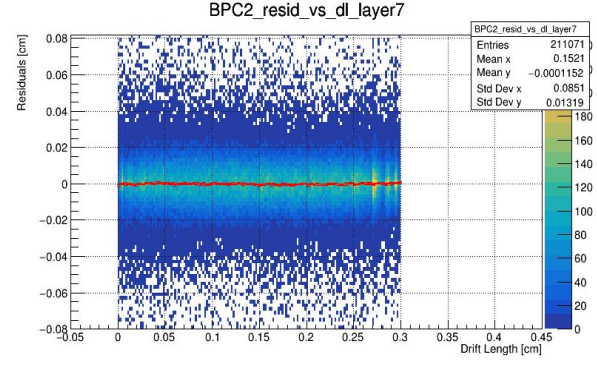




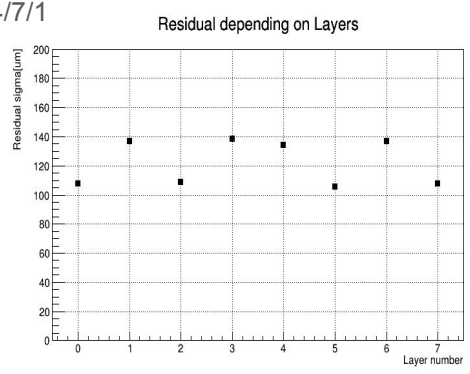


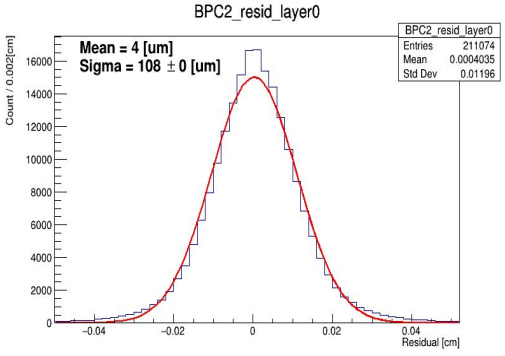


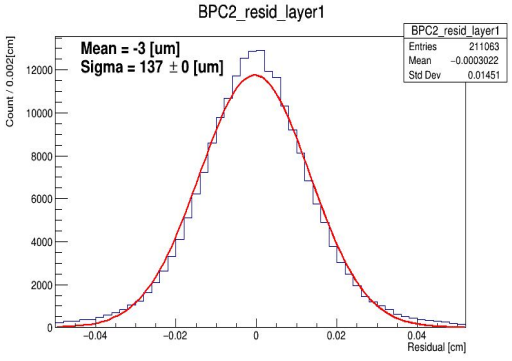


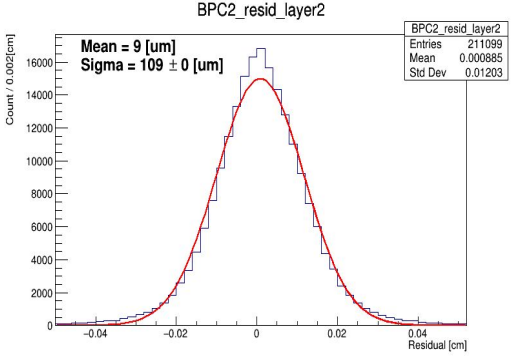


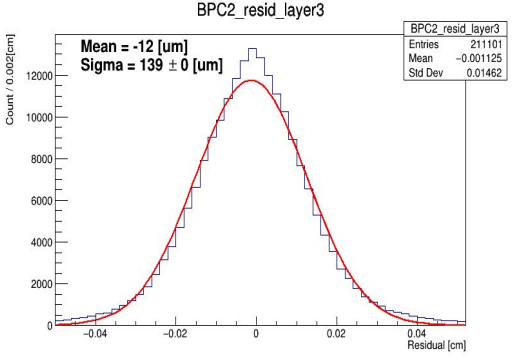
Residual BPC2

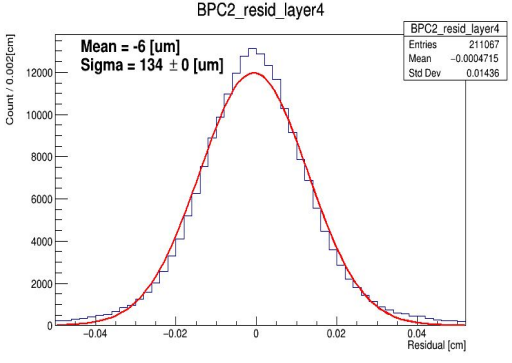


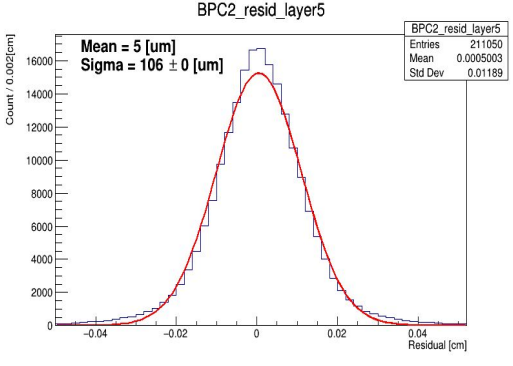


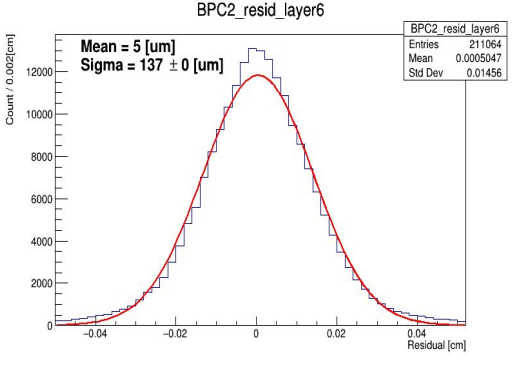


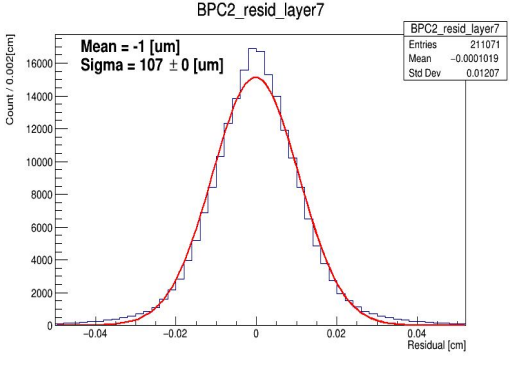






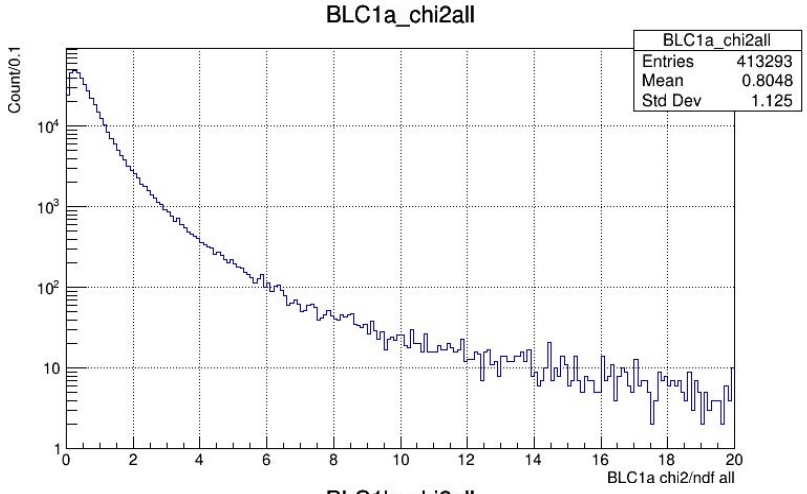


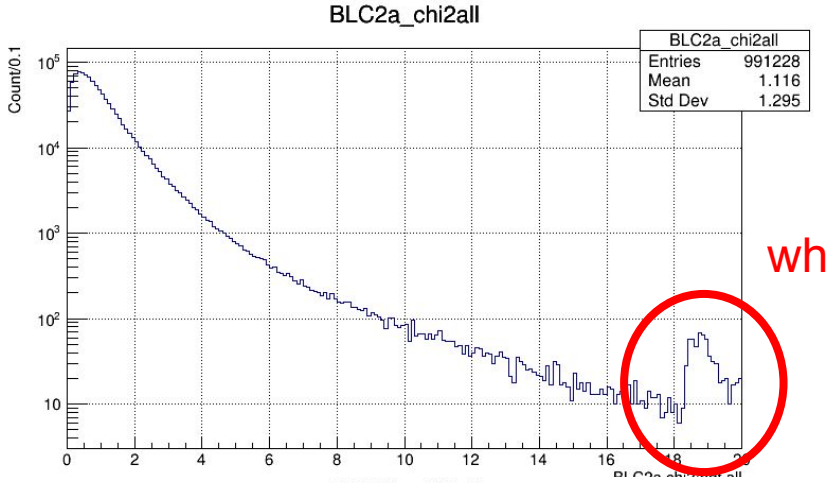




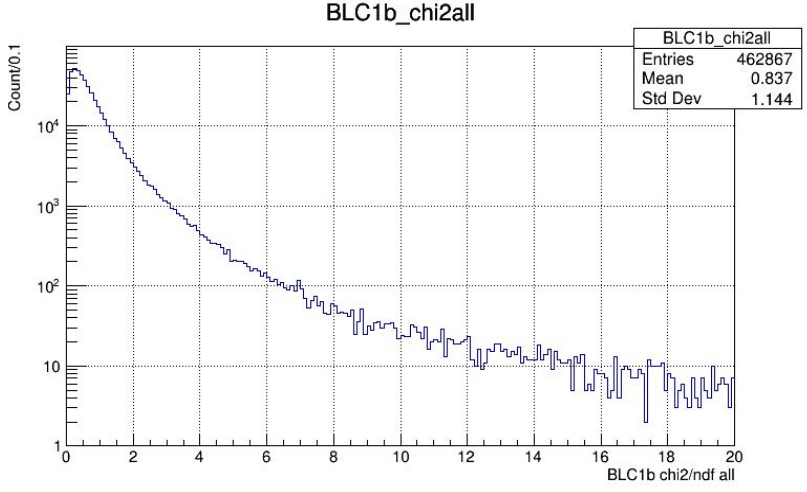
Chi2 distribution

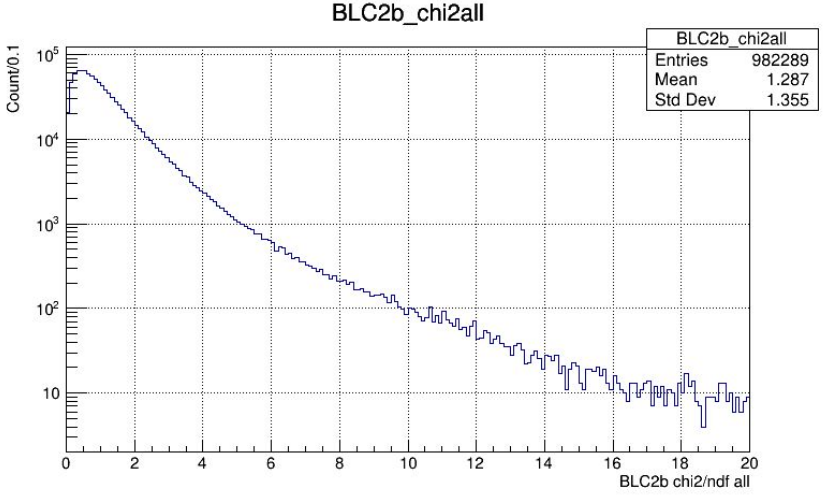
- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~3,000,000 events, nTracks =1 && Single[each detector]





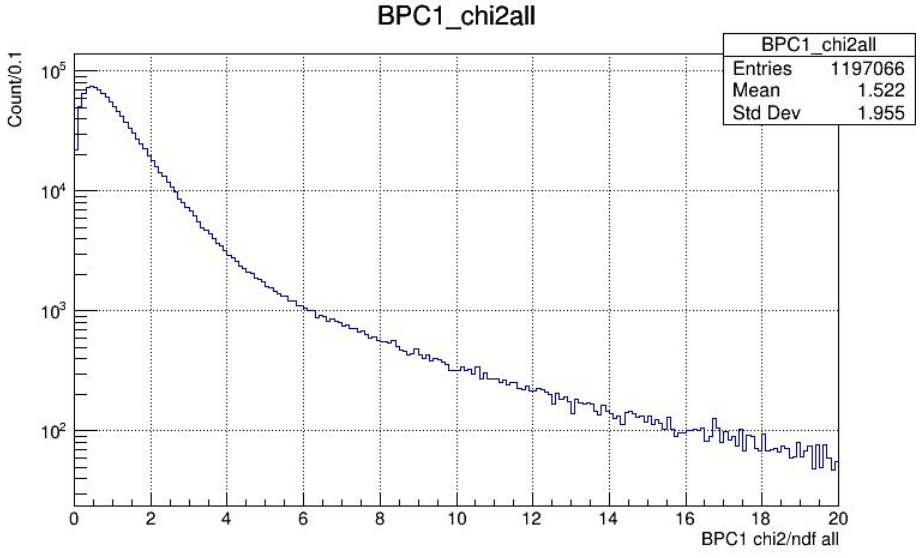
why?

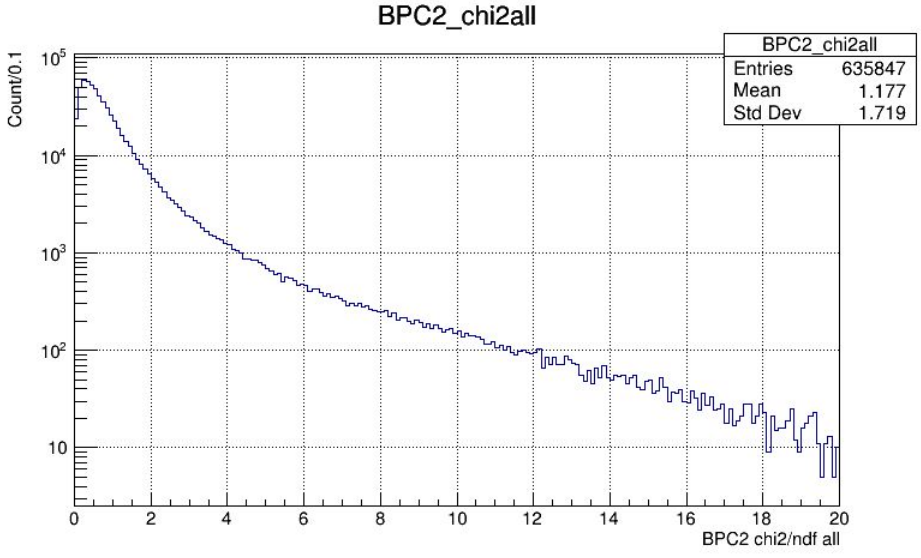




Chi2 distribution

- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~3,000,000 events, nTracks =1 && Single[each detector]

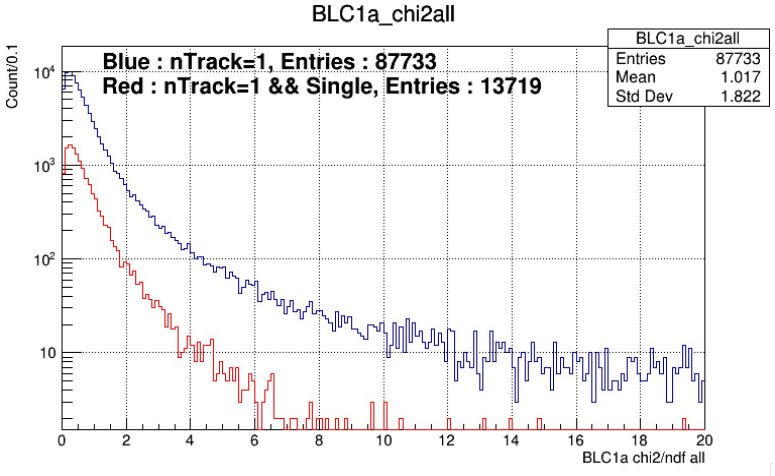


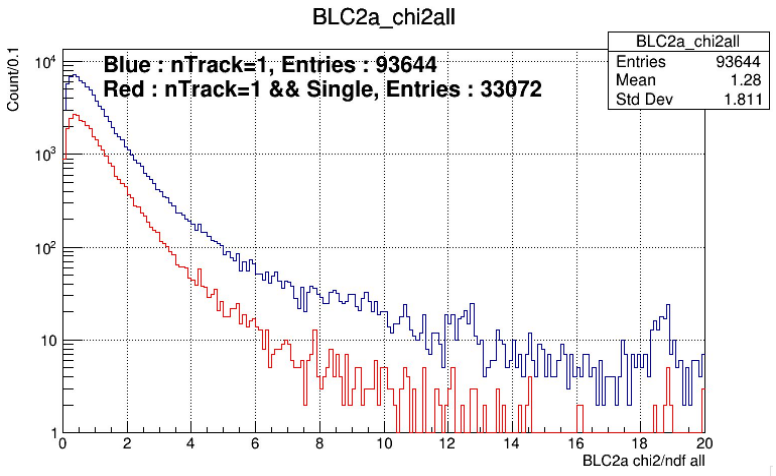


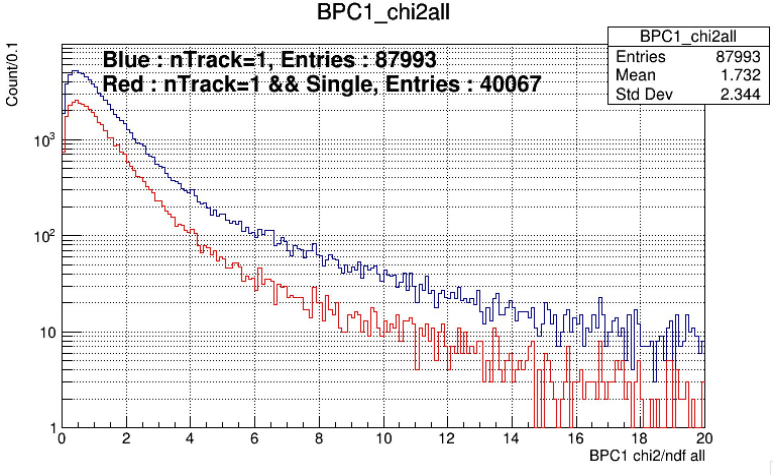
- Why is these entries “BPC1 > BLC2 > BPC2 > BLC1?” → pile up events ?
- What is the hump of BLC2a at chi2/ndf ~ 19 ? → come from lack of wire

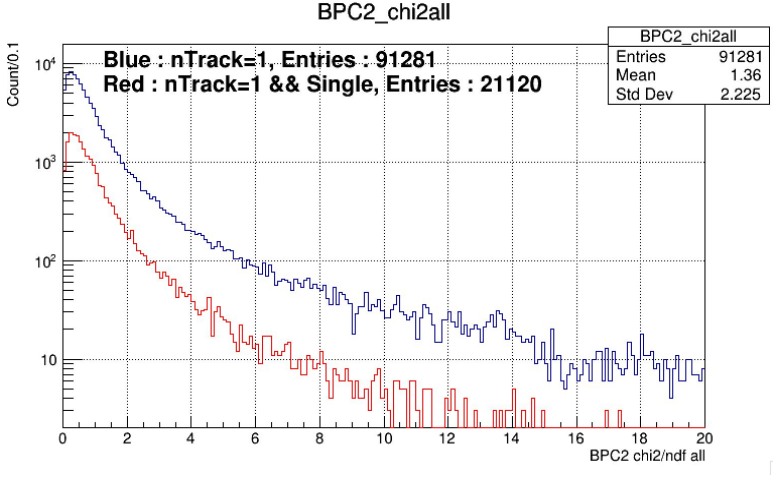
Chi2 distribution

- E73_2nd Run955 (using XTparam optimizing Run955), Helium-3 production
- loop ~100,000 events







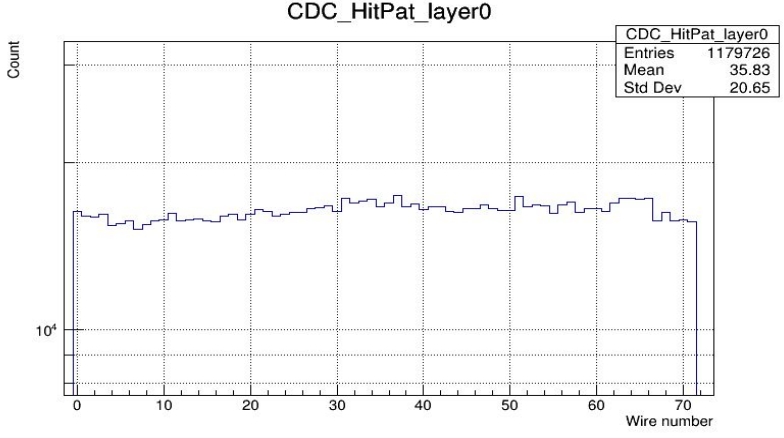


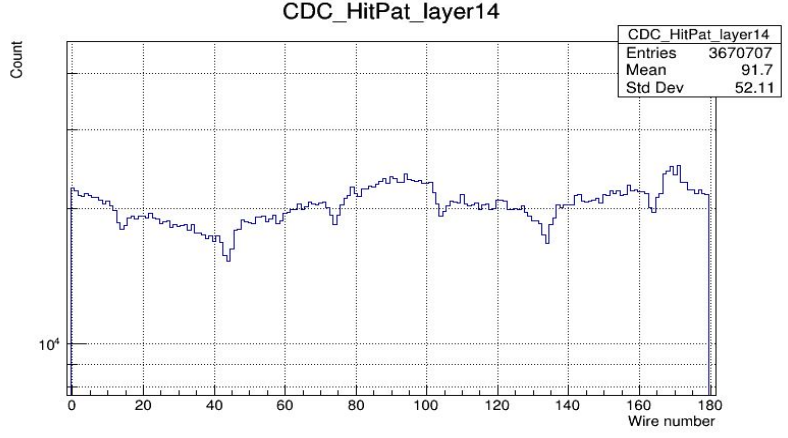
CDC

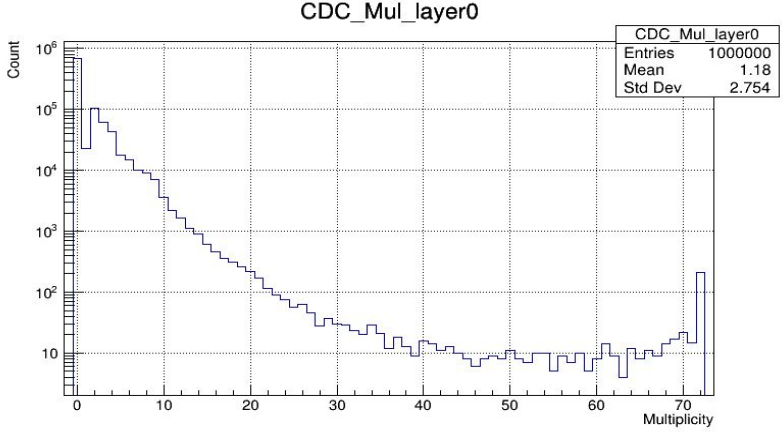
CDC analysis

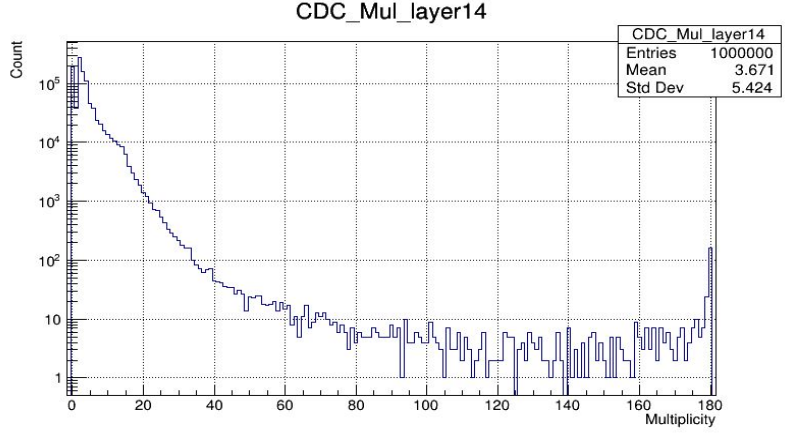
- First look of CDC Raw Histogram
  - HitPat, Multiplicity
- loop ~1,000,000, Run600, Cosmic data, w/o mag

- some structure in Layer14 HitPat
- non zero events Layer14 > Layer0



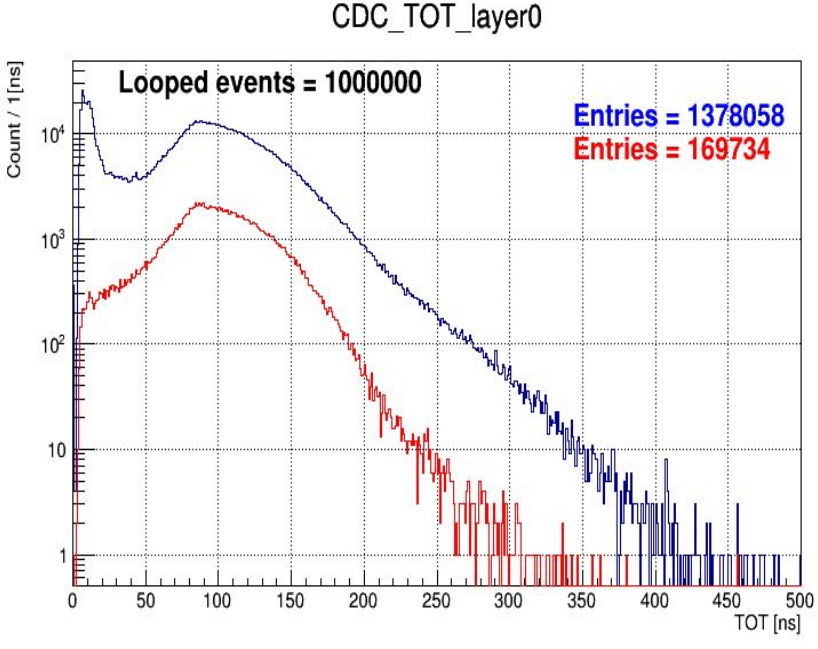


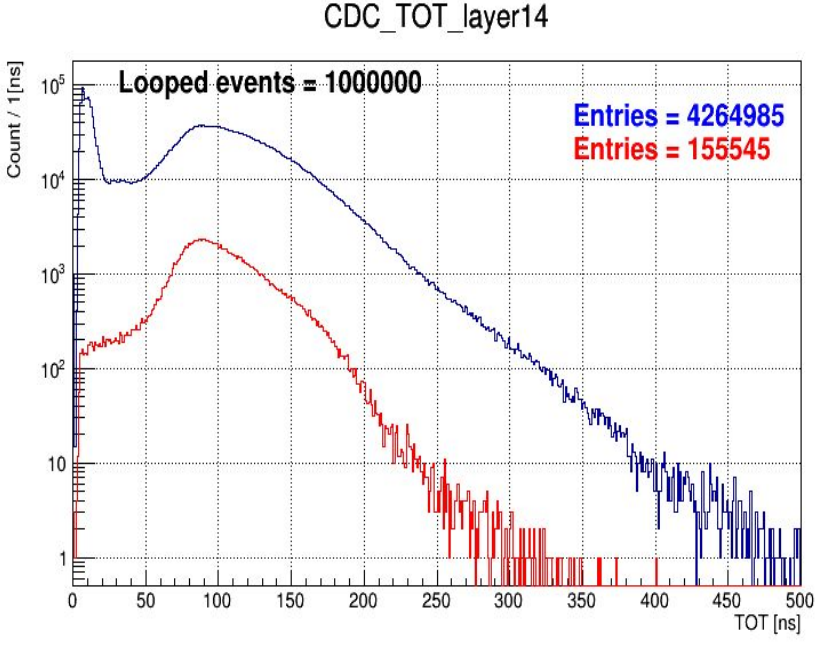




CDC analysis

- First look of CDC Raw Histogram
  - TOT
- loop ~1,000,000, Run600, Cosmic data, w/o mag
- Blue : Raw
- Red : “Single”... 2 hit in every layers && multiplicity >0 in each wire





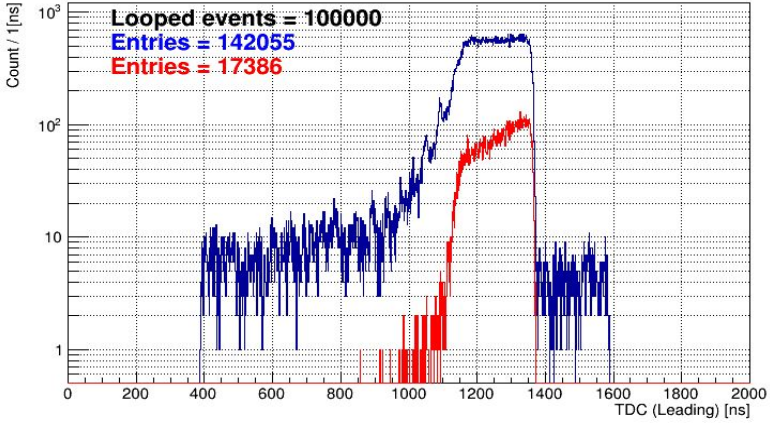
ns → ch

CDC analysis

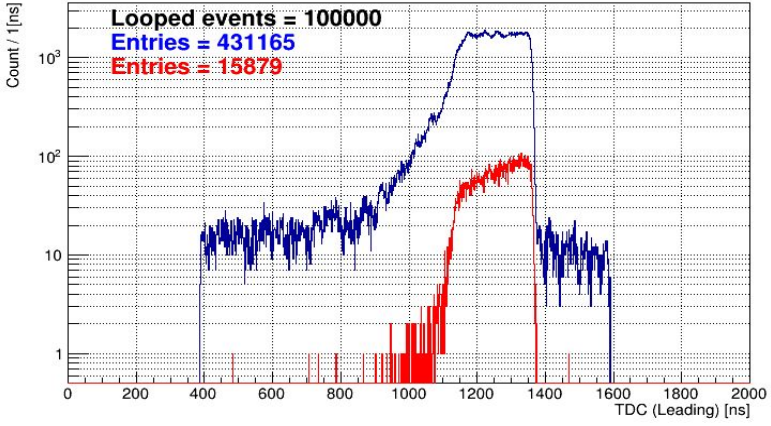
- First look of CDC Raw Histogram
  - TDC, Drift Time(not adjust yet)
- loop ~100,000, Run600, Cosmic data, w/o mag

- Blue : Raw
- Red : “Single”... 2 hit in every layers && multiplicity >0 in each layer
- Green : “Single” && TOT>50

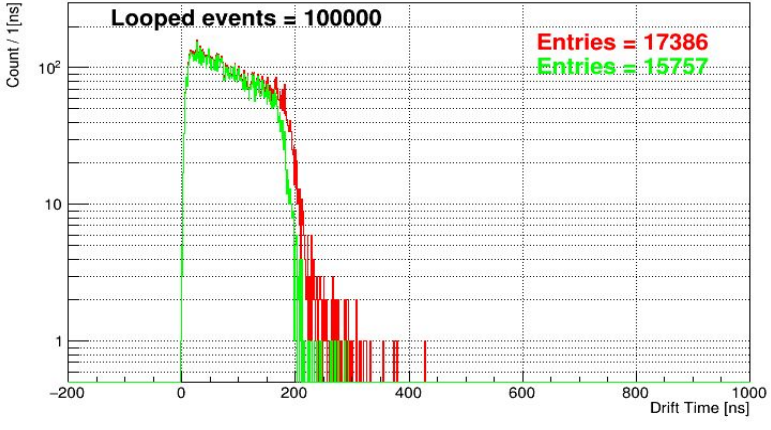
CDC_Leading_layer0



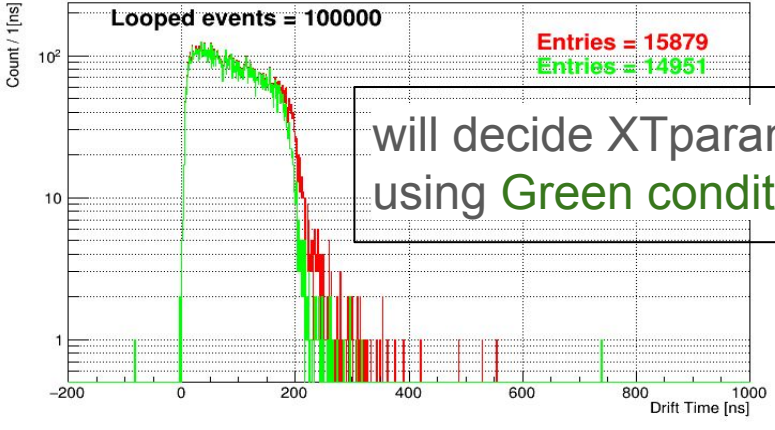
CDC_Leading_layer14



CDC_dt_single_layer0



CDC_dt_single_layer14



will decide XTparam by using Green condition

Status

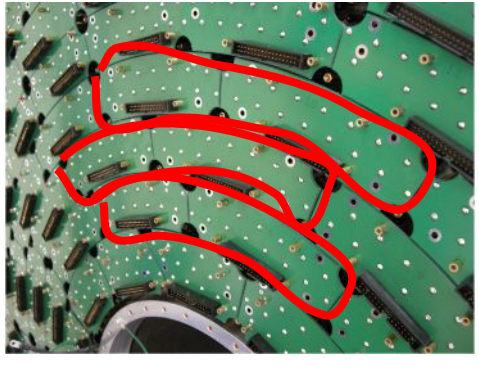
- checked the validity of BLDC param (Layer dependense, chi2, dt vs resid…)
- looked the histograms of CDCRaw
  - HitPat, Multiplicity, TOT, TDC
- To Do by next meeting
  - look HitPat after cutting by CDH segments
  - (decide the XT parameters of CDC by each layer)
  - check the validity of the XT parameters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