Beam test status update

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Electronic update

Work still on process, these updates will realize from

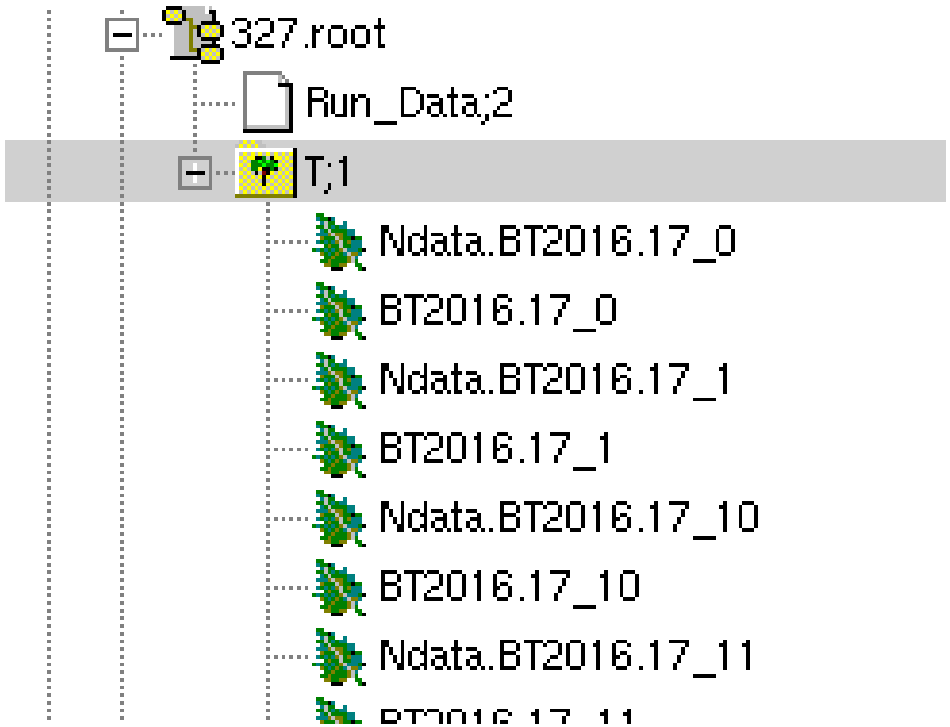
- The FASPD is removed from SUM of calorimeter
- Will remove preshower from trigger too.
- Will add one scaler and other modules to get rate information for all preshower and shashlyk detectors. All SoLID detectors signals will input to FADC and scaler, including S4, LASPD and FASPD.

- We are not taking any GEM data now, just use high rate to make sure other detector work. The data taking rate could reach 1K with beam now.

Module	FADC	TDC	Scaler
S4_L	√	√	√
S4_R	√	√	√
LASPD_L	√	√	√
LASPD_R	√	√	√
FASPD	√	√	√
THU	√		√
preshower	√		√
SDU #1	√		√
SDU #2	√		√

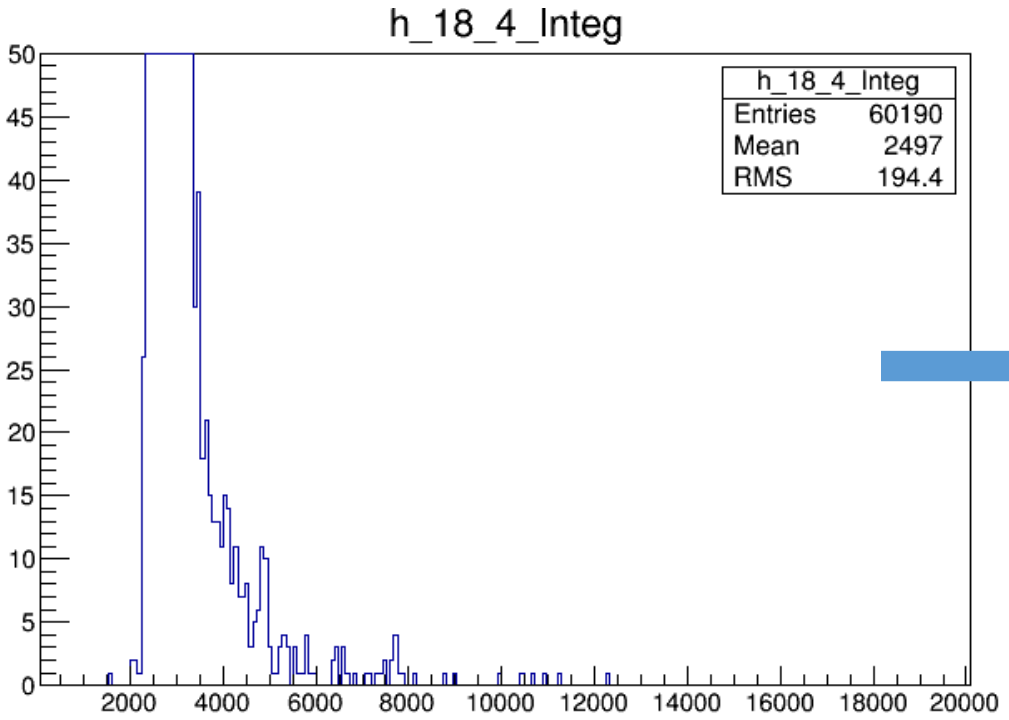
Data readout by HallA analyzer

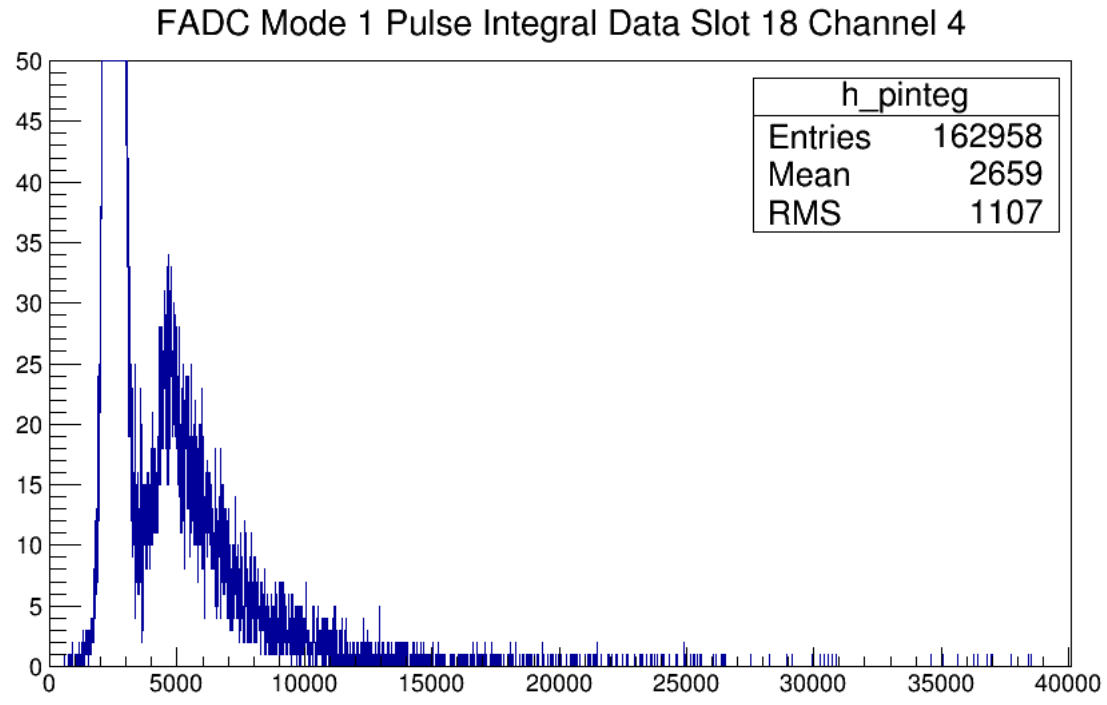
- Now the decoder of TDC and FADC works well using HallA analyzer
- HallA analyzer is simple and easy to use
- Need help to add more functions, including GEM decoder and also scaler
- Need a lot of work to do such as add detector geometry to realize more advanced analysis



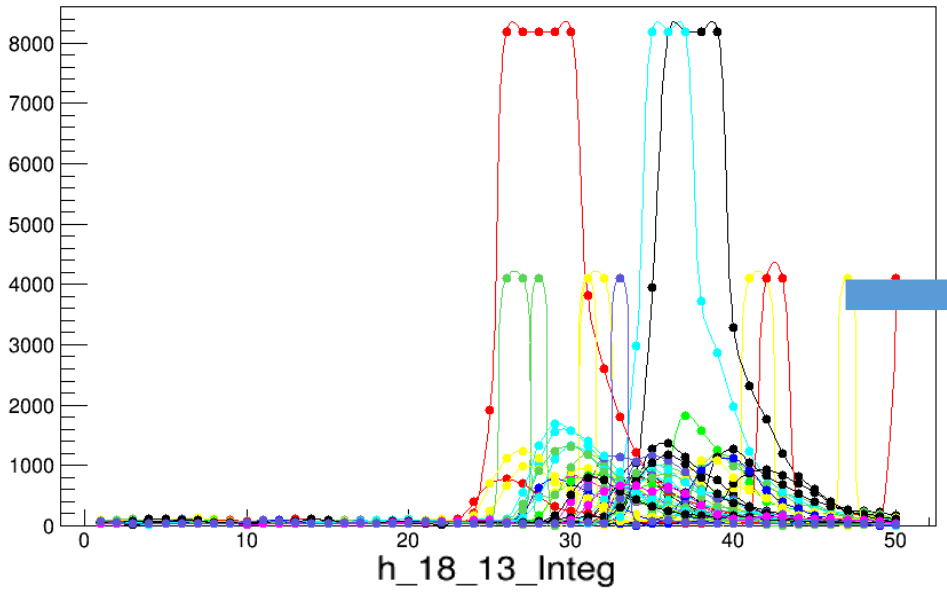
Detector test data after changing HV(BEAM)

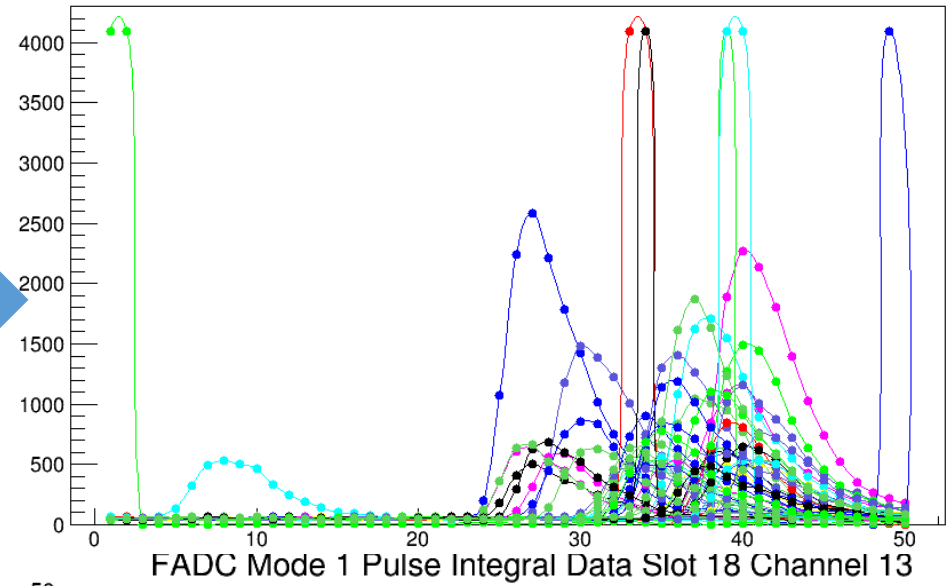
- Preshower in front of THU module, HV raise from 1600 to 1800

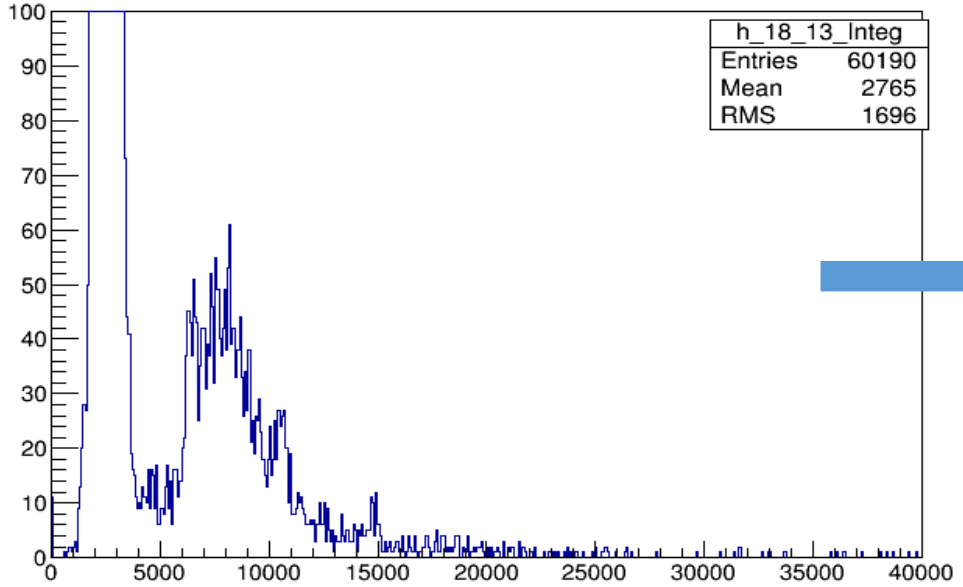


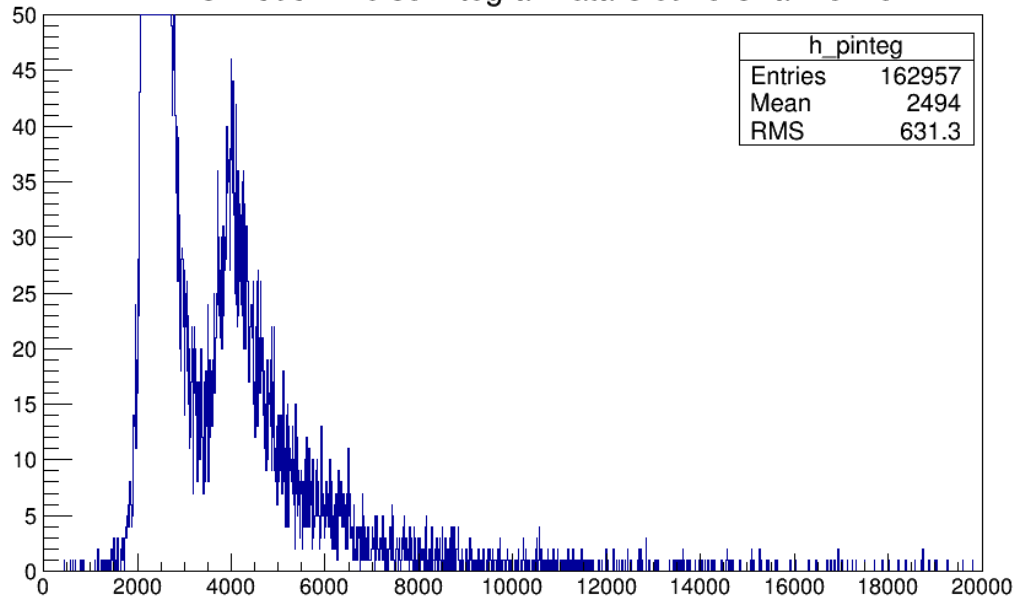


Channel 13, preshower in front of SDU1， decrease from 1600 to 1500

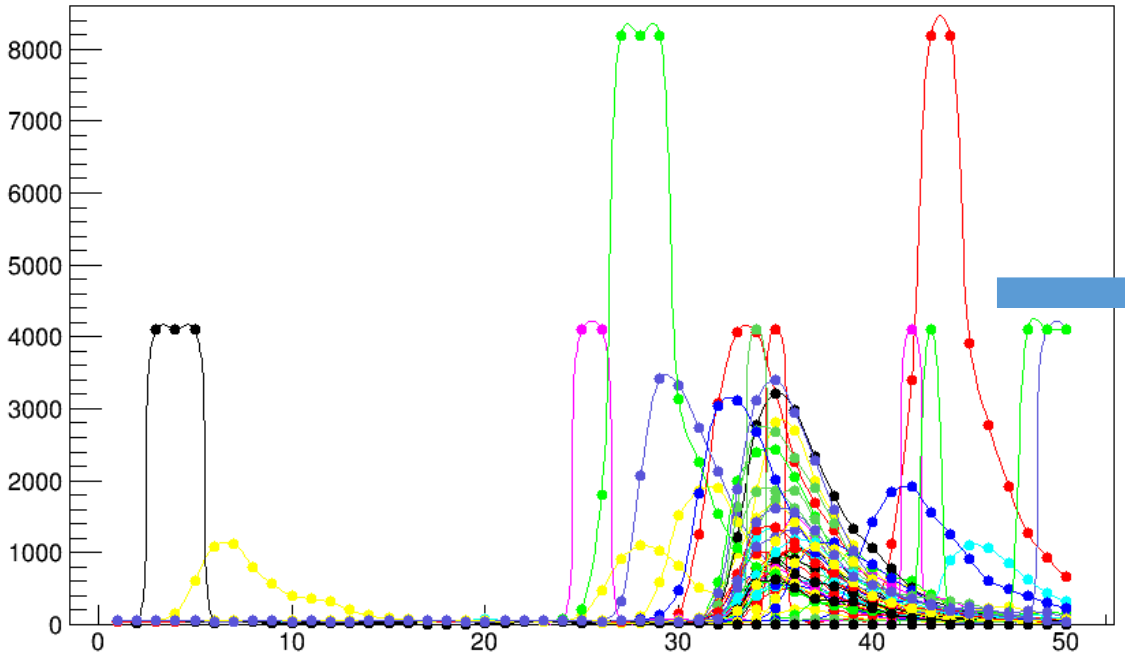


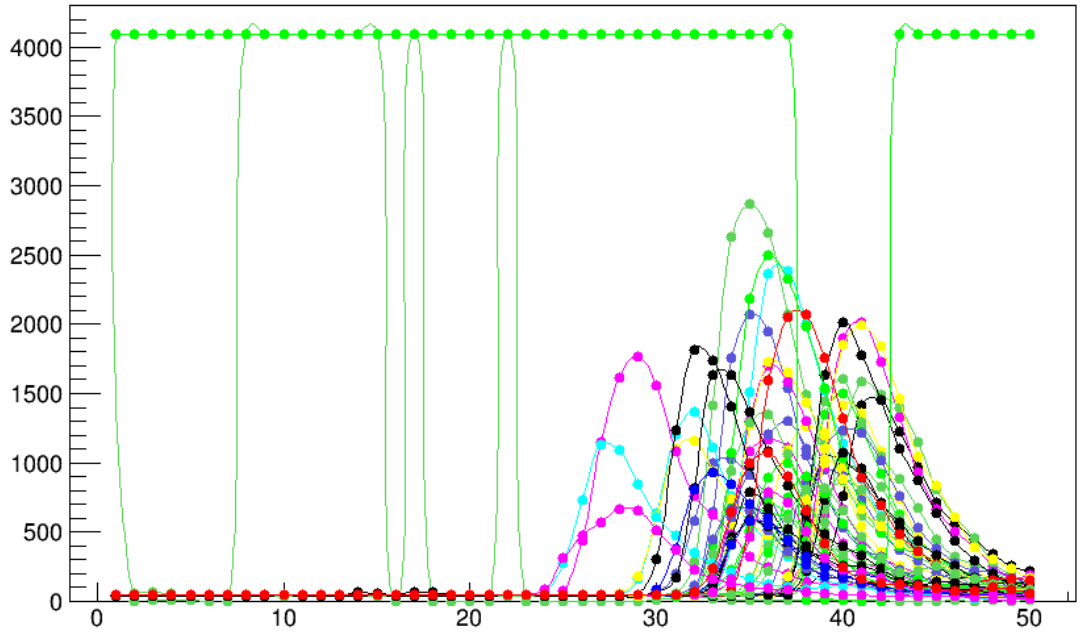




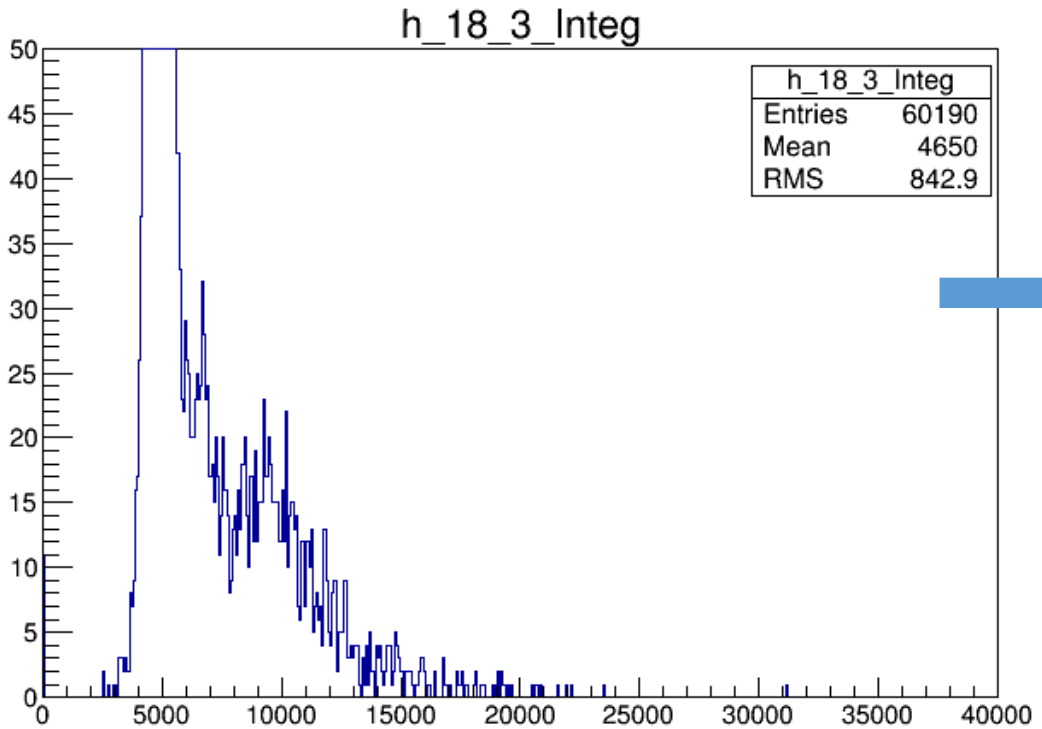


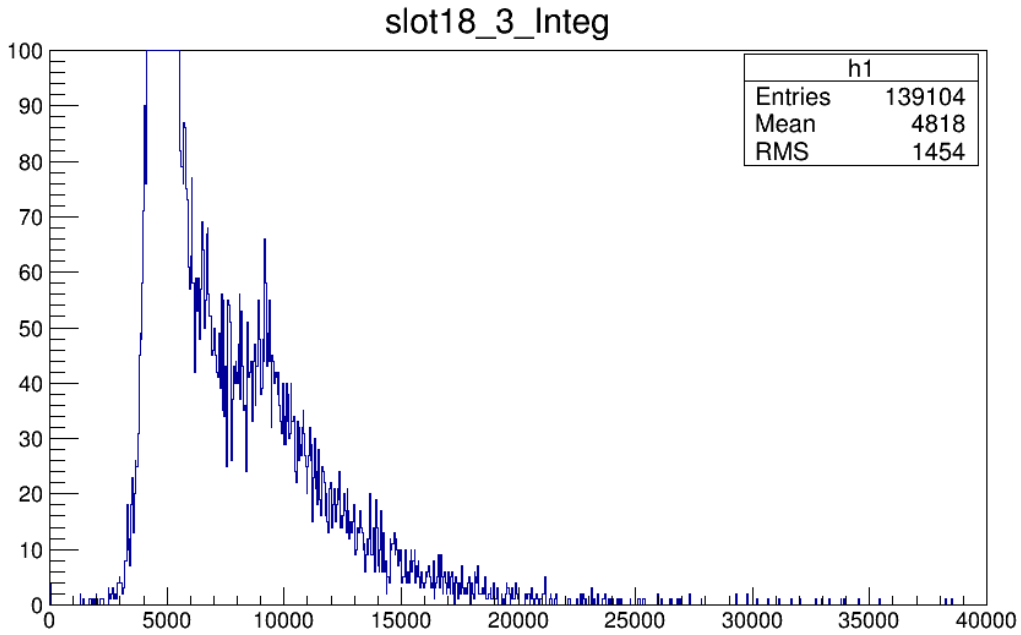
SDU #2 HV decrease from 1320(2.5* 10^6) to 1200(1.5*10^6)

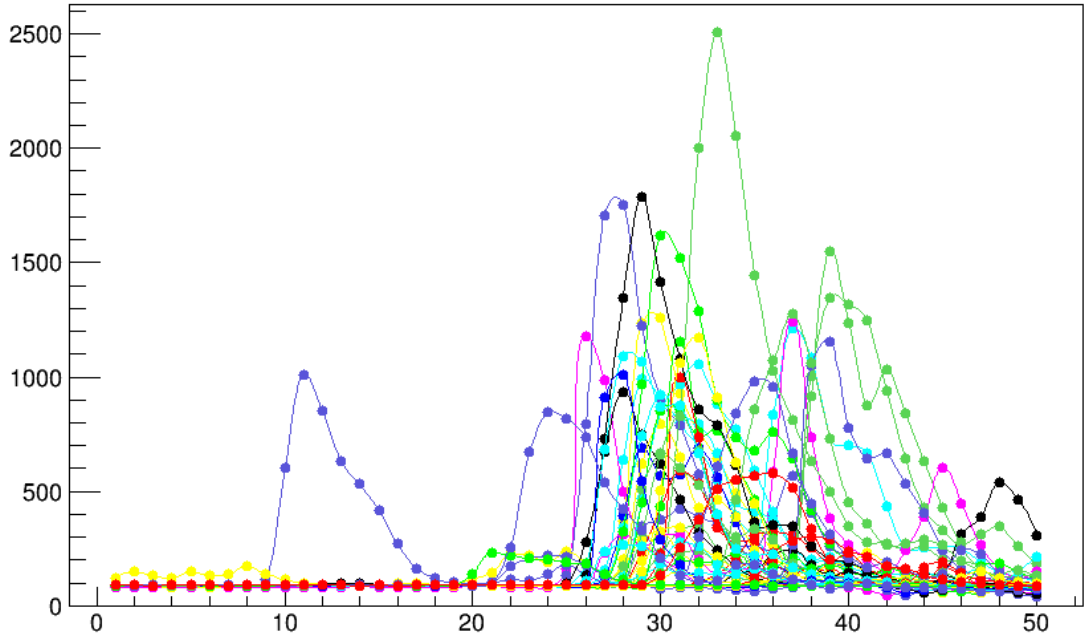




THU module raise from 2000 to 2050



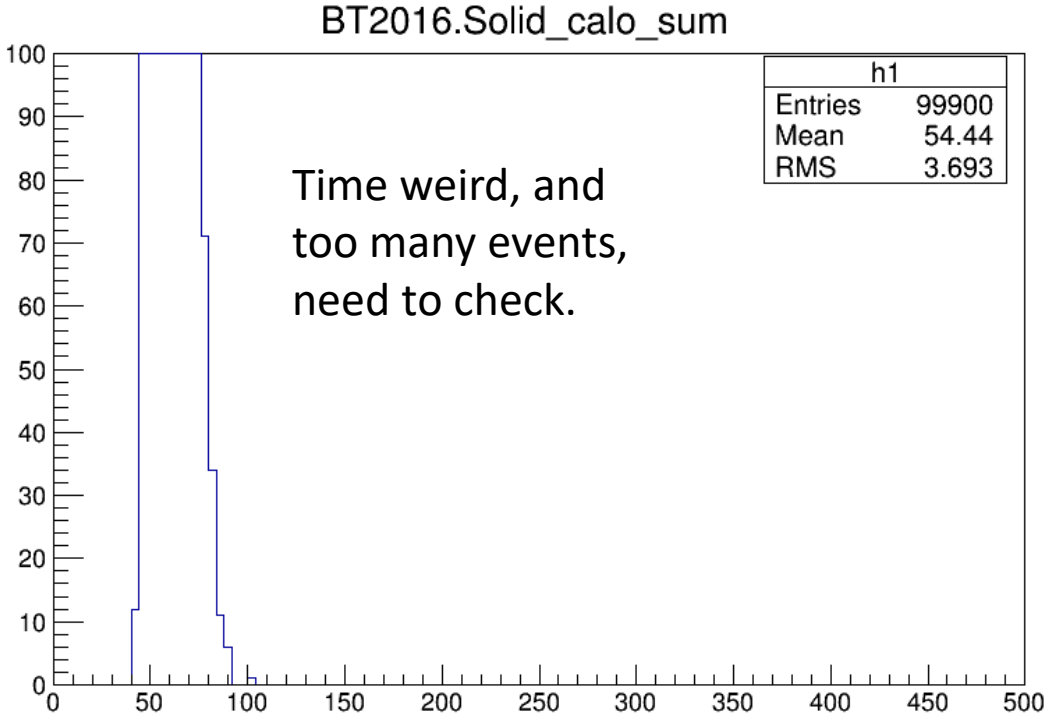




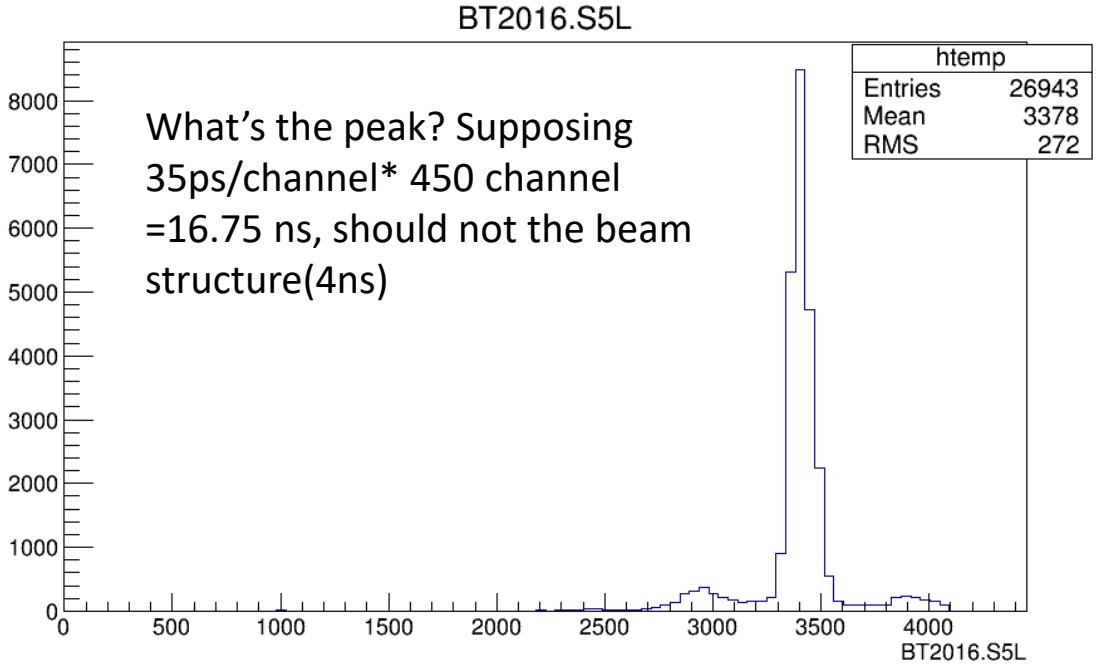
Time information with beam

- We don’t have FASPD data because bad cable issue, which is solved now
- Now TDC cable issue solved

TDC channel for SoLID sum

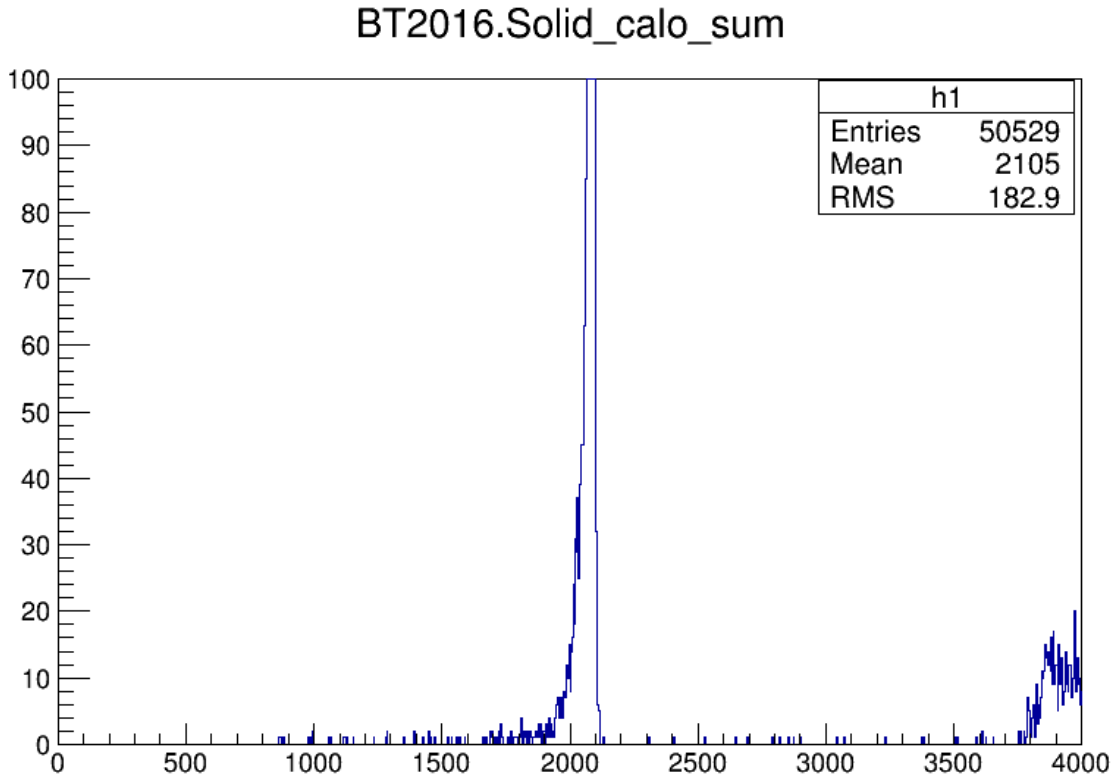


TDC channel for LASPD (left)

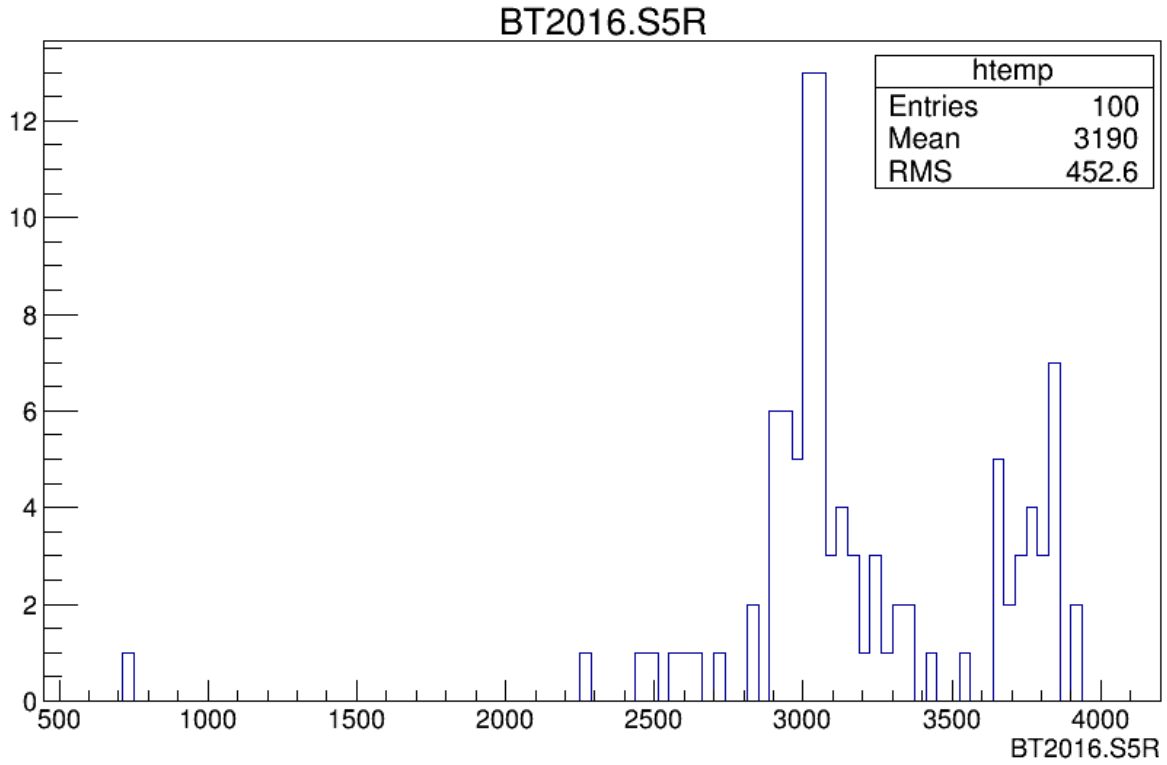


Time information for cosmic ray test

Sum od SoLID detector



LASPD



Scaler test with cosmic ray

Normal rate with all HV on

```
  ========   1151 Scalers   ===========

scaler num 1
   Type           Counts     Rate (Hz)    Rate (KHz)
       10 KHz pulser   180148 10000.00     10.00
     Front Top scint       87     4.83      0.00
     Front Mid scint      126     6.99      0.01
     Front Bot scint      137     7.60      0.01
   OR of Front scint      314    17.43      0.02
 Calorimeter Trigger     5720   317.52      0.32
                 L1A        0     0.00      0.00
     TDC Common Stop        0     0.00      0.00
             TI Busy        0     0.00      0.00
             Trigger        0     0.00      0.00
                  S4        7     0.39      0.00
                  S5       87     4.83      0.00
          Solid calo     1571    87.21      0.09
          Calo row 1       28     1.55      0.00
          Calo row 2       31     1.72      0.00
          calo row 3       13     0.72      0.00
hac_bcm_average               0.0539181
haBDSPOS.VAL                  8.27933e+06
haBDSPOS                      8.27933e+06
haBDSSELECT                   Carbon hole
```

Scaler aate with only THU module off

```
//only turn off THU module
  ========   1151 Scalers   ===========

scaler num 1
   Type           Counts     Rate (Hz)    Rate (KHz)
       10 KHz pulser   100997 10000.00     10.00
     Front Top scint       36     3.56      0.00
     Front Mid scint       81     8.02      0.01
     Front Bot scint       79     7.82      0.01
   OR of Front scint      168    16.63      0.02
 Calorimeter Trigger      190    18.81      0.02
                 L1A        0     0.00      0.00
     TDC Common Stop        0     0.00      0.00
             TI Busy        0     0.00      0.00
             Trigger        0     0.00      0.00
                  S4        5     0.50      0.00
                  S5       38     3.76      0.00
          Solid calo       29     2.87      0.00
          Calo row 1       23     2.28      0.00
          Calo row 2       20     1.98      0.00
          calo row 3       12     1.19      0.00
hac_bcm_average               0.0537643
haBDSPOS.VAL                  8.27933e+06
haBDSPOS                      8.27933e+06
haBDSSELECT                   Carbon hole
```

When THU module use HV 2050V, at most events triggered by THU module.

2000V

```
//only THU 2000V
  ========   1151 Scalers   ===========

scaler num 1
   Type           Counts     Rate (Hz)    Rate (KHz)
       10 KHz pulser   100788 10000.00     10.00
     Front Top scint        0     0.00      0.00
     Front Mid scint        0     0.00      0.00
     Front Bot scint        0     0.00      0.00
   OR of Front scint        0     0.00      0.00
 Calorimeter Trigger     1300   128.98      0.13
                L1A        0     0.00      0.00
     TDC Common Stop        0     0.00      0.00
            TI Busy         0     0.00      0.00
            Trigger         0     0.00      0.00
                 S4         0     0.00      0.00
                 S5         0     0.00      0.00
          Solid calo      219    21.73      0.02
          Calo row 1        4     0.40      0.00
          Calo row 2        8     0.79      0.00
          calo row 3        0     0.00      0.00
hac_bcm_average              0.0537598
haBDSPOS.VAL                 8.27933e+06
haBDSPOS                     8.27933e+06
haBDSSELECT                  Carbon hole
```

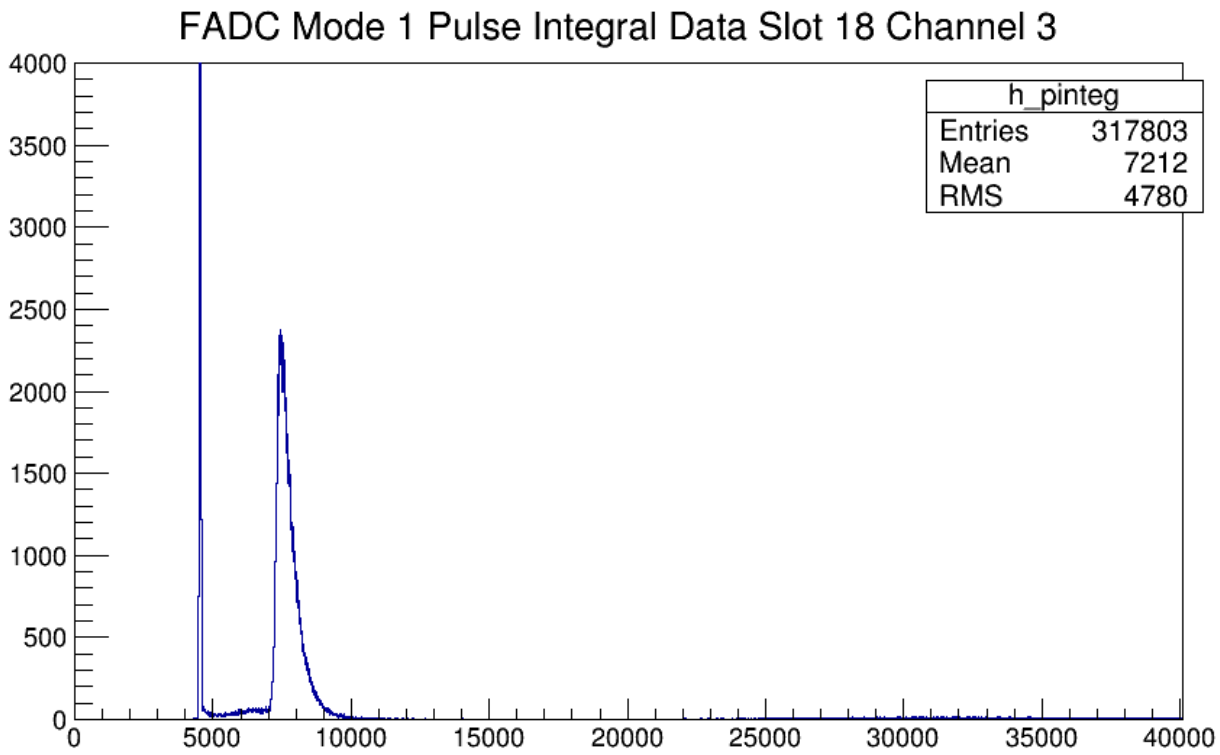
2050V

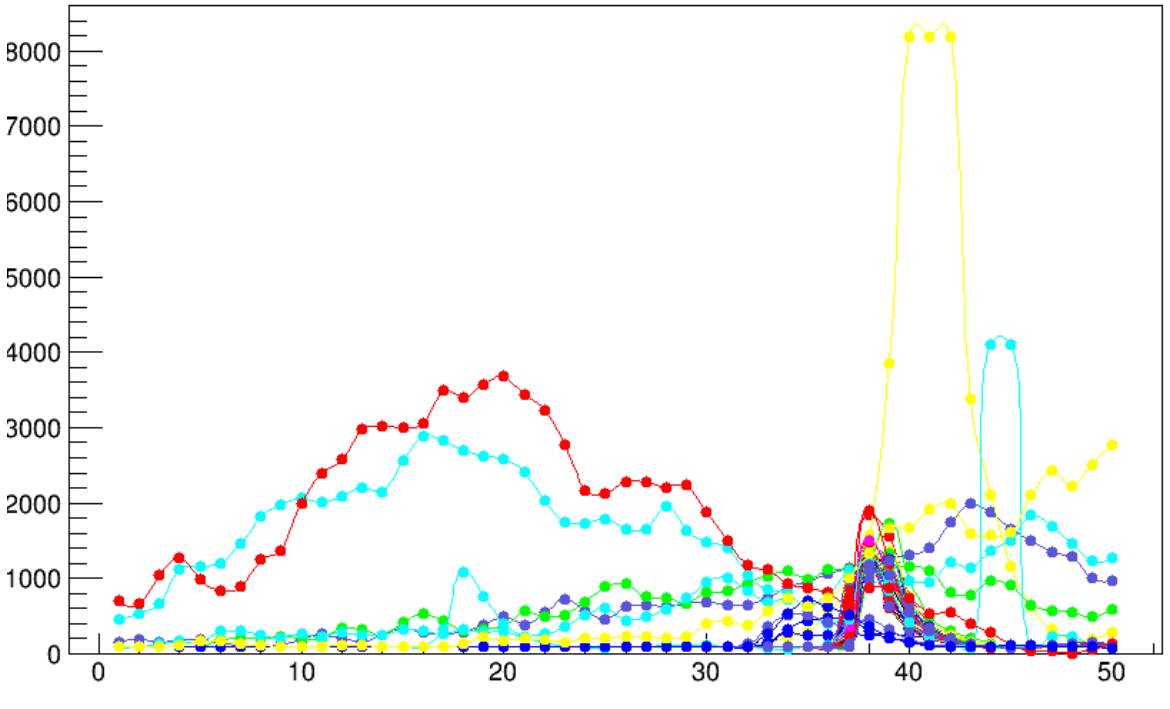
```
  ========   1151 Scalers   ===========

scaler num 1
   Type           Counts     Rate (Hz)    Rate (KHz)
       10 KHz pulser   100672 10000.00     10.00
     Front Top scint        0     0.00      0.00
     Front Mid scint        0     0.00      0.00
     Front Bot scint        0     0.00      0.00
   OR of Front scint        0     0.00      0.00
 Calorimeter Trigger     2659   264.13      0.26
                L1A        0     0.00      0.00
     TDC Common Stop        0     0.00      0.00
            TI Busy         0     0.00      0.00
            Trigger         0     0.00      0.00
                 S4         0     0.00      0.00
                 S5         0     0.00      0.00
          Solid calo      753    74.80      0.07
          Calo row 1        2     0.20      0.00
          Calo row 2        9     0.89      0.00
          calo row 3        3     0.30      0.00
hac_bcm_average              0.0538676
haBDSPOS.VAL                 8.27933e+06
haBDSPOS                     8.27933e+06
haBDSSELECT                  Carbon hole
```

Cosmic ray data

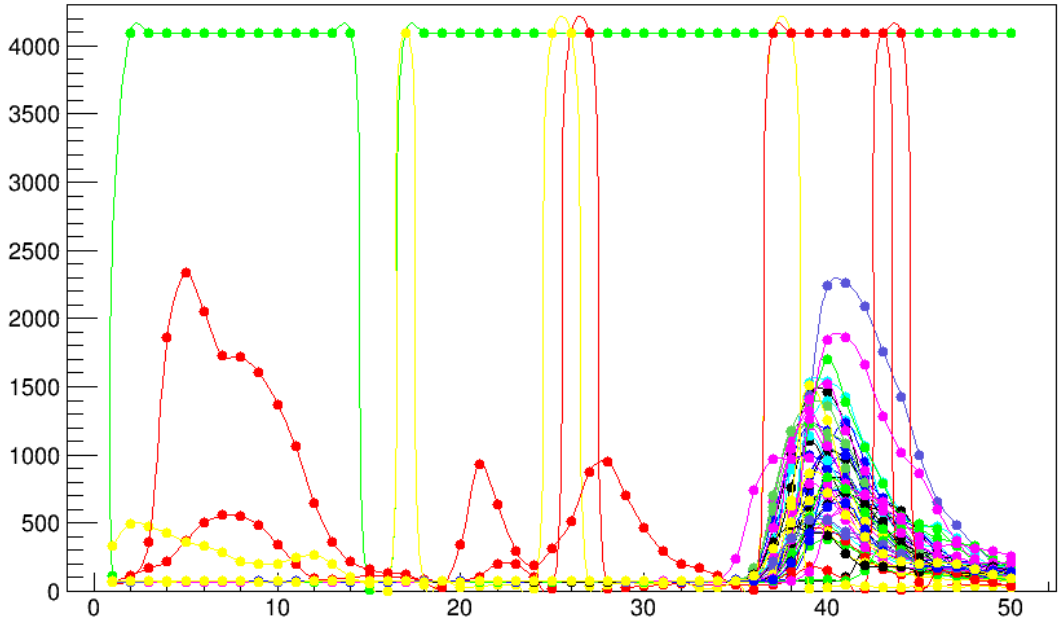
- **THU module**

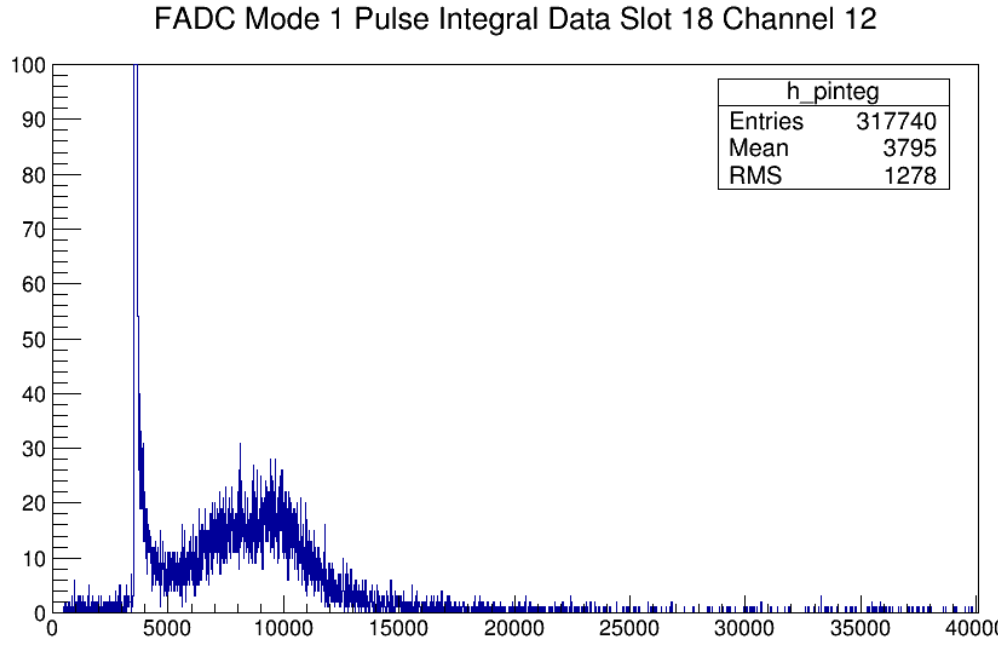




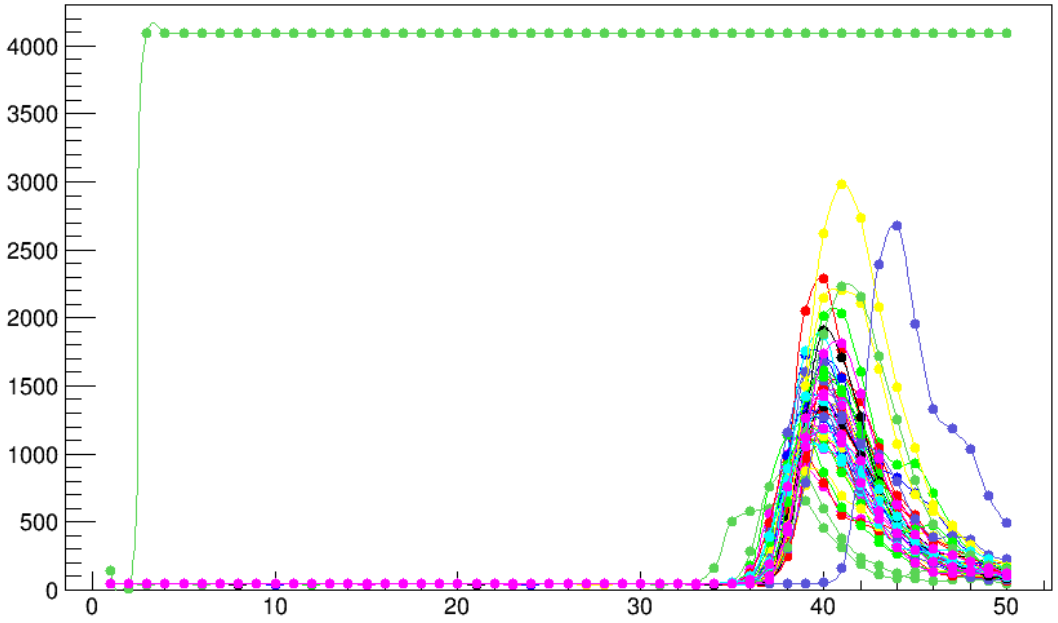
SDU module

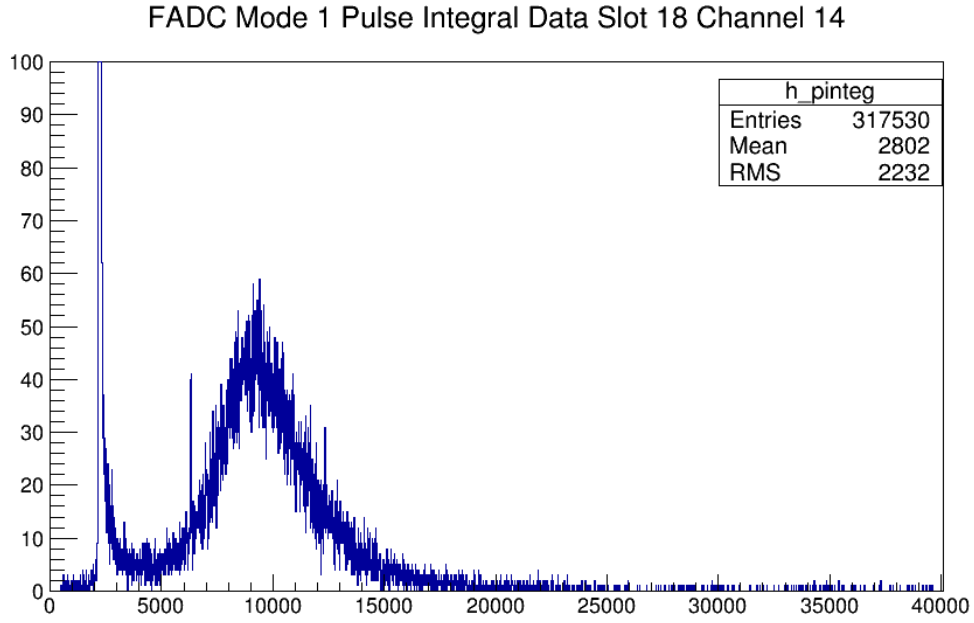
SDU #1





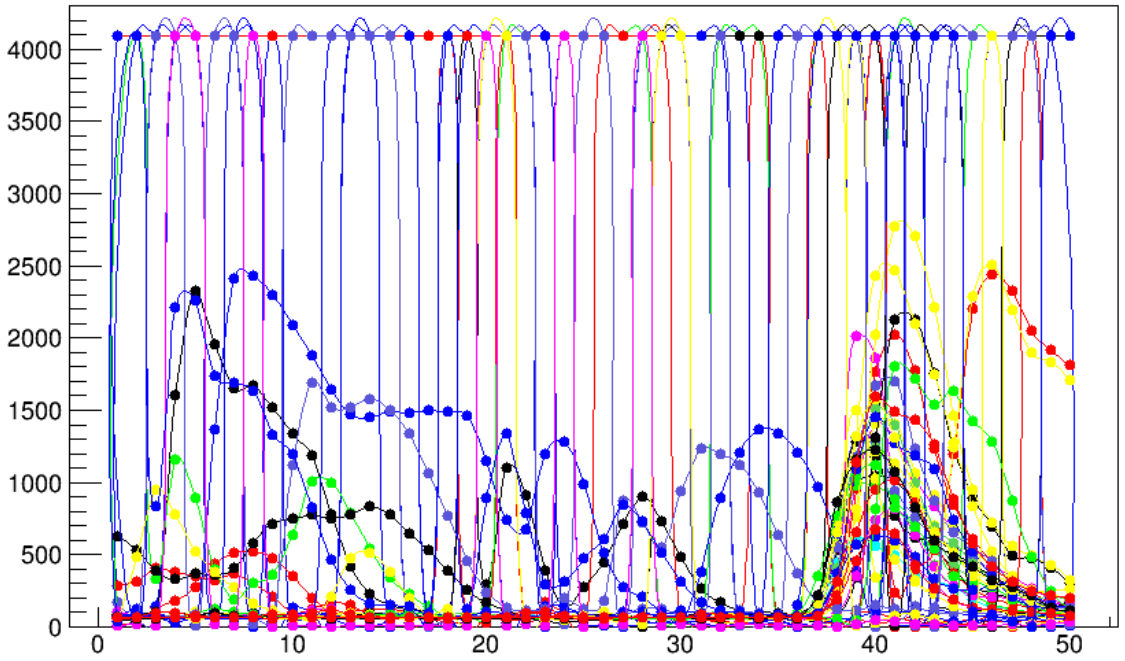
SDU #2

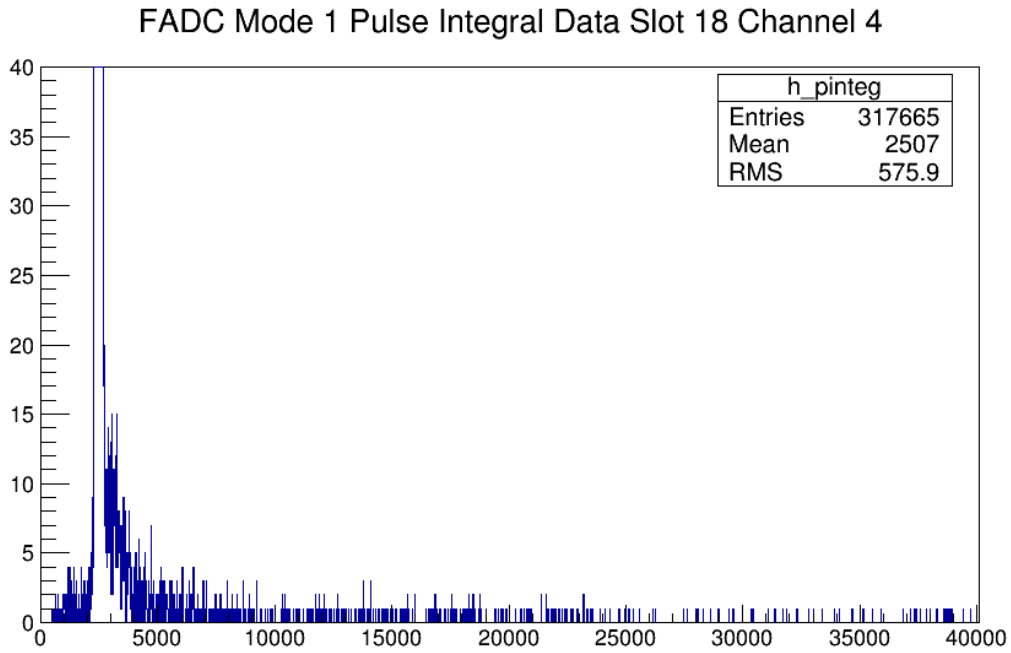


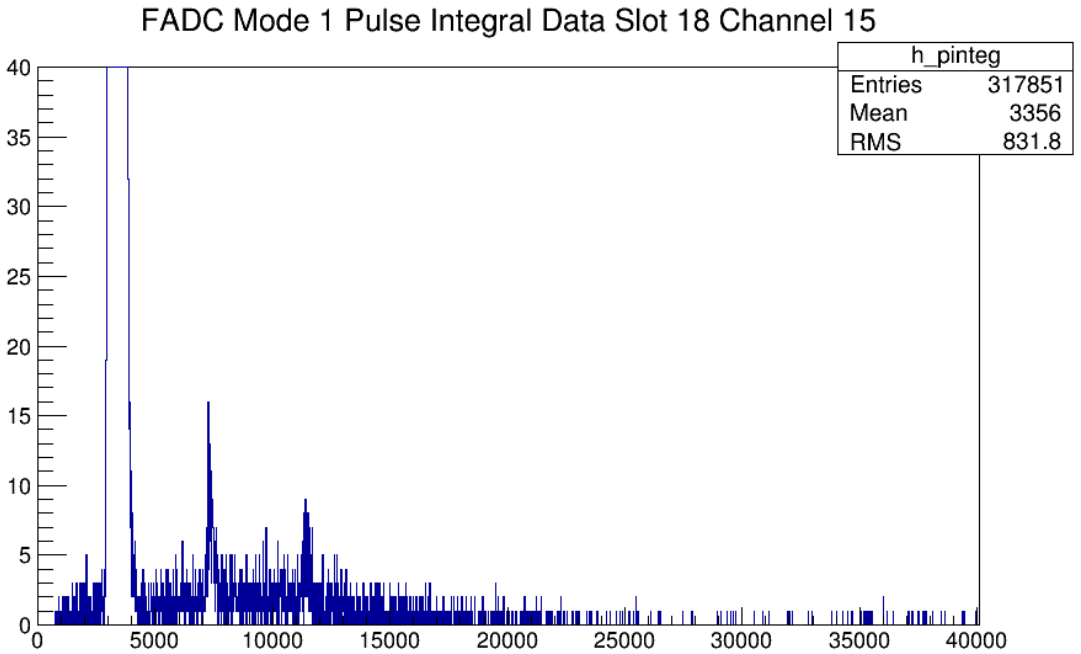


Preshower

Light-leak will result in wider pedestal.

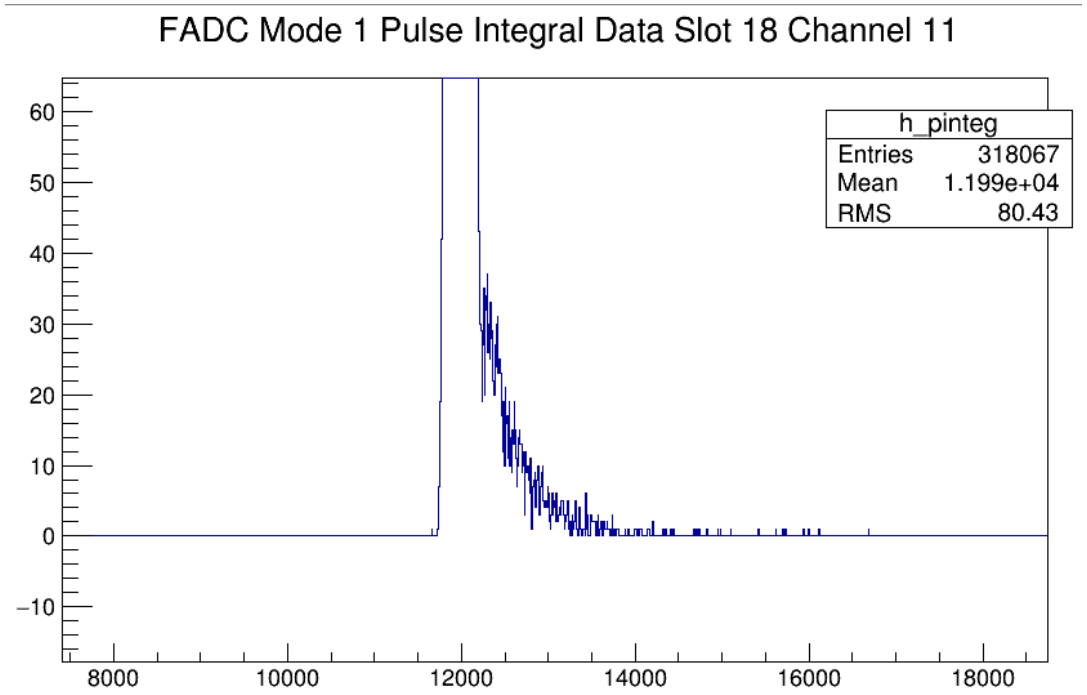






FASPD

- After putting the signal into Fan In/Out module, the signal baseline changed. Already changed the offset to make pedestal normal(Need to check).



Light-tight check

Detector	FADC channel	Average current
THU shashlyk	3	9 nA
Preshower NCS5	4	4.96 uA
FASPD	11	7 nA
SDU #1	12	1.5 nA
Preshower NCS6	13	22.4 uA
SDU #2	14	2 nA
Preshower (KEDI6)	15	5.7 uA

Tested by picoammeter, borrowed from another group.
Three preshowers use bad light-leak material to cover the fiber, and the result get much better(could reach 20 nA) when wrapped by other black cloth. Even so, the rate for both cosmic and beam is still low(trigger threshold is high).
FASPD use same PMT as preshower which is different from shashlik module, but it use black Teflon cloth for wrapping. We now have enough black Taflon to rewrap the preshower.