



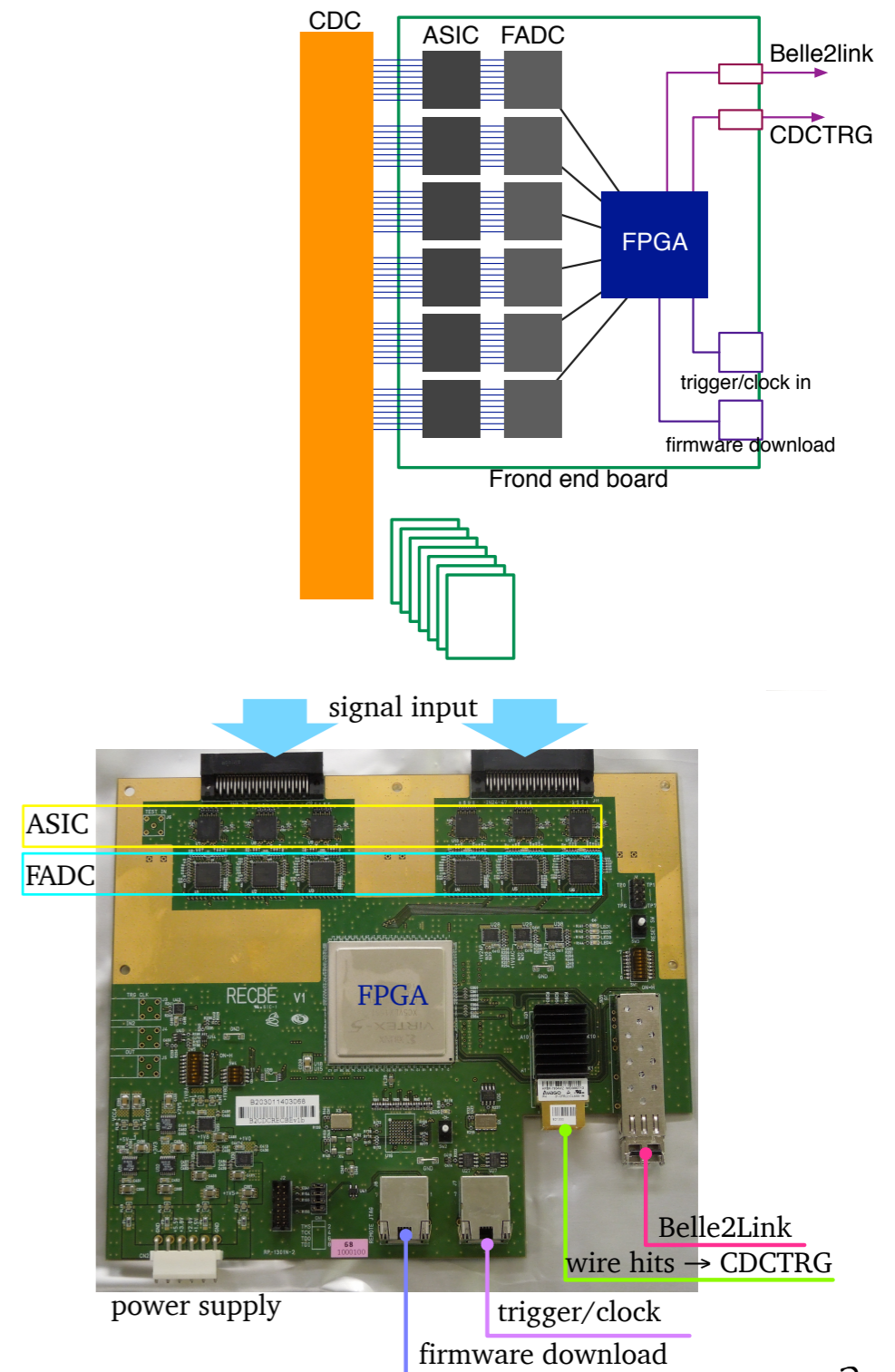
CDC

Nanae Taniguchi (KEK)

NTU, Aug. 2017

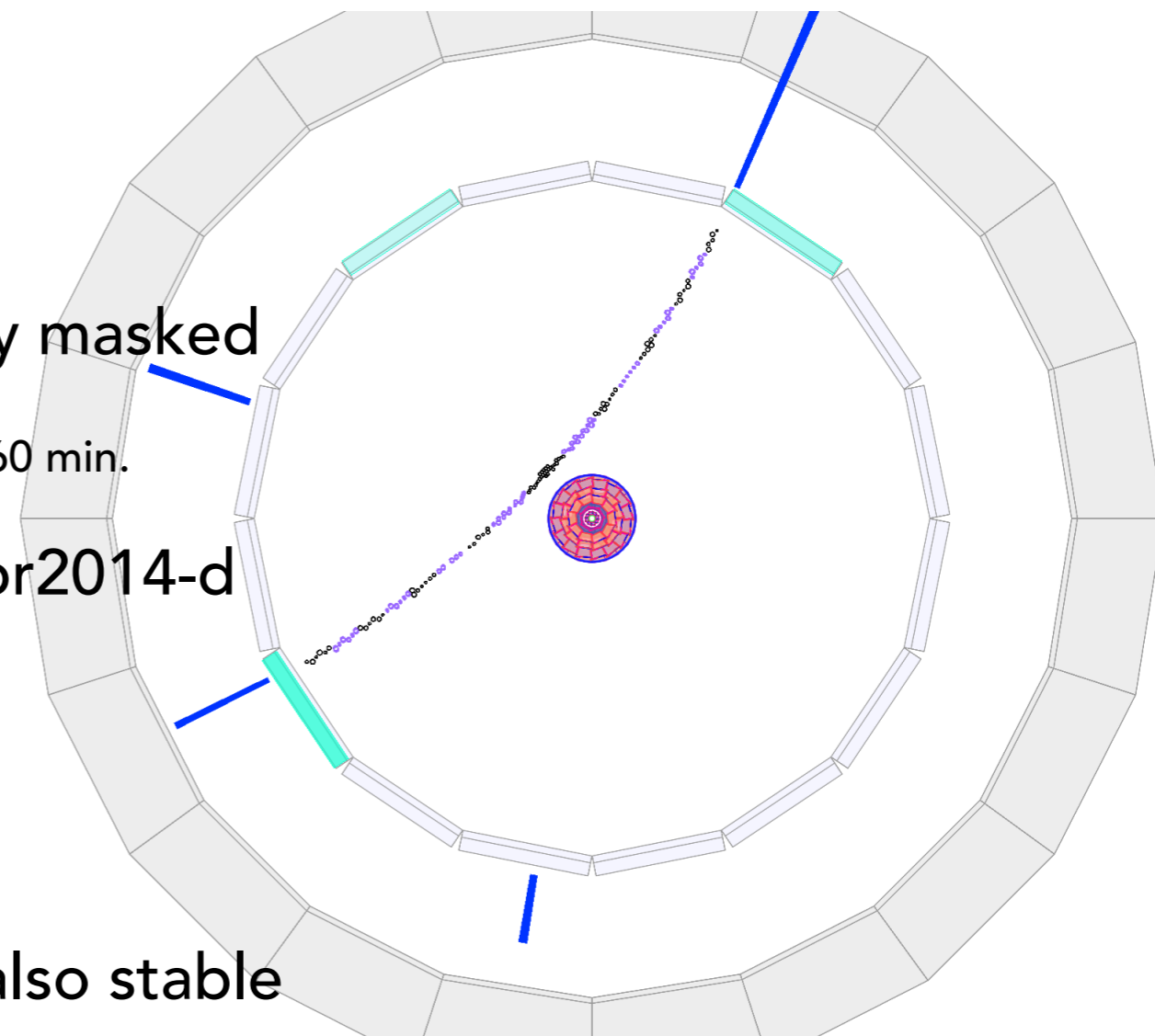
introduction

- **Central Drift Chamber**
 - installed in Belle : Oct. 2016
 - commissioning with cosmic ray
 - 14336 sense wires (signal)
- **Readout**
 - 48 channels / board
 - 299 front-end board for entire readout
 - entire readout since January 2017



cosmic run in summer

- cosmic ray run in this summer
 - magnetic field $B=1.5T$
 - cpr2014-d (board#204) is basically masked
 - b2llost (belle2 link lost) stop run every 30 - 60 min.
 - No errors other than b2llost of cpr2014-d
- **No troubles in LV/HV operation**
 - stable operation
 - temperature of CDC and FE are also stable

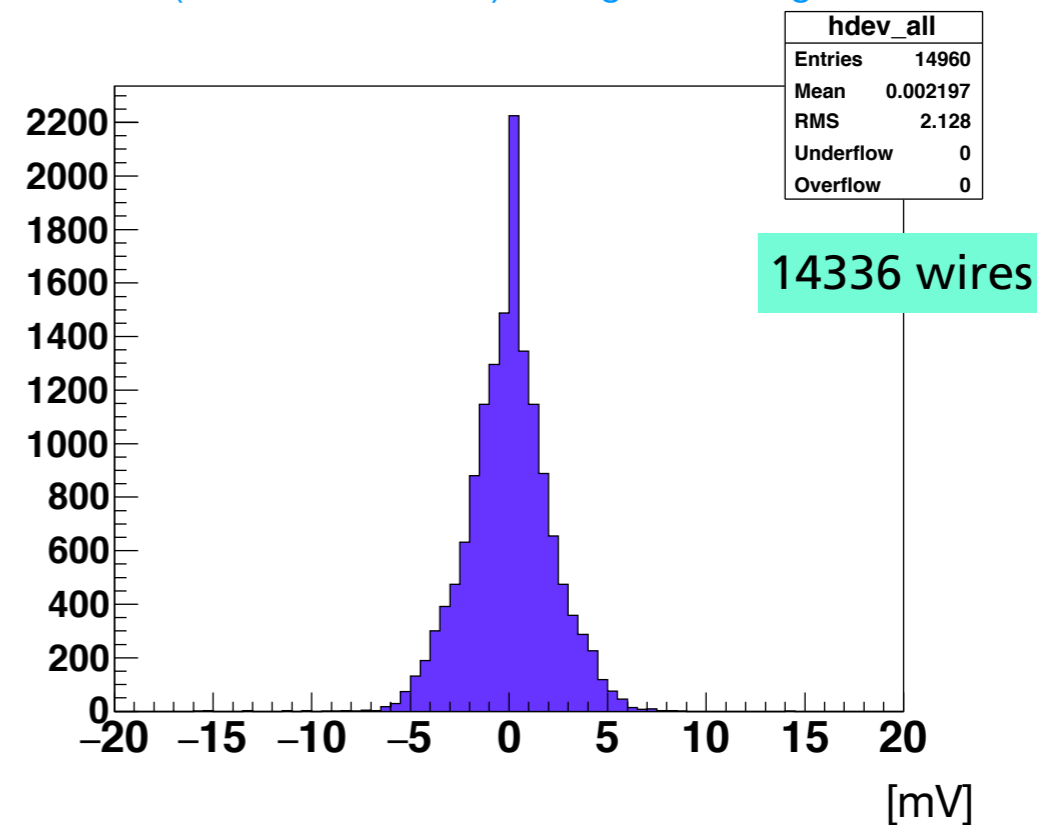
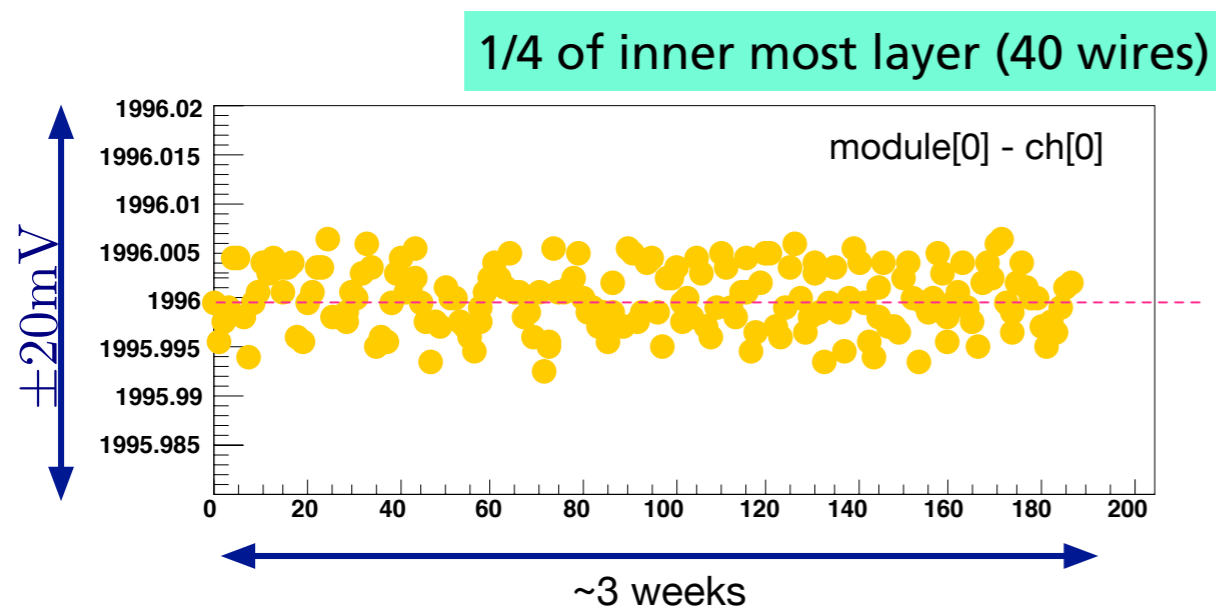


operation

- High Voltage operation

- ~2kV for small cell (inner most 8 layers)
 - 1/4 layer X 32ch(2modules)
- 2.3-2.4kV for normal cell
 - 1 layer X 48ch(3modules)

distribution of (Measured value) - (nominal value)
for all channels (5 modules X 16ch) during 3-weeks global cosmic run



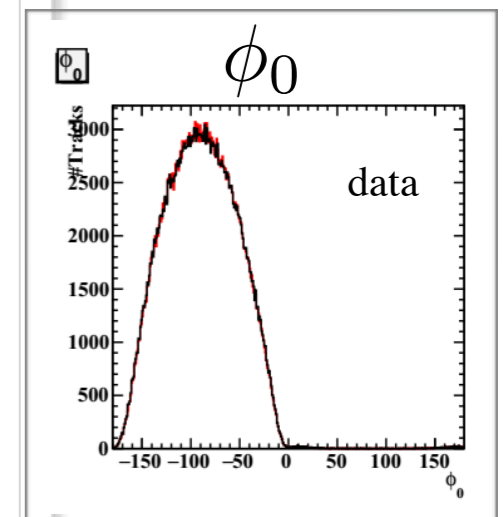
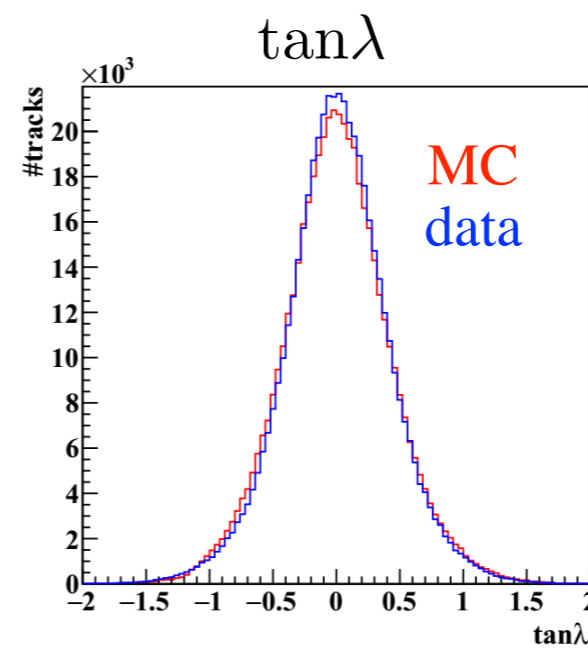
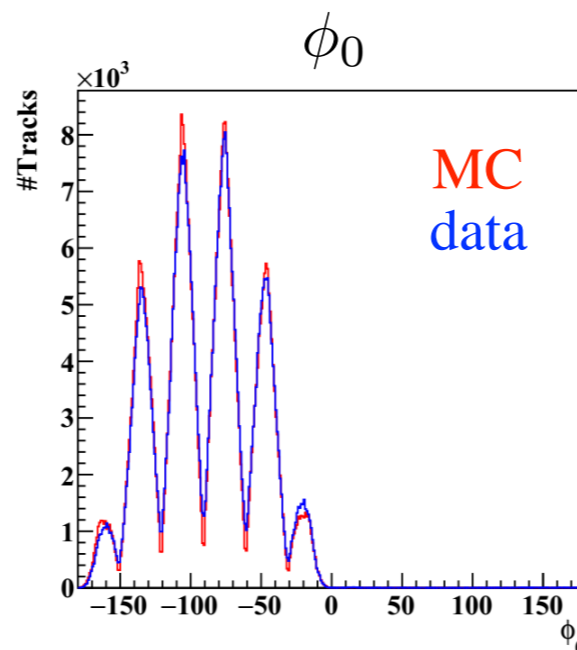
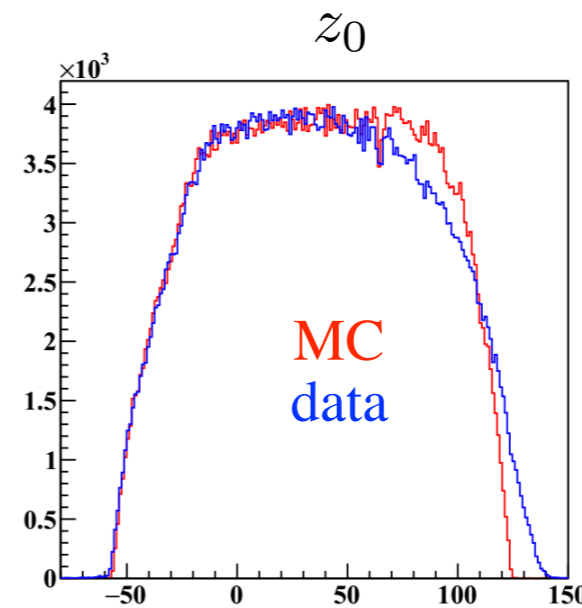
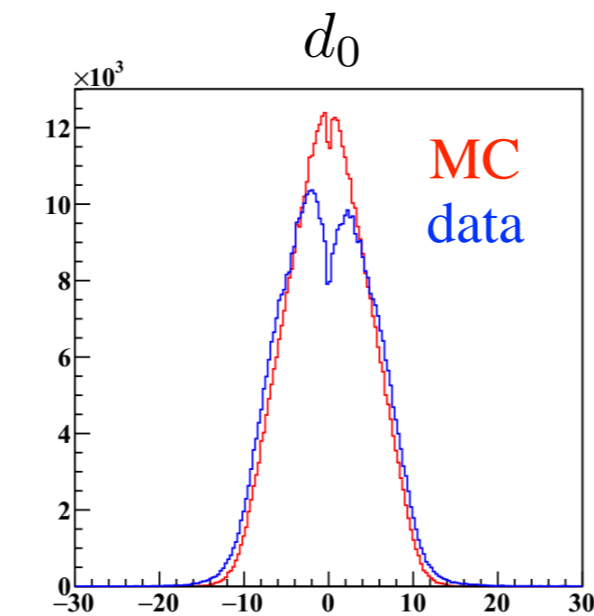
HV is stable during cosmic run

D. V. Thanh

Track Parameters

- Number of event are same for MC and data, 500K events.
- MC and Data are good agreement at ϕ_0 and $\tan\lambda$ distribution
- D_0 distribution of data is wider than MC.
- Z_0 distribution is also wider at $z > 125$

trigger condition(TSF) is included in simulation
(Sara, KyungTae)



ECL_timing && singleTSF

8/1/2017

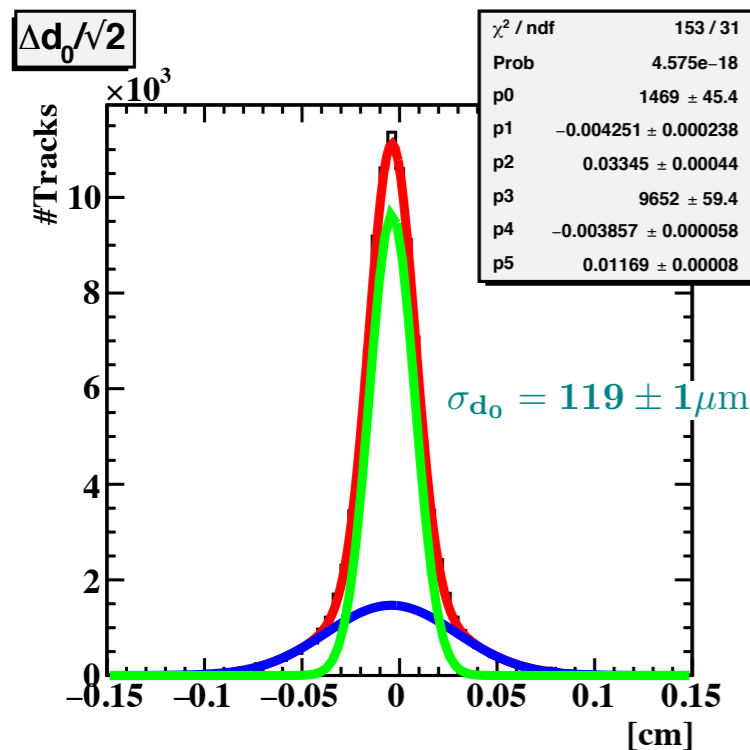
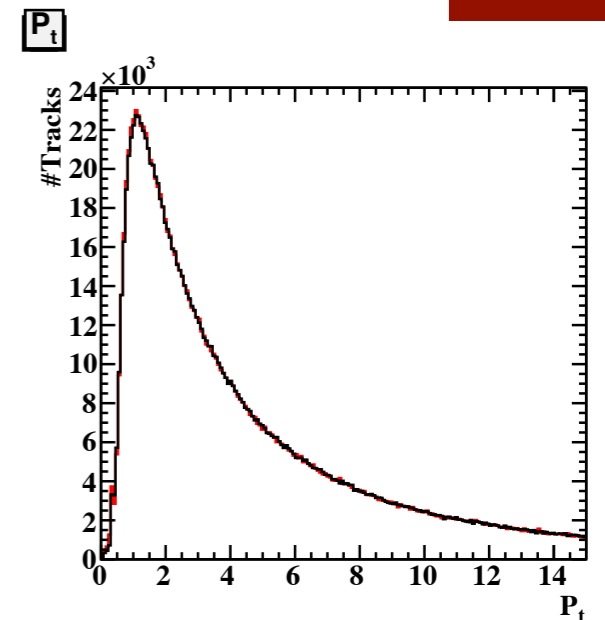
bump due to effect of boundary of TSF
(ECL_timing && b2bTSF)

4

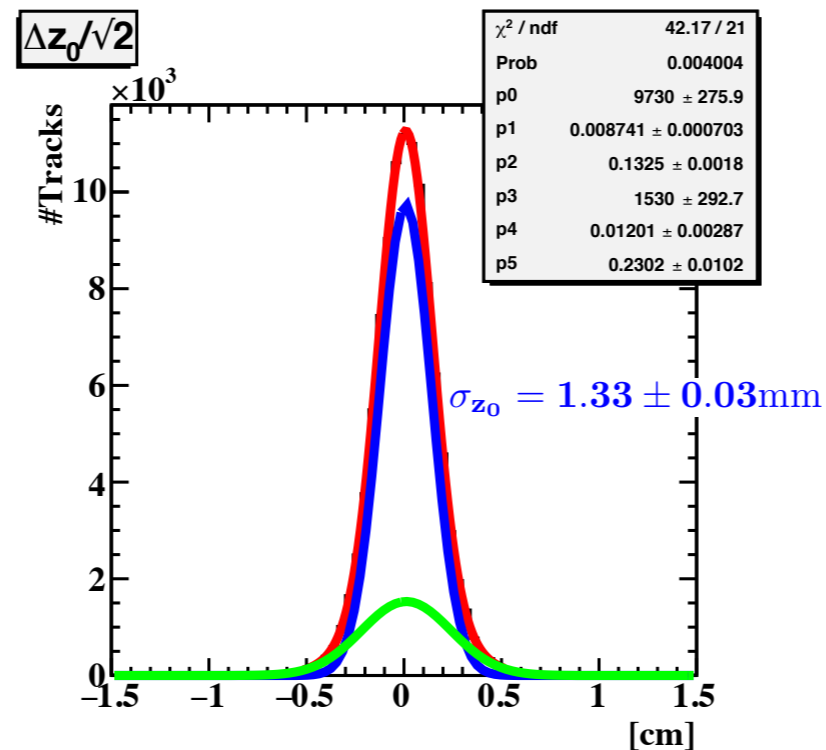
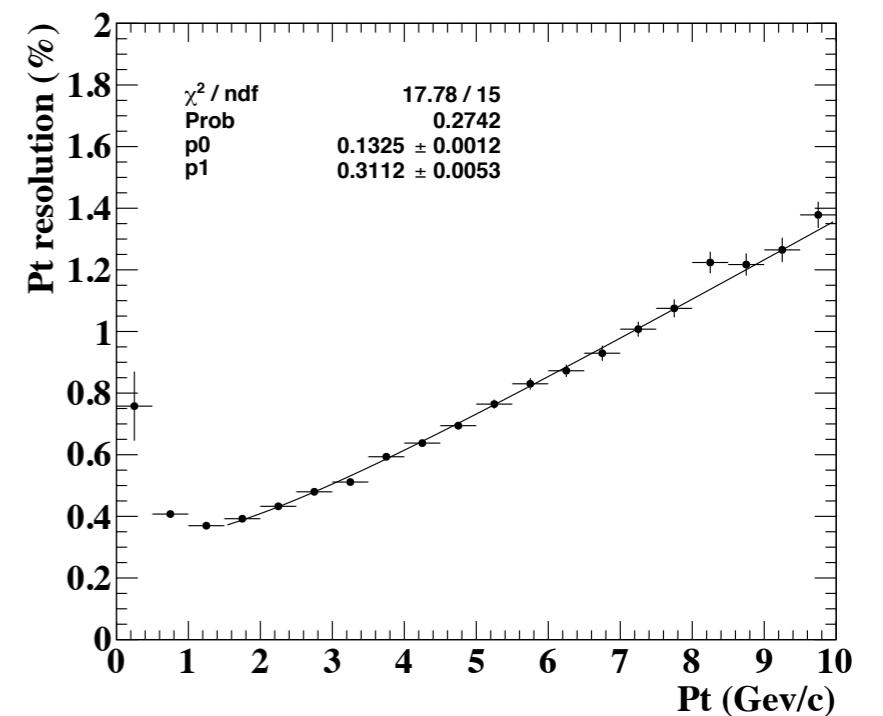
global cosmic run in July

D. V. Thanh

- Calibration constants have been updated
 - XT function (layer, L/R, **theta**, **incident angle**)



good

improved
(good)improved from the last B2GM,
but deviation is still large

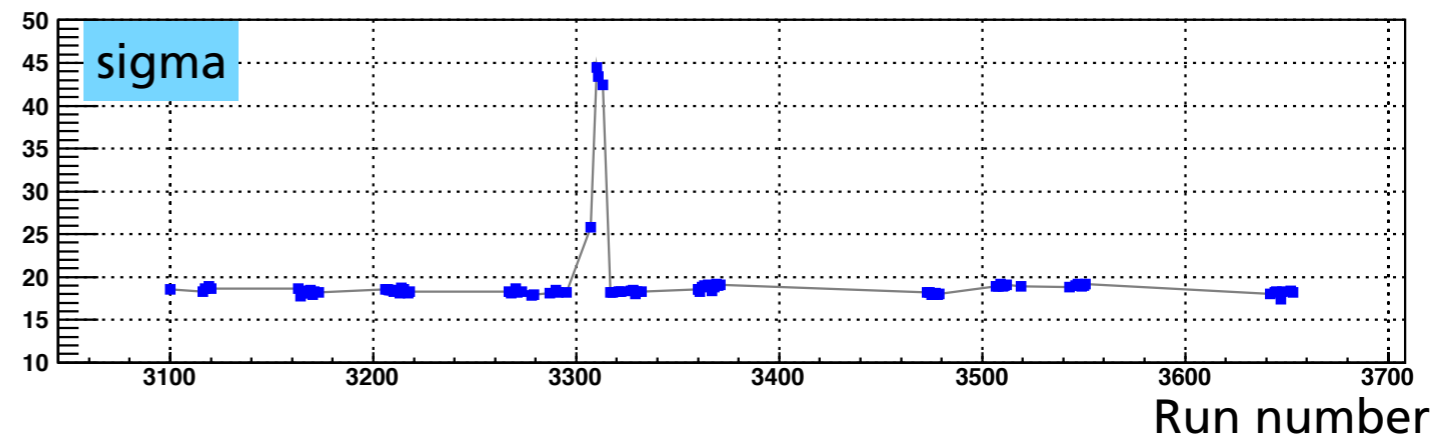
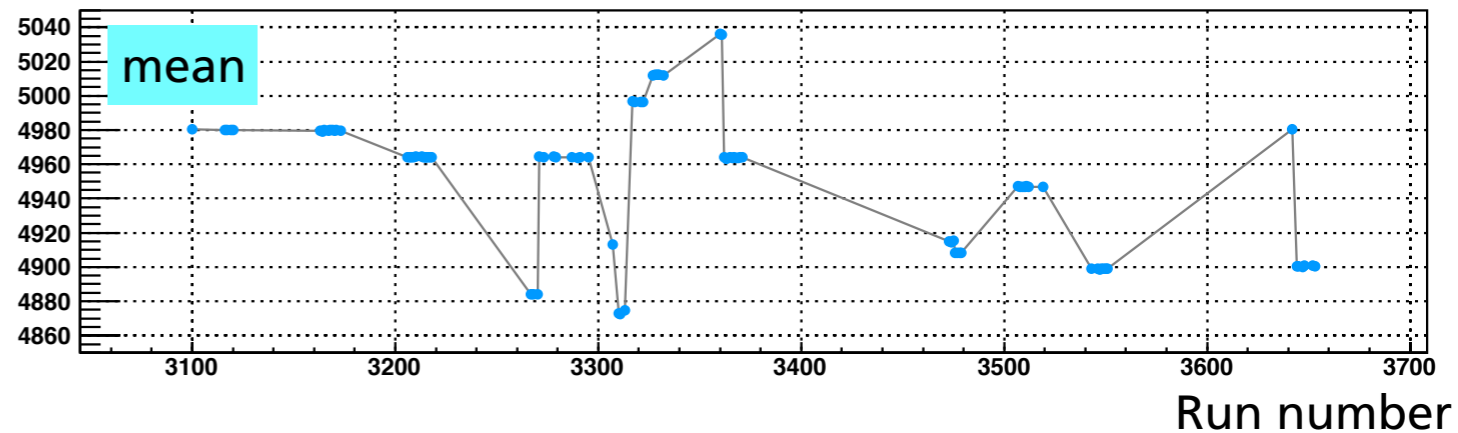
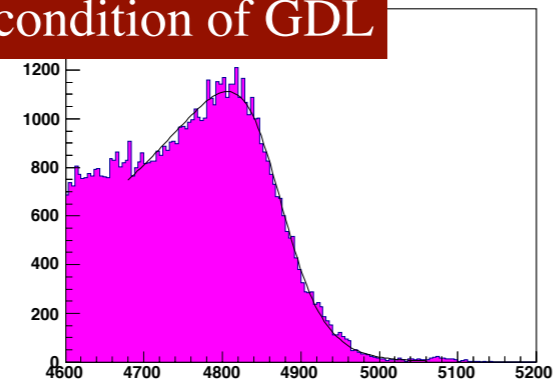
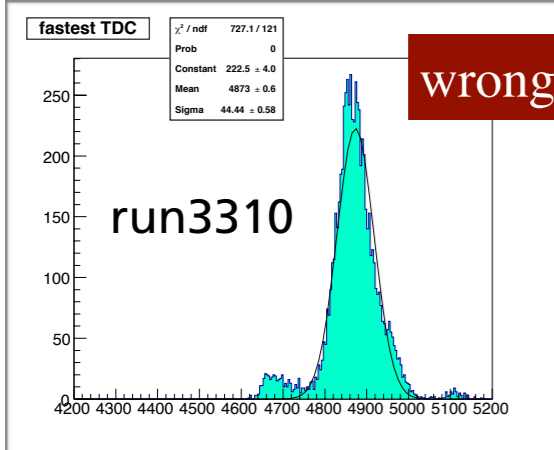
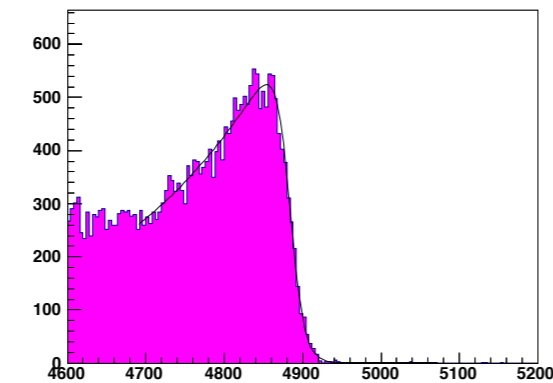
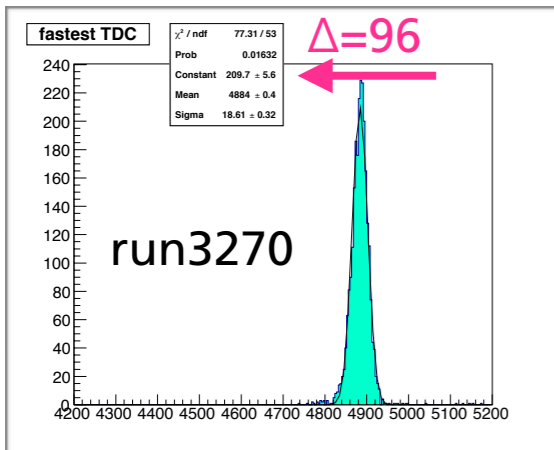
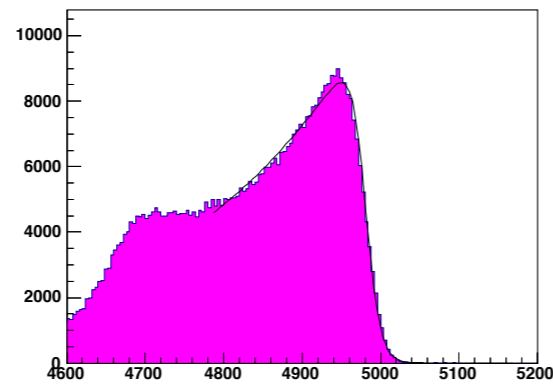
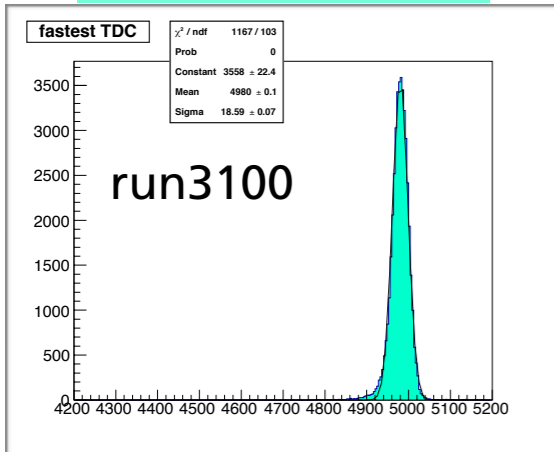
latency shift

distribution of fastest TDC

TDC distribution of super layer [8]

based on Run record page
<http://localhost:8080/logdaq/runrecord.html>

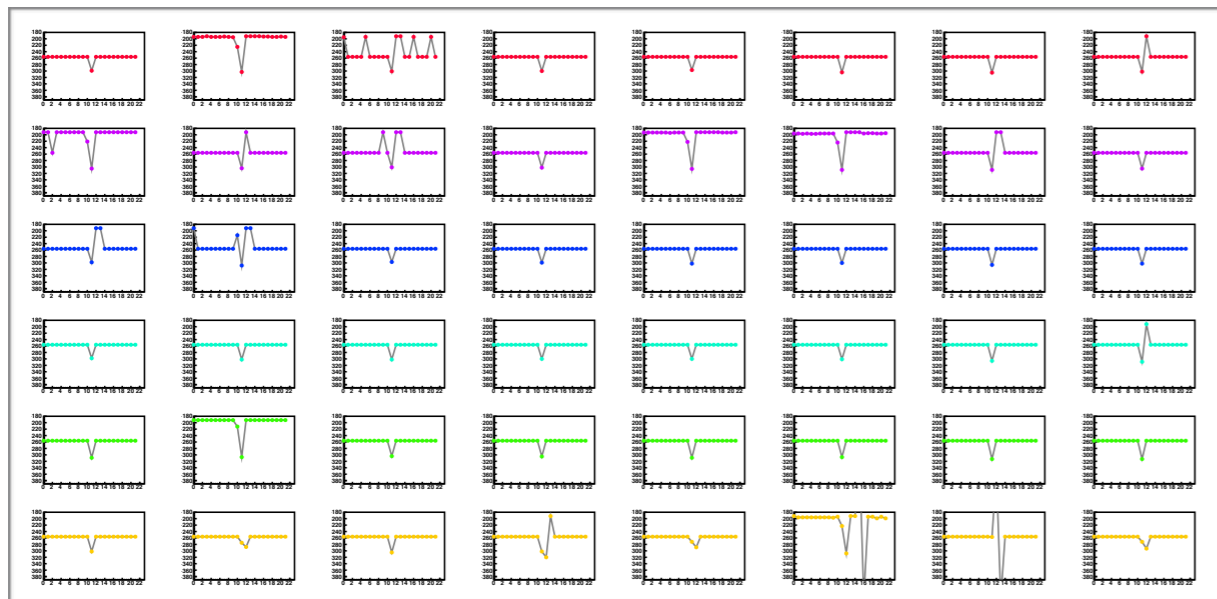
data taken in experimental shift
 trigger out > 2k events



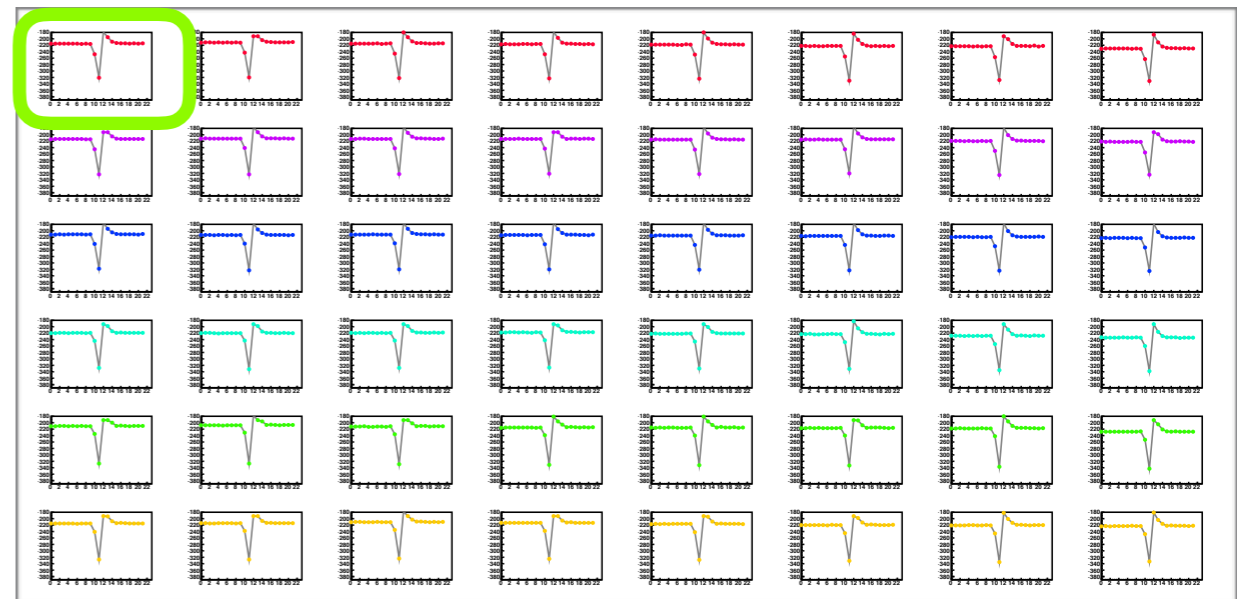
T₀ should be extracted for each run in analysis

local run

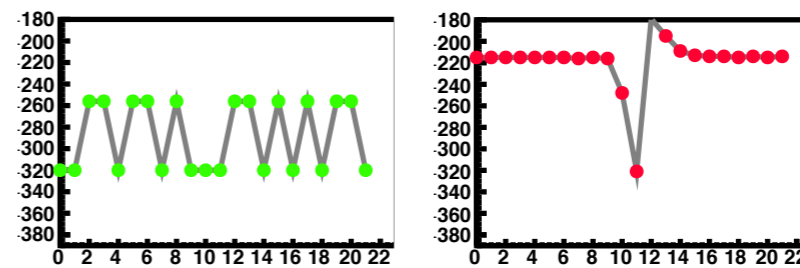
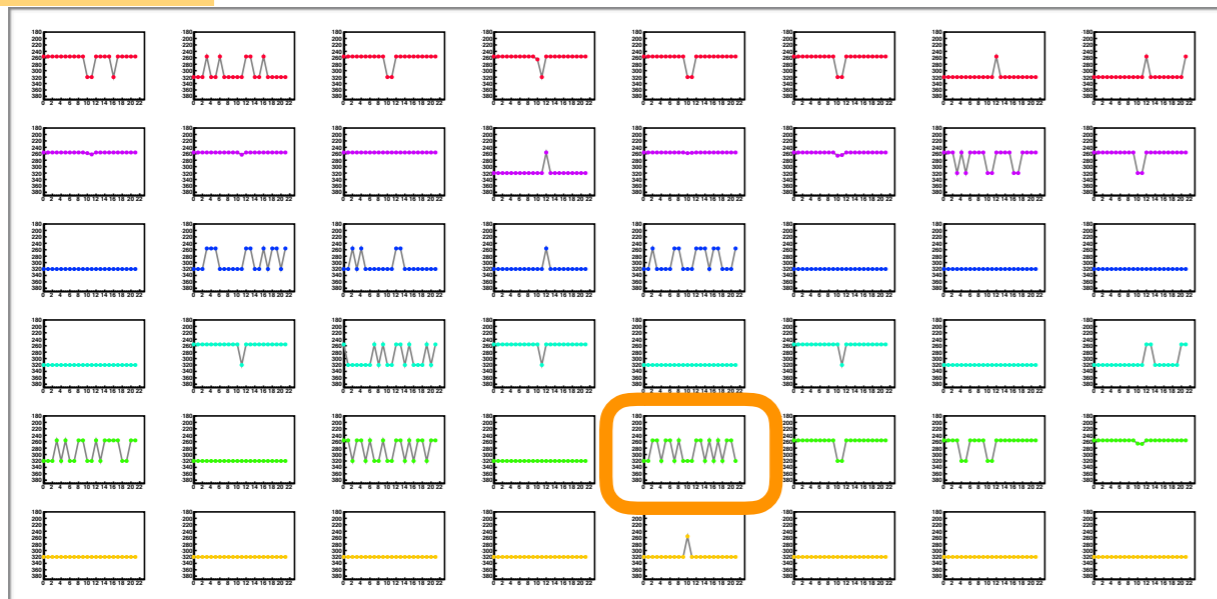
board#52



board#82



board#53



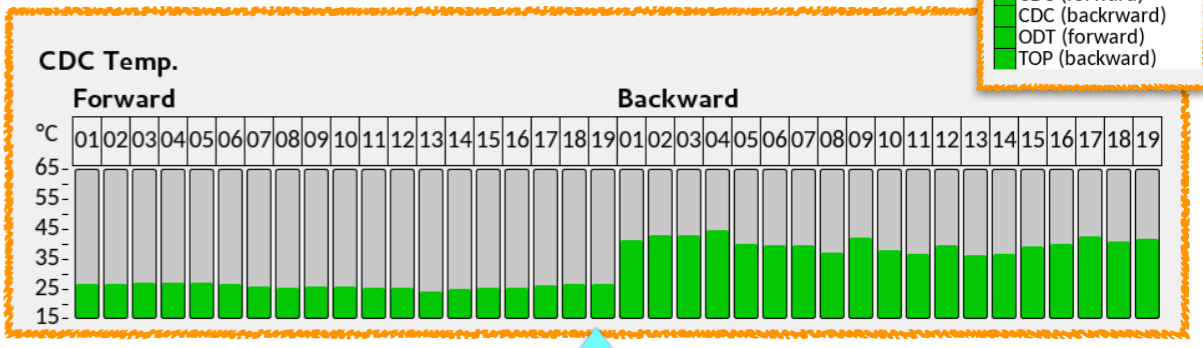
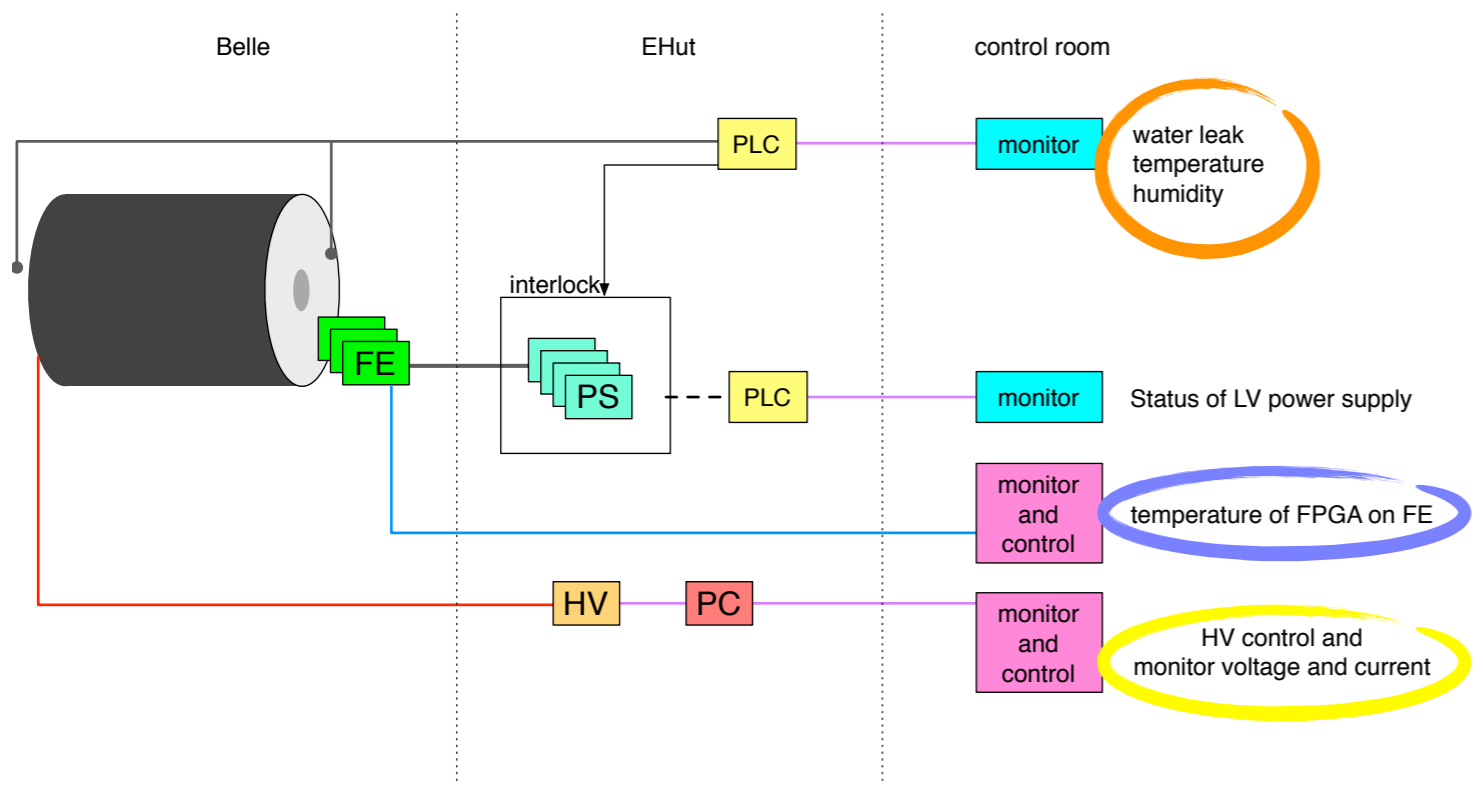
problem in analog ASIC in several boards

slow control

PARK SeokHee (Yonsei), Sadaharu Uehara (KEK)
Tomoyuki Konno (KEK)

WaterLeak

- CDC (forward)
- CDC (backward)
- ODT (forward)
- TOP (backward)

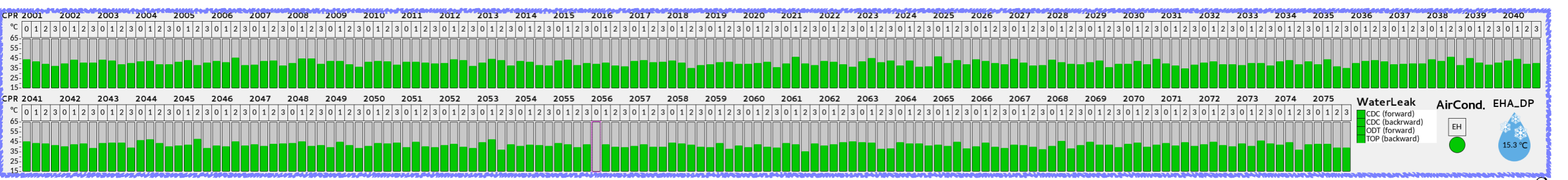


New!

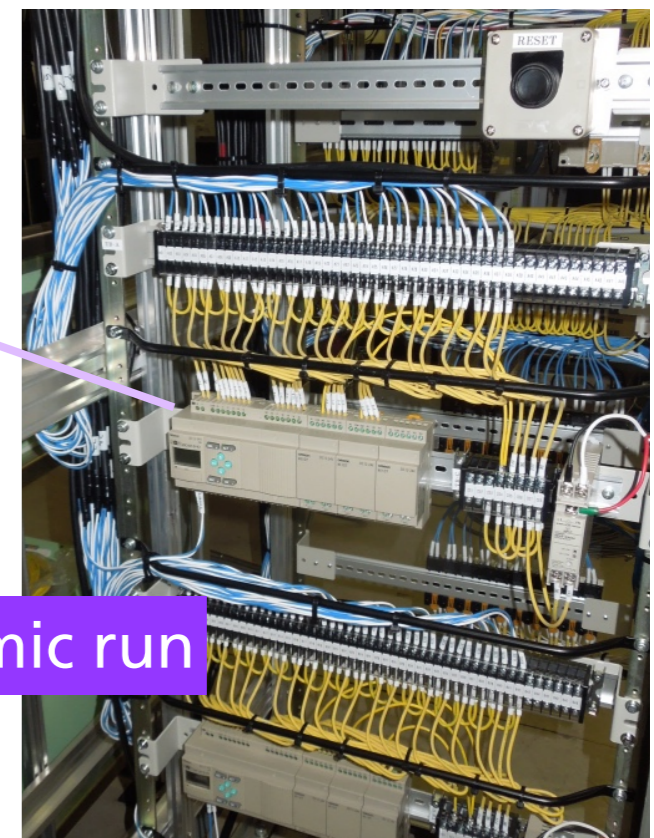
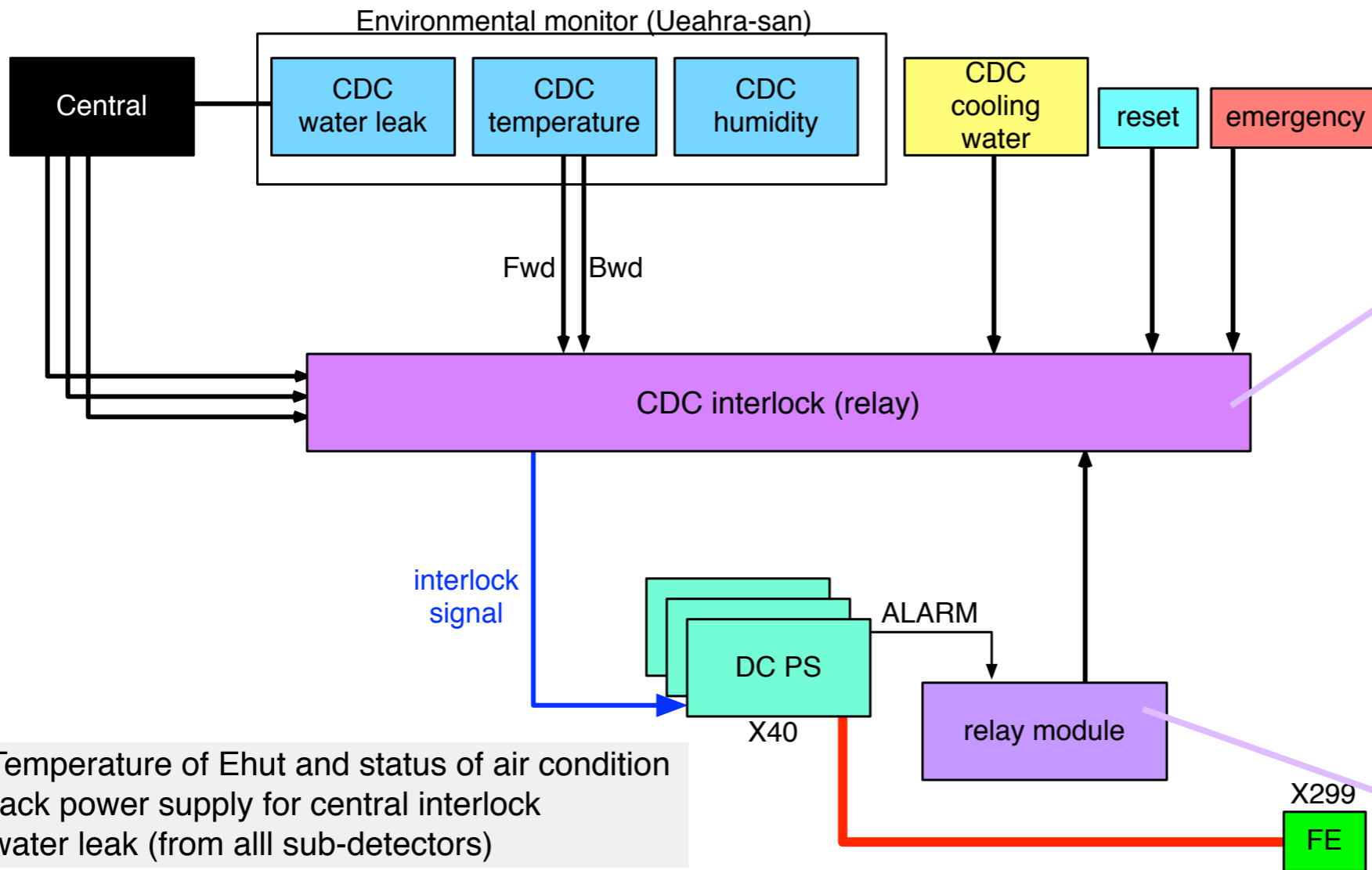
HV CDC_HV Main commands: TURNINGON, ABORT, PEAK, TURNOFF, RECOVER. HV configurations: Standby, Peak.

CDC_HV crate(1) slot(1)											CDC_HV crate(1) slot(3)										
Slot#	Ch#	Switch	RampUp	RampDn	Vset	Vlimit	CLimit	Status	VMon[V]	CMon[uA]	Slot#	Ch#	Switch	RampUp	RampDn	Vset	Vlimit	CLimit	Status	VMon[V]	CMon[uA]
1	1	ON	10	10	1996	2400.0	688E-5	TRIP	0.2	-0.0	3	1	ON	10	10	2298	3000.0	25.0	AMPDOW	83.8	-0.0
1	2	ON	10	10	1996	2400.0	688E-5	TRIP	0.3	-0.0	3	2	ON	10	10	2287	3000.0	25.0	AMPDOW	75.9	-0.0
1	3	ON	10	10	1996	2400.0	688E-5	TRIP	0.2	-0.0	3	3	ON	10	10	2298	3000.0	25.0	AMPDOW	79.0	-0.0
1	4	ON	10	10	1996	2400.0	688E-5	TRIP	0.3	-0.0	3	4	ON	10	10	2309	3000.0	25.0	AMPDOW	96.3	-0.0
1	5	ON	10	10	2068	2400.0	688E-5	TRIP	0.2	-0.0	3	5	ON	10	10	2320	3000.0	25.0	AMPDOW	101.9	-0.0
1	6	ON	10	10	2068	2400.0	688E-5	TRIP	0.3	-0.0	3	6	ON	10	10	2345	3000.0	25.0	AMPDOW	111.8	-0.0
1	7	ON	10	10	2068	2400.0	688E-5	TRIP	0.2	-0.0	3	7	ON	10	10	2357	3000.0	25.0	AMPDOW	126.2	-0.0
1	8	ON	10	10	2068	2400.0	688E-5	TRIP	0.3	-0.0	3	8	ON	10	10	2325	3000.0	25.0	AMPDOW	104.1	-0.0
1	9	ON	10	10	2081	2400.0	688E-5	TRIP	0.2	-0.0	3	9	ON	10	10	2351	3000.0	25.0	AMPDOW	109.7	-0.0
1	10	ON	10	10	2081	2400.0	688E-5	TRIP	0.3	-0.0	3	10	ON	10	10	2339	3000.0	25.0	AMPDOW	111.2	-0.0
1	11	ON	10	10	2081	2400.0	688E-5	TRIP	0.2	-0.0	3	11	ON	10	10	2347	3000.0	25.0	AMPDOW	114.3	-0.0
1	12	ON	10	10	2081	2400.0	688E-5	TRIP	0.3	-0.0	3	12	ON	10	10	2343	3000.0	25.0	AMPDOW	102.4	-0.0
1	13	ON	10	10	2091	2400.0	688E-5	TRIP	0.2	-0.0	3	13	ON	10	10	2332	3000.0	25.0	AMPDOW	108.9	-0.0
1	14	ON	10	10	2091	2400.0	688E-5	TRIP	0.4	-0.0	3	14	ON	10	10	2336	3000.0	25.0	AMPDOW	112.0	-0.0
1	15	ON	10	10	2091	2400.0	688E-5	TRIP	0.2	-0.0	3	15	ON	10	10	2340	3000.0	25.0	AMPDOW	118.2	-0.0
1	16	ON	10	10	2091	2400.0	688E-5	TRIP	0.4	-0.0	3	16	ON	10	10	2347	3000.0	25.0	AMPDOW	125.2	-0.0

working well during global cosmic run



Interlock



- Temperature of Ehut and status of air condition
- rack power supply for central interlock
- water leak (from all sub-detectors)

- CDC temperature (Fwd/Bwd)

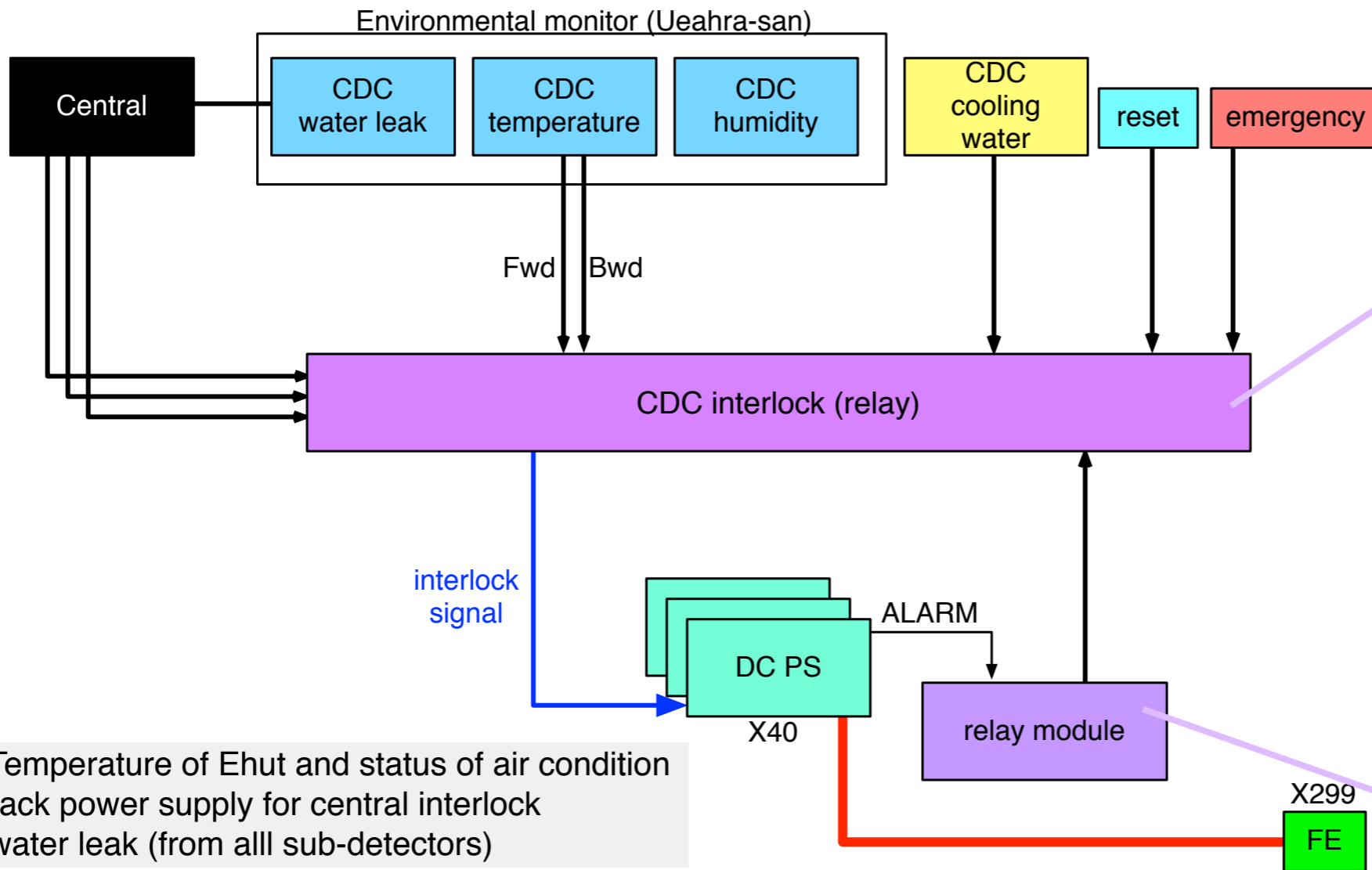
- CDC cooling water

- reset/emergency buttons

- DC power supply ALARM (over current/ over voltage/ over heat)

working well during global cosmic run

Interlock



- Temperature of Ehut and status of air condition
- rack power supply for central interlock
- water leak (from all sub-detectors)

- CDC temperature (Fwd/Bwd)

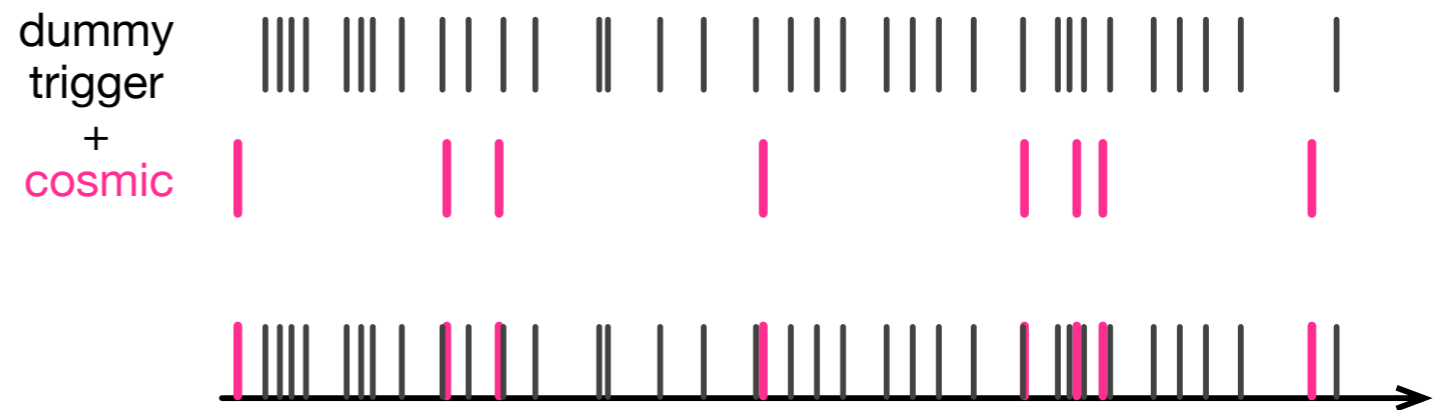
- CDC cooling water

- reset/emergency buttons

0. Monitor output of relay using available channel of PLC (provided by Uehara-san)
1. Replace relay with new PLC (FY2018)

prospect for phase-2

- high rate test has been done regularly by Yamada-san
 - unstable cpr2014-d, 2017-d, 2046-d
 - running >30kHz (no storage)
- plan to study with "cosmic + dummy"
 - noise ?
 - data processing
 - event matching
 - tracking efficiency
 - resolution



schedule

Sep.

Oct.

Nov.

Dec.

16-21(25)

access CDC

fix problems of HV and FE boards

We need to operate DAQ

cosmic ray test without magnetic field

data taking for calibration/alignment

debugging CDCTRG

high rate test with cosmic + dummy

preparation for phase-2



Backup

1 Experimental Shifter

Fig. 1 shows data displayed for experimental shifter.

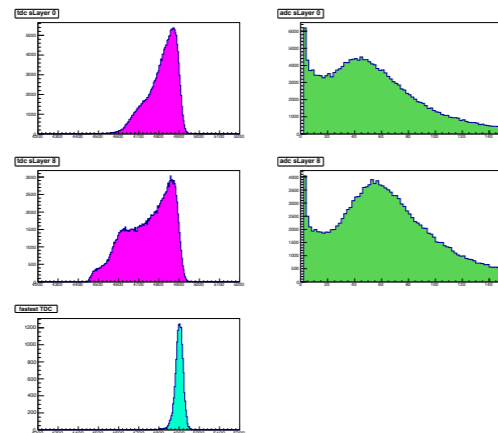


Figure 1: ADC sum/TDC distributions for super layer [0] and [8] and Distribution of fastest TDC in each event.

- tdc sLayer 0 : TDC distribution for super layer [0] (inner most super layers)
 - It is corresponding to drift time. Offset is not subtracted.
 - check shape and position of edge (T_0)
- adc sLayer 0 : ADC sum distribution for super layer [0] (inner most super layers)
 - It is corresponding to energy loss.
 - check shape and gain (peak position)
- tdc sLayer 8 : TDC distribution for super layer [8] (outer most super layers)
 - It is corresponding to drift time. Offset is not subtracted.
 - check shape and position of edge (T_0)
- adc sLayer 8 : ADC sum distribution for super layer [8] (outer most super layers)
 - It is corresponding to energy loss.
 - check shape and gain (peak position)
- fastest TDC : Distribution of fastest TDC in each event
 - check position of mean : latency monitor
 - check width of distribution : timing resolution monitor

Remarks During global cosmic run, T_0 , gain and latency may be changed. Reference plots will be prepared after run condition is fixed.

2 Detector Expert

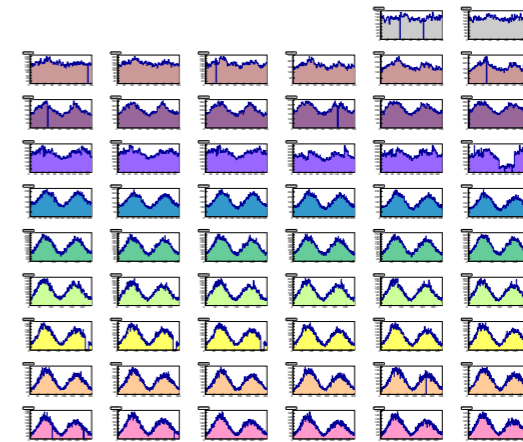


Figure 2: Distribution of the number of hits in ϕ direction for each layer.

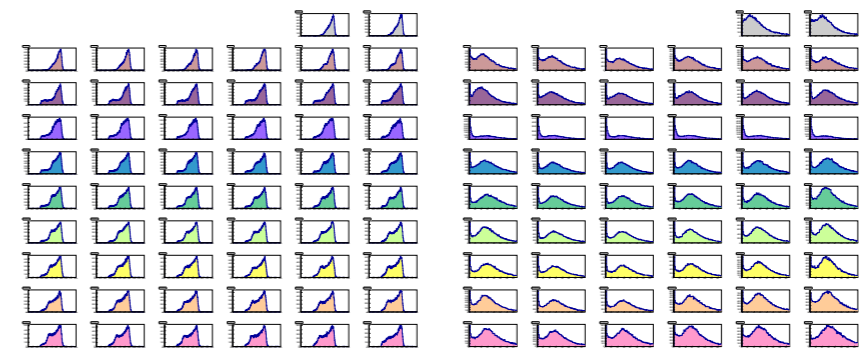


Figure 3: Distribution of TDC (left) and ADC sum (right) for each layer.