Run coordinator report

Shoji Uno

KEK

2017.10.12

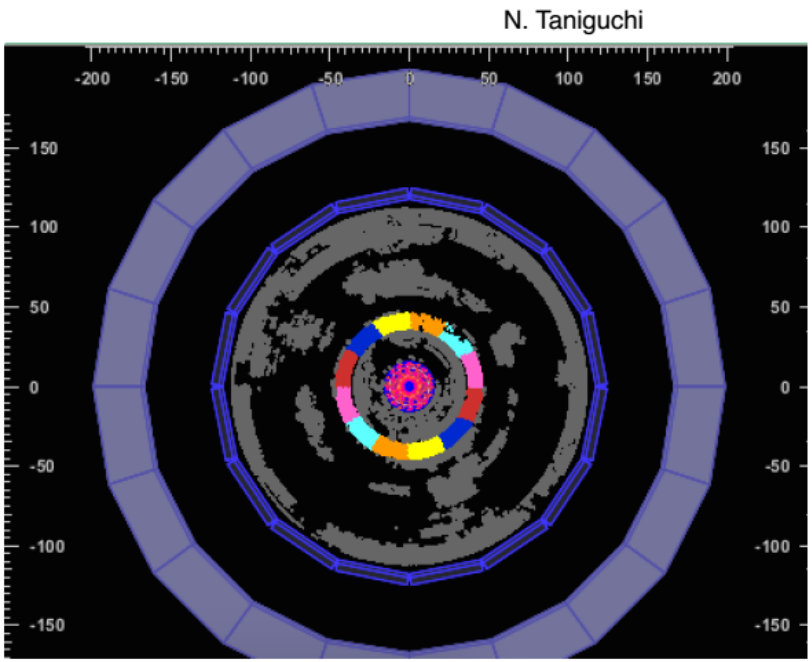
B2GM

Global cosmic run

- July : 3rd- 25th and August 18th -26th
- Magnetic field
  - Basically 1.5 Tesla + QCS on (off in some periods)
- Trigger condition :

  back-to-back (or single) TSF & ECL timing.
- DAQ has been stable.
  - Unstable part has been masked.
  - Dead time : 1.5msec for TOP and 10msec for KLM
- Field measurement was performed in August by DESY peo ple.
- Experimental shifters were assigned.
  - Thanks for 17 (8+9) persons.
  - https://confluence.desy.de/display/BI/Shift+schedule

Setup of cosmic ray



- Taking data with CDC+TOP+ECL+KLM
- Magnetic field: 1.5T + QCS
- Trigger conditions: CDC + ECL
  - CDC trigger: Track-Segment Finder (TSF) at super-layer 2
  - **Trigger timing is determine by ECL**
  - **July:** TSF back-to-back, required two TSFs at the same color region.
    ~6.4M events (good data) ~10Hz
  - **August:** single TSF, just required one TSF on Super-Layer 2.
    ~32M events ~100Hz

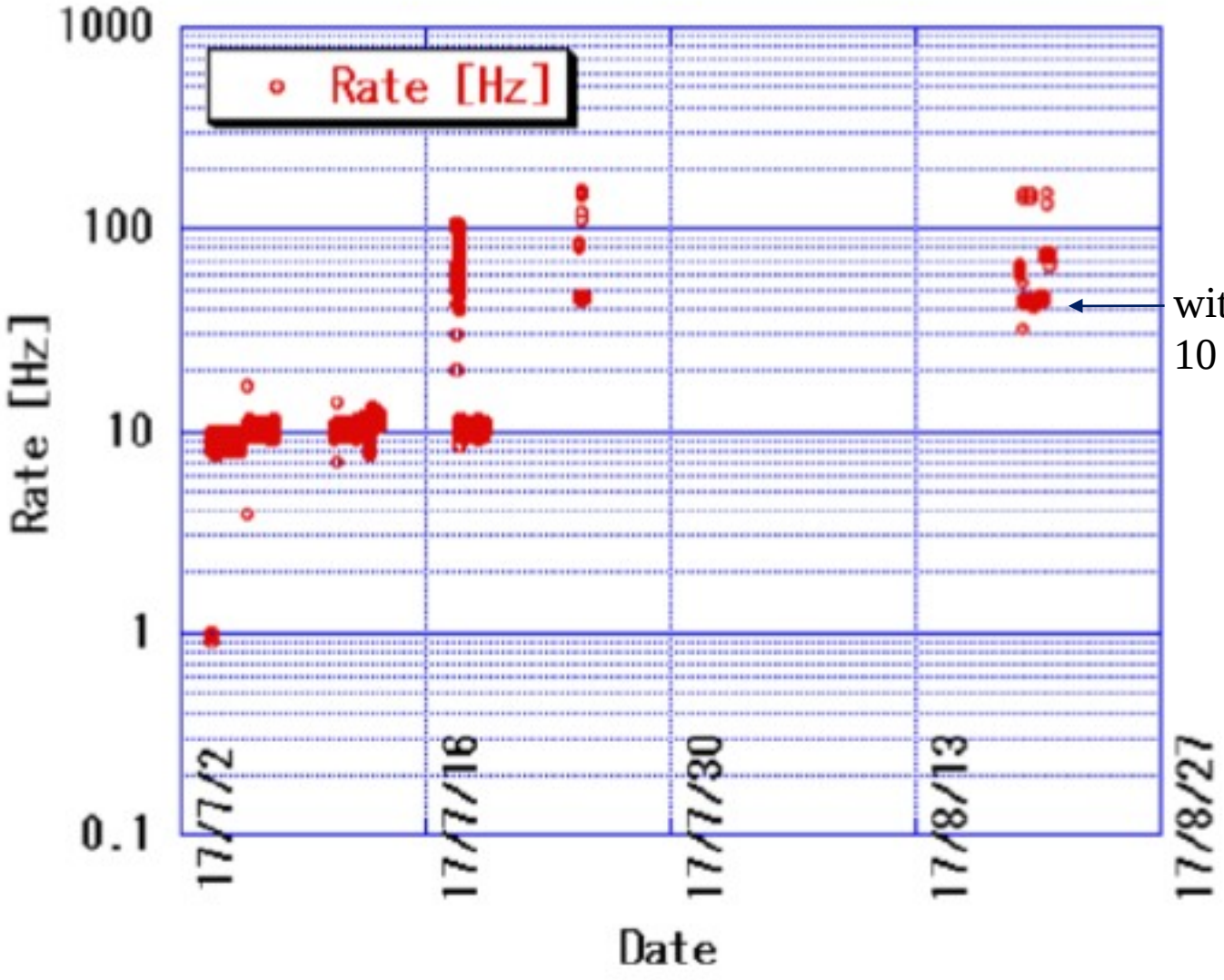
Simulation:

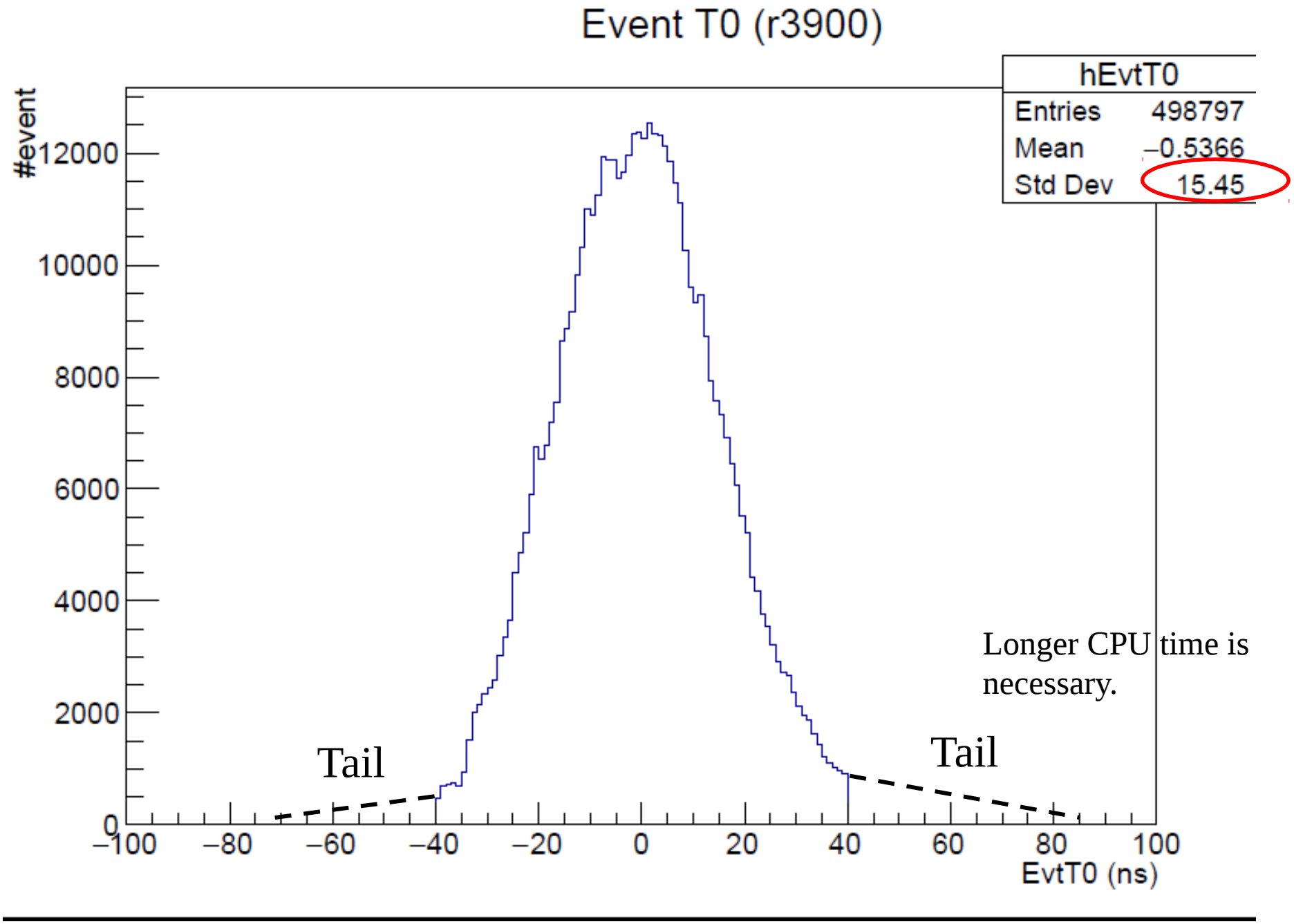
- Generator: CRY
- Trigger Simulation: both back-to back and single TSF

Reconstruction (for both MC and data):

- Track Finder: Belle II CDC cosmic finder
- Fitter: DAF (Deterministic Annealing Filter).

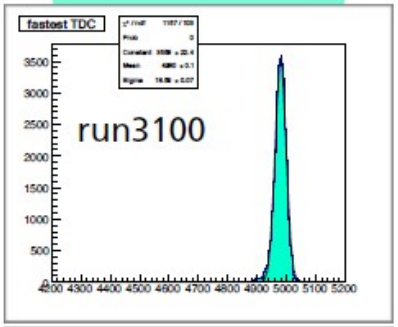
Data taking rate

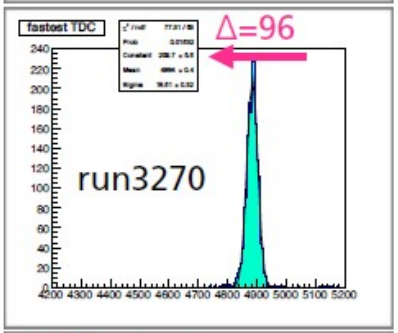


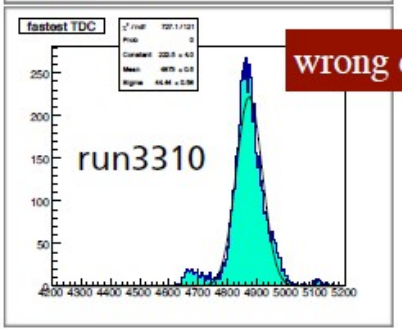

Event T0 (r3900)
hEvtT0
Entries 498797
Mean −0.5366
Std Dev 15.45
#event
12000
10000
8000
6000
4000
2000
0
−100
−80
−60
−40
−20
0
20
40
60
80
100
EvtT0 (ns)
Tail
Tail
Longer CPU time is necessary.

latency shift

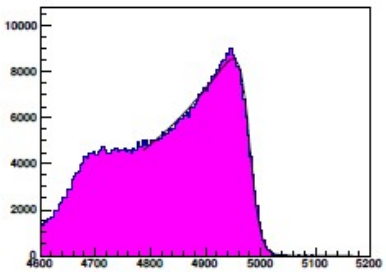
distribution of fastest TDC

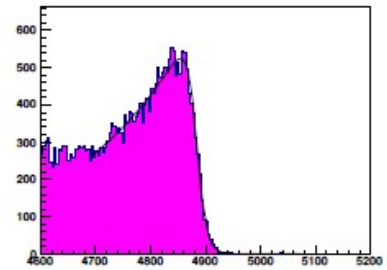




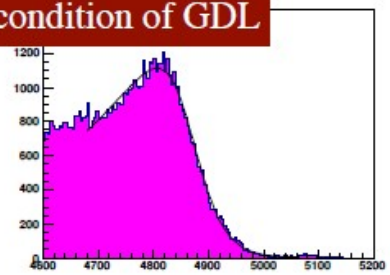


TDC distribution of super layer [8]



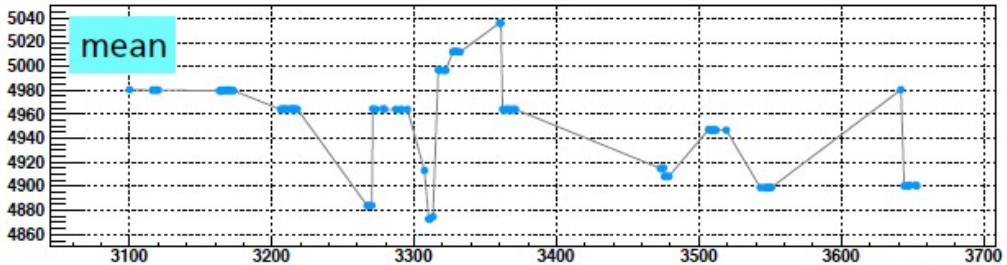


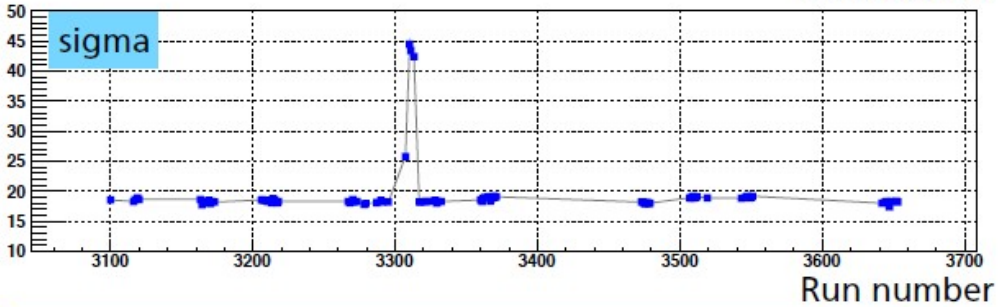
wrong condition of GDL



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

data taken in experimental shift
trigger out > 2k events





T_0 should be extracted for each run in analysis

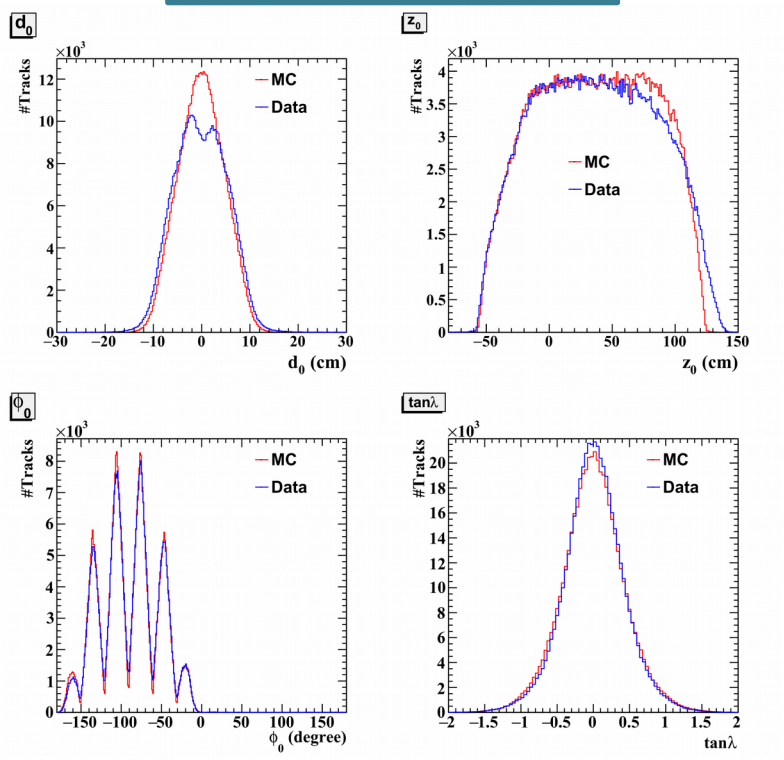
Track Parameters distribution (MC & Data)

Red: MC

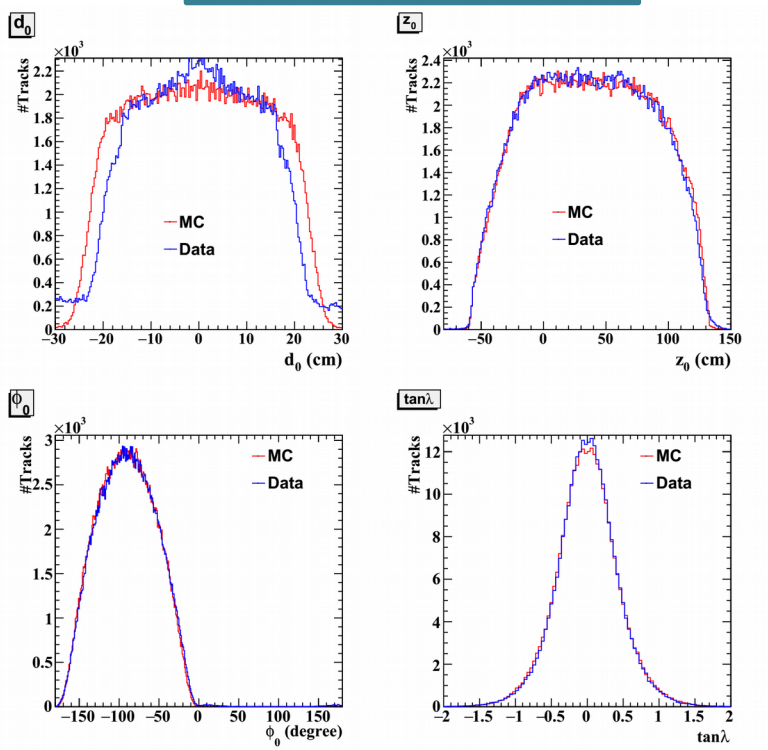
Blue: Data

Thanks to trigger group (Sara, Kyung-Tae,…) for providing trigger simulation modules

Back-to-back TSF



Single TSF



Using CRY generator, rate of comic can be also estimated.

- MC: 20.12Hz
- Data (In/Out) : ~11Hz / 10Hz

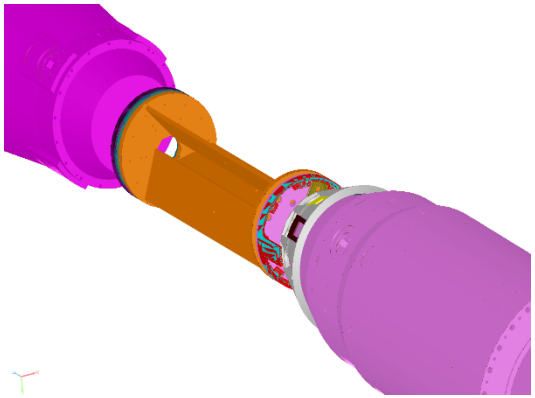
- MC: 89 Hz
- Data (In/Out): ~84/45 Hz

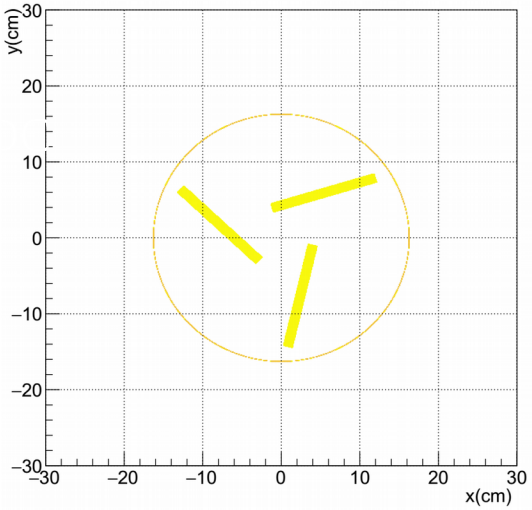
B field mapper

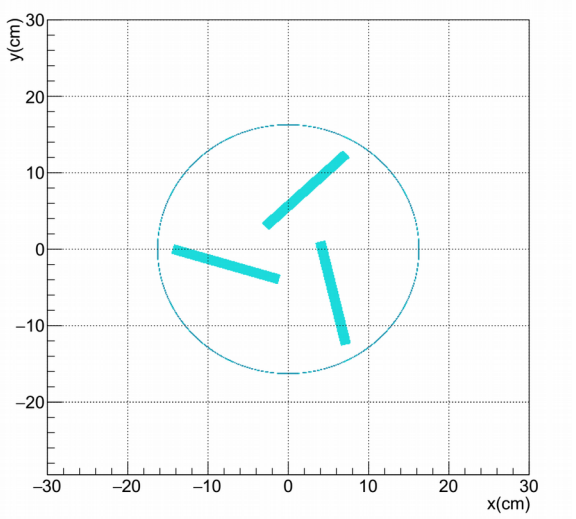
- B-Field mapper is located inside CDC during data taking period.

φ = 16.7° (July)
3085(start) -> 3882

φ = 43.3° (August)
3883 -> 4038(end)



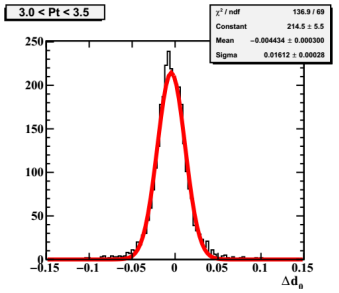


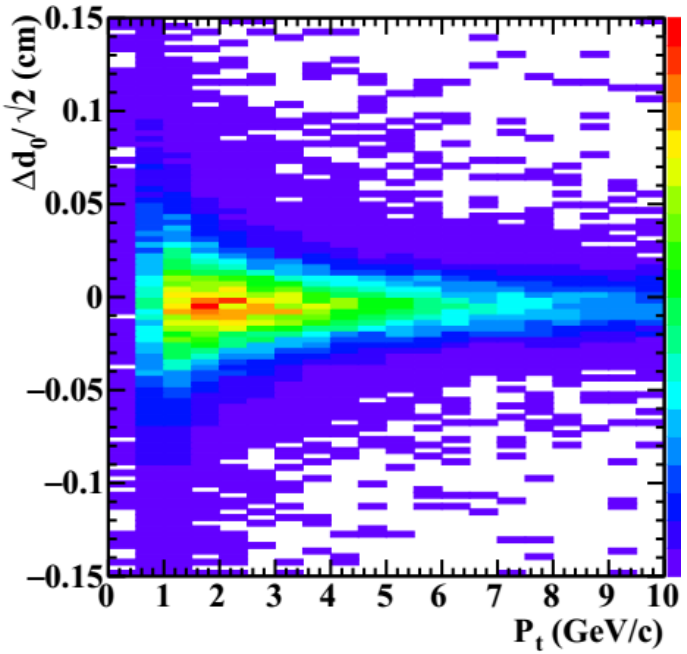


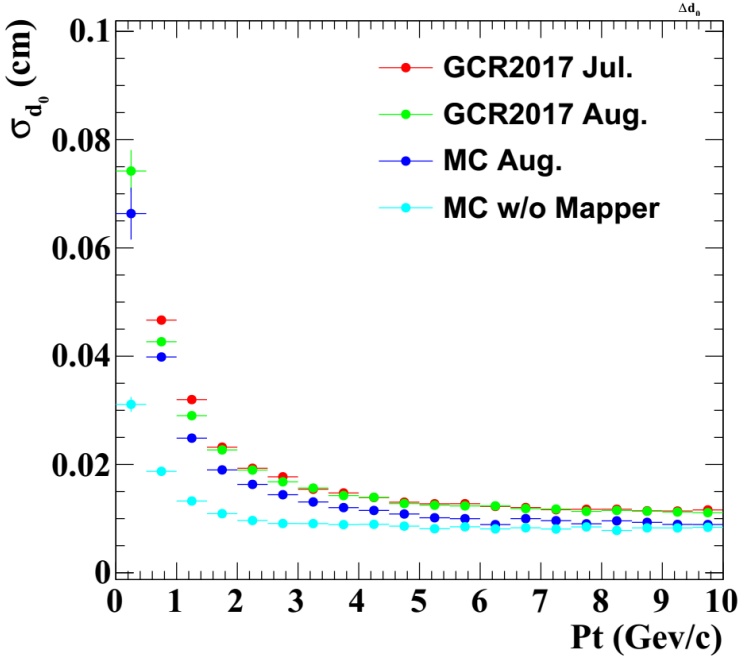
- Main material of mapper is Aluminum, thickness of each plate is **1.2cm.**
- Mapper causes larger effect on performance of CDC, especially low Pt region.

d_0 resolution

- Closet approach in x-y plane
- d_0 resolution is defined as:
- Bin width = 0.5 GeV, fitted with a gaussian function



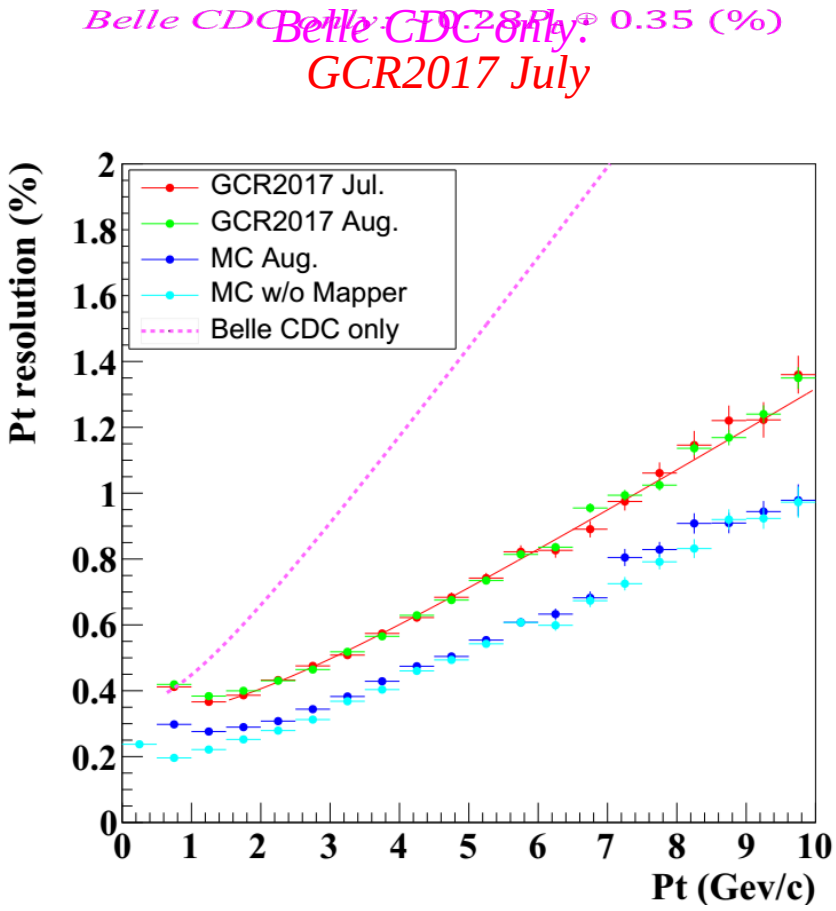




- d_0 resolution is about 120 μm at high Pt region. It is worse at low Pt reg ion due to mapper effect.

Transverse momentum (Pt) resolution

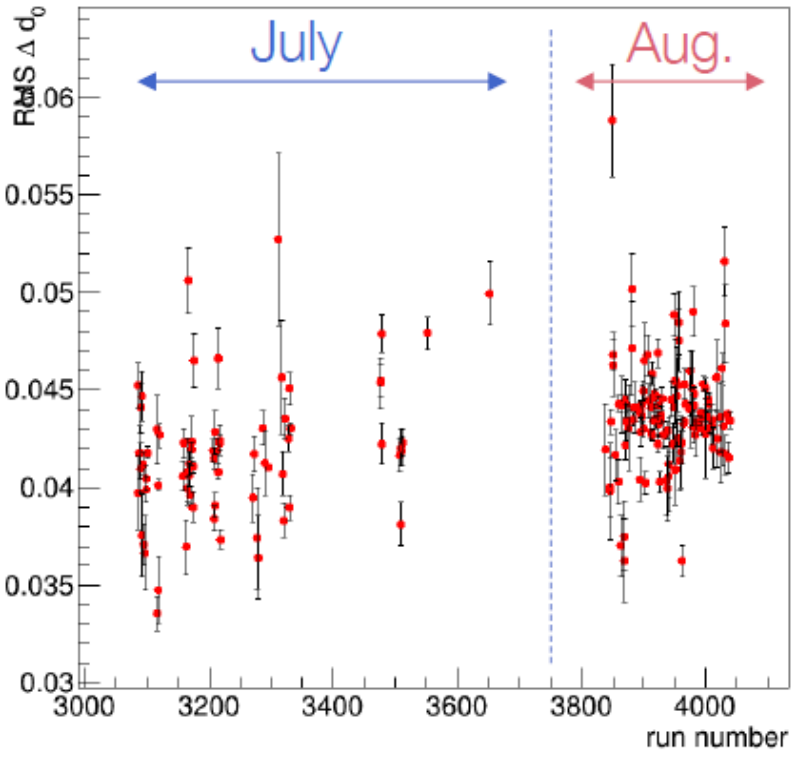
- P_t resolution = ;



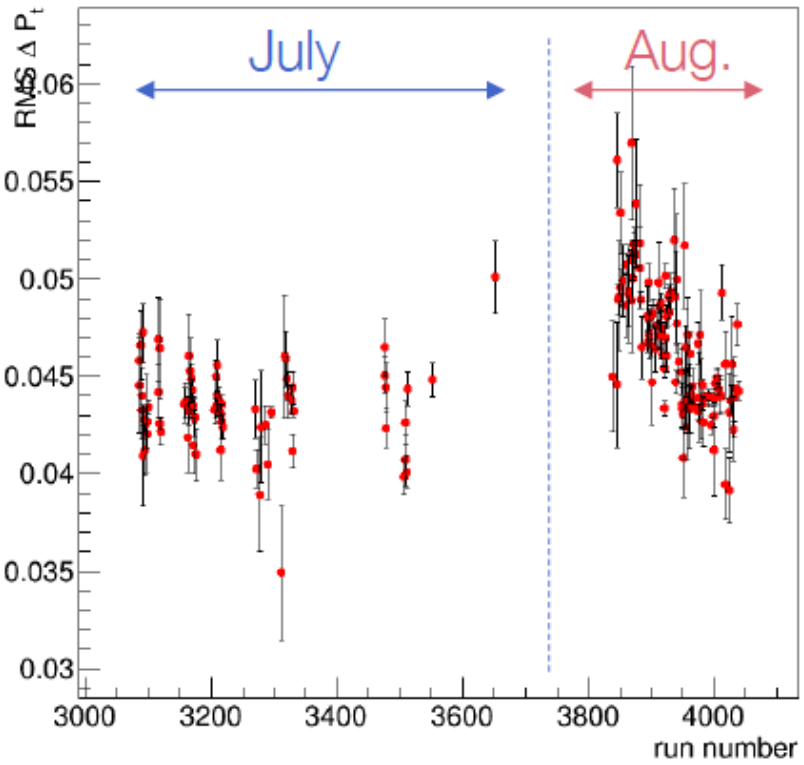
- P_t resolution is ~0.38% at P_t=1.5GeV.
- It's much improved as compared with Belle CDC, especially high Pt region.
- This great improvement is as a result of the increase CDC radius and also better calibration and alignment.
- The difference between MC and data might be due to the remaining misalignment in CDC.

First glance of run dependence

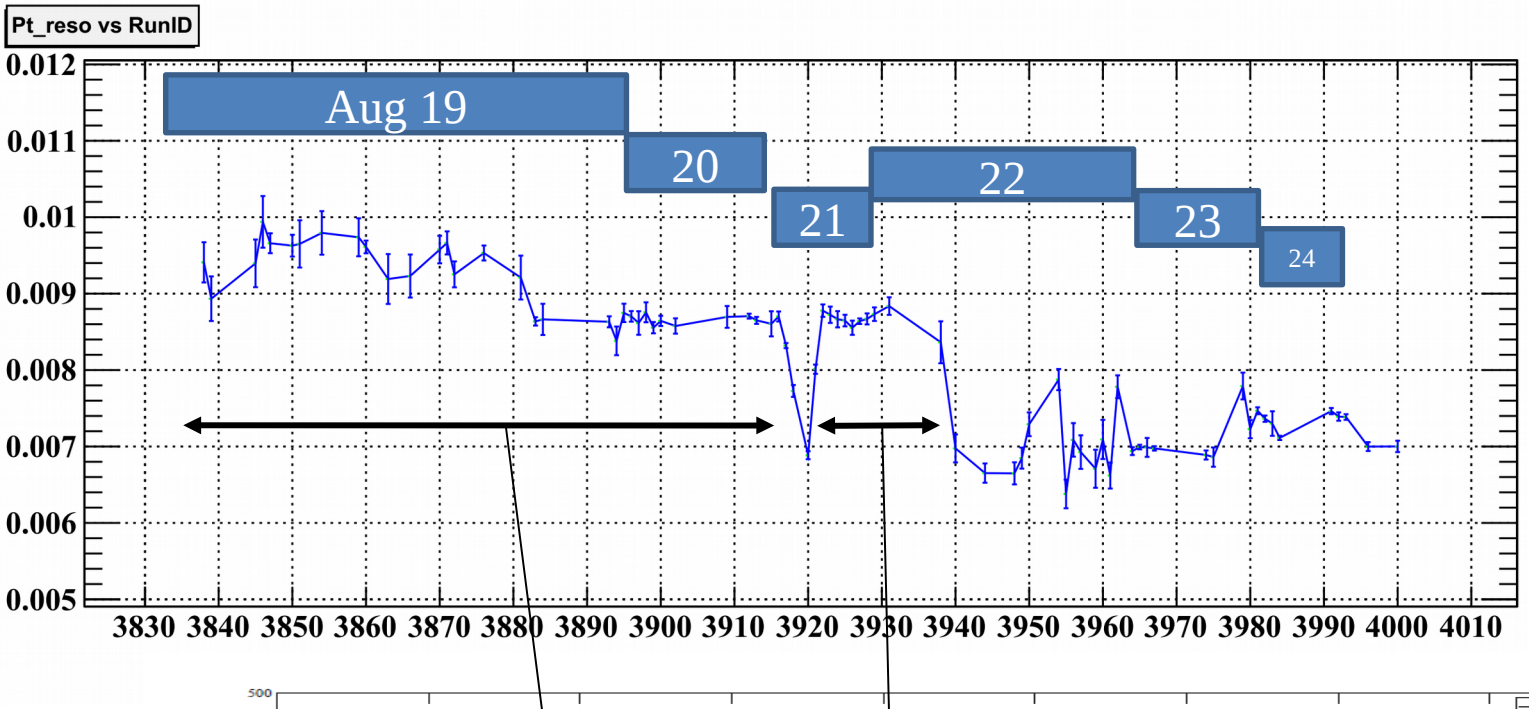
RMS of Δd_0



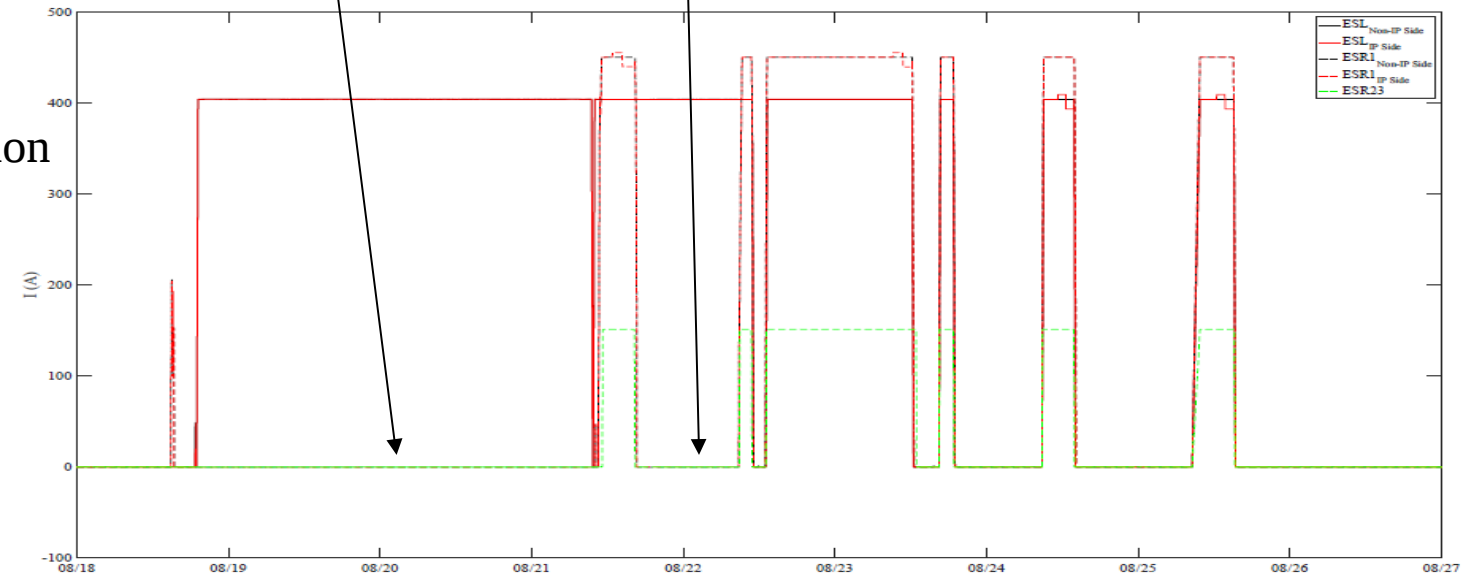
RMS of ΔP_t



- Software build-2017-08-21, global tag (GT266)
- For first half of Aug. runs, ΔP_t looks worse than others



QCS current (Compensation solenoid)



Aug.18

Aug.27

Track matching efficiency in ECL

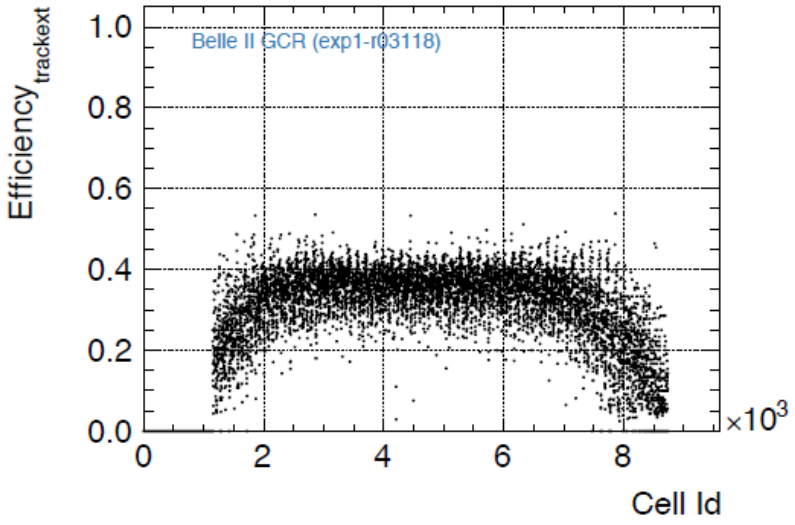
August 23rd 2017

Torben Ferber (ferber@physics.ubc.ca)

Track matching

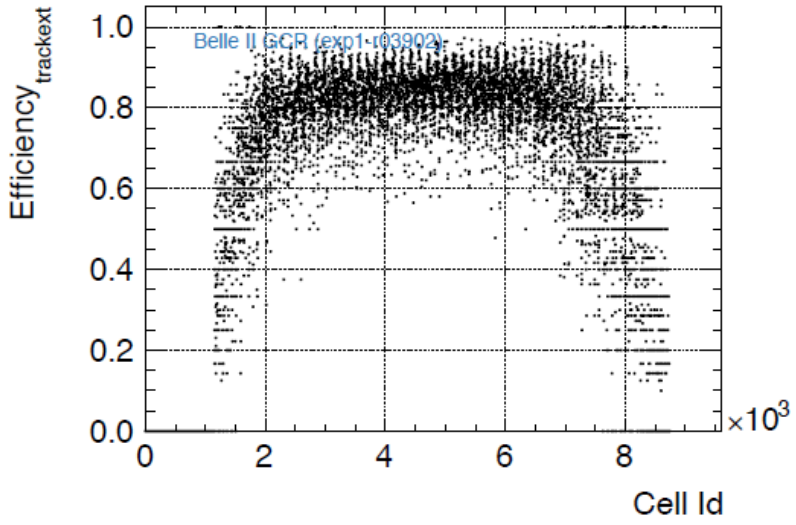
r03118

July



r03902

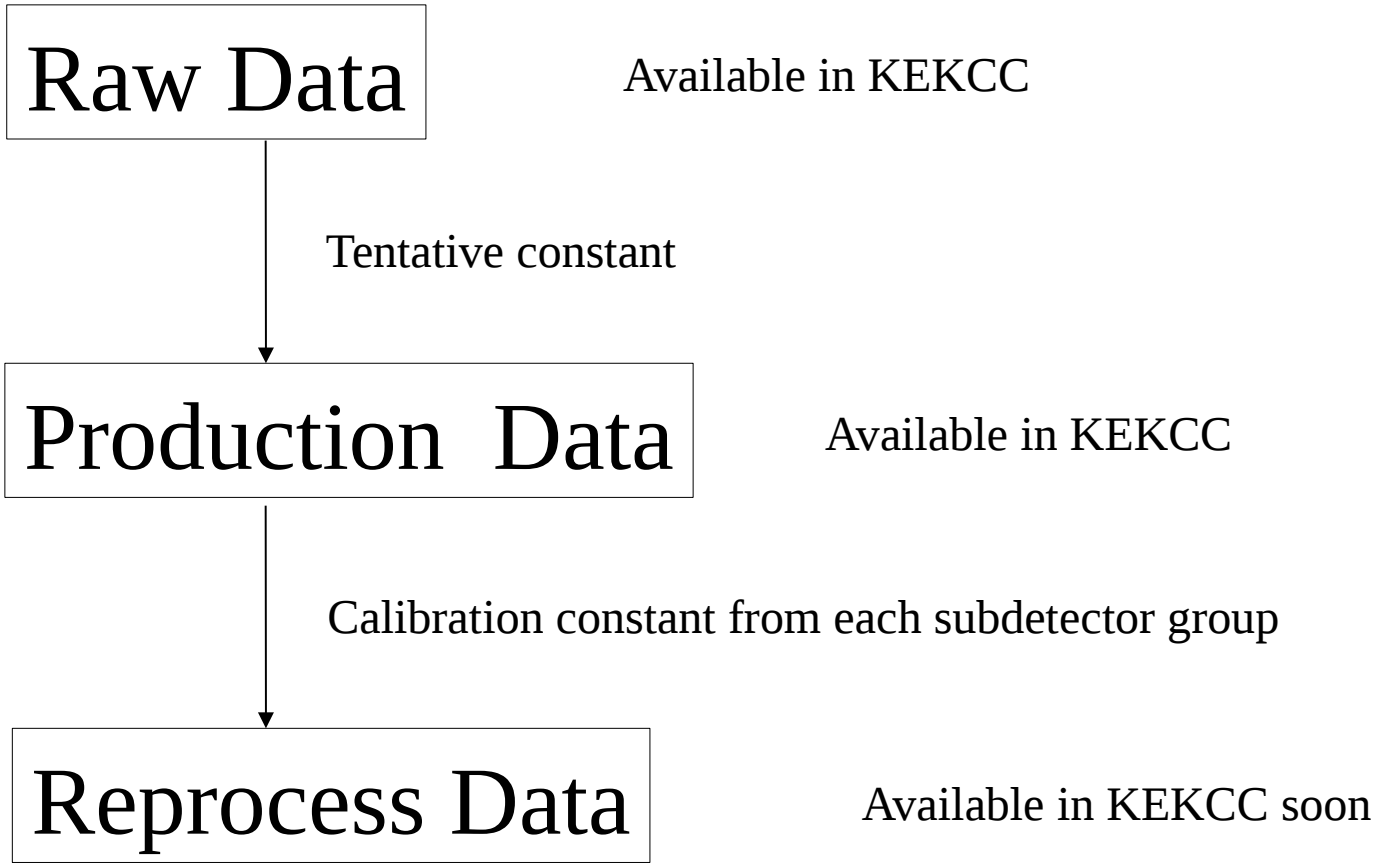
August



After timing adjustment
New firmware in DSP module

Data

Please look Karim's slides in data production session.



Please look data carefully.
It is important for the phase -II preparation.

Before Phase-2

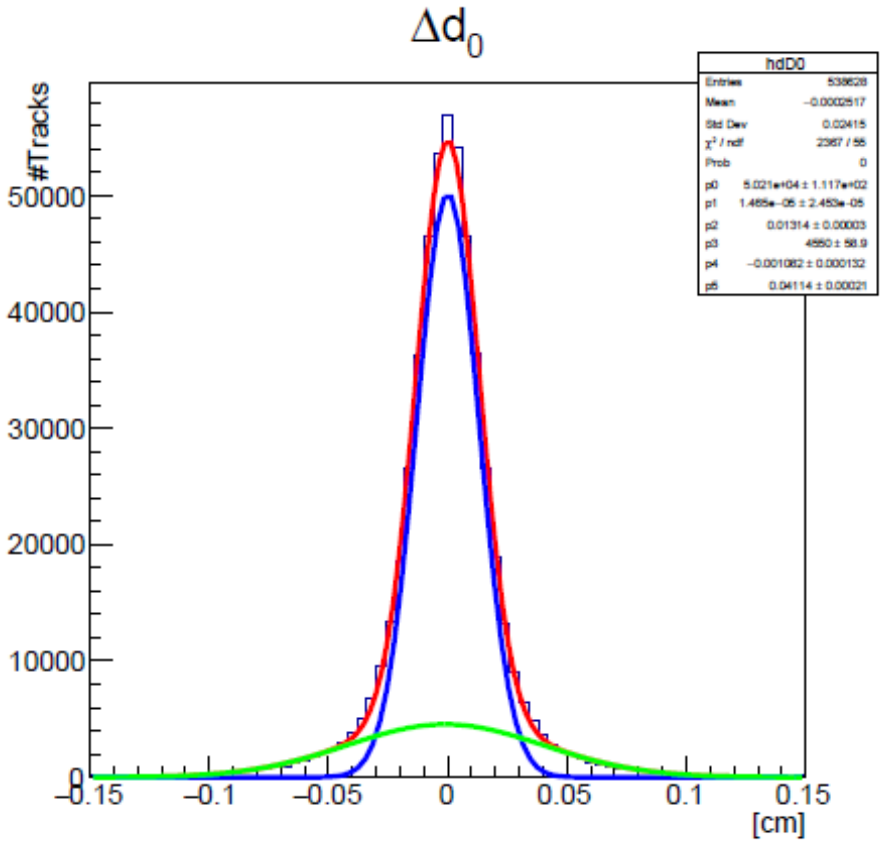
- Oct. of 2017 - Jan. of 2018
  - Debugging mode for each subdetector
    - Belle solenoid field can not be excited.
    - Subdetector groups may take some data time to time.
    - One scintillator will be installed inside CDC in next week.
      - It is available until the BEAST-II installation.
    - No official GCR is planed.
      - If you have a request, please let me know.
- Next global cosmic run (GCR) will be done in Feb. for around two weeks.
  - CDC+ECL+TOP+KLM+ARICH+ Partial VTX
    - Real 2D charged trigger + ECL neutral trigger
    - Random trigger (up to 30kHz)

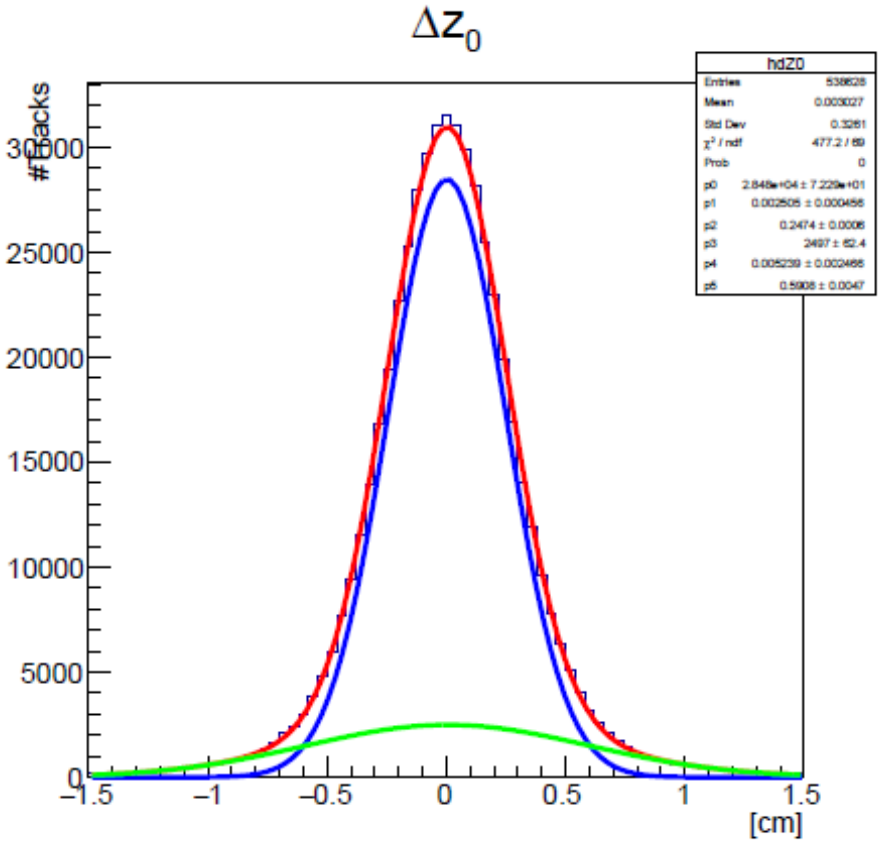
Phase-2

- Middle of Feb. – Middle of July (or more), 2018
- First four months
  - Mainly, accelerator tuning
    - You will take experimental shifts?
  - But, we want to take some data time to time.
    - Not so much.
    - Beam energy : Y(4S)
    - Schedule is not decided.
      - First collision may happen in middle of April.
- Last one (and half ?) months
  - Basically, luminosity run
  - Continuous data taking
  - Beam energy :Y(6S)???

Backup

Performance check





Resolutions are consistent with the simulation for comic ray.

GDL Setup for GCRT

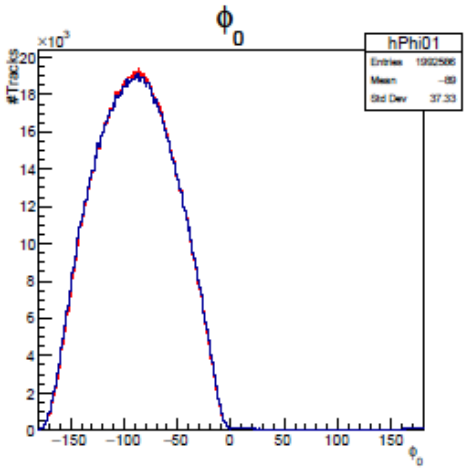
	Logic	Timing
July (3 - 25)	TSF2b2b && ecl_timing	ecl_timing
August (18 -)	TSF2Single && ecl_timing	ecl_timing

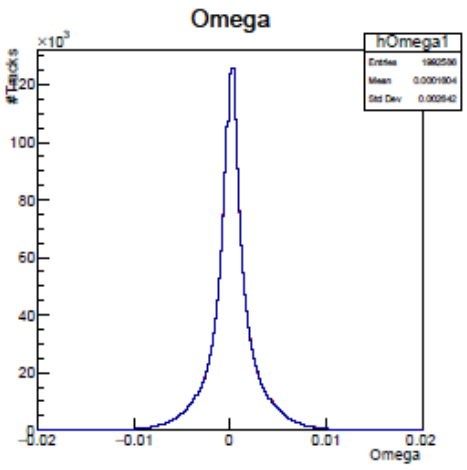
Rates

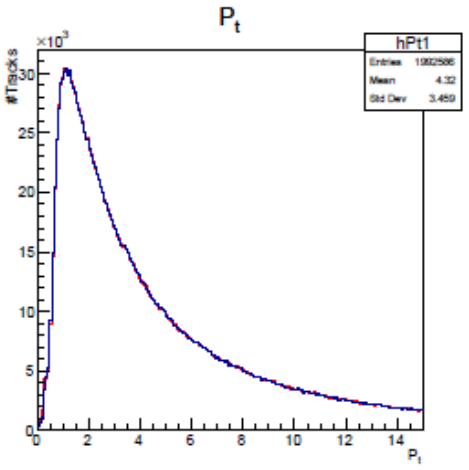
ecl_timing	~1 kHz
TSF2 b2b	20 - 30 Hz
TSF2 Single	400 - 500 Hz
ecl_timing && TSF2b2b	7 - 10 Hz
ecl_timing && TSF2Single	70 - 80 Hz (50 - 60 Hz for KLM)

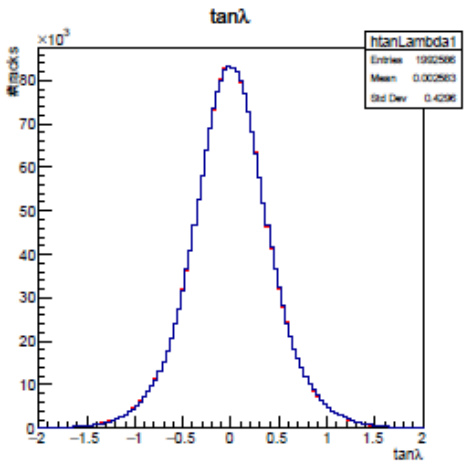
Dong Van Thanh

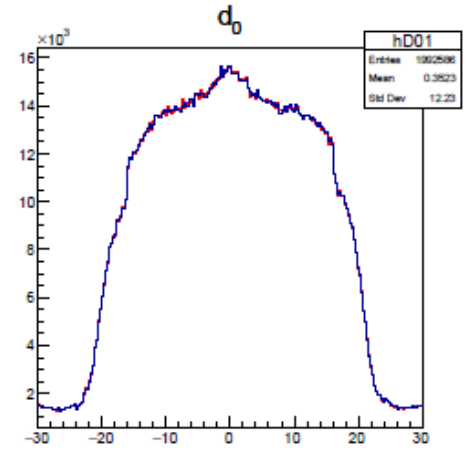
August run

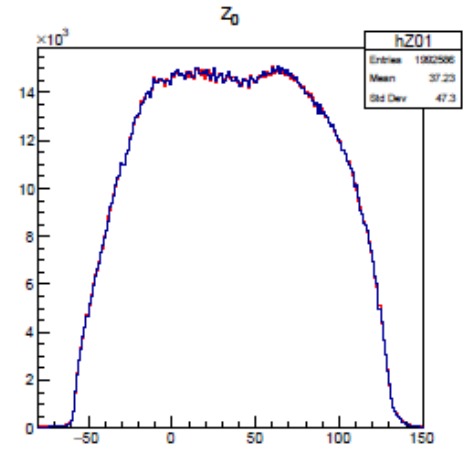








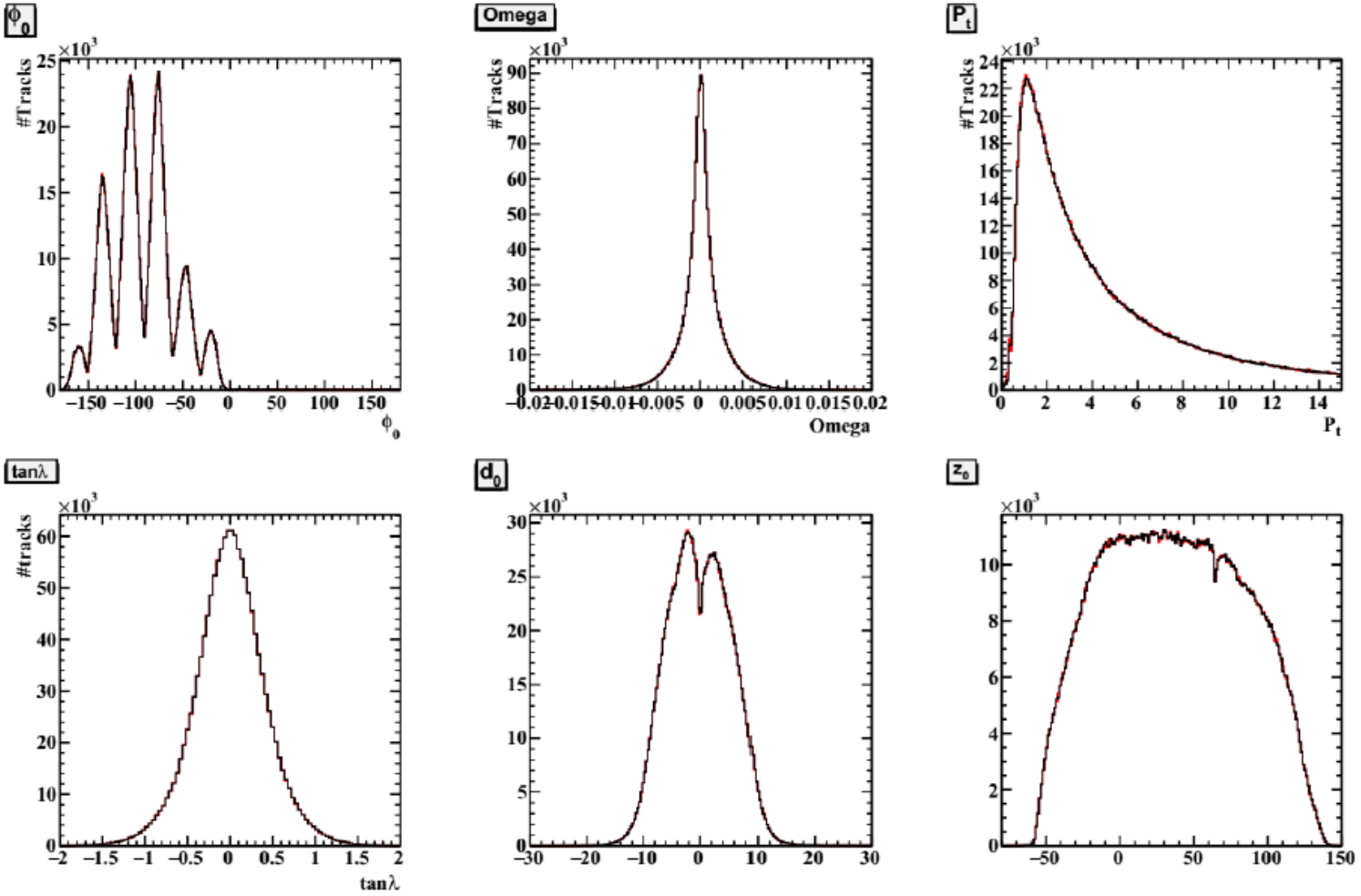




Dong Van Thanh

July Run

- Reject events which are opposite direction at perigee point



Performance study (d_0,z0,Pt,ϕ_0,tanλ resolution), long tracks around IP region are selected: Ndf>25 && $|d_0|$<5 && $|z_0|$<1;

Timing Shift Problem

- Timing Shift after
  - GDL firmware update
  - ECL work
  - Shutdown
- Checked with CDC fastest hit
- Partly due to broken GDL firmware
- Other reason unknown
- Timing Monitor Introduced
  - Off-line analysis of GDL b2l data
  - Will be include in DQM

CDC fastest hit distribution