

# GRL

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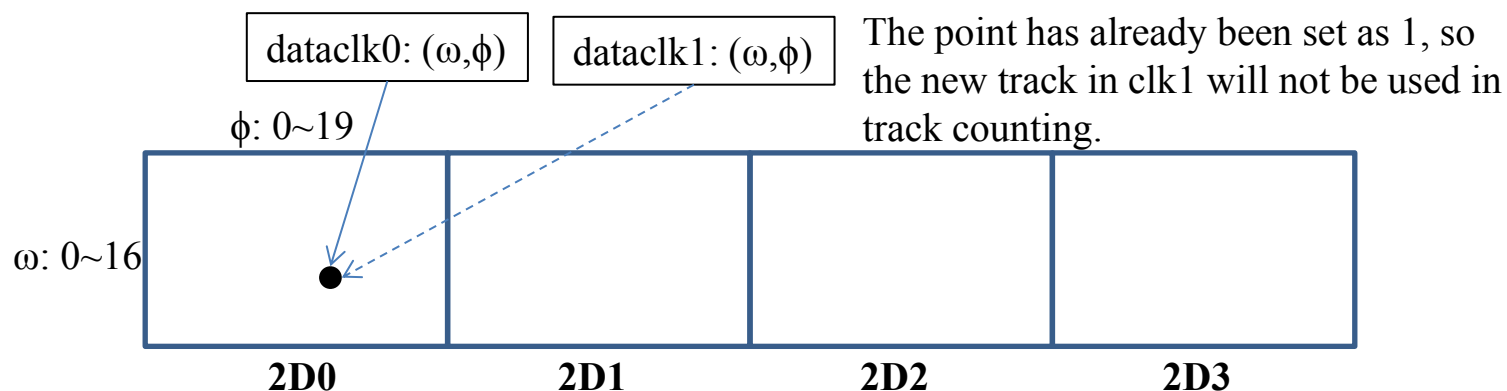
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- GRL receives detailed information of physics objects (track, cluster...) for reconstruction, and also provides summary information to GDL.
- Master of CDCTRG: inputs from TSF, 2D, 3D, and NN.
  - Track counting for 2D, 3D, NN (z0 cut).
  - **Short tracking.**
  - **Track counting reduction.**
  - **CDCTRG event timing from 2D/NN.**
  - b2b between 2 tracks, opening angle.
  - CDCTRG flow control.
- Matching between the CDC 2D track and outer detector hit in barrel.
  - CDC-ECL (cluster position and energy)
  - CDC-KLM (KLM sector ID).
  - CDC-TOP (TOP slot ID).
  - b2b between 1trk-1cluster and 2 clusters, samehem, opphem.

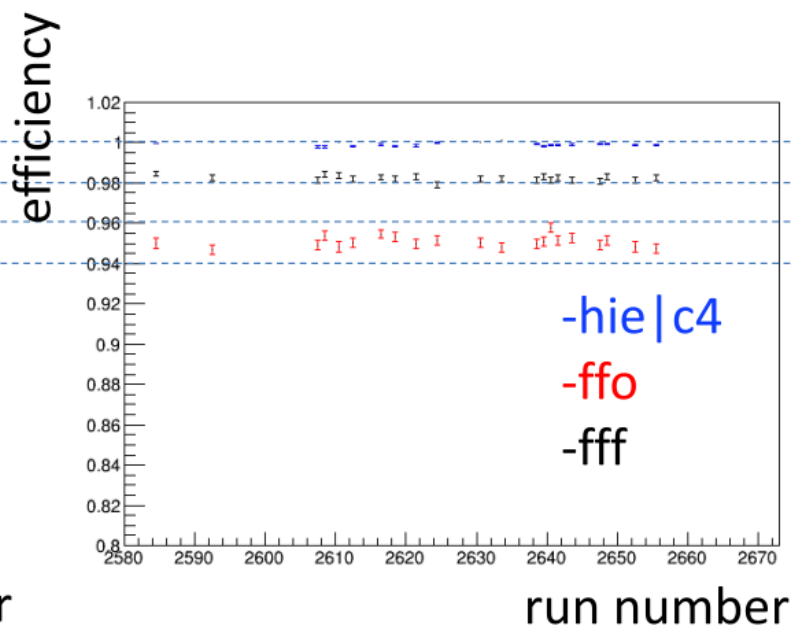
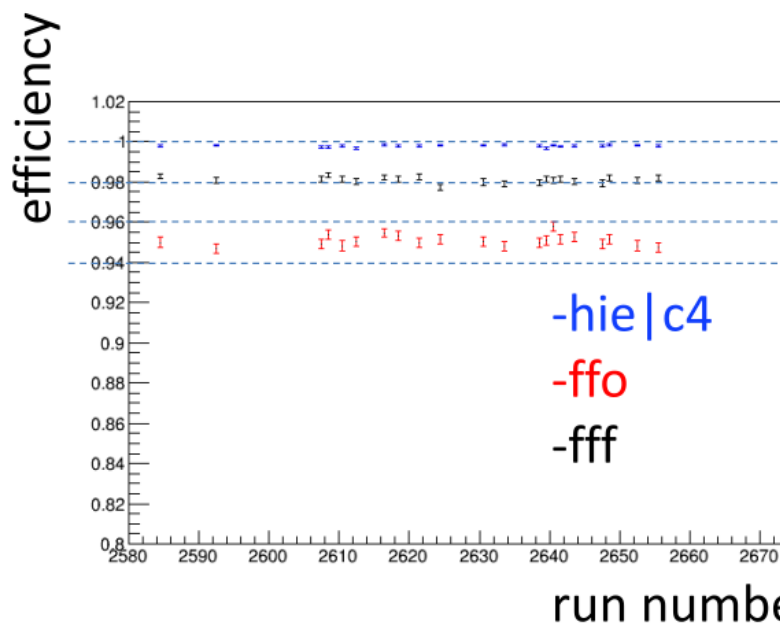
# Track counting reduction in GRL: a

- One reason of high fff rate: clone 2D tracks with similar value of  $\omega$  and  $\phi$ .
- To suppress the clone track by comparing the  $\omega$  and  $\phi$ , those information have to be kept.  $\rightarrow$  A  $\omega$  and  $\phi$  2D map is used in GRL to persist the information.
- $\omega$ : -33 ~ 33,  $\phi$ : 0~79.
  - A 17\*20\*4 map is used for now. Mesh size: 2\*2. (2 bits in LSB are ignored.)
  - Even larger mesh size is worth trying:  
[https://confluence.desy.de/download/attachments/98077342/koga\\_reducedtrack\\_2019\\_7\\_11.pdf?version=2&modificationDate=1565161472524&api=v2](https://confluence.desy.de/download/attachments/98077342/koga_reducedtrack_2019_7_11.pdf?version=2&modificationDate=1565161472524&api=v2)

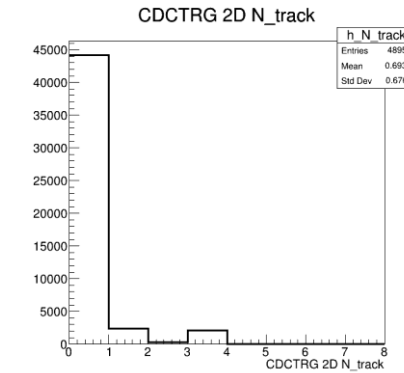
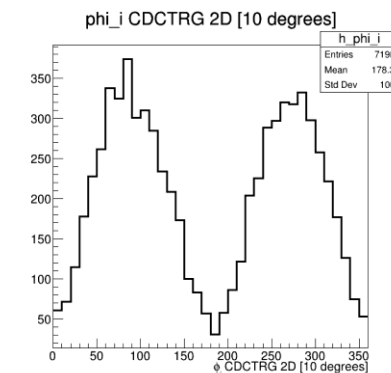
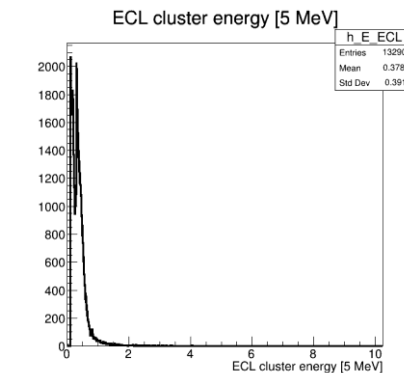
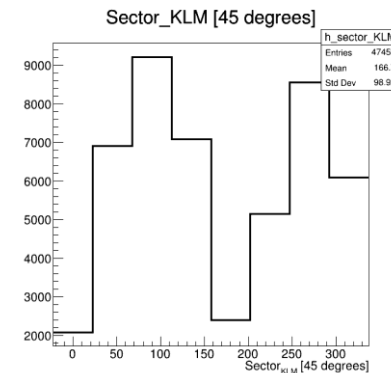
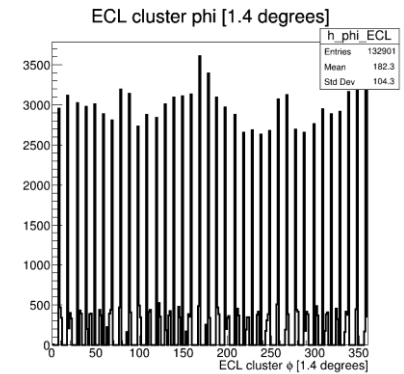
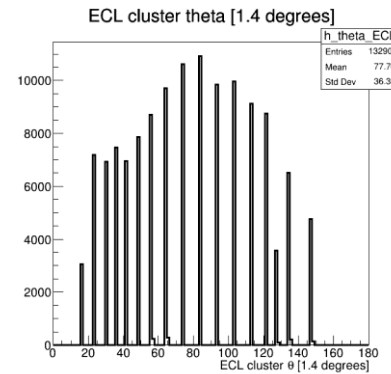
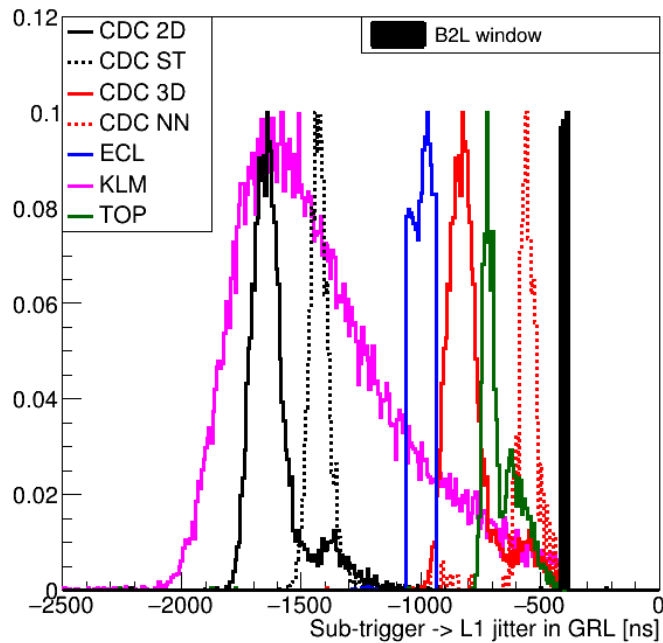


# Track counting reduction in GRL: a (cont'd)

- Compared with fff, aaa rate is reduced by 20%.
- eff check for a/f:
  - Done for both dimuon skim and hadronic skim
  - fff/aaa eff. for hadronic skim:



- Jitter (latency difference) between each sub-trigger inputs.
- Angular distributions.
- Has been online from this release.



# Summary & To do

- GRL DQM is online.
- Track counting reduction:
  - Mesh size  $2*2$ : aaa eff in hadronic events looks good. L1 rate is reduced by 20%.
  - try larger mesh size ( $4*4$ ) in the next beam run.
- 2D (NN)  $t_0$ : to be tested soon.
- 3D/NN track counting: using lemo/LVDS?
- Short tracking:
  - Performance study with the next beam run and CDCFE cross-talk reduction.
  - Extrapolation & matching with endcap ECL and KLM.
  - Define trigger bits.
  - Associated eff study for low-multiplicity events.