

GRL

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Belle II TRG/DAQ workshop 2019

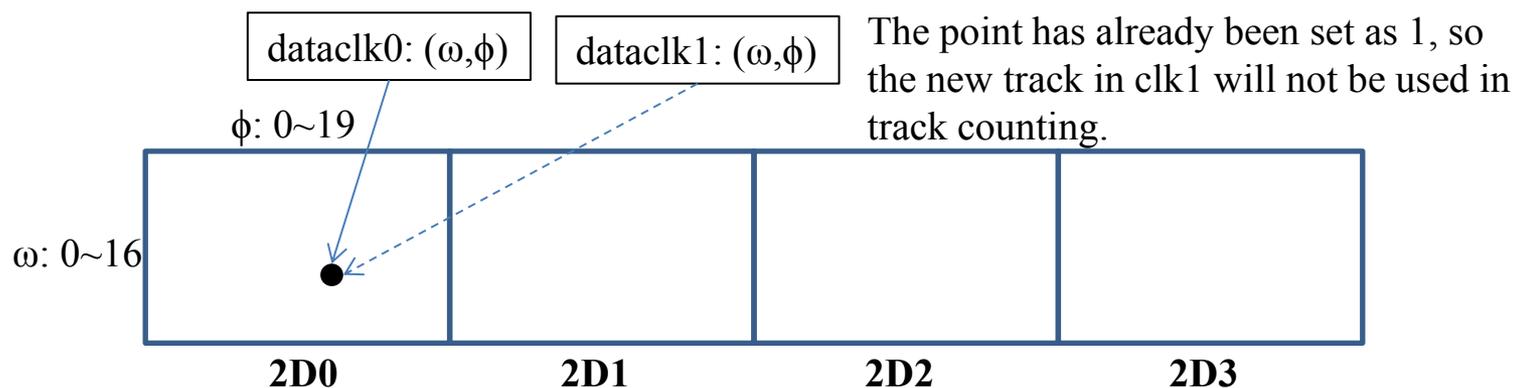
August 28, 2019



- 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 1 trk-1 cluster and 2 clusters, samehem, opphem.

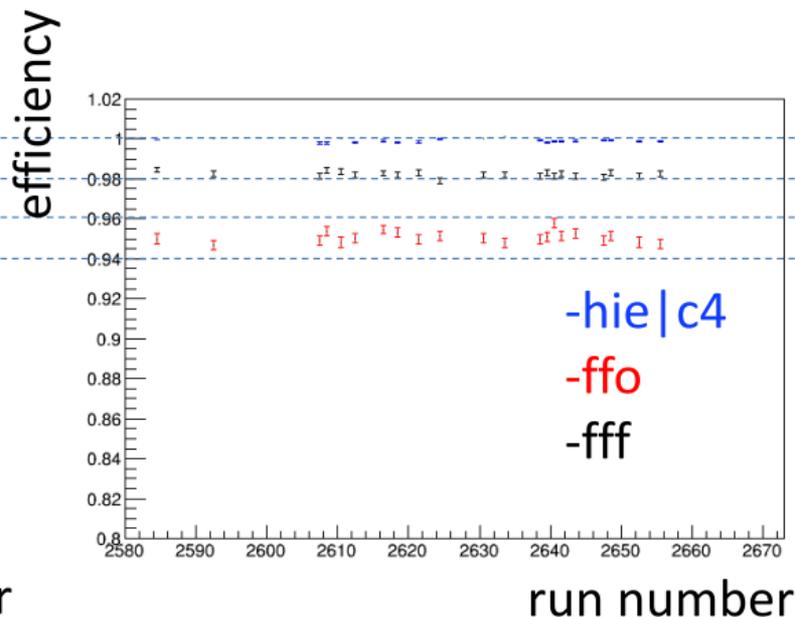
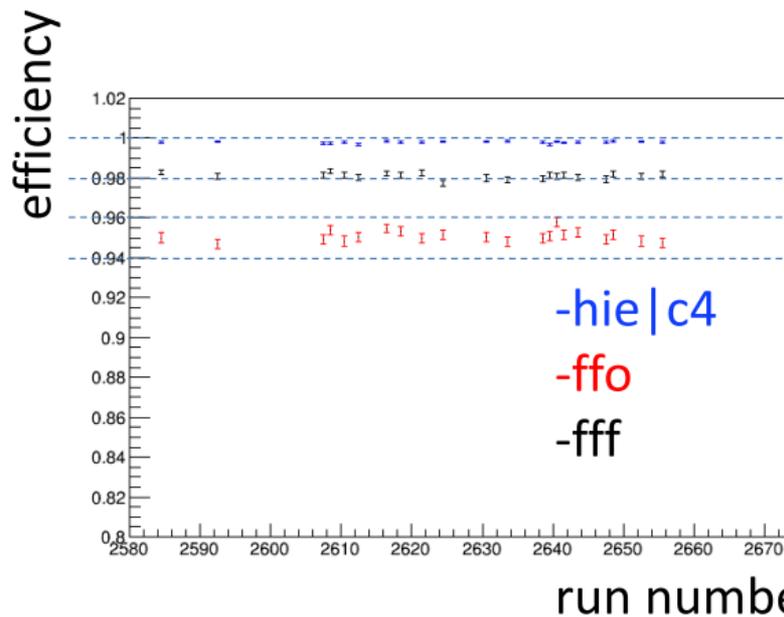
Track counting reduction in GRL: a

- One reason of high fff rate: clone 2D tracks with similar value of ω and ϕ .
- To suppress the clone track by comparing the ω and ϕ , those information have to be kept. \rightarrow A ω and ϕ 2D map is used in GRL to persist the information.
- ω : -33 ~ 33, ϕ : 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

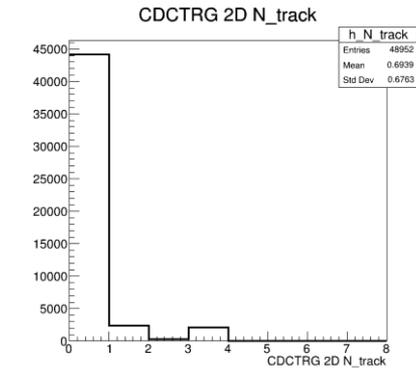
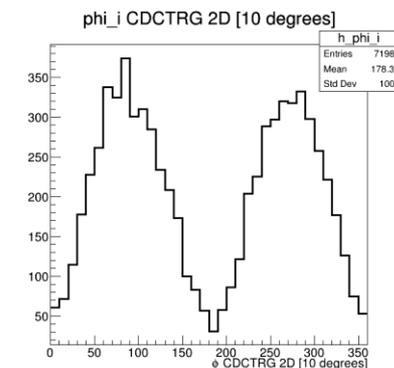
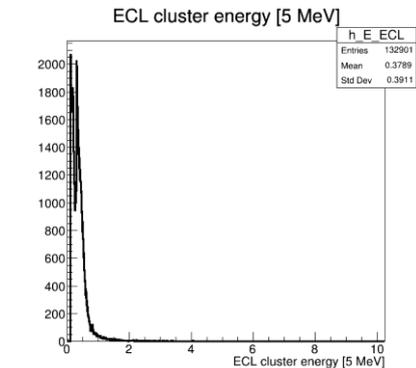
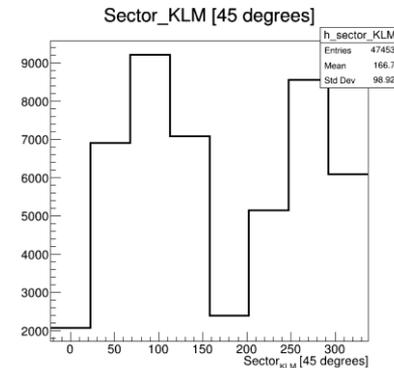
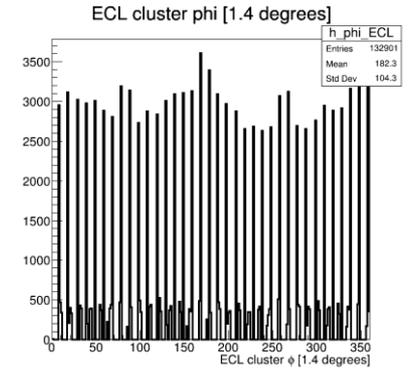
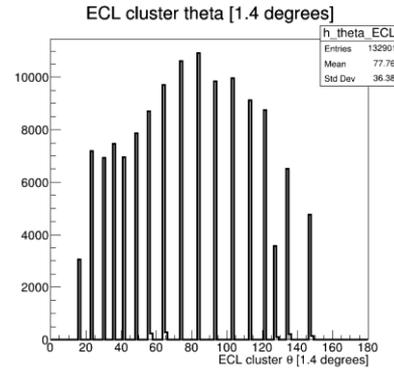
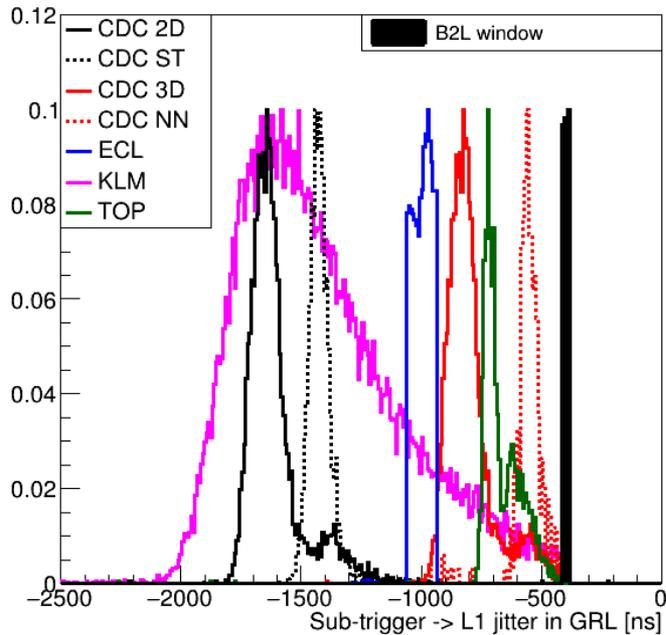


Track counting reduction in GRL: a (cont'd)

- 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) t0: 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.