CDCTRG Summary

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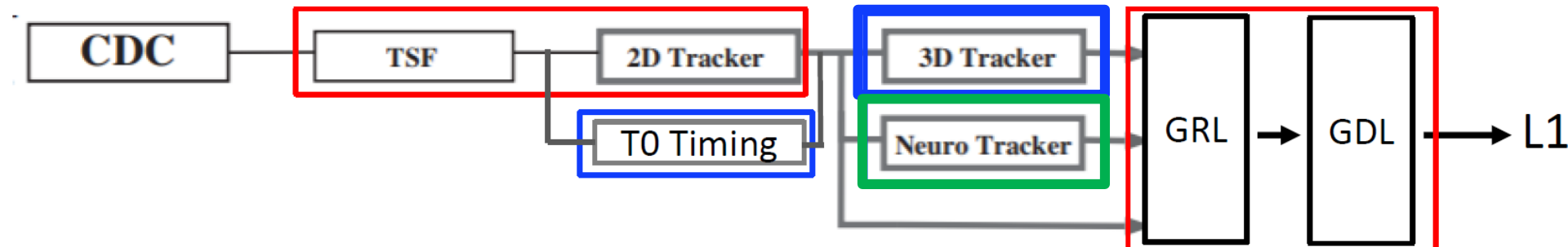- -3D Neuro
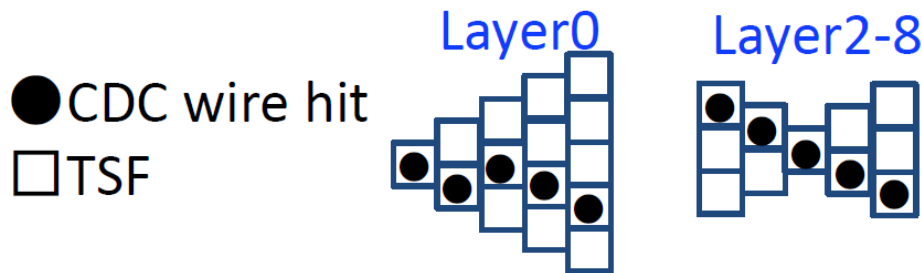- -3D conventional
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CDCTRG status in 2019

-Red: working in 2019 spring   -Blue: not ready in 2019
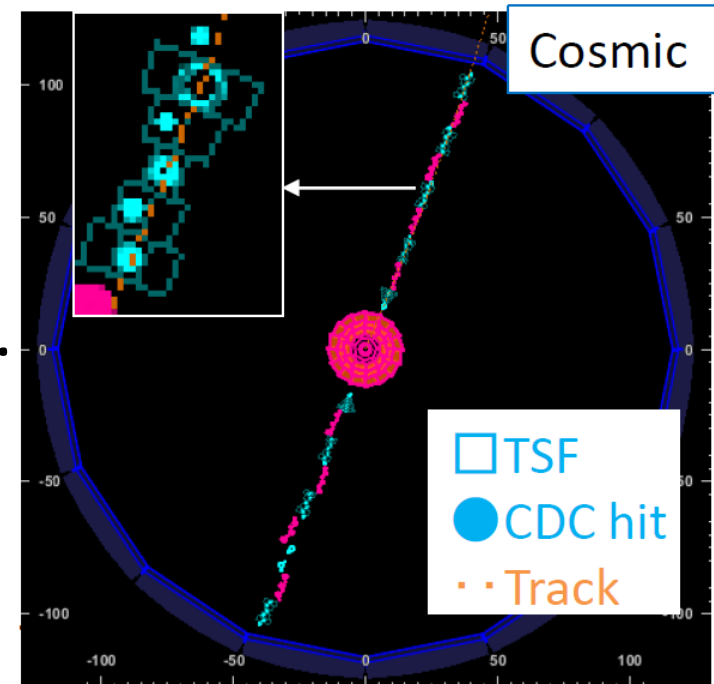
-Green: will be used in 2019 Autumn

-TSF:find cluster of CDC hits (TS) in each SL

-2D tracker: find 2D track with axial TS. hough transfer.

-3D: find 3D track with 2D track and stereo TS.

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Frontend

-2019 Spring

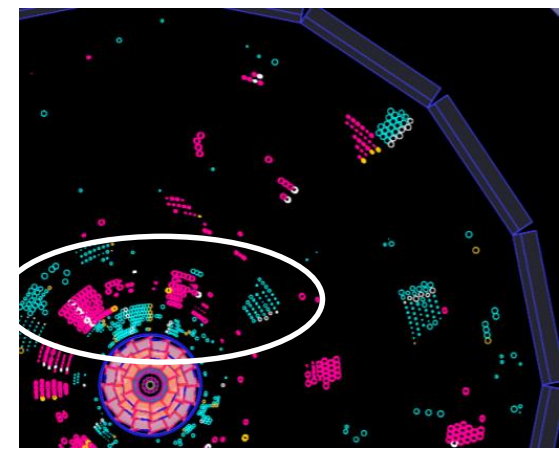-No crosstalk noise cut on FE. High trigger rate.

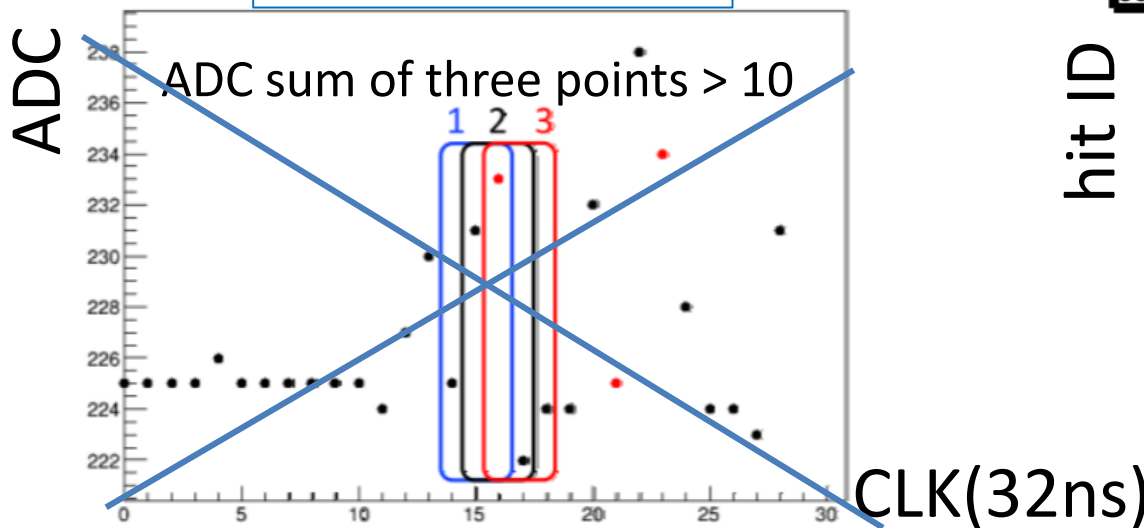**-2019 Autumn**

-Tryed to introduce ADC cut

-> gave up due to large latency (~250ns of AD convertion)

-Another idea is proposed to use TDC: If mulitiple hits on a ASIC have the same TDC value, the hits are vetoed on FE.
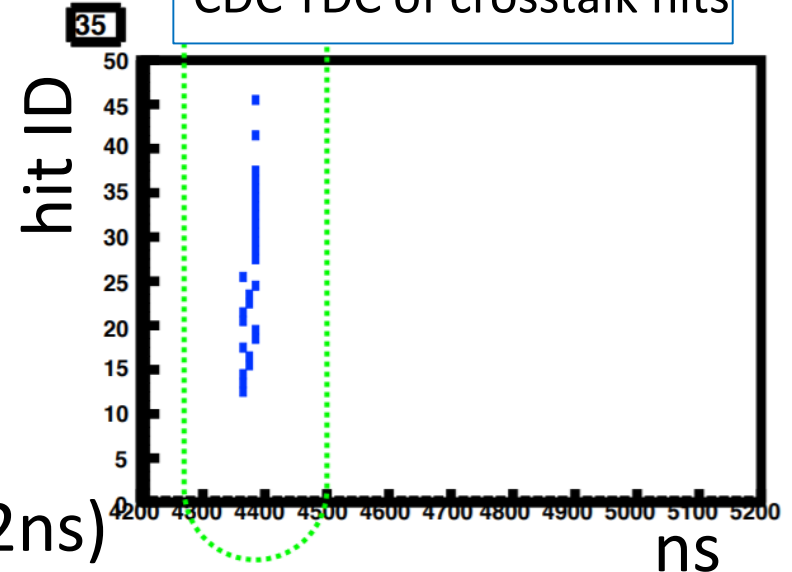
-> feasibility study will be done soon after coming back Japan

CDC ADC waveform

ADC sum of three points > 10

ADC

1 2 3

CLK(32ns)

CDC TDC of crosstalk hits

35

hit ID

ns

4

TSF(track segment finder)

-2019 Spring

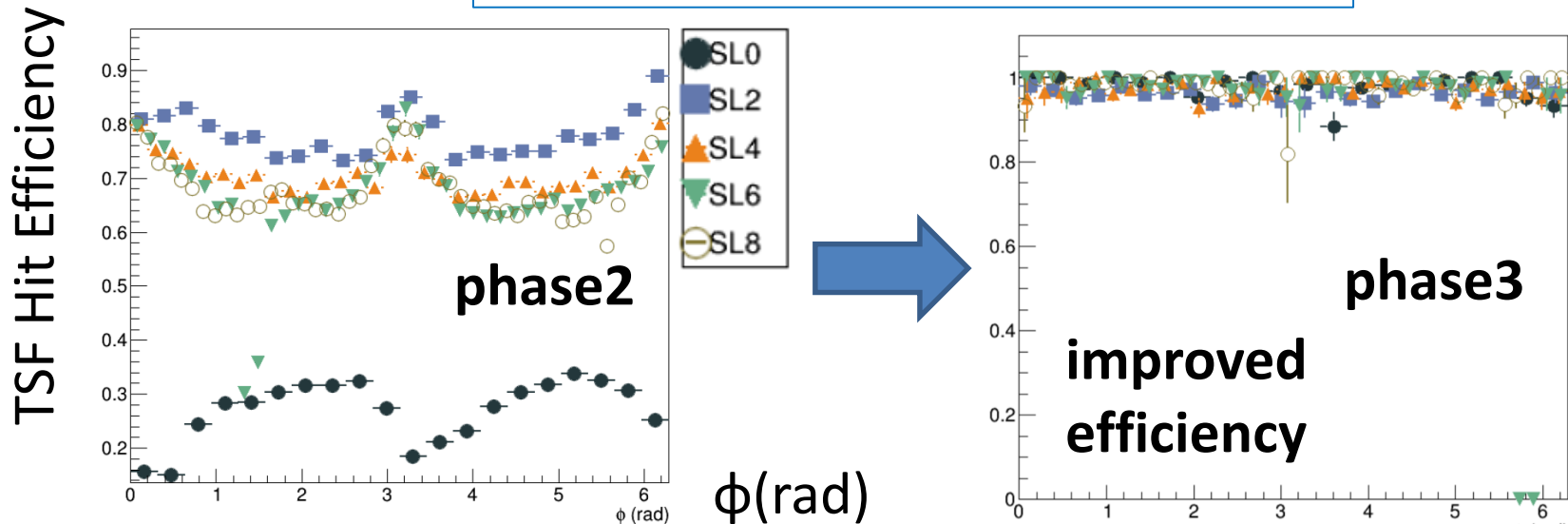 -Efficiecy is improved: state-machine firmware, bad channel fixing

-2019 Autumn

  -Increase maximum number of TS/SL/CLK from 10 to 15

    -to improve deadtime and efficiency with multi track and high noise

    -firmware is being tested, will be ready in September.

TSF hit efficiency compared with CDC hit

phase2

phase3

improved efficiency

TSF Hit Efficiency

φ(rad)

2D tracker

-2019 Spring

  -No change of 2D firmware itself

  -Efficiecy is improved due to TSF modification

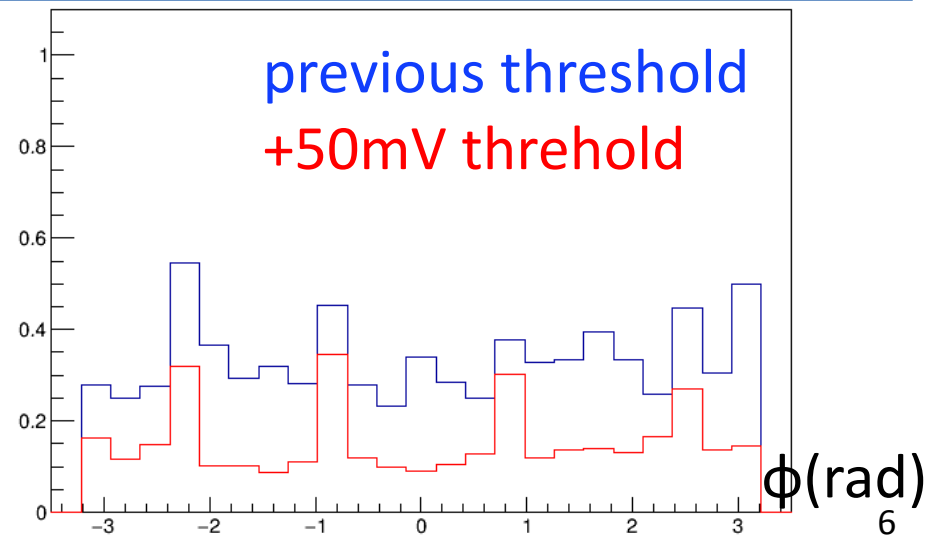 -Fake track rate is improved by increasing CDC TDC threshold +50mV

-2019 Autumn

  -Increase maximum number of TS/SL/CLK from 10 to 15

  -Provide CDC timing for L1 decision (next page)

2D efficiency with Dimuon skim

-#2D track >=1
-#2D track >=2
-#2D track >=3

Phase2   Phase3   #Run
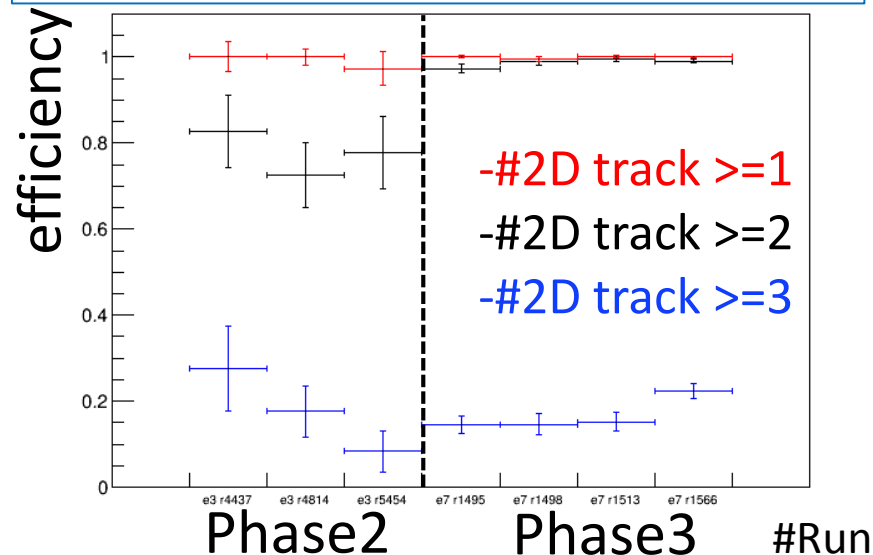
2D trigger track overcounting rate

previous threshold
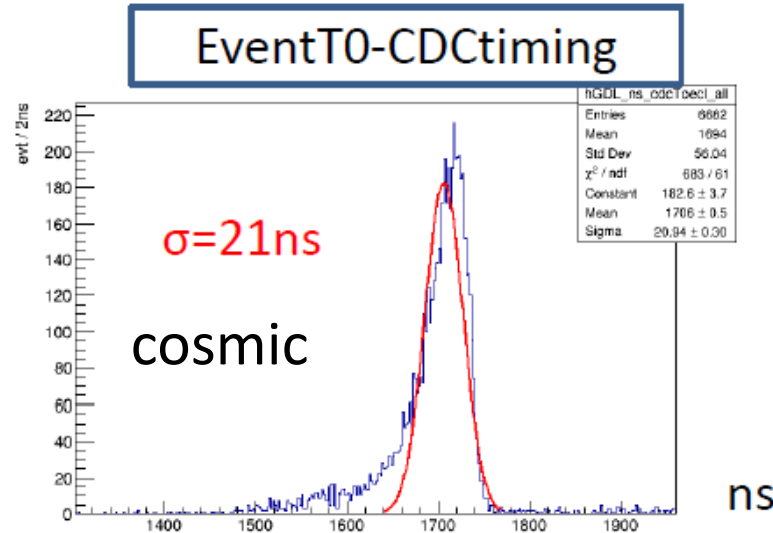+50mV threshold

ϕ(rad)

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ETF (Event timing finder)

-2019 Spring

  -Not working due to beamBG and noise. Not used for data taking.

  -No track information. Difficulty to reject noise.

-2019 Autumn

  -Newly provide CDCtiming from 2D module. (ETF is not used.)

   -fastest priority timing among 2D tracked TSF

  -Data will be taken with ECL and CDC timing

EventT0-CDCtiming

hGDL_ns_cdcToecl_all	
Entries	6662
Mean	1694
Std Dev	56.04
χ² / ndf	683 / 61
Constant	182.6 ± 3.7
Mean	1706 ± 0.5
Sigma	20.94 ± 0.30

σ=21ns

cosmic

ns

-2020

  -Modify ETF to use 2D track information with the fastest timing

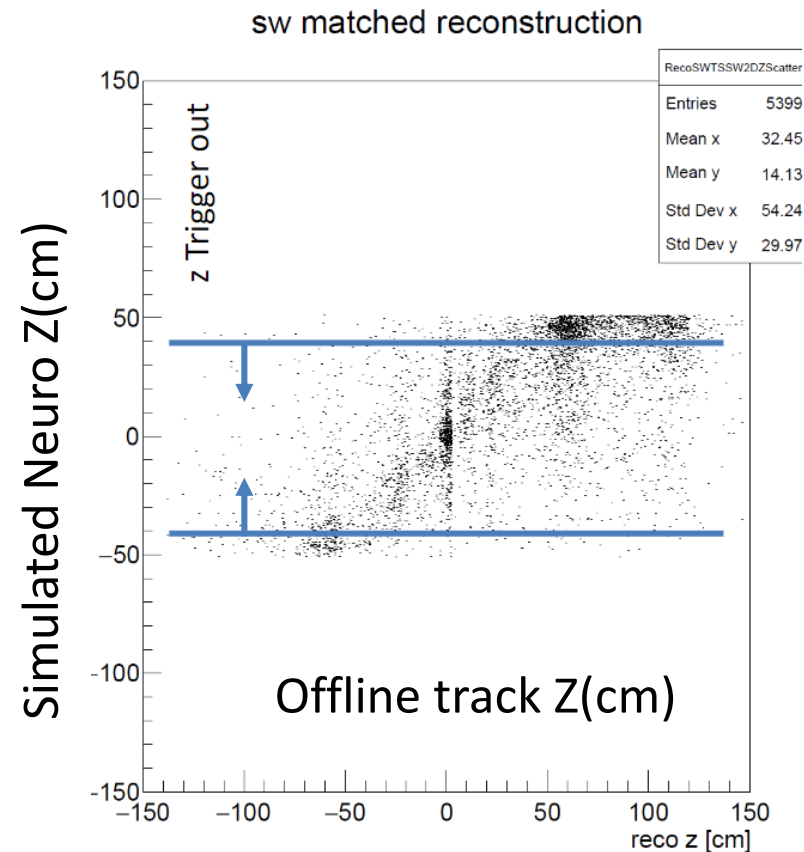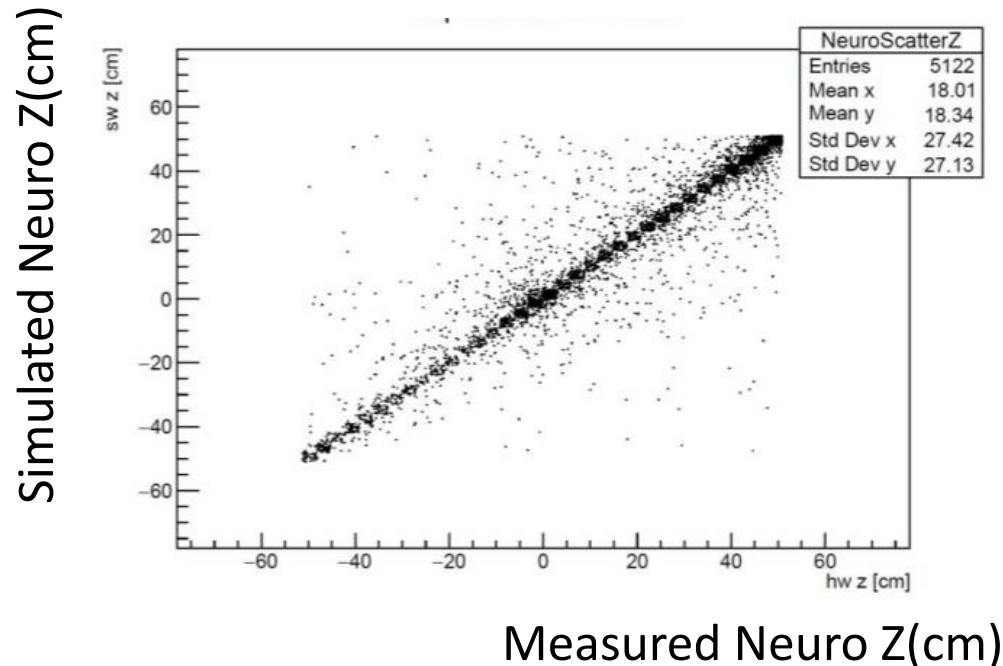 -Expected resolution is <10ns (?). Feasibility study is on-going.

3D Neuro

-2019 Spring
 -Still debugging stage. Data is collected with beam and cosmic.

-2019 Autumn
-Debugging is still on-going: efficiency, hardware/software difference
 should be understood during shutdown

-With <40cm cut, CDCTRG rate < ~1/5.
 ffz will be used first.

Simulated Neuro Z(cm)

Measured Neuro Z(cm)

sw matched reconstruction

Simulated Neuro Z(cm)

Offline track Z(cm)

3D conventional

-2019 Spring
  -Still debugging stage.

-2019 Autumn
  -Still debugging stage..
 Validation of 2D fitter logic (part of 3D) will be done during summer.
  After that, 3D fitter will be validated.
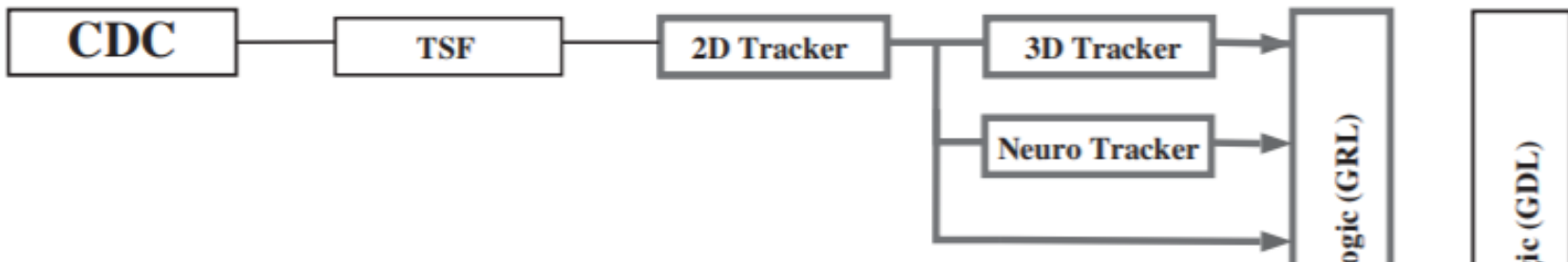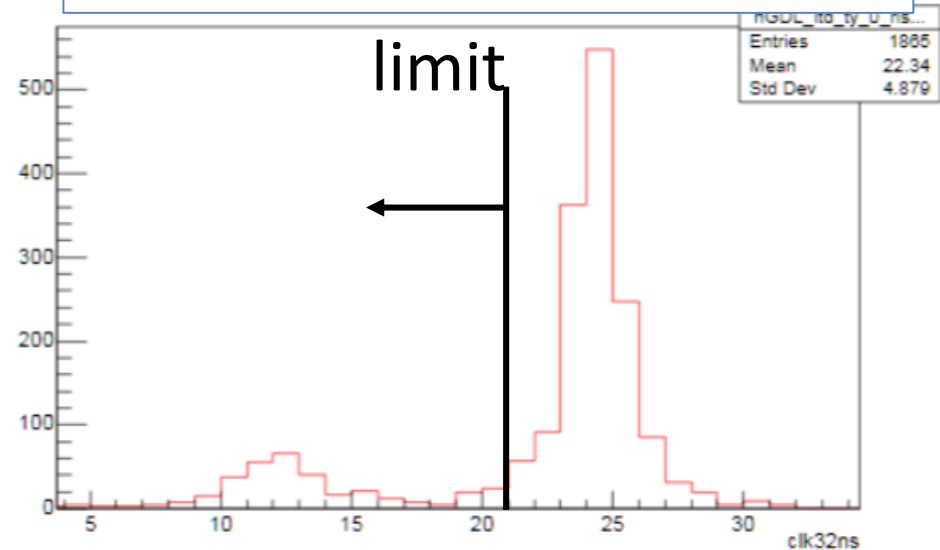 -More time is needed to finish debugging. Not ready in Autumn run.

Latency

-Latency of 2D and 3D are acceptable

-Latency of NN exceed our limit to provide L1

-one of dominant latency is GTH(X) connection between UT3

-we will replace GTH -> LVDS between NN and GRL

3D tracker input timing on GDL
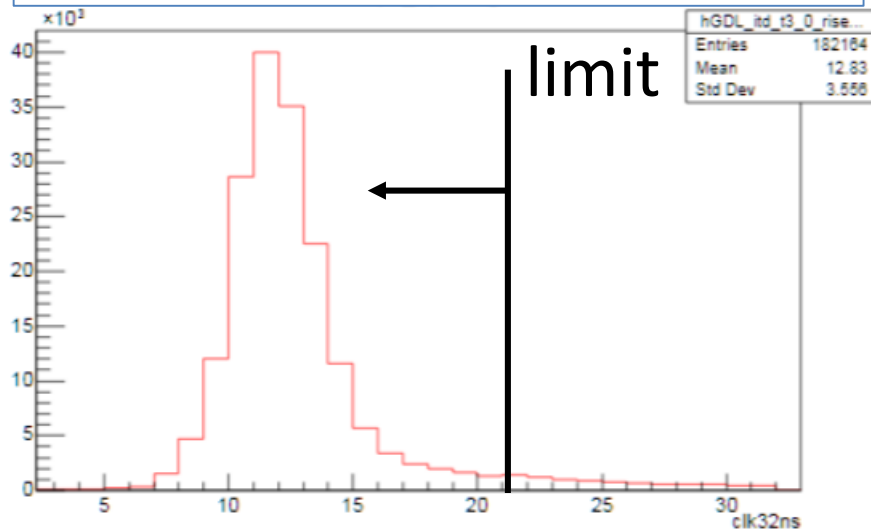
3D NN input timing on GDL

Summary

-Summary of discussed items and status/plan in 2019

   -Frontend: gave up ADC cut. Try to implement TDC cut.

   -TSF: maximum TSF number will increase 10->15

   -2D: provide CDC timing based on tracked hit

   -ETF: large update is planed in 2020.

   -3D Neuro: efficiency, hardware/software difference

                   are being studied.

   -3D conventional: debugging is on-going.

   -Latency: Neuro exceeds latency limit. Try LVDS connection.

Backup