

# Status on ecl trigger

2024/10/02

B2GM

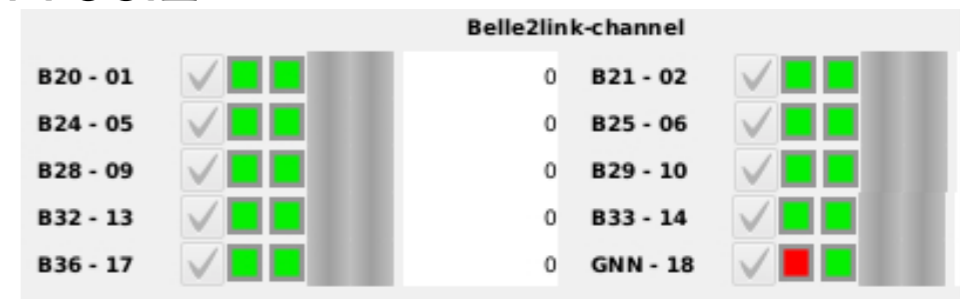
Y.Unno

# ETM

- Newly send N(TC) for FW, BR, BW separately to GDL
  - Will be utilized at GDL for updated injection veto
- Start sending all TC data to GNN-ETM
  - one transceiver(4lines,GTY) with YungTsung protocol
  - counter+revo + 576 x [hit(1)+timing(7), energy(12)]
- Investigation of instability of TMM-ETM link after firmware reboot is (slowly) in progress...

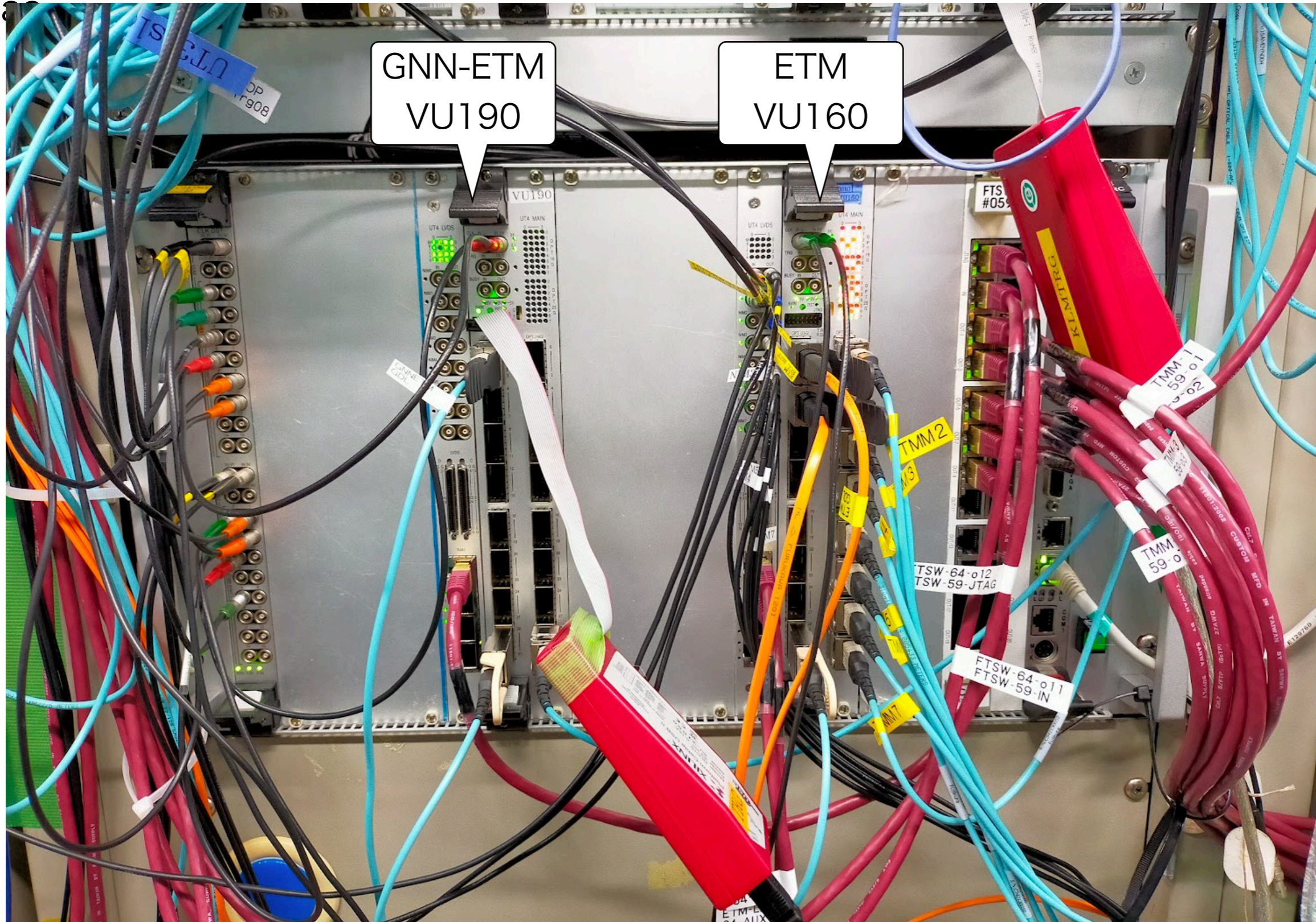
# GNN-ETM

- VU190 installation at ehut done.
  - Cabling (PCIe40, FTSW, GDL, ETM, clock) done
- Simple online software w/ ecltrg library prepared
  - Status check(clk,b2tt,b2l), reboot, mcs load
- Receiving all 576 TC data from ETM w/ one transceiver(4lines,GTY)
- 1st version of GNN-ETM with b2link by Marc
- Test of b2link in progress
  - Thanks to Yamada-san
    - Software update to split ecl and ecltrg data on recl2
    - Update some daq conditionDB files
    - Update and test of ECL run control GUI
  - Thanks to Mikhail
    - Large help and support for several tests and checks
- Never successfully took GNN data yet
- Plan
  - Need more test and study
  - Need to prepare unpacker for GNN-ETM and modify unpacker for ETM



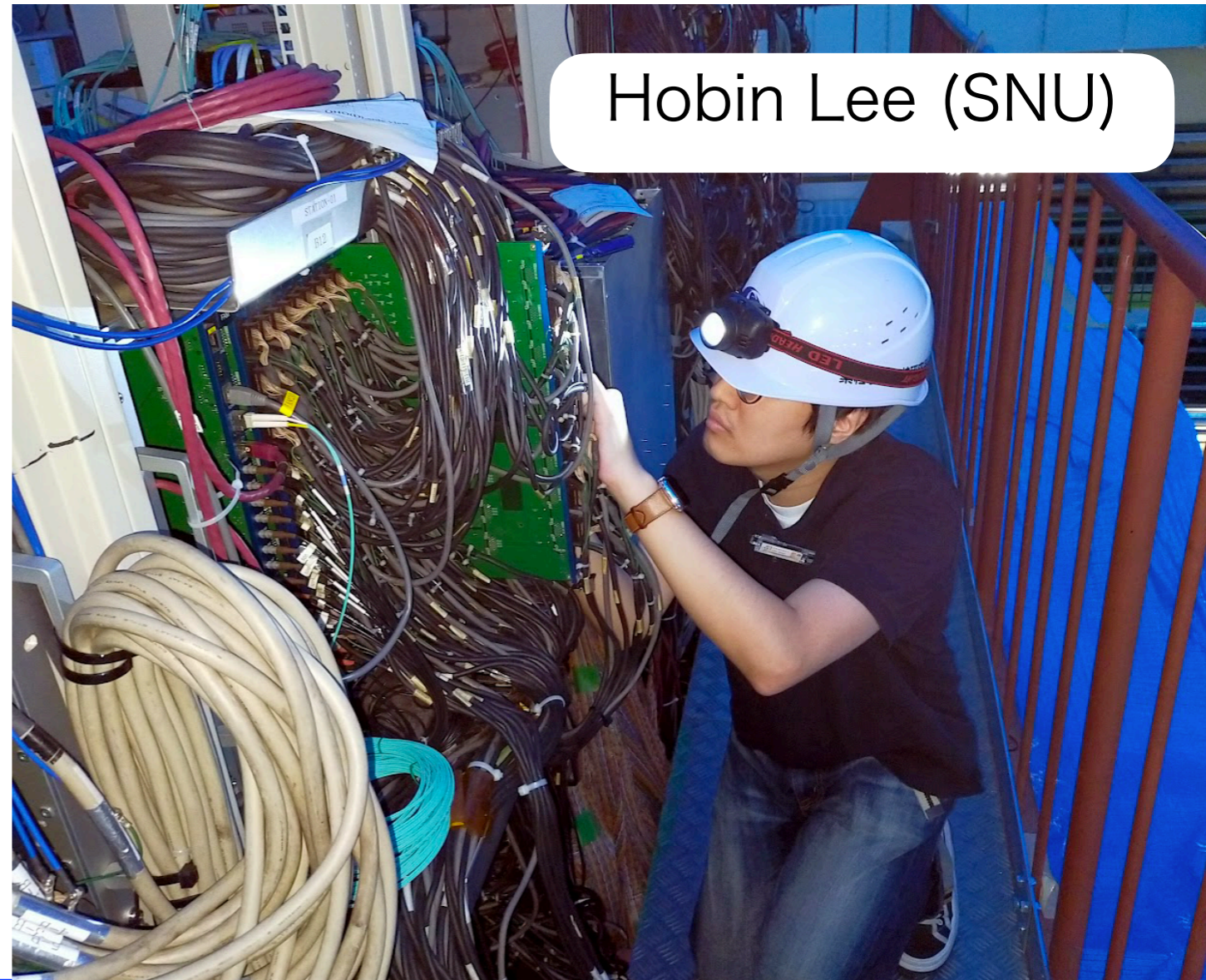
# GNN-ETM in ehut

• App



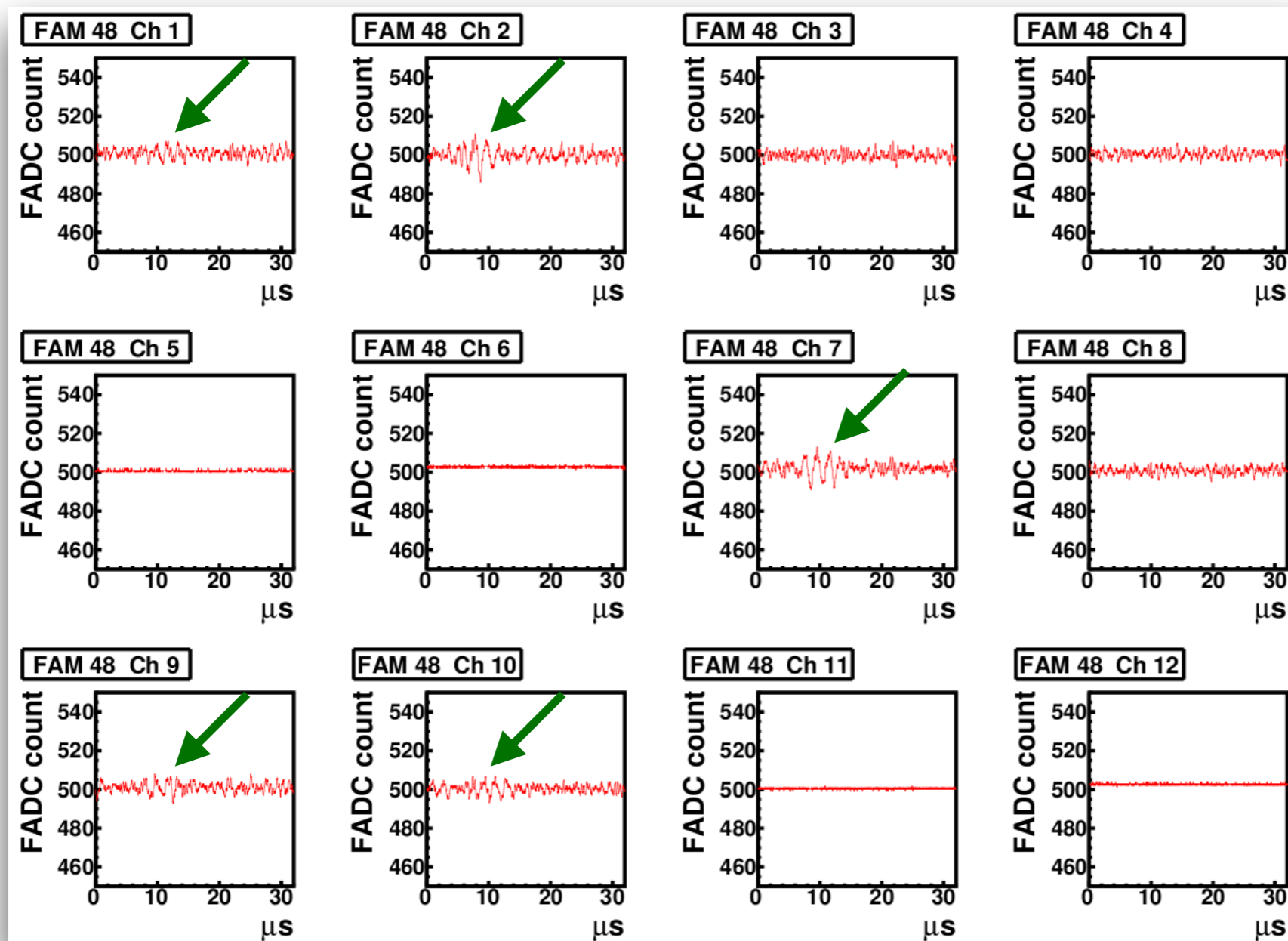
# Energy gain adjustment

- Installed jumper for 4 ch (4 ShaperDSP) to adjust E gain.
  - Gain for 1 ch was too high
  - ECL experts cut off one of two lines for 3 ch during summer
    - Found 3 ch were unstable due to one of two lines
- Attenuator coefficients were adjusted roughly.
- Plan to perform energy calibration with beam data



# Noisy channel

- Some channels became noisy
  - Normal TC hit rate for cosmic is 10Hz, but >1000Hz sometimes
  - Noisy channels are all in endcap, and noise level is changing...
  - Example waveform

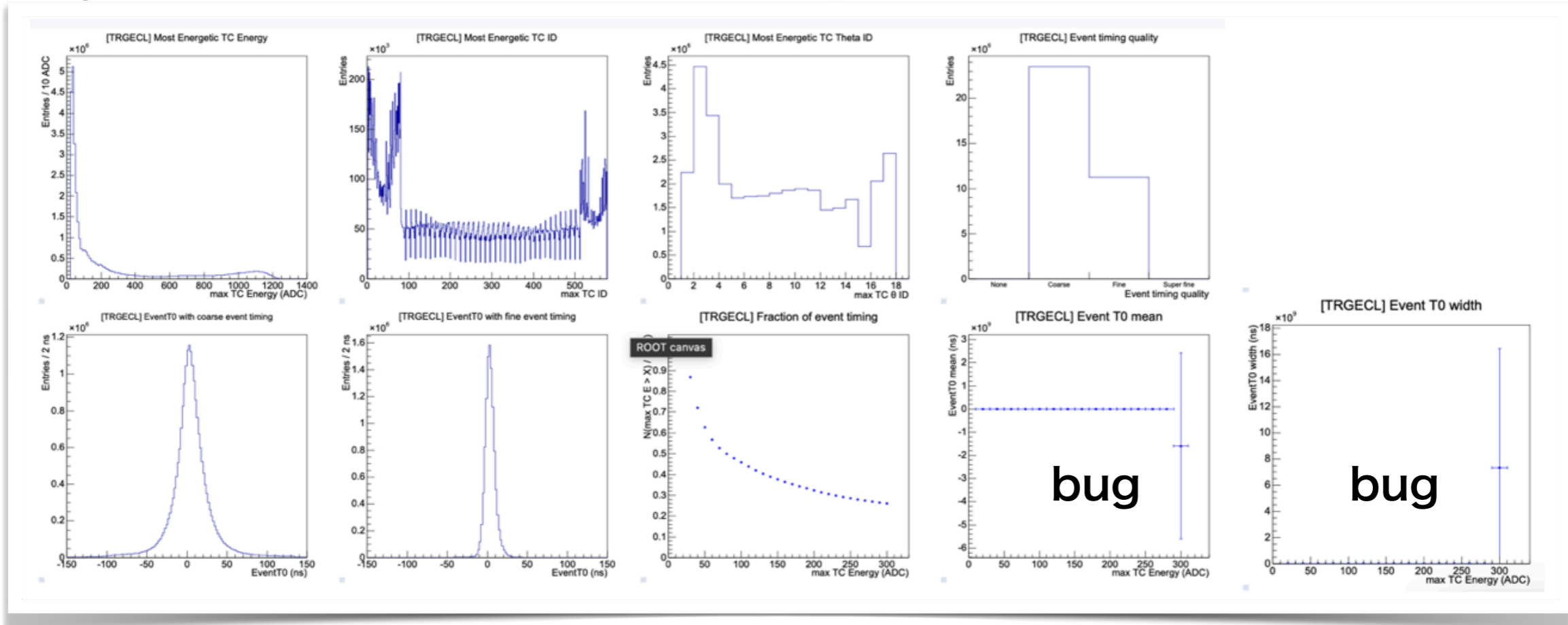


# Noisy channel

- At detector, with Hobin Lee(SNU), some checks were done.
  - Confirmed noise is from cables between ShaperDSP and detector
  - Connect and disconnect wires between VME and ShaperDSP for reducing grounding loop, but no difference in noise level was found
  - (Not all noisy channels were tested...)
- For run 2024c, if noise level is kept high, increase TC energy threshold.
  - I will monitor until beam comes.

# Event timing DQM

- Event timing DQM were prepared during 2024b run
  - bug was found

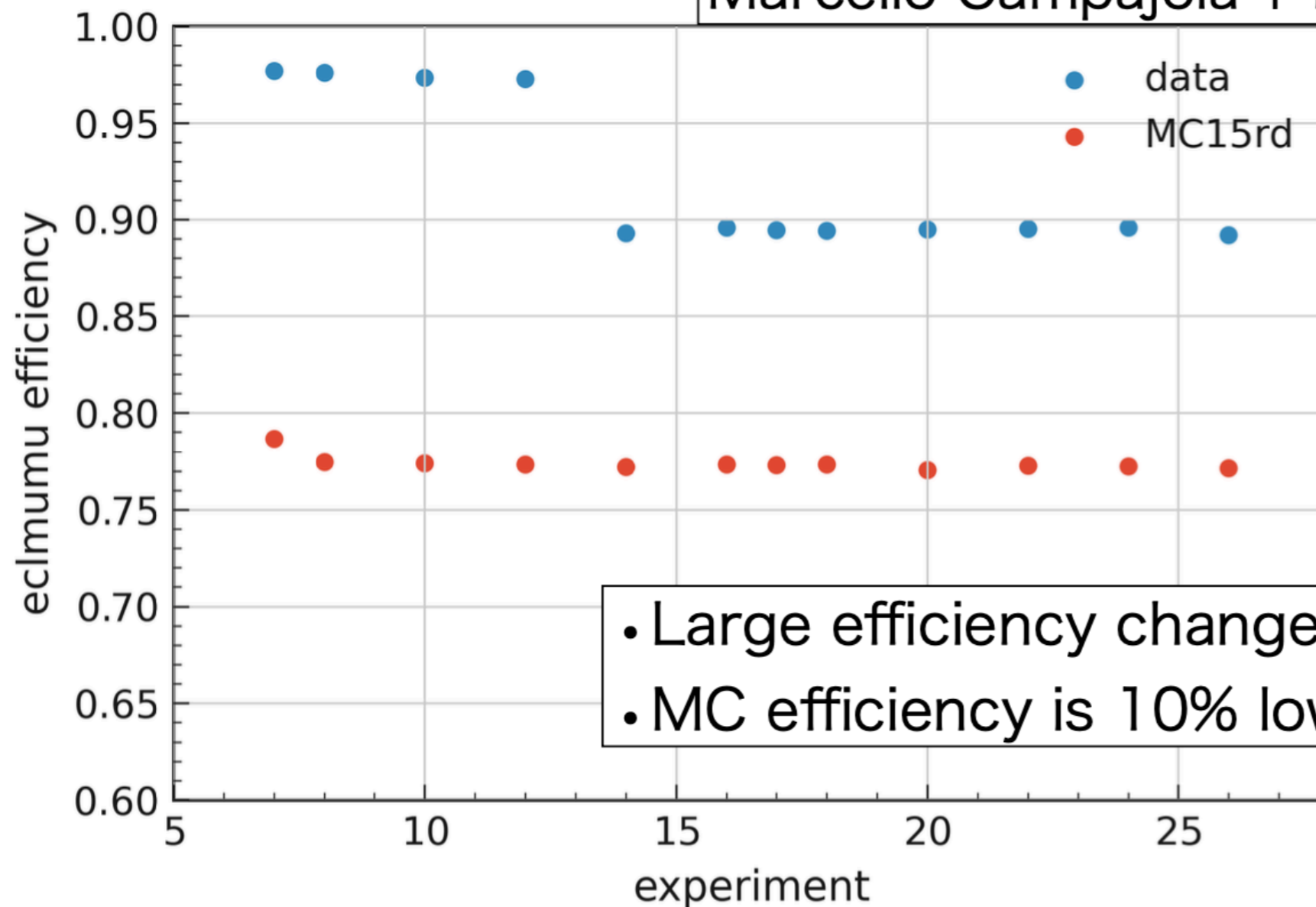


- The bugfix and MR are done, and ready for 2024c run.
- Plan
  - Prepare manual
  - Add some parameters to QAM (or mirabelle)
  - Report and discuss with SVD experts for next updates.



# Status of problems found from eclmumu bit

Marcello Campajola + Kang Chen and Yubo Li



- Large efficiency change in data from exp14
- MC efficiency is 10% lower than data

• eclmumu bit, generated by ETM and prescale=1 at GDL

- $165^\circ < \Sigma\theta_{\text{CM}} < 190^\circ$ , where  $\Sigma\theta_{\text{CM}}$  is sum of polar angles of 2 clusters in CM
- $160^\circ < \Delta\phi_{\text{CM}} < 200^\circ$ , where  $\Delta\phi_{\text{CM}}$  is difference of phi angles of 2 clusters in CM
- $E(\text{CL1}) < 2 \text{ GeV} \ \&\& \ E(\text{CL2}) < 2 \text{ GeV}$ 
  - where  $E(\text{CLX})$  is energy of cluster number  $X$  ( $X=1,2$ ) in CM

# Status of problems found from eclmumu bit

- With large contributions from Kang, Yubo, Junhao, and Koga-san,
  - For tsim, bugs were found
    - Affected all ecl trigger bits, but mainly for ecl mumu
  - For FW, wrong cluster energy threshold for exp14-26 were found
    - The threshold was ok for  $\leq \text{exp}12$  and  $\geq \text{exp}27$
- Yubo prepared script which check parameter in real data and checked past data if similar problem for other bits exist or not.
  - Fortunately, no problem in other trigger bit was confirmed.
- Bugfix tsim was prepared and it is in release.
- In order to have exp dependent parameter, tsim is updated again.
  - updated tsim is in MR
  - conditionDB related update is in MR
- Plan
  - Complete tsim updates with conditionDB
  - Update ETM SLC to monitor all parameters

# Summary / plan

- Summary
  - ECL trigger is ready for 2024c run
  - Updates and bugfixes for hardware, firmware, and software during summer
    - Not all are completed
- Plan
  - investigation of instability of tmm-etm link
  - Preparation of gnn
  - Countermeasure for noisy channels
  - Tsim update
  - TC energy calibration
  - Server OS update
  - Beam background study

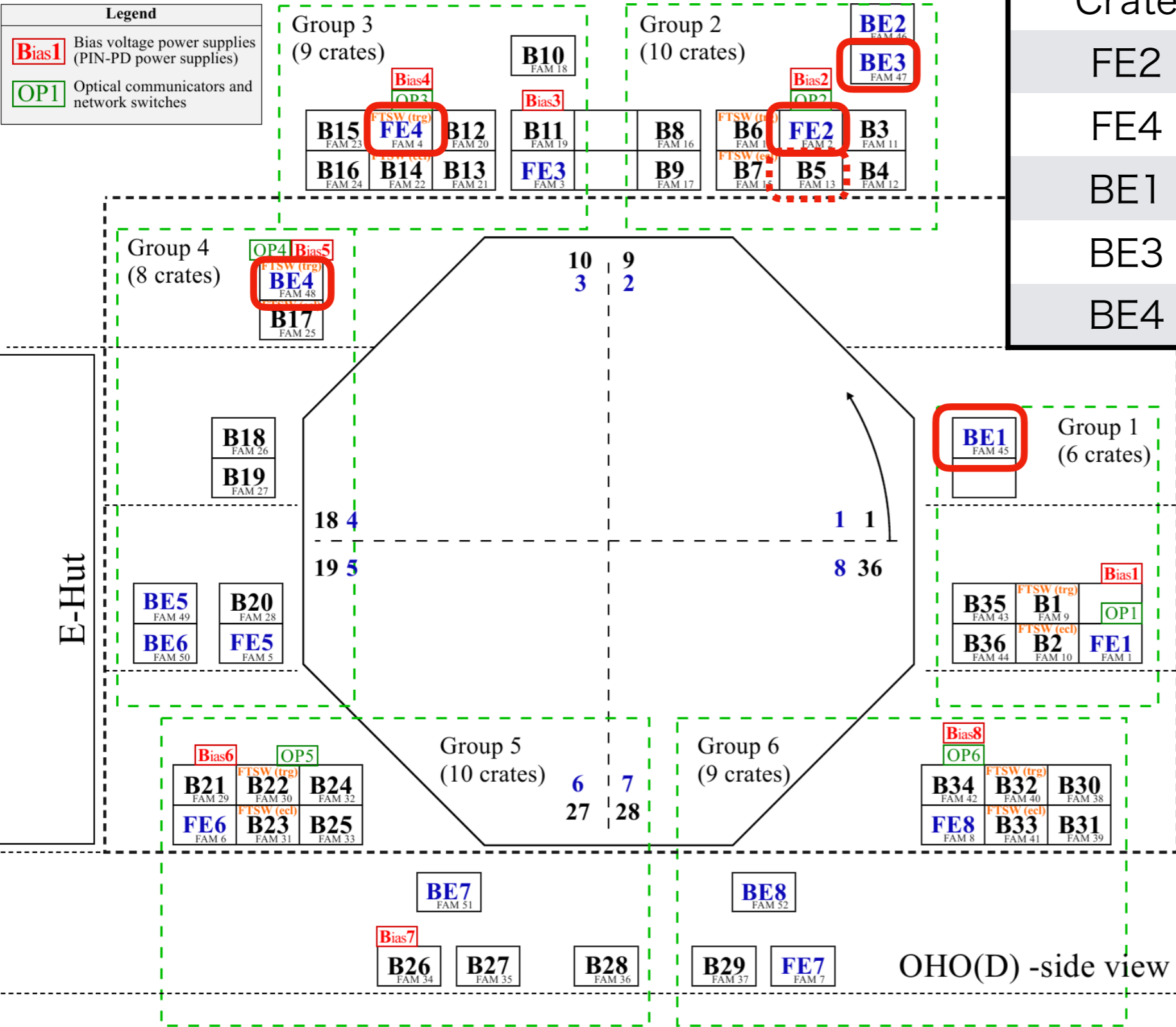
# Backup

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# Noisy channel

**Legend**

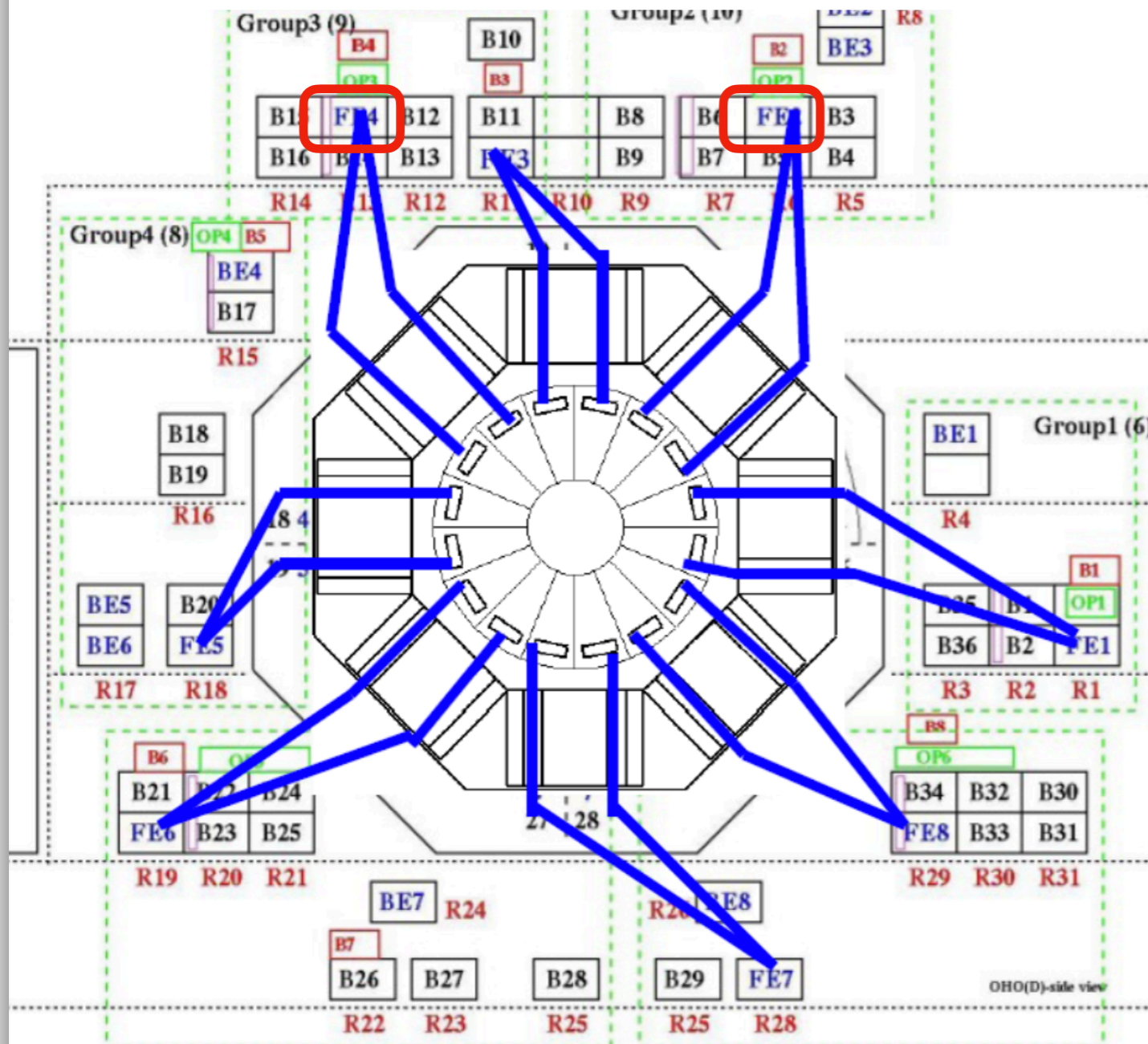
- Bias1** Bias voltage power supplies (PIN-PD power supplies)
- OP1** Optical communicators and network switches



Crate	Shaper	FAM
FE2	4	2
FE4	8	4
BE1	3	45
BE3	1	47
BE4	2, 7, 9, 10	48

# Noisy channel

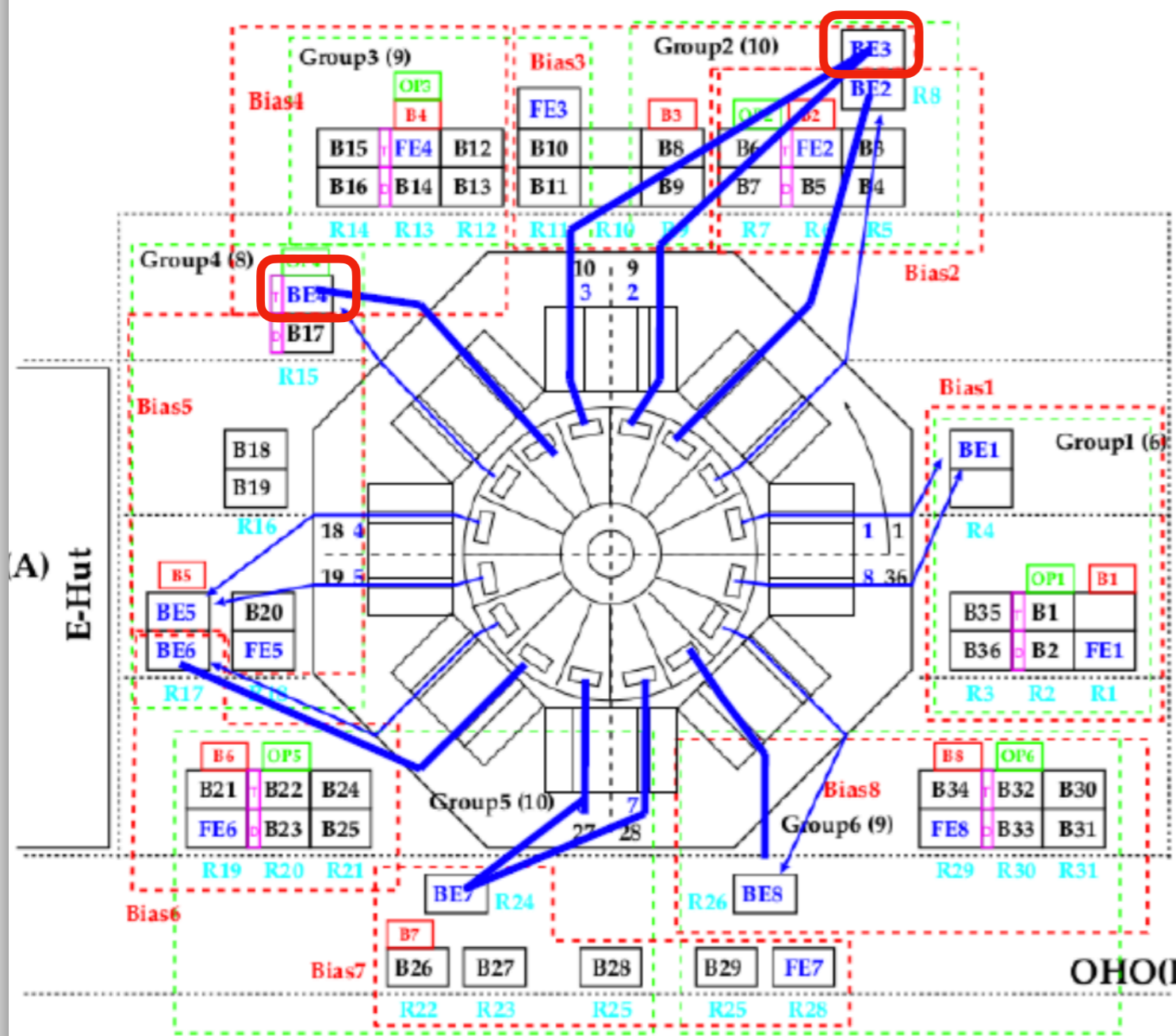
## Forward endcap



FAM	Sector	Cable	Crate(cable)
1	F1	F1	FE1(6-10)
2	F2	F2	FE2(1-5)
	F3	F3	FE2(6-10)
3	F4	F4	FE3(1-5)
	F5	F5	FE3(6-10)
4	F6	F6	FE4(1-5)
	F7	F7	FE4(6-10)
5	F8	F8	FE5(1-5)
	F9	F9	FE5(6-10)
6	F10	F10	FE6(1-5)
	F11	F11	FE6(6-10)
7	F12	F12	FE7(1-5)
	F13	F13	FE7(6-10)
8	F14	F14	FE8(1-5)
	F15	F15	FE8(6-10)
1	F16	F16	FE1(1-5)

# Noisy channel

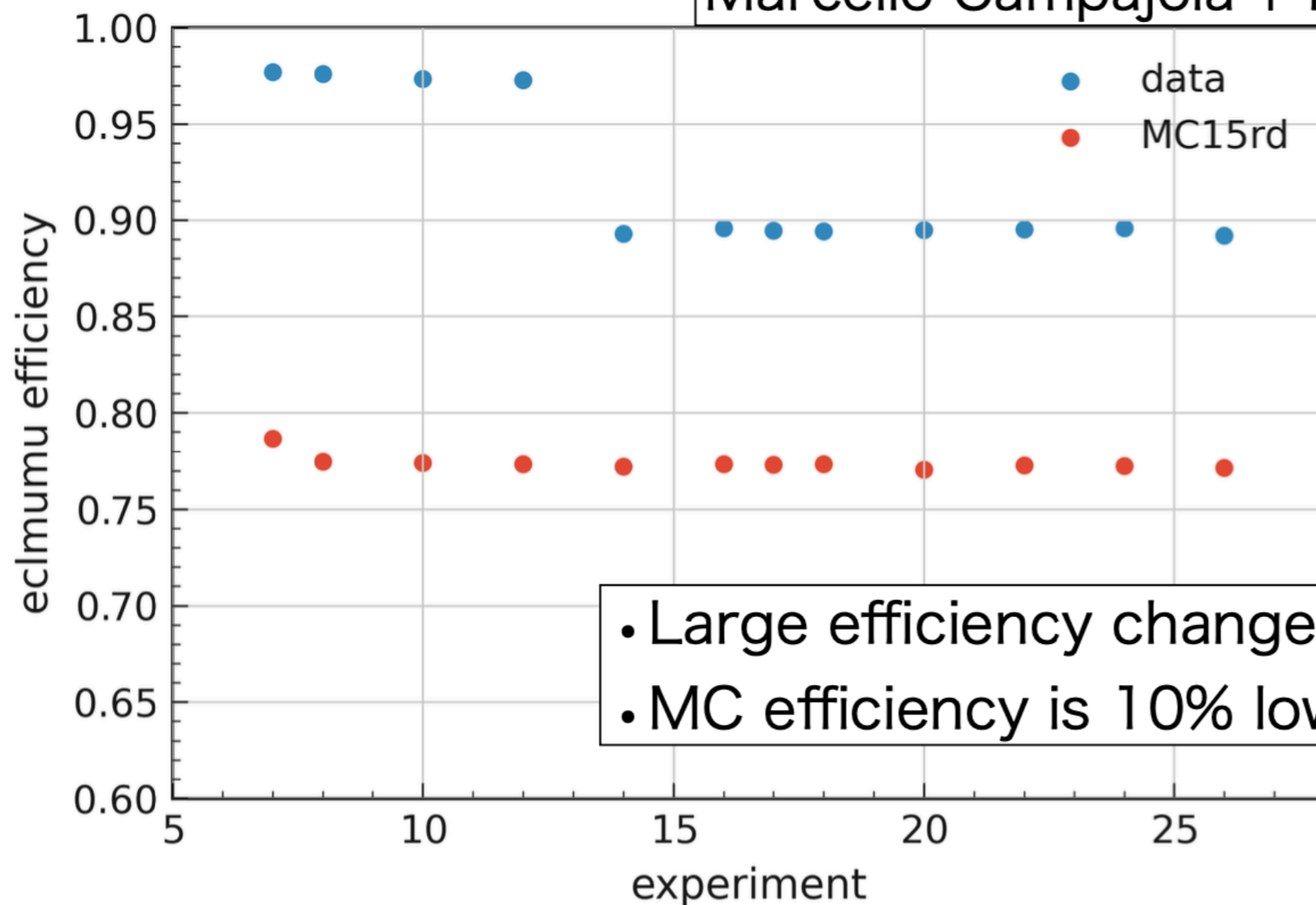
## backward endcap



FAM	Sector	Cable	Crate(cable)
45	B1	B1	BE1(5-8)
46	B2	B2	BE2(1-4)
	B3	B3	BE2(5-8)
47	B4	B4	BE3(1-4)
	B5	B5	BE3(5-8)
48	B6	B6	BE4(1-4)
	B7	B7	BE4(5-8)
49	B8	B8	BE5(1-4)
	B9	B9	BE5(5-8)
50	B10	B10	BE6(1-4)
	B11	B11	BE6(5-8)
51	B12	B12	BE7(1-4)
	B13	B13	BE7(5-8)
52	B14	B14	BE8(1-4)
	B15	B15	BE8(5-8)
45	B16	B16	BE1(1-4)

# Problem in eclmumu bit

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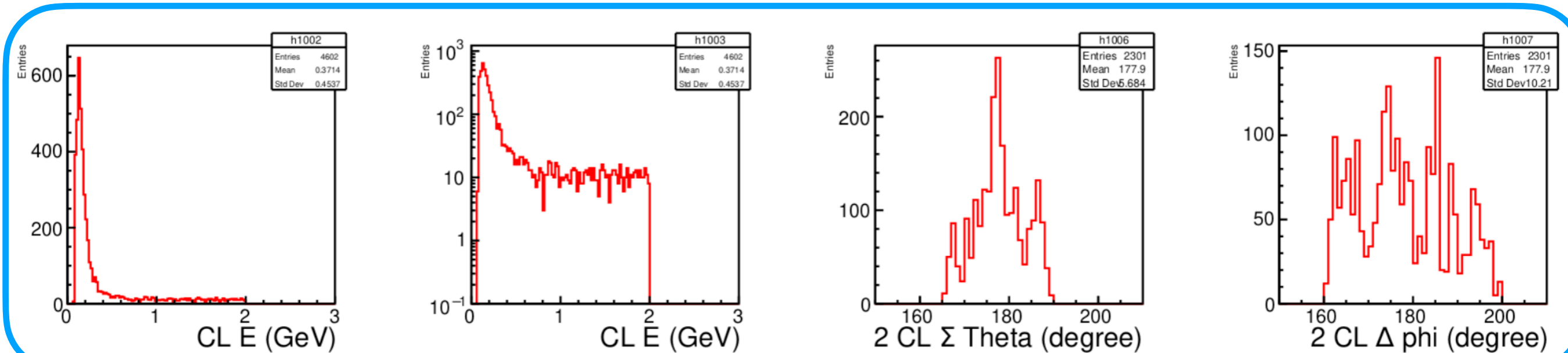
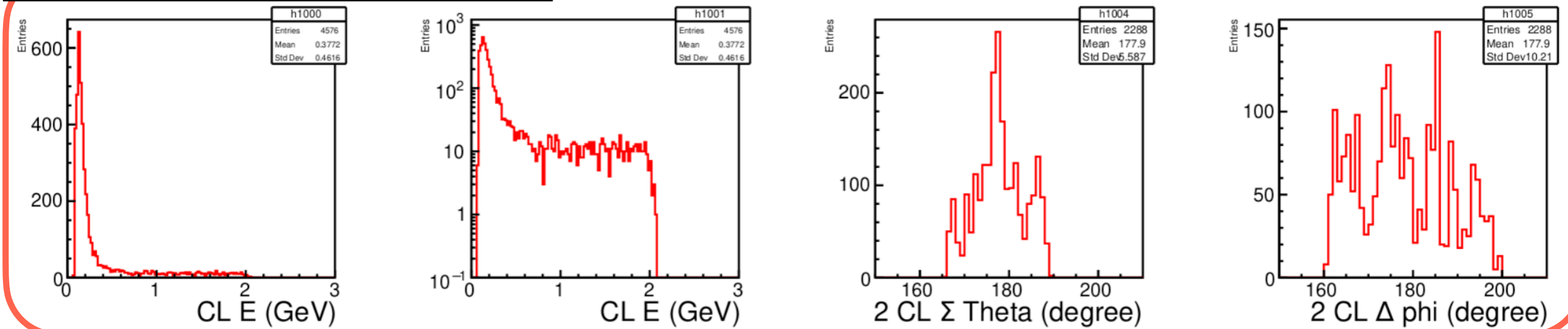
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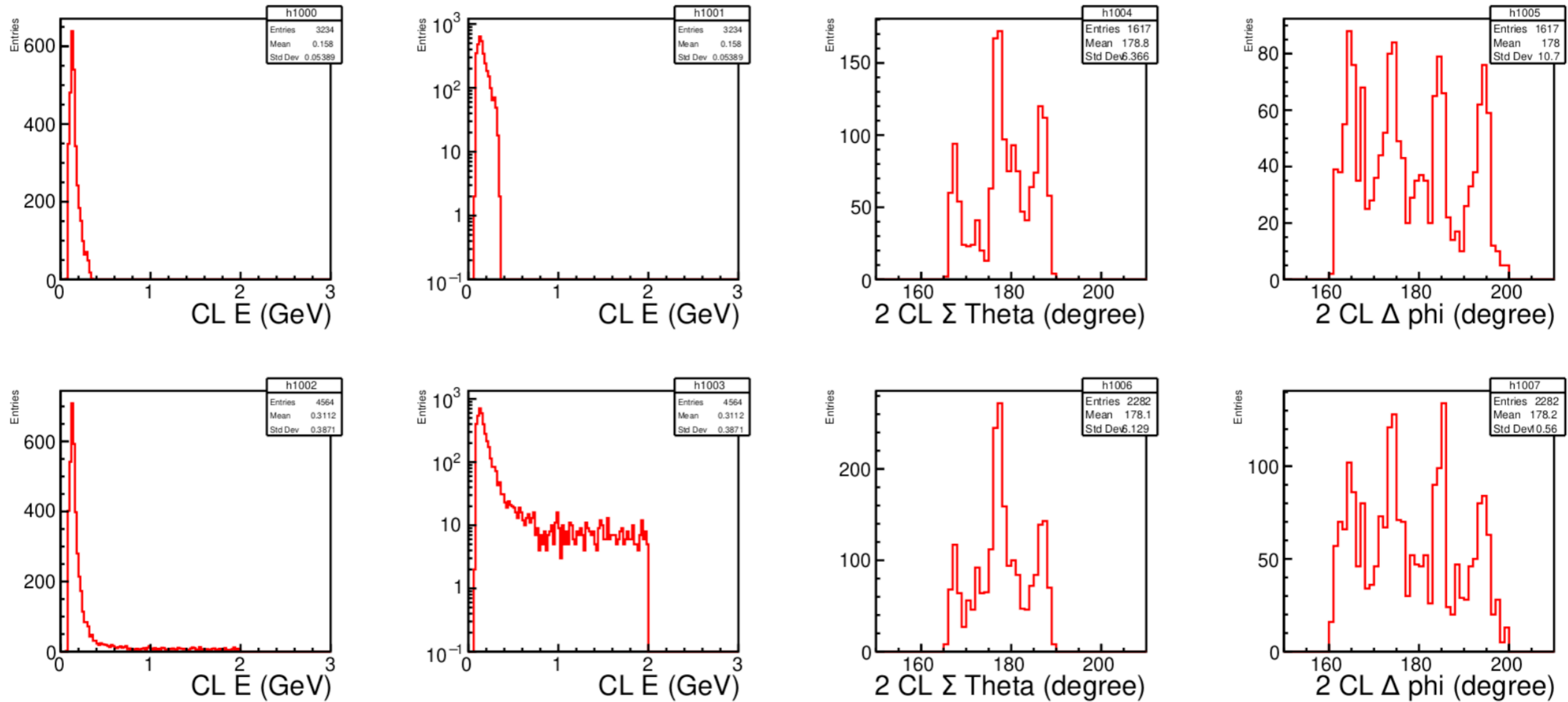
# eclmumu e12r6399

## TRGSummary eclmumu=1



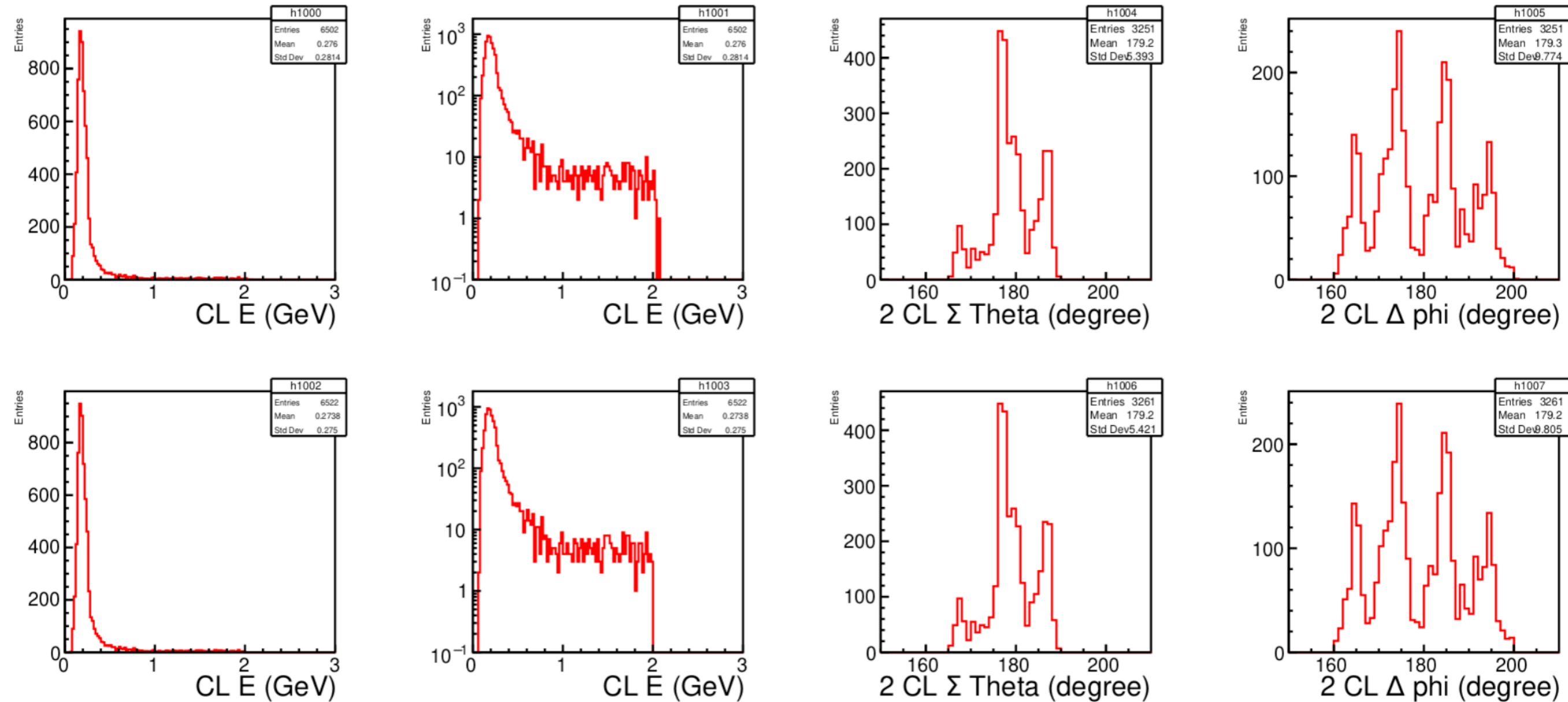
## Manual reconstructed eclmumu=1

# eclmumu e14r799



- Same bad results continue for run of exp26

# eclmumu e30r165



- From the beginning of exp30 to now, we have correct results as same as exp12.
- From exp30, started using UT4, and online software was updated.

# Plan

- It's still unclear why wrong parameter was used
  - ETM(UT3), SLC, and online-lib were updated many times, but not all were saved
- Need to update SLC
  - Consistency check between loaded and read parameters is not done on ETM
    - In FAM case, it's done on SLC for all(?) parameters, and error signal is issued if inconsistent is detected.
  - Bad parameter names in SLC are subject to error
    - 2d\_bhabha, bhabha1, bhabha\_3d, bhabha2,,,
    - eclmumu parameters are in array of bhabha2 and bhabha\_3d
- Make python script to check all parameters from raw data
  - Run this script when new exp start after shutdown or big updates
  - Check parameters of ETM for past exp data