scECAL at Shinshu

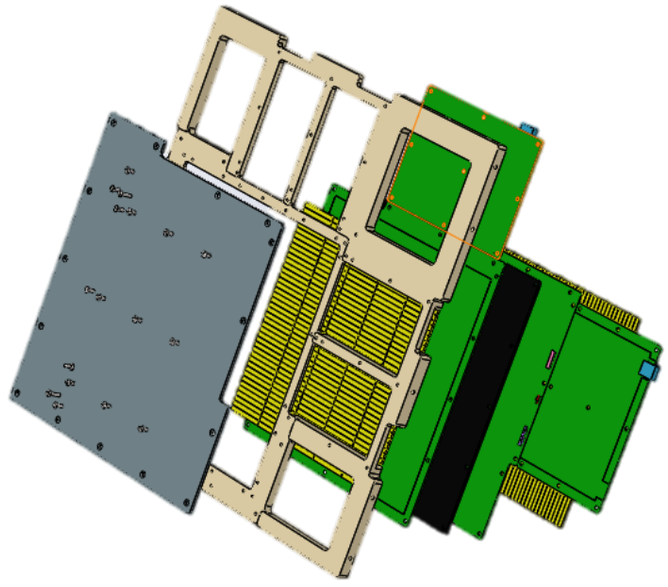
Tohru Takeshita

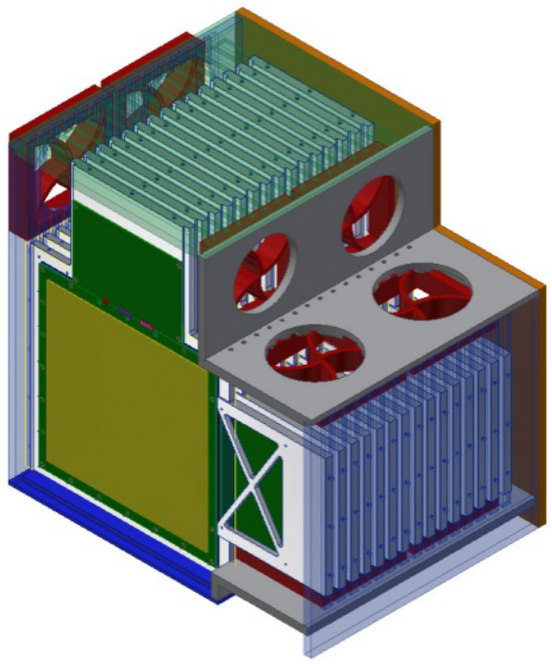
CALICE meeting at MacGill Mar.2020

- Preparation for TB at DESY
  - ECAL Base Unit (EBU) and SPIROC
  - Scintillator strip
- Active Absorber calorimeter study

Test Beam at DESY

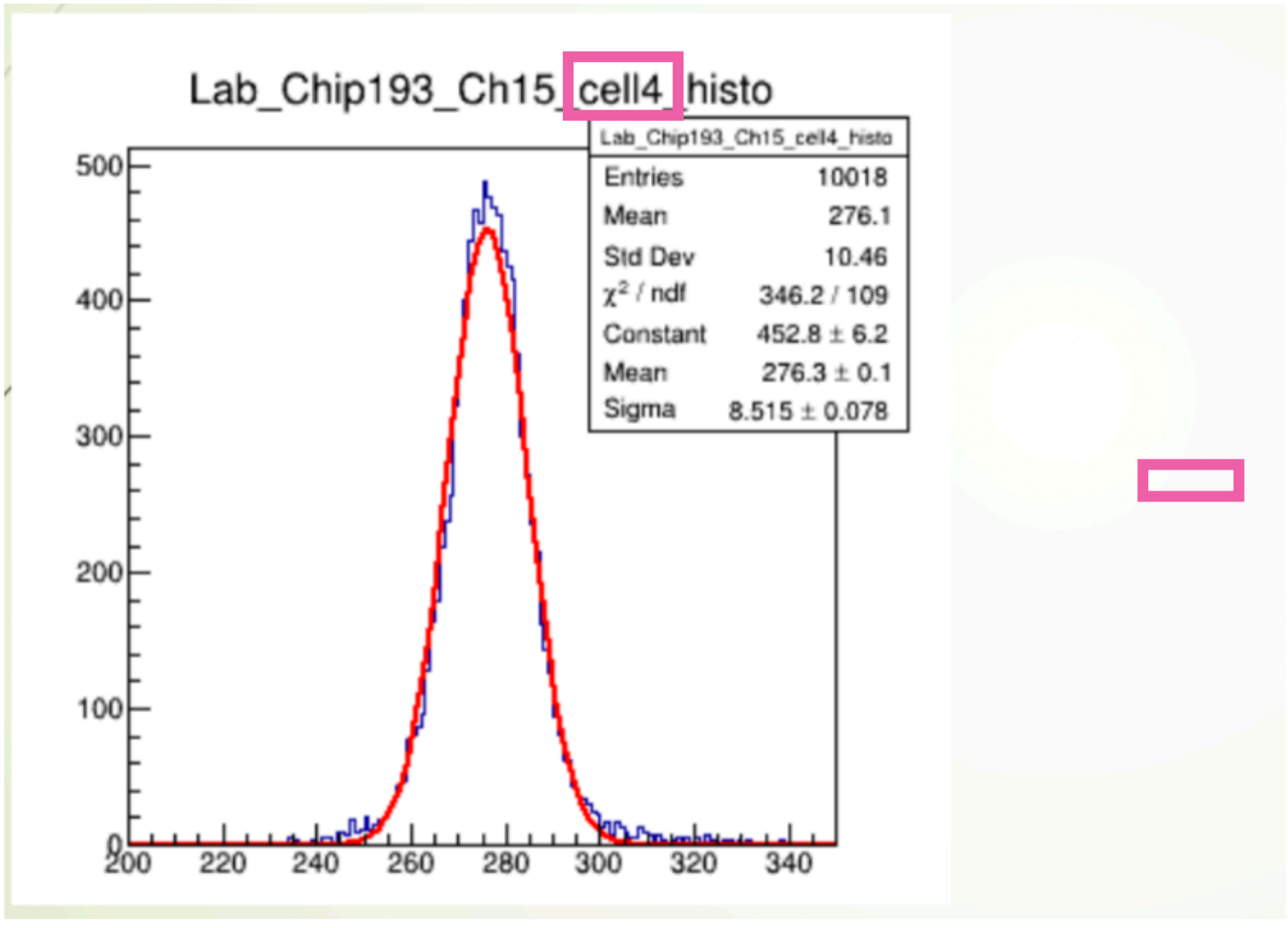
- Verification of scECAL Technological Prototype
- China (USTC and IHEP), & Japan (Tokyo and Shinshu)
- 28 layers, 2 + 2 layers
- Center hole, double hole read out, center hole+dorm
-





Ecal Base Unit :ped.

- Shinshu-EBU with four SPIROC2b's
- memory cell response difference
- pedestals



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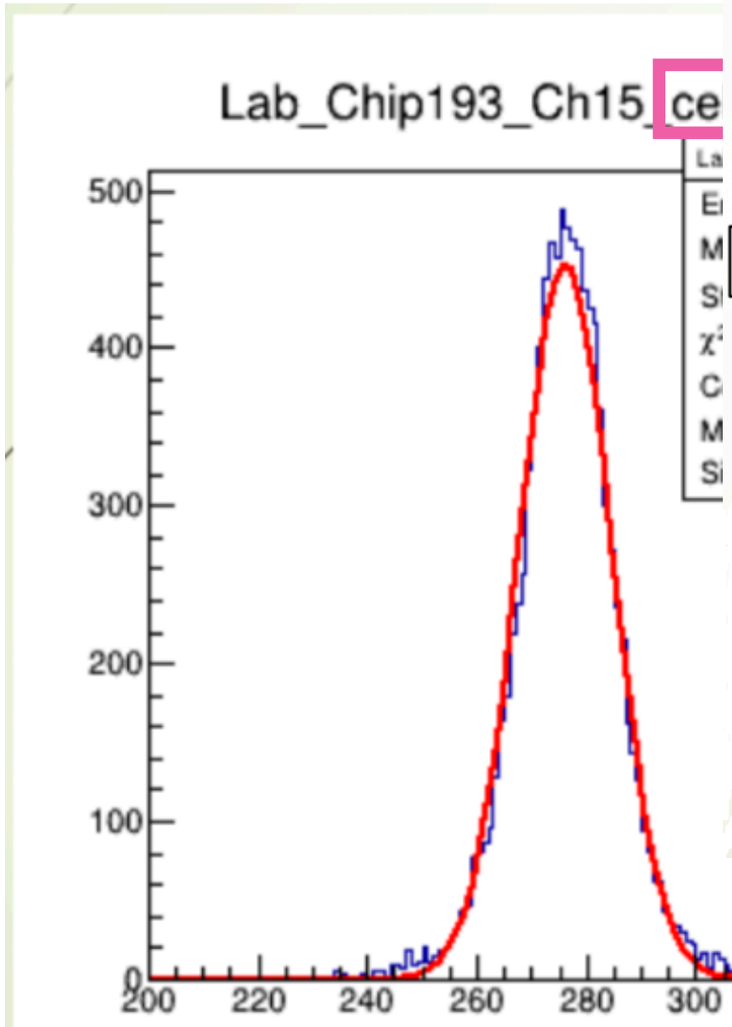
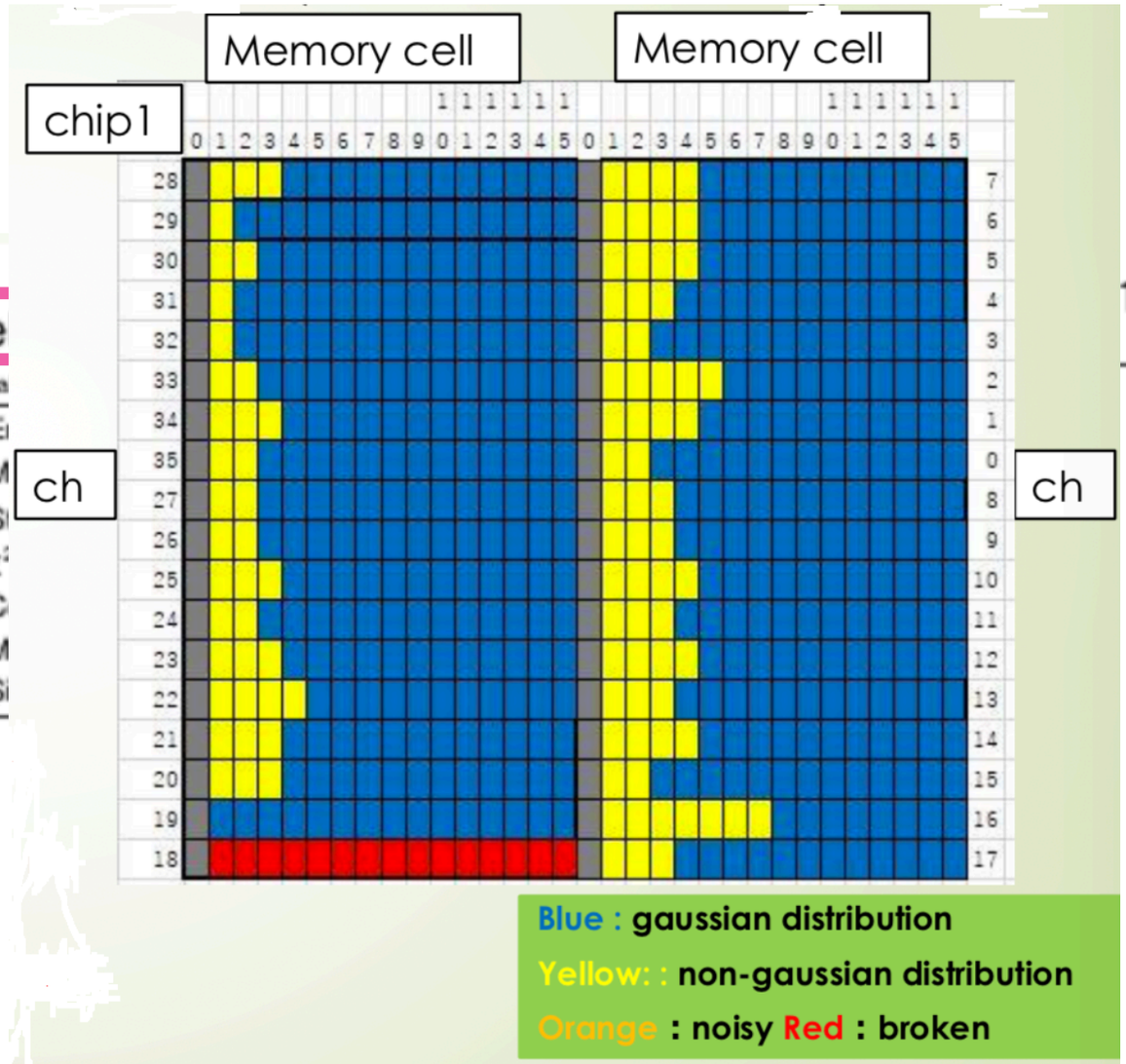
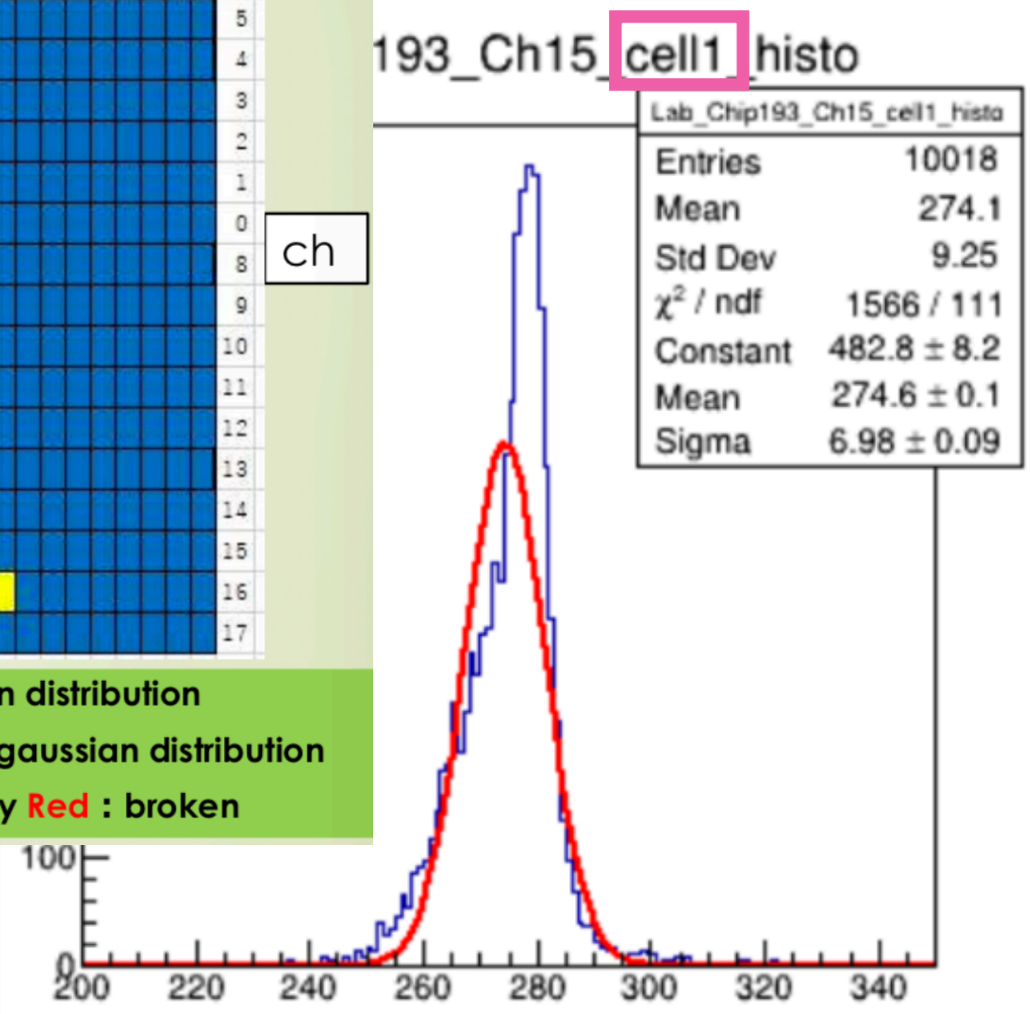
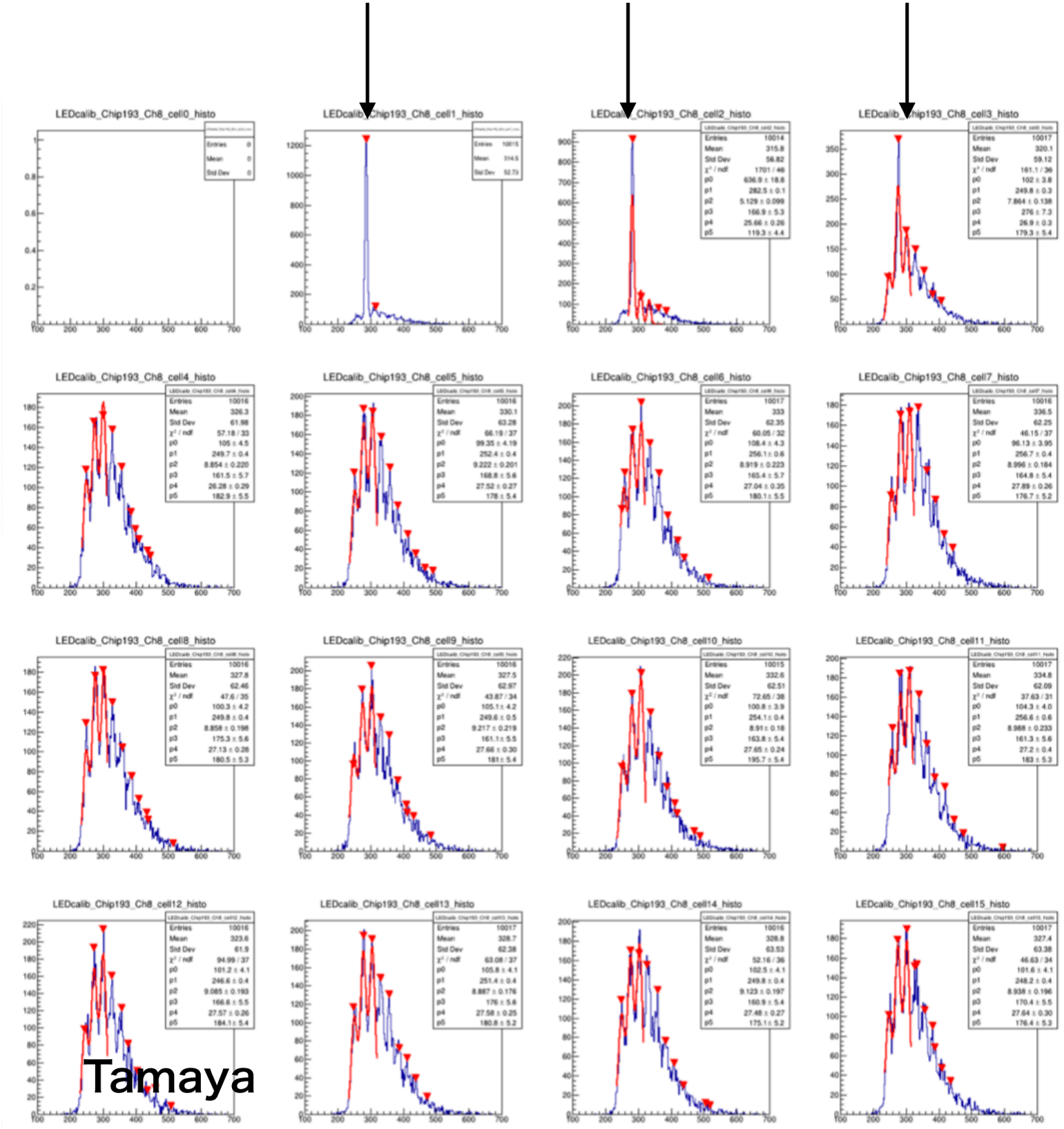






Ecal Base Unit :LED

- LED calibration mode examined
- memory cell problem
- undefined peak for smaller number cells



Tamaya

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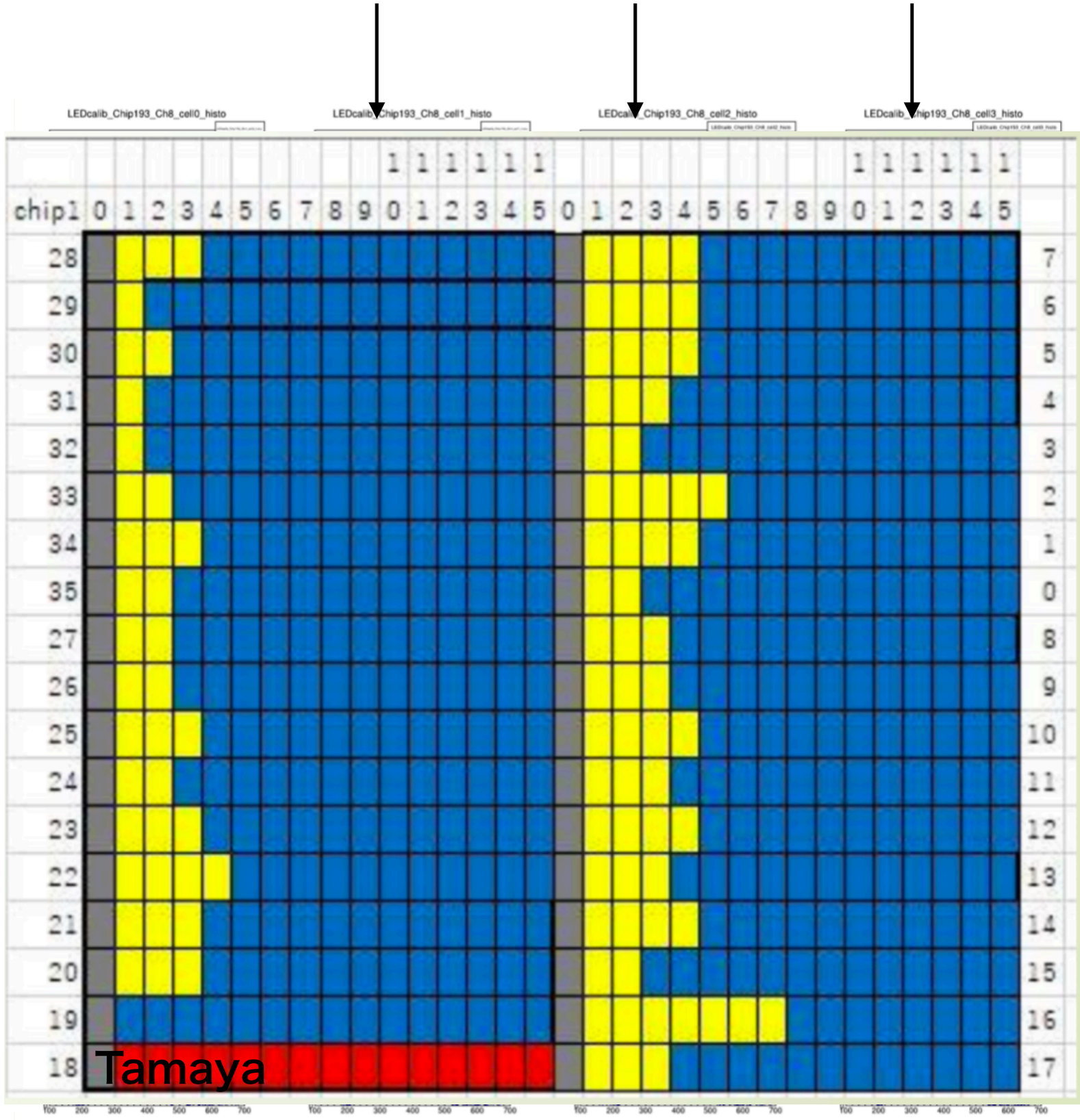

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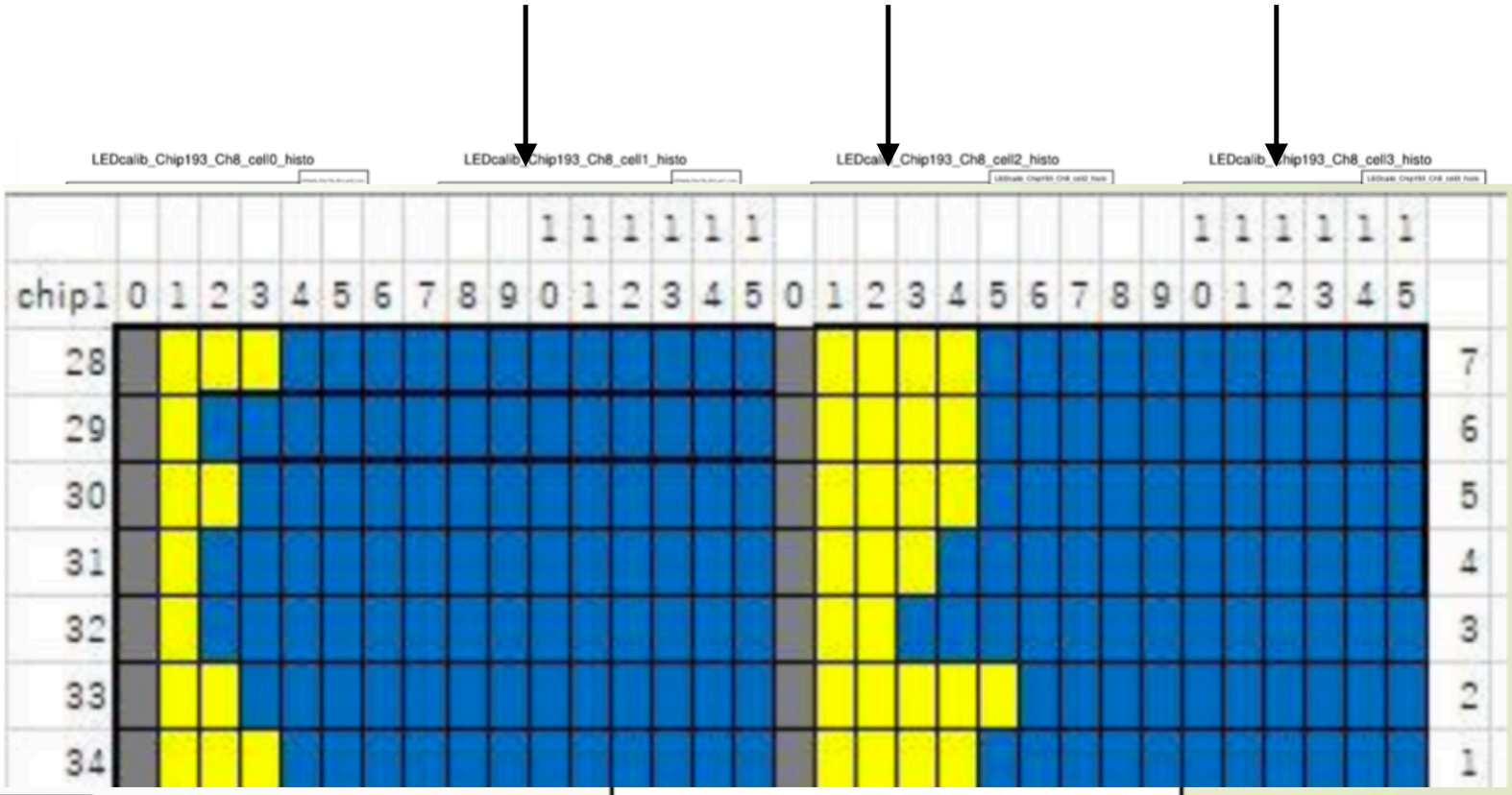
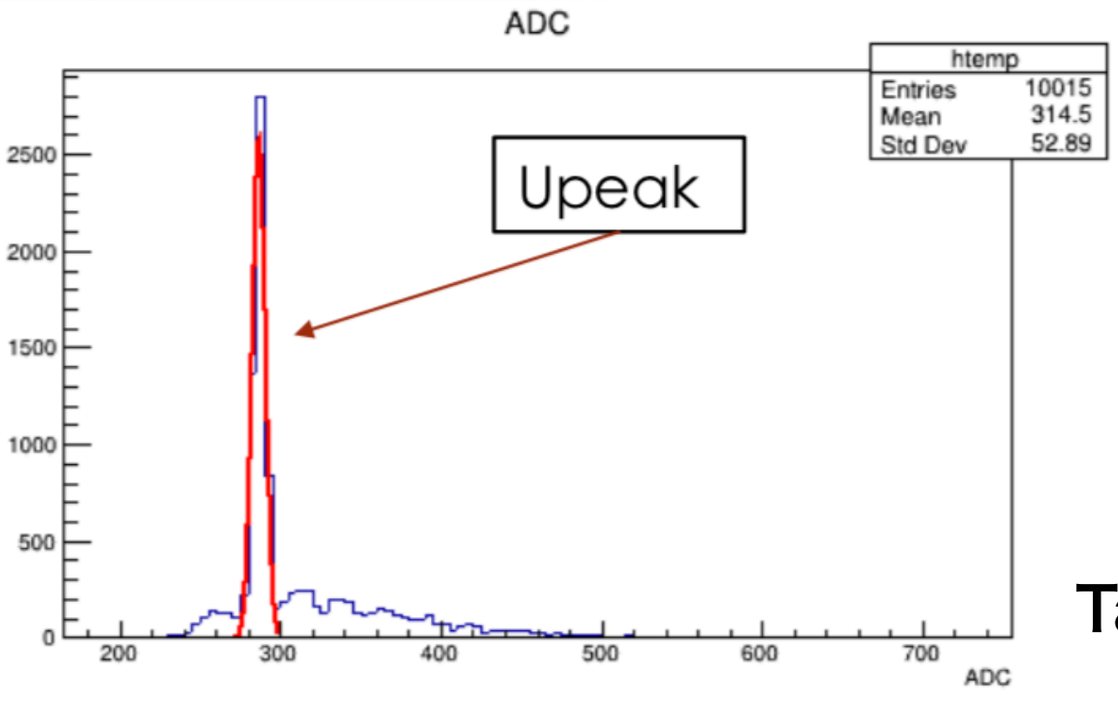
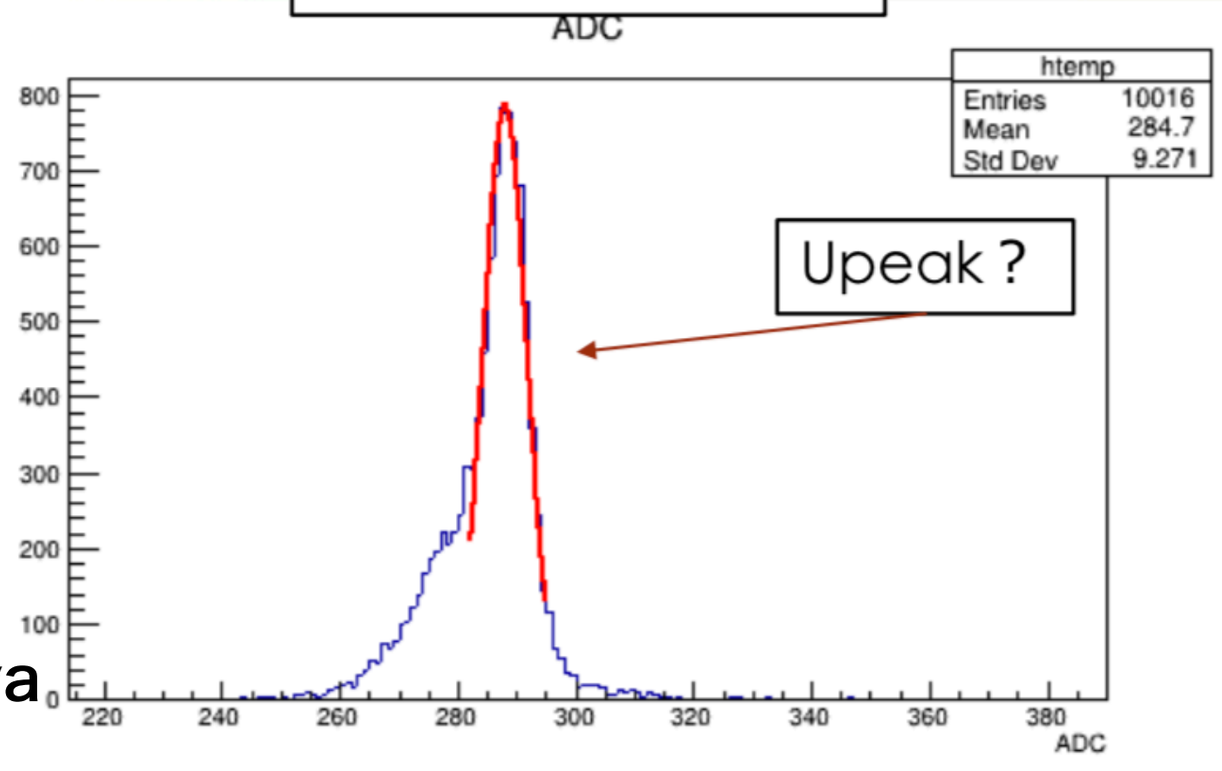


Ch8,cell1,LEDキャリブレーション



Ch8,cell1,Pedestal



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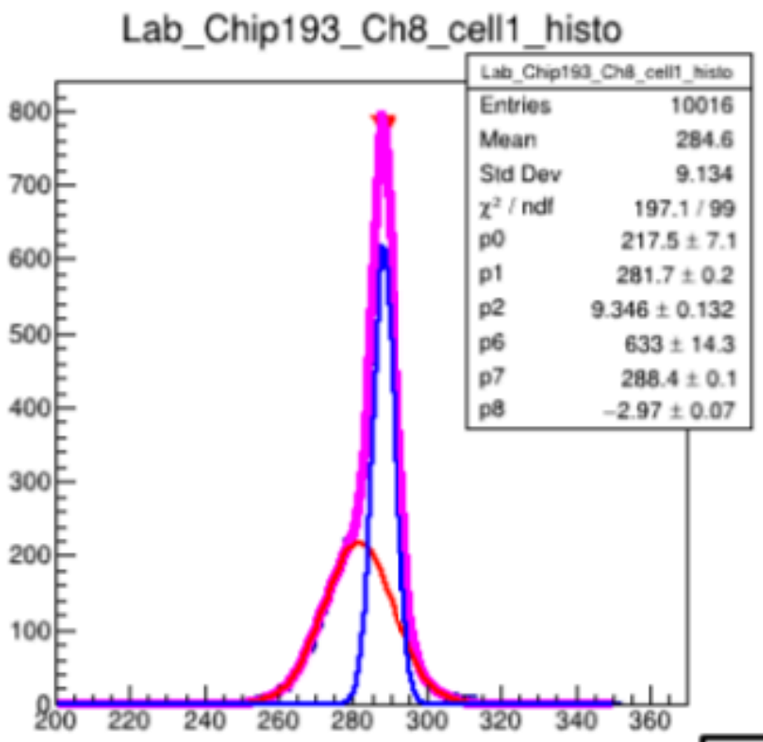
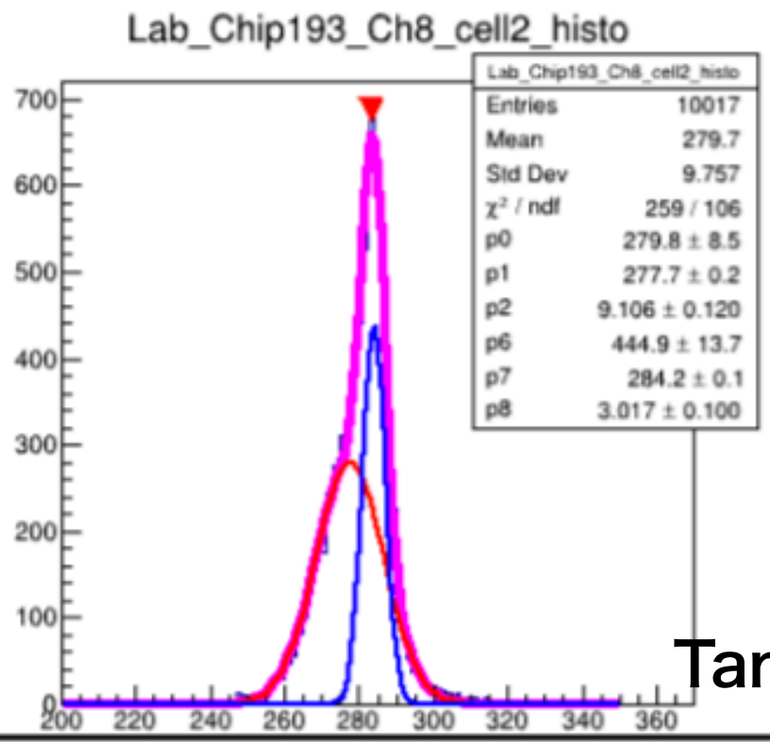
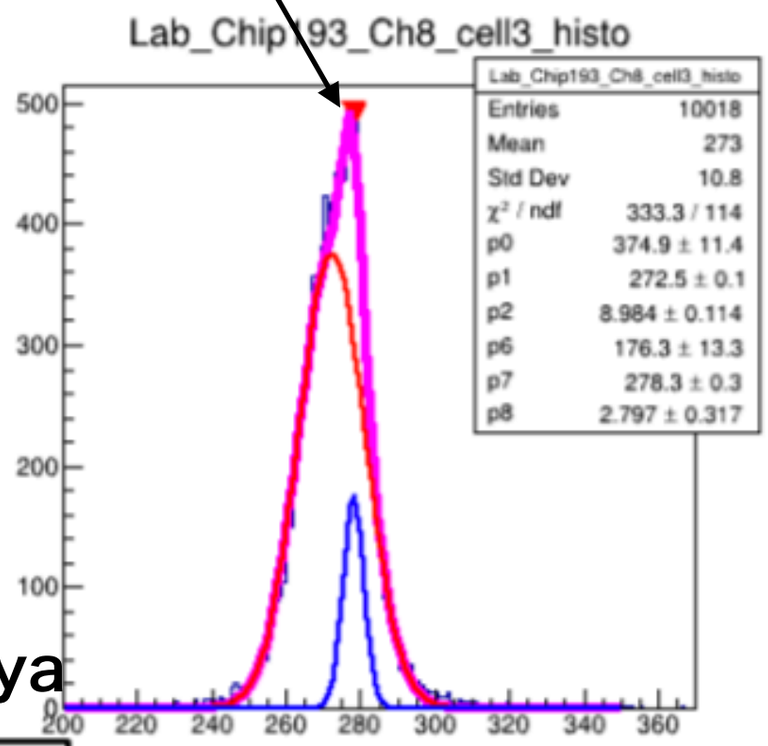
EBU: UPeak

- pedestal fitting with two gaussians
- true pedestal can be seen with a UPeak







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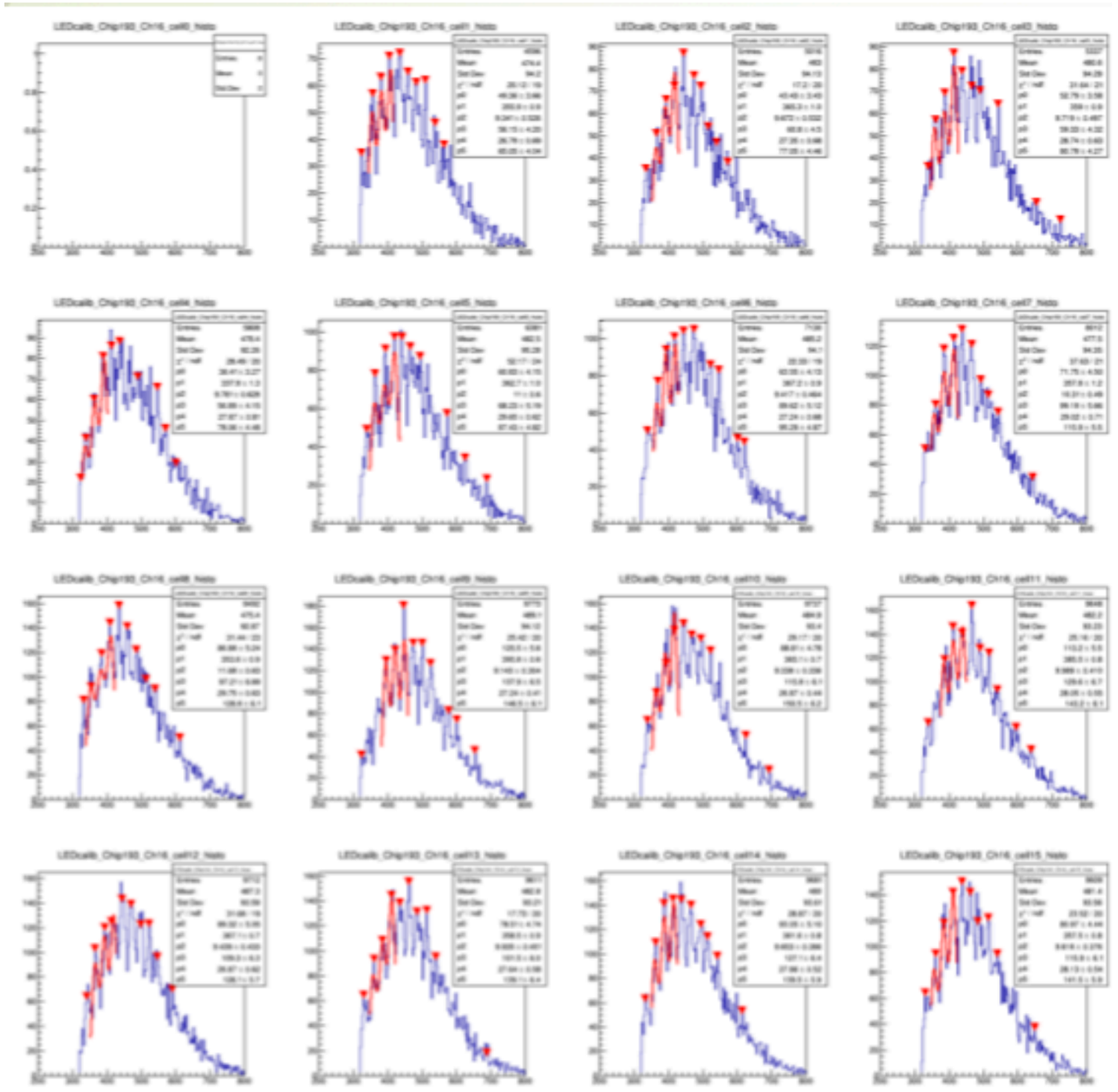
EBU: LED

- LEDs without UPeaks
- reasonable photon peaks
- Gains given by each memory cell are consistent with a constant value



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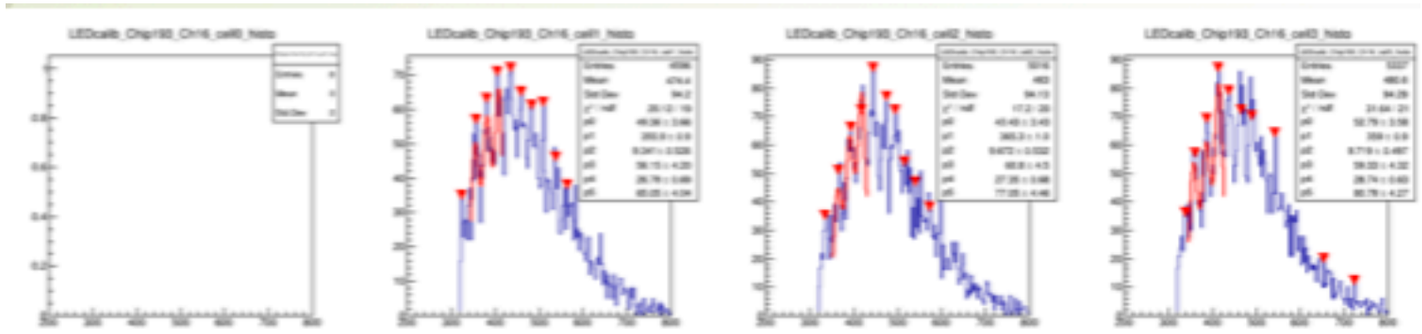
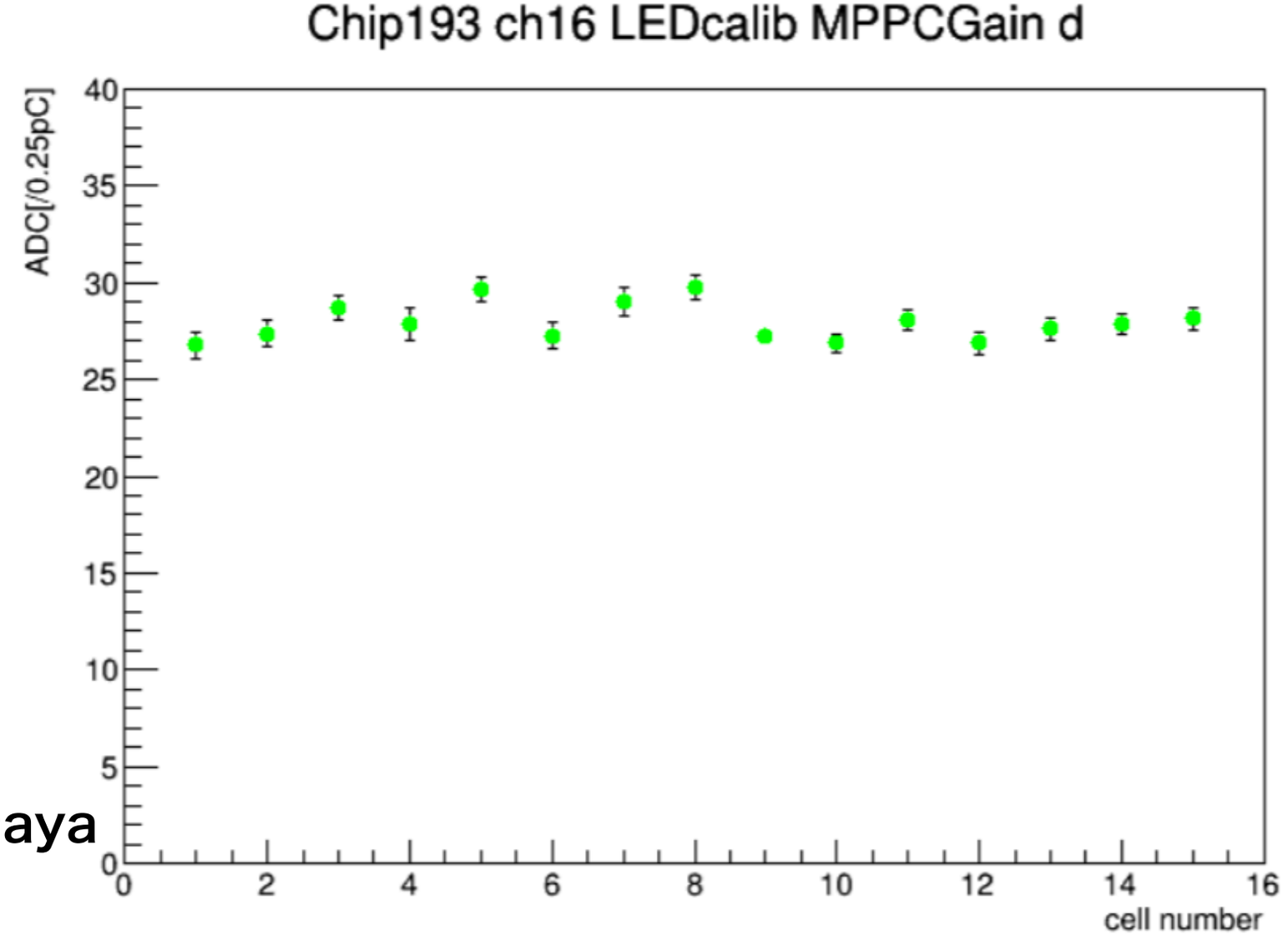
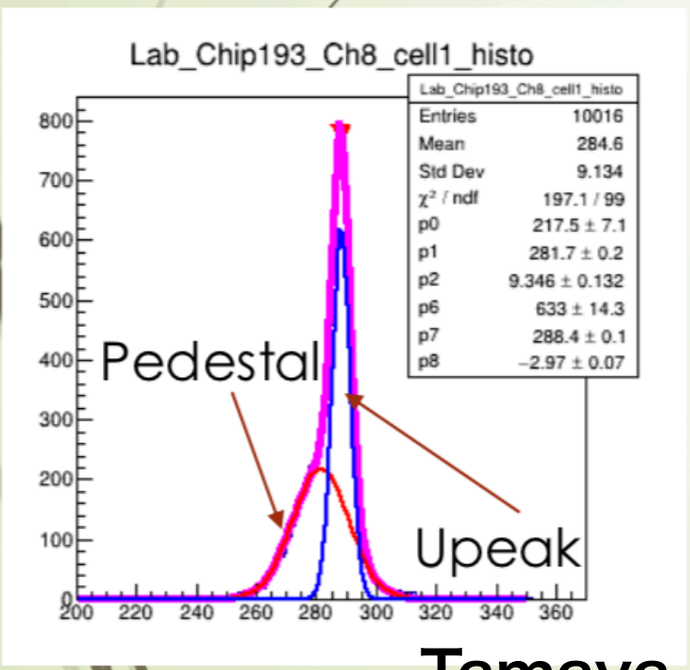




EBU: ped & LED

- we found funny peaks in memory cells which locate smaller number address of memory cells
- by neglecting them, we are able to use all memory cells in SPIROC2b
- The reason should be clarified



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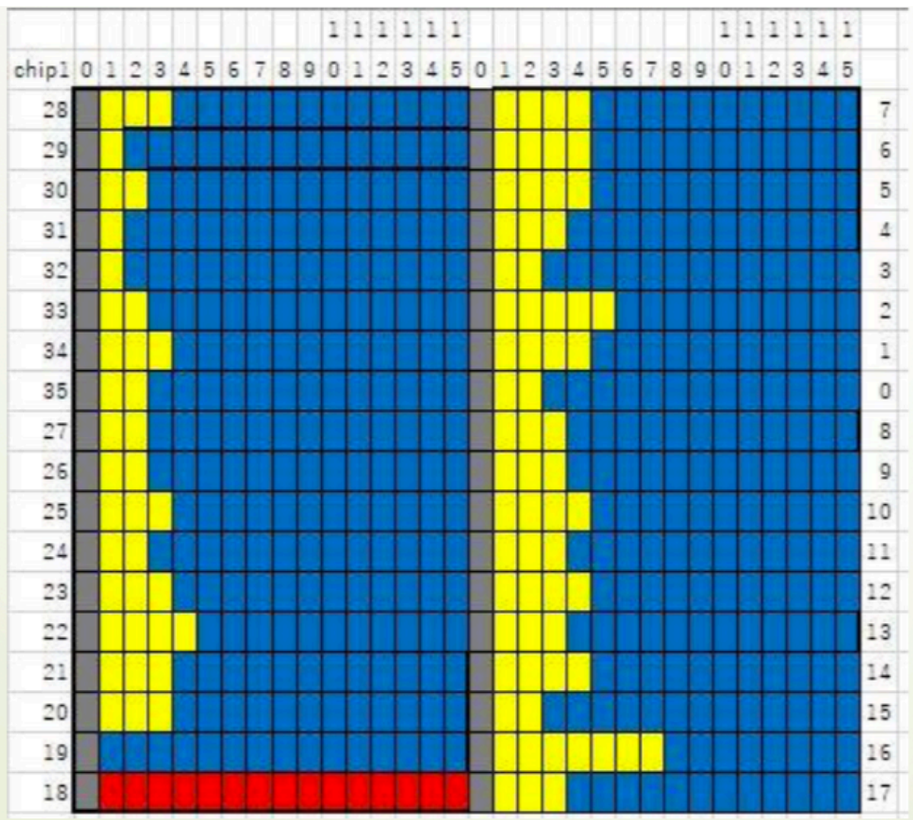
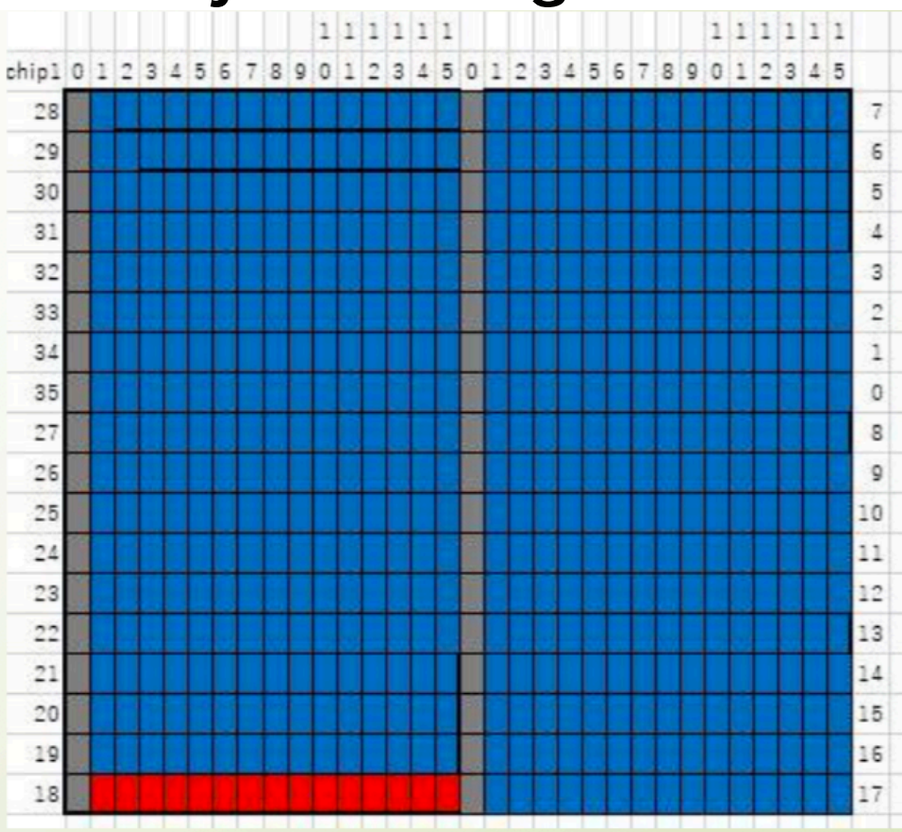
with UPeak



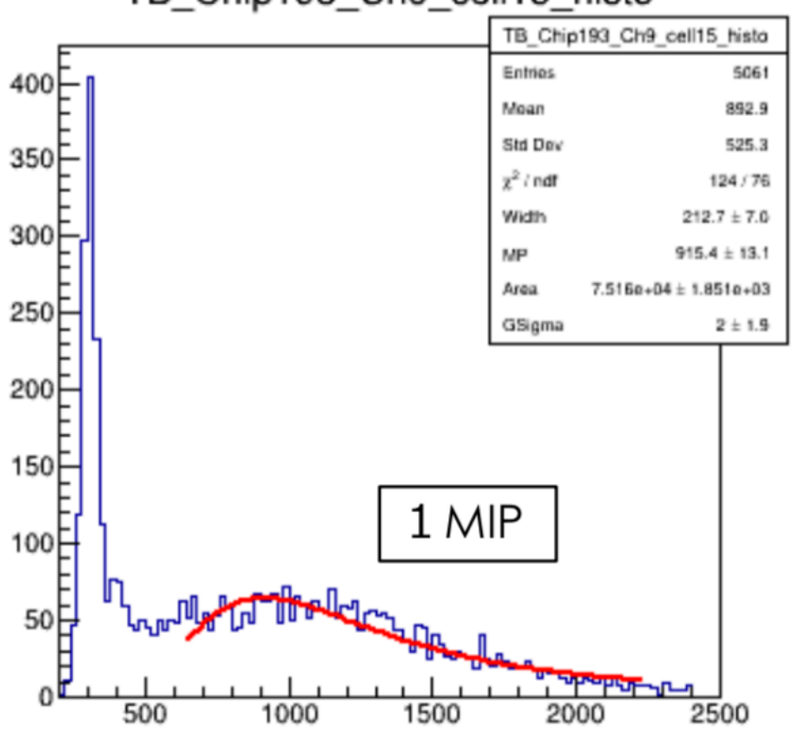
without UPeak by removing

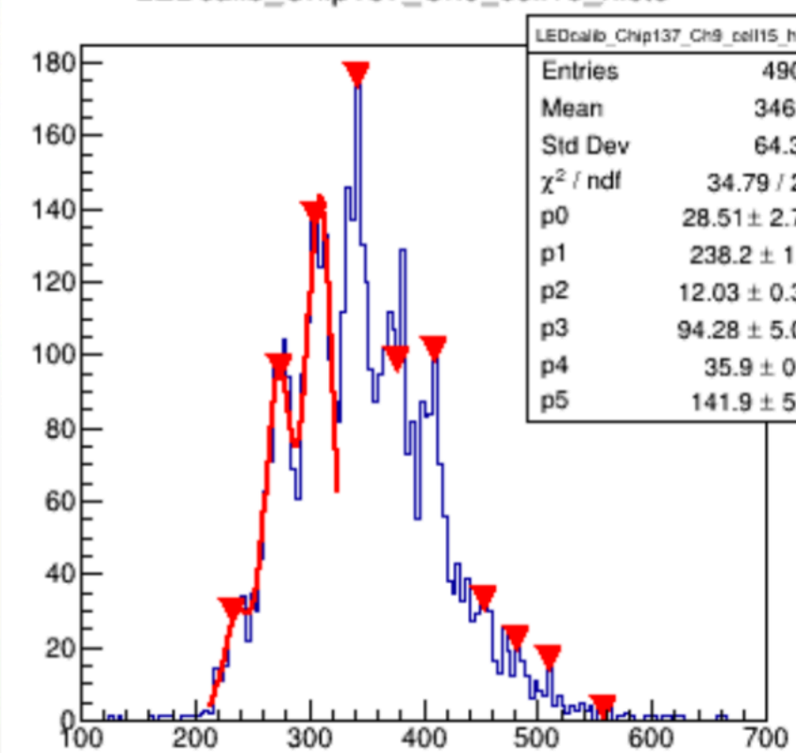


EBU: MIP & LED

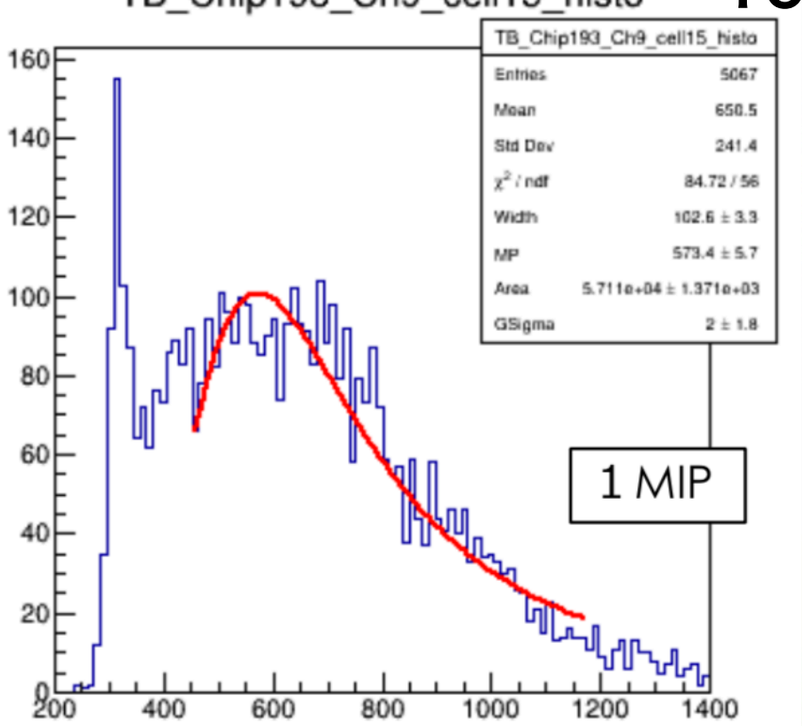
- 10um pitch or
  15um pitch MPPC
- similar
  performance for
  both MIP and LED
  calibration

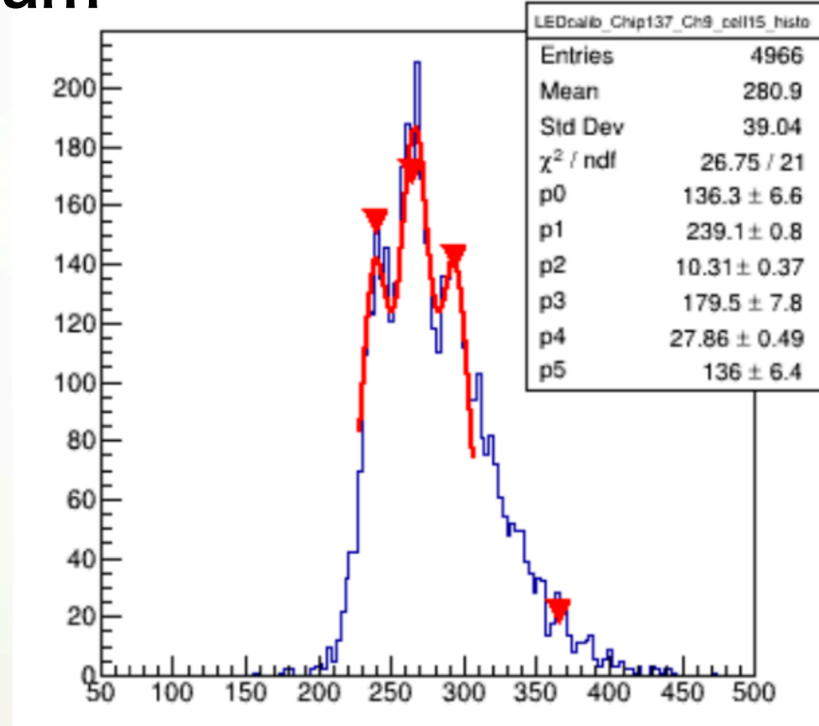
15um





10um





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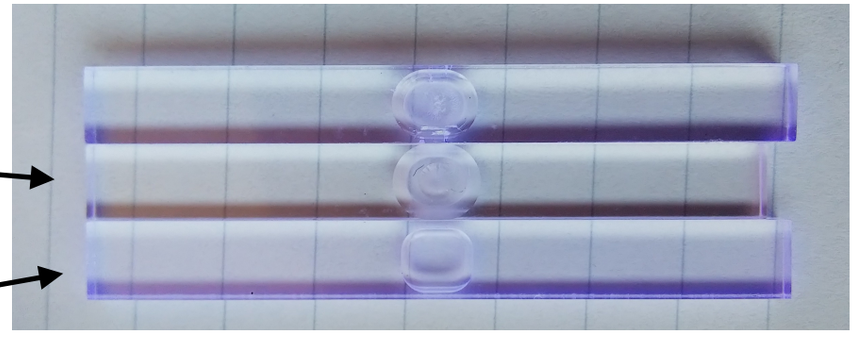
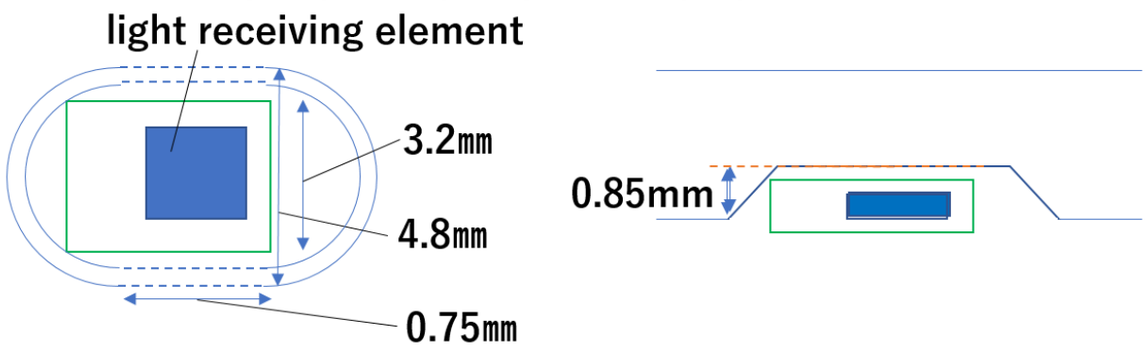
Scintillator strip

- Two model candidates for strip hole for MPPC
  - Center hole (Chinese model)
    BC408
  - Center hole + dorm (Shinshu model)
    Scsn38

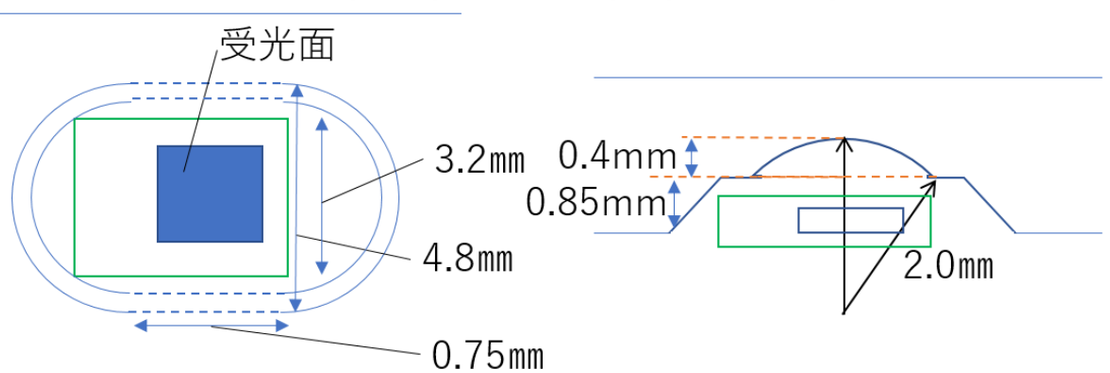


- Two material of scintillator
  - PS(scsn38 by Kuraray) and PVT(EJ204 by Elgen)

Chinese model =hole



Shinshu model = hole + dorm

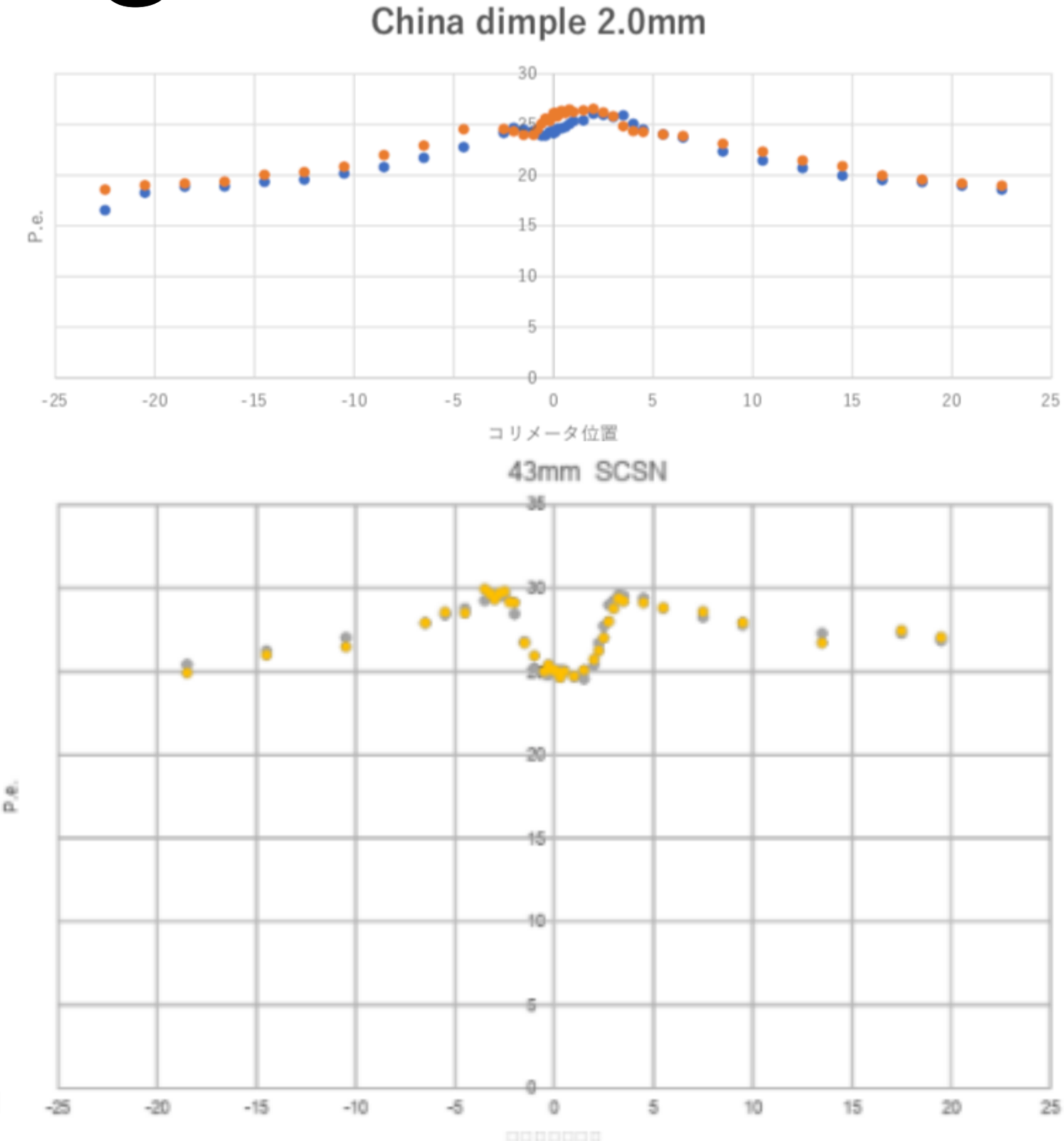


strip Light Yield

- reference: LY in terms of position in X

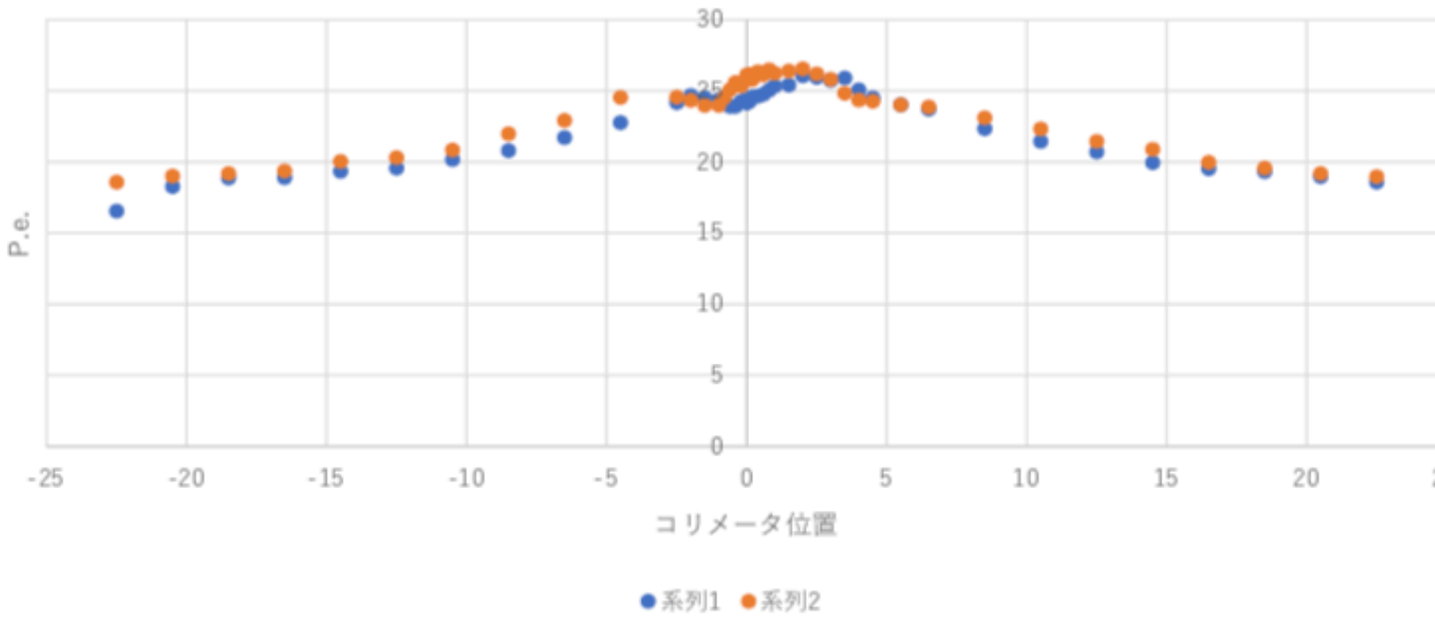
- Center hole =Chinese model

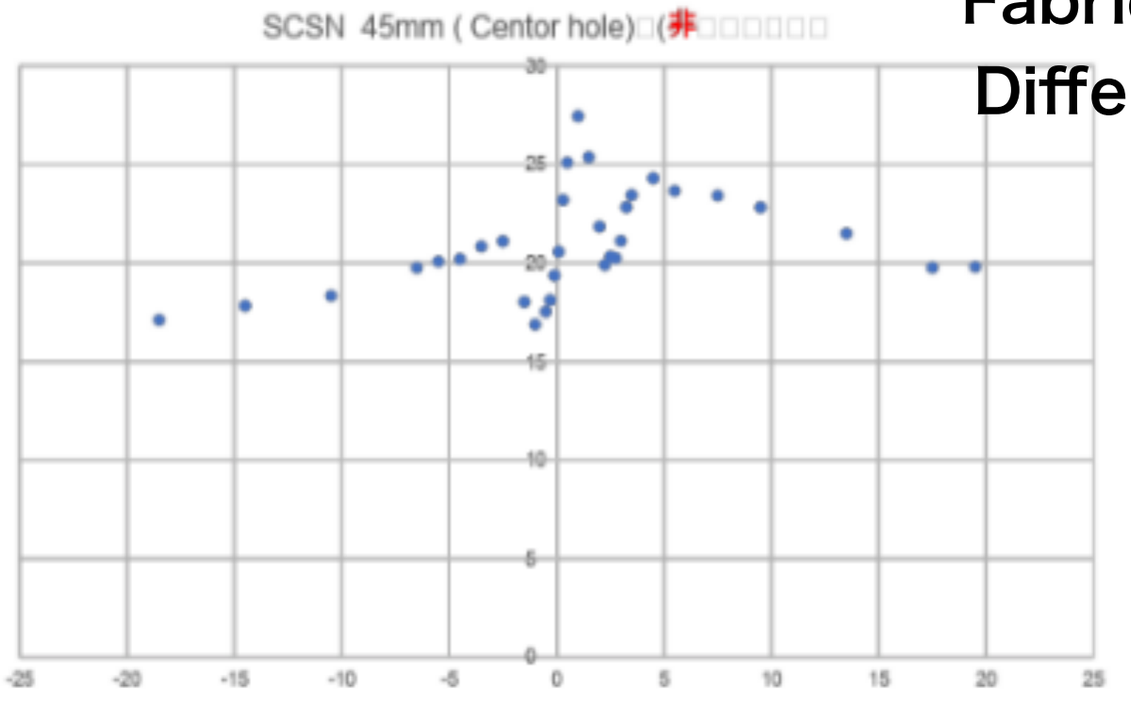
- Center hole+dorm =Shinshu model



strip Light Yield

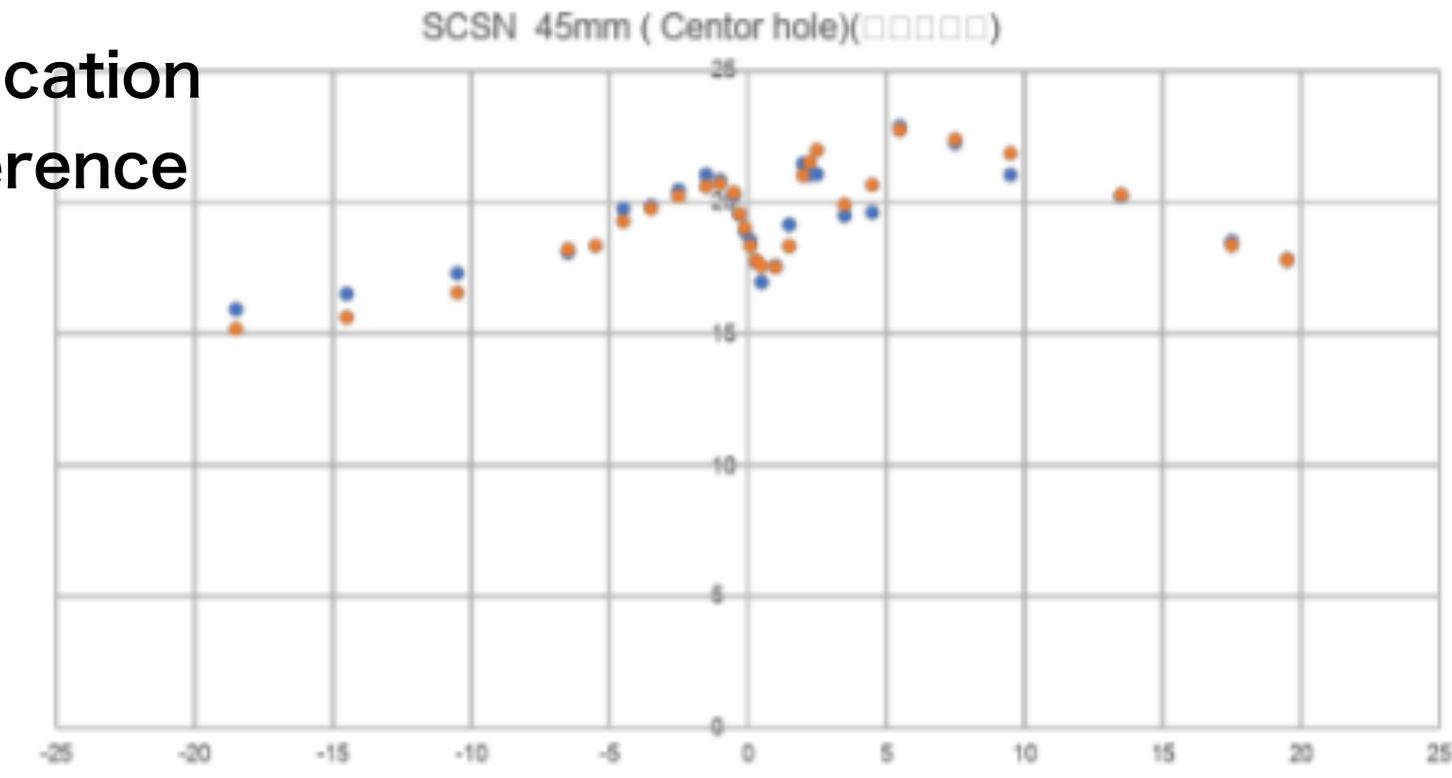
- Center hole of China
- Center hole made in J
- By different com.
- Surface roughness





Company R

Fabrication Difference

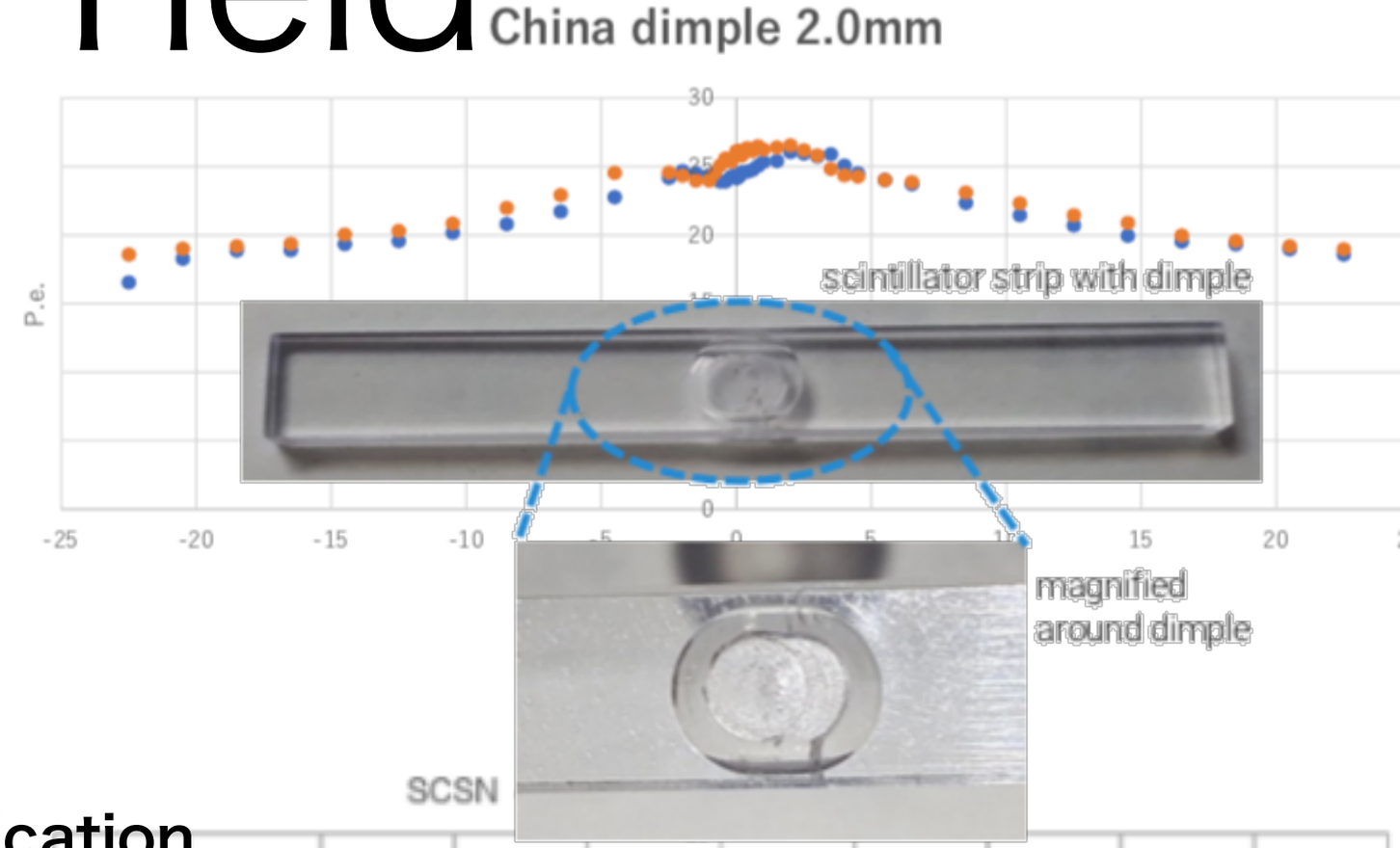


Company T

Shirai

strip Light Yield

- Center hole of China
- Center hole made in J
- By different com.
- Surface roughness



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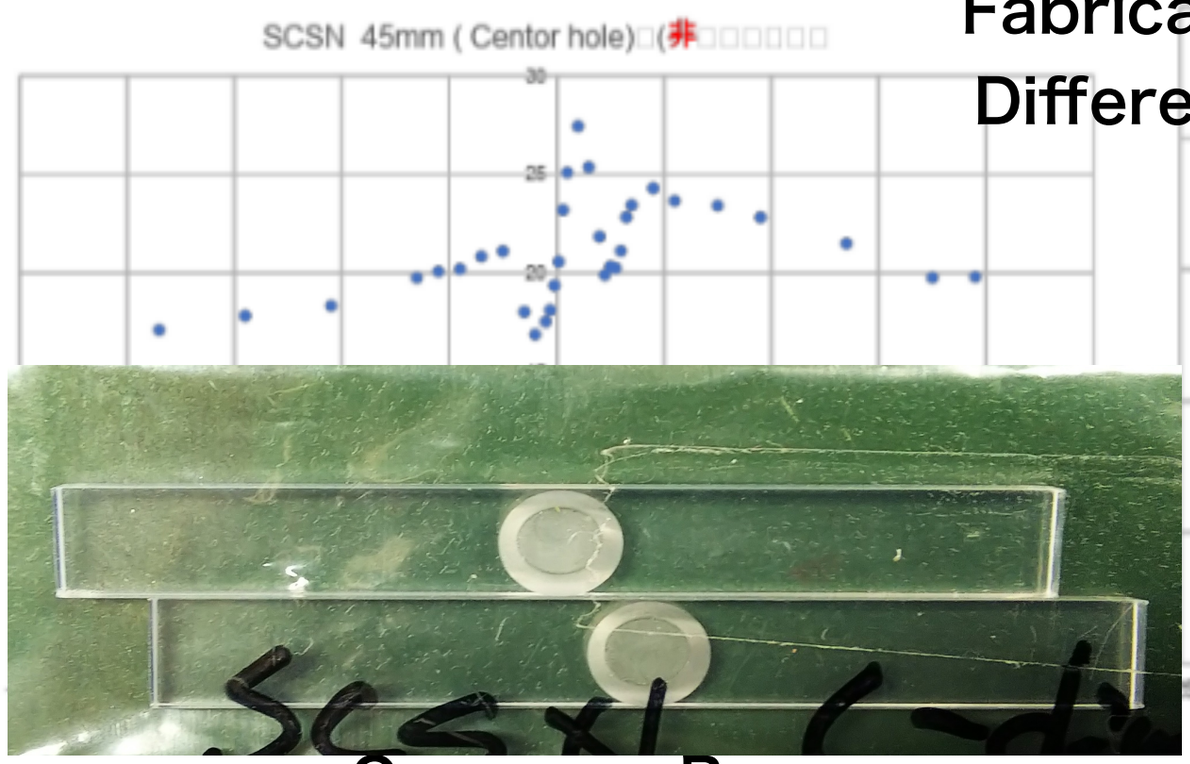
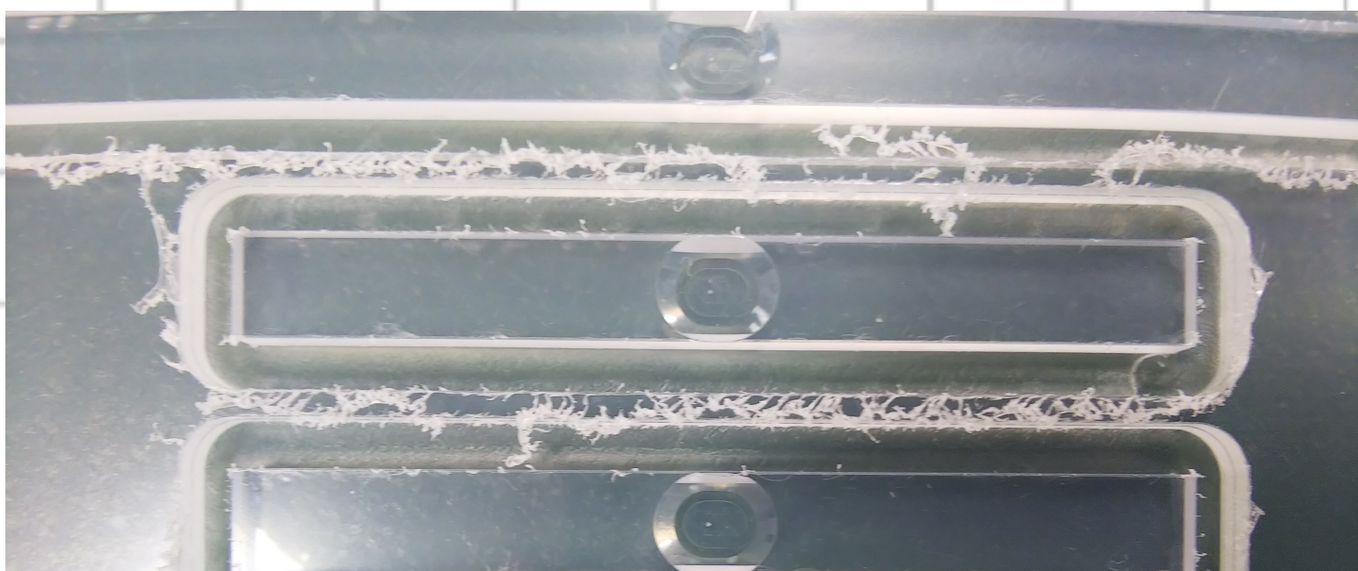


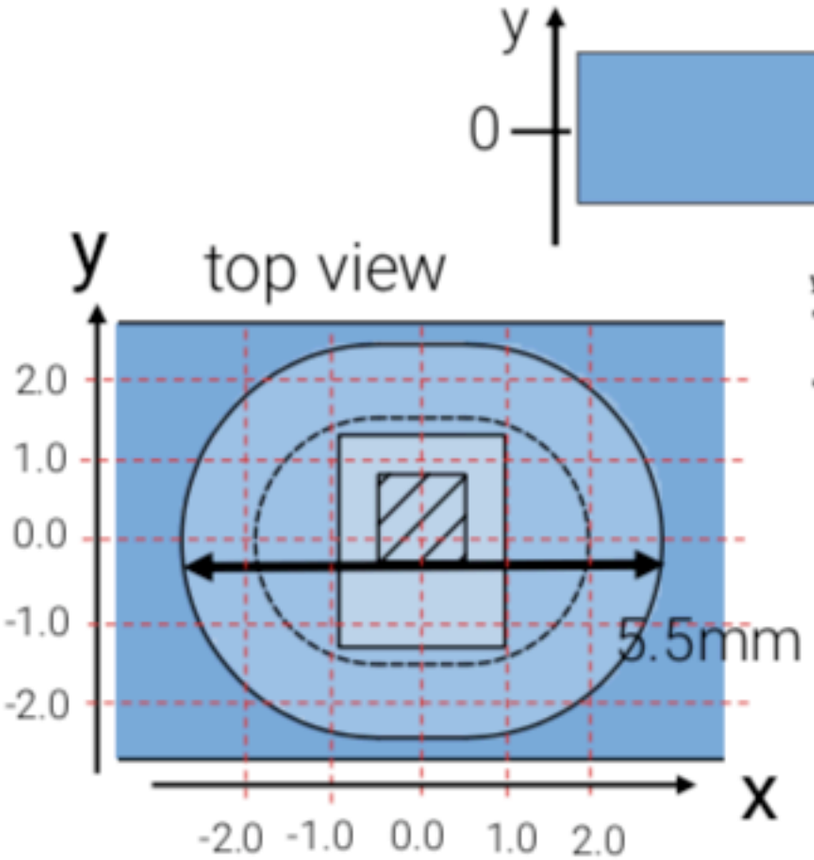
Company R

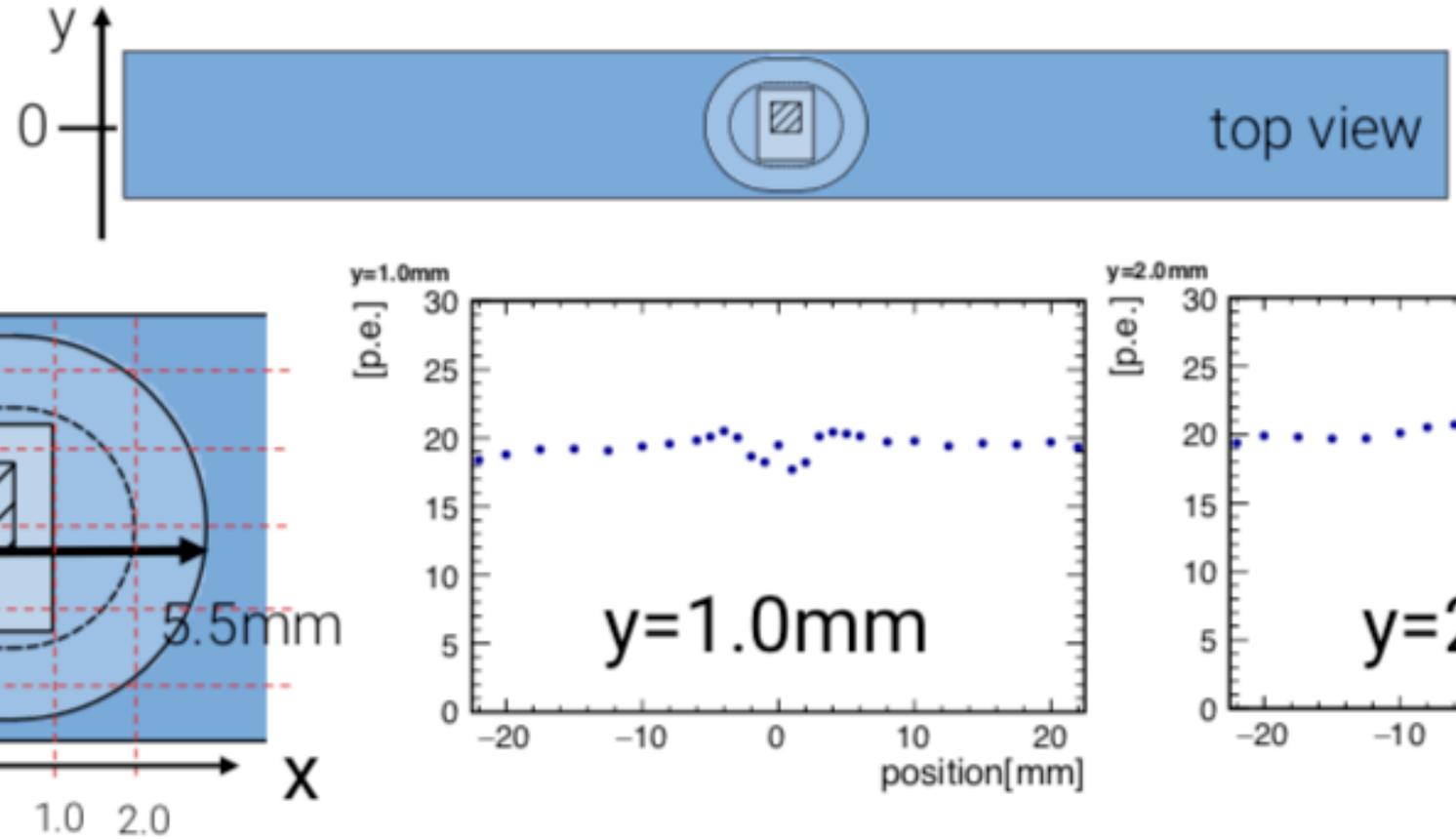
Shira

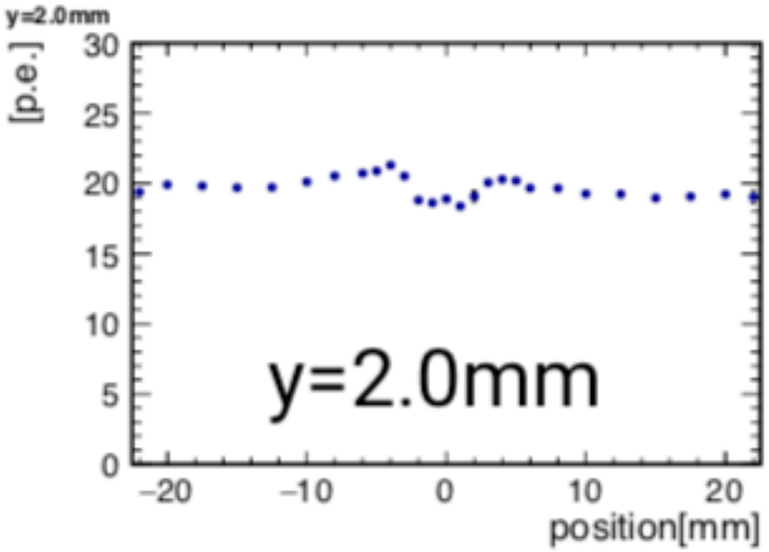


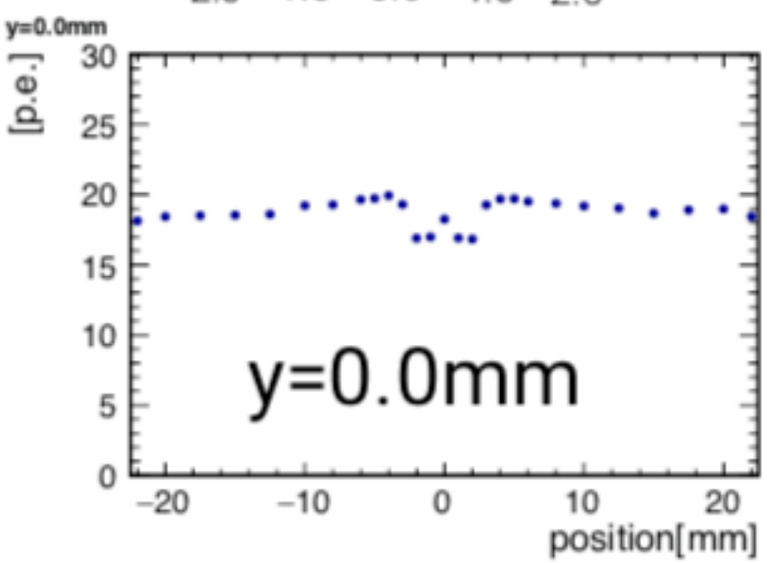
Center dimple test

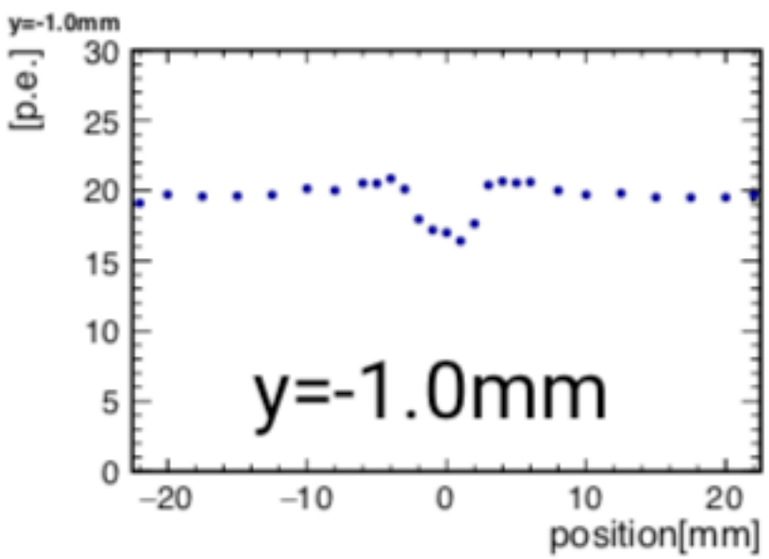
- Mogi ICEPP measured

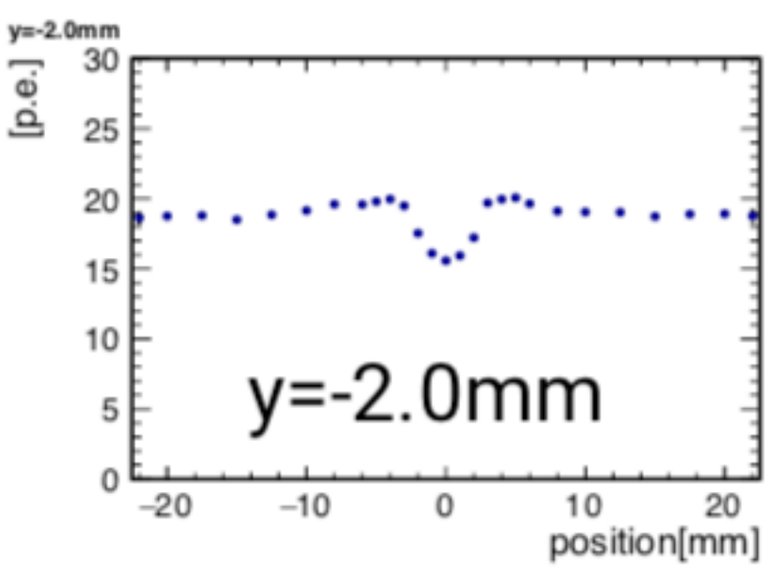








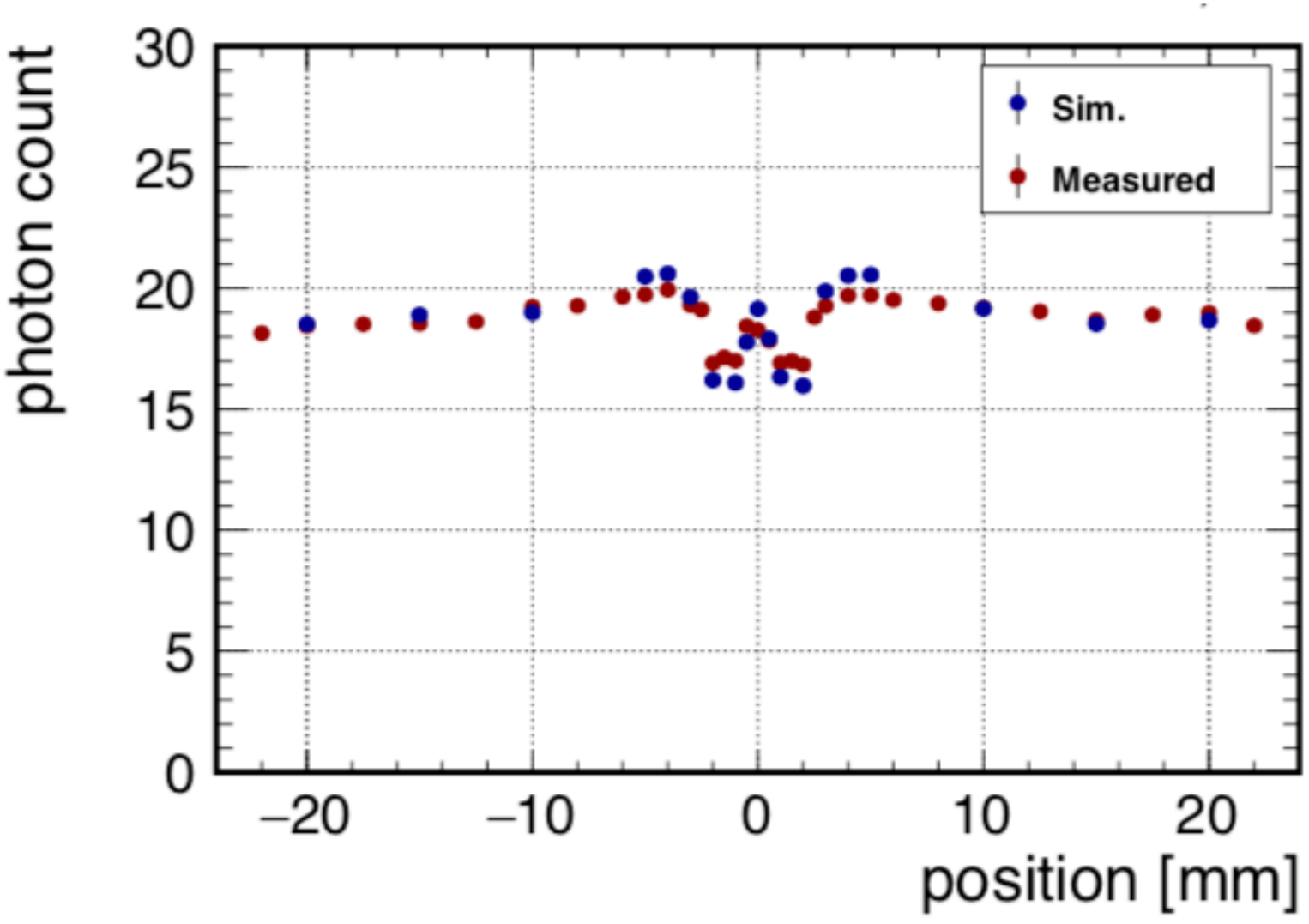




Center dimple simulation

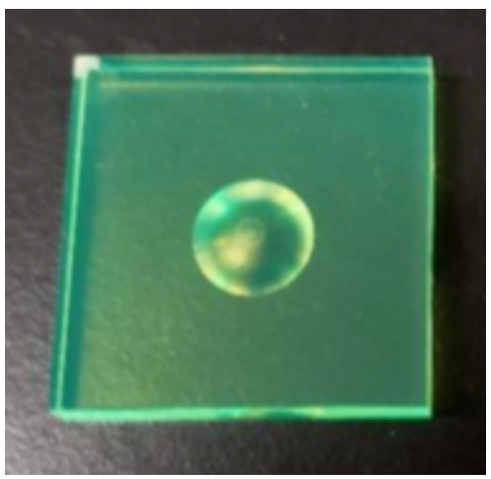
- G4 simulation with visible photon tracing

- Tuning the parameters depending on wavelength, such as absorption length, reflectivity, and refractive index



Active absorber CAL

- Lead glass active absorber ECAL has been tested
- Energy resolution is dominated by photon statistics
- To improve number of photon from 3x3cm2 lead glass block, 1.6 times larger signal with WLS coupler



1.6 times large number of photons

scECAL at Shinshu

- Preparing Test Beam at DESY
- Preparing another EBU with center hole+dorm
- Publication of Segmented Lead glass ECAL performance is in preparation

Fabricated
By com. T