

status report from Shinshu- toward the scecal beam test at DESY

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Shinshu contribution to the scale beam test at DESY

Preparation of two EBU's

Bottom and Center read out



ECAL Technological prototype

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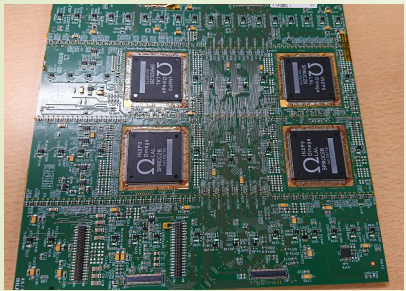
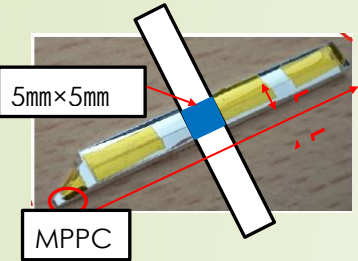
Scintillator Electro-Magnetic CALorimetre : scECAL

Scintillator strip : sensor with tungsten absorber

++ embedded readout electronics (EBU)

Orthogonal setting of sc-strip gives 5mm x 5mm resolution

We have been studying with separated electronics and now verifying of Integrated electronics (EBU) in a layer

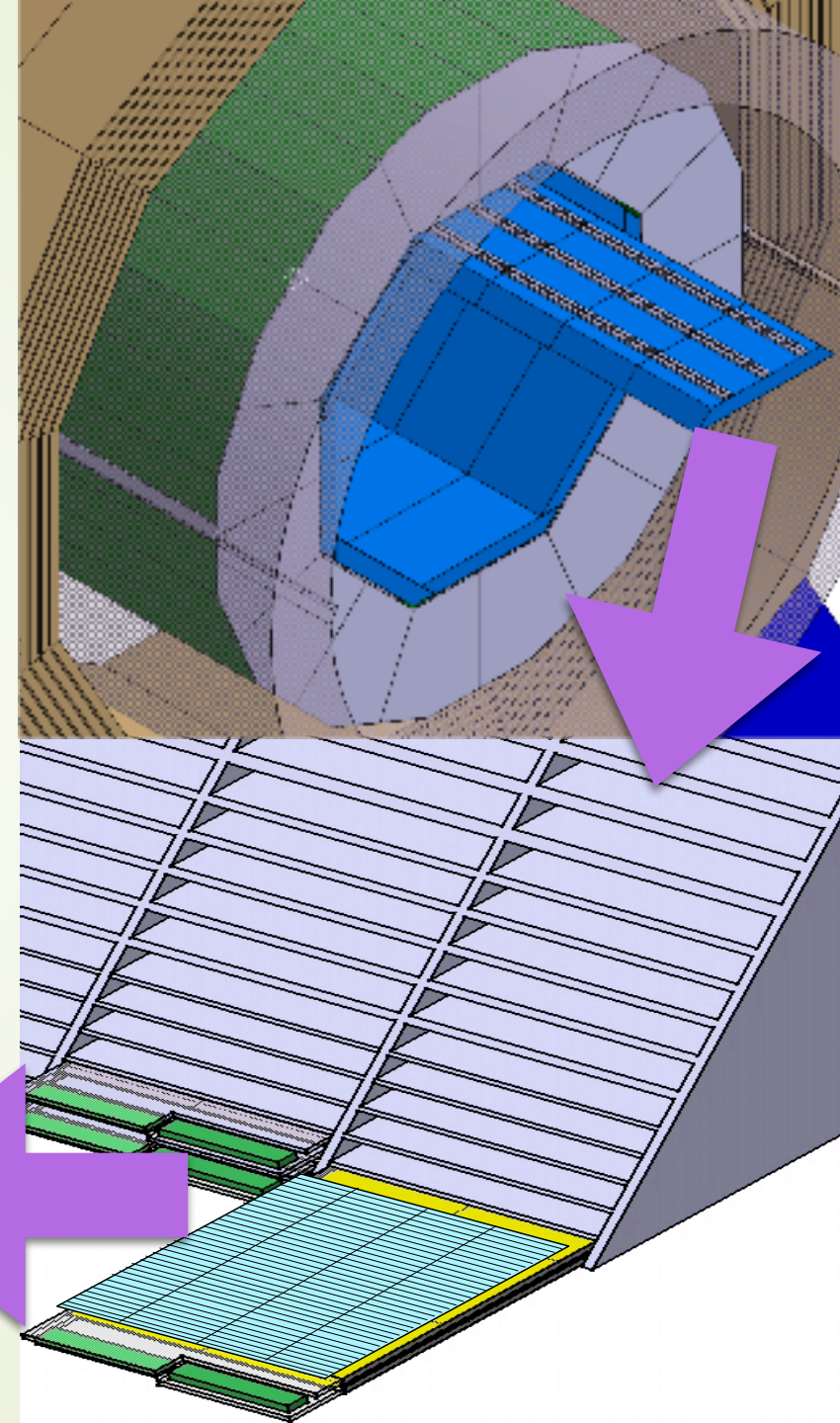
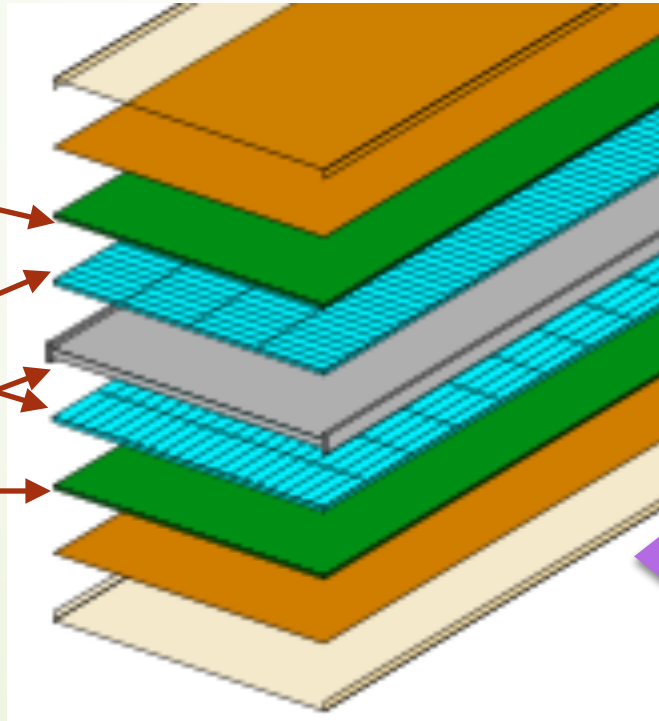


EBU

Scintillator strip

Tungsten abs.

EBU



EBU = ECAL Base Unit by DESY

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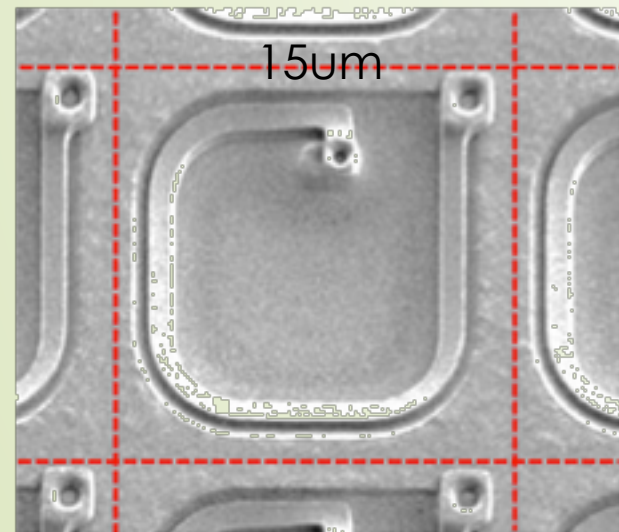
18cm x 18cm < 5mm/layer

144 sc-strips and MPPCs

Front end electronics = SPIROC2b ASIC (Ω)

- MPPC signal will be amplified, memories and digitized in SPIROC then read out
- Gains, thresholds and timing control
- LED calibration capability for p.e. gain
- Bias control, monitor

● Fill factor: 49%



trench

Sc-strip = 5x45x2mm³

Bottom read out and Center read out by a MPPC

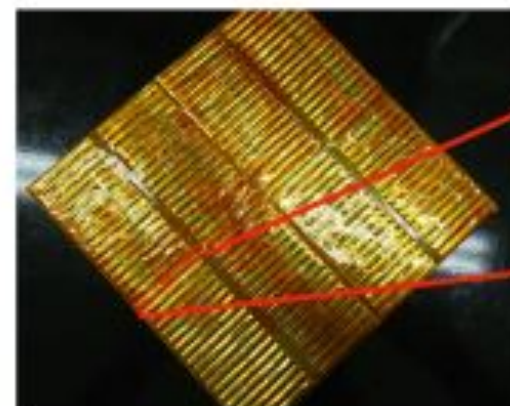
15µm pitch (~7500 pixels in 1.3x1.3 mm²)

SPIROC2b

EBU



SIPROC surface 18cm



Scintillator surface

scintillator

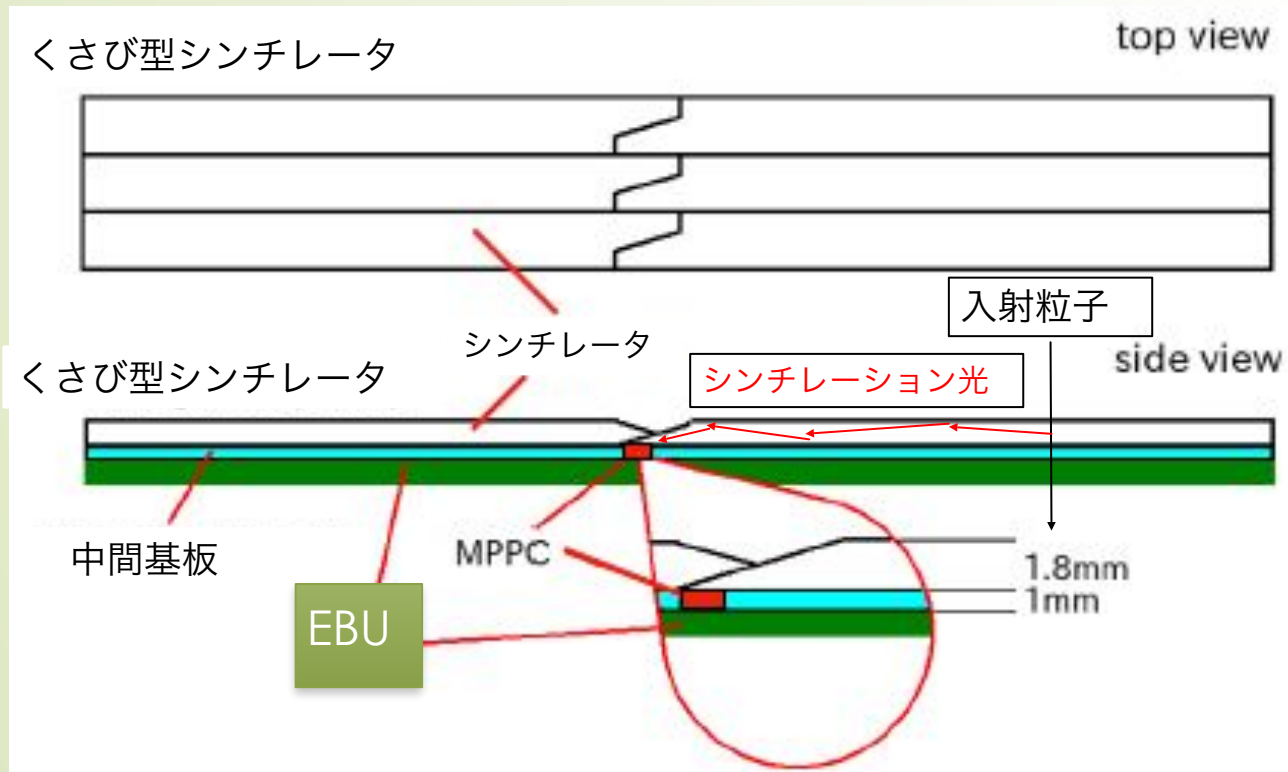


45mmx5mm

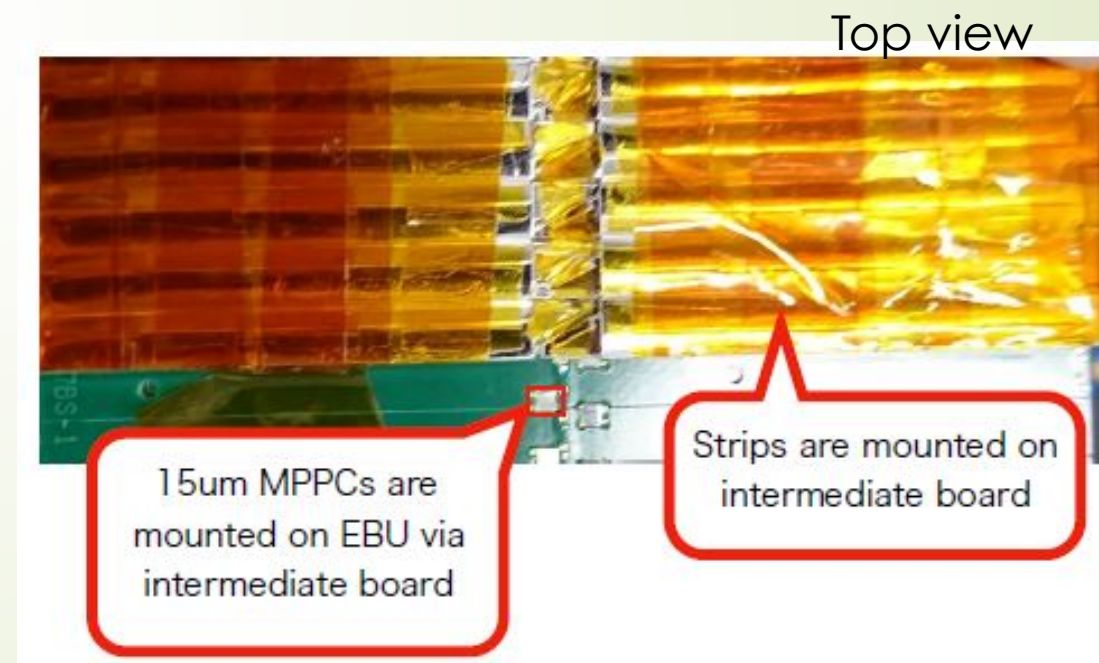
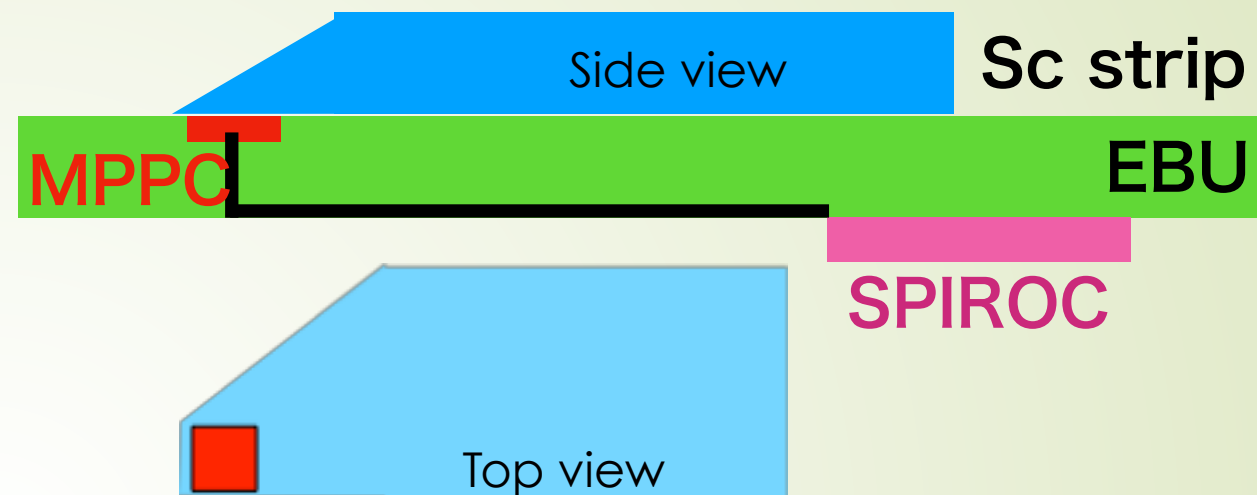
Bottom read out of sc-strip

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No dead volume in the scintillator plane
Better uniformity of response along the length
(than side read out)



Bottom read EBU



Center read out of sc-strip

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- A dimple at center of a strip
- A dimple with race track shape
- Need optimization and understanding of the shape of dimple

Center read EBU

Side view

Sc strip

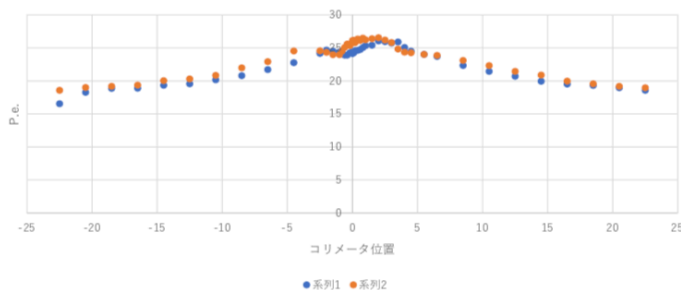


MPPC

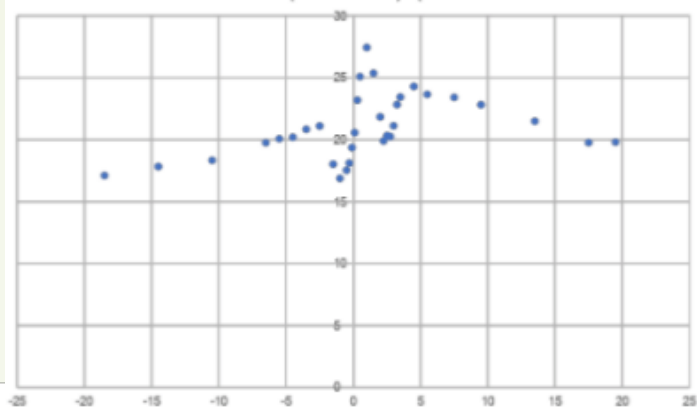
EBU

SPIROC

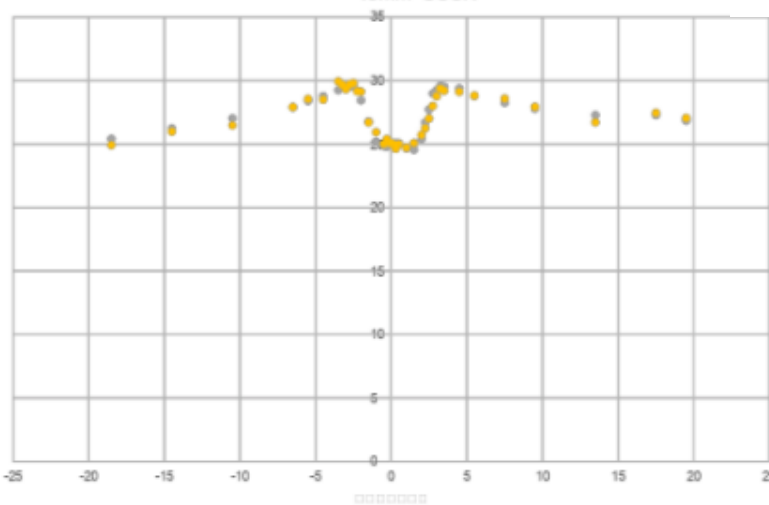
China dimple 2.0mm



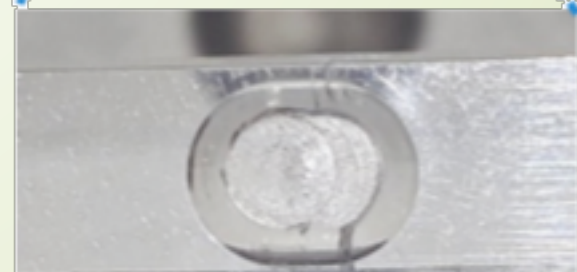
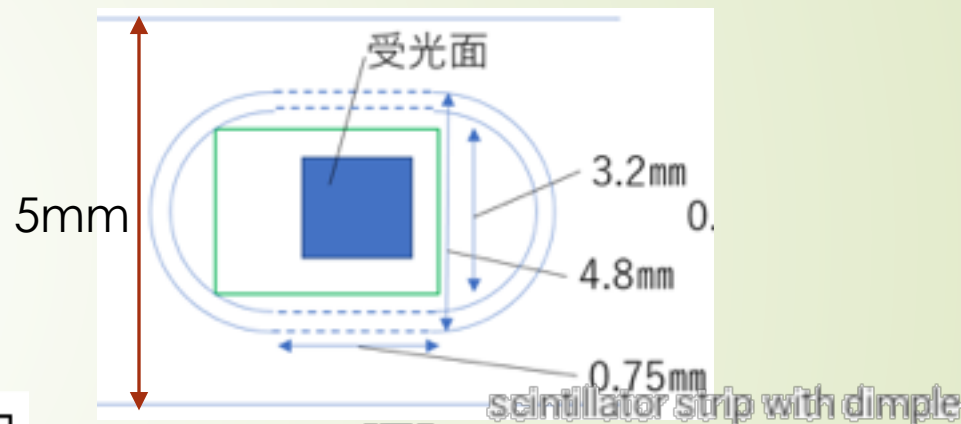
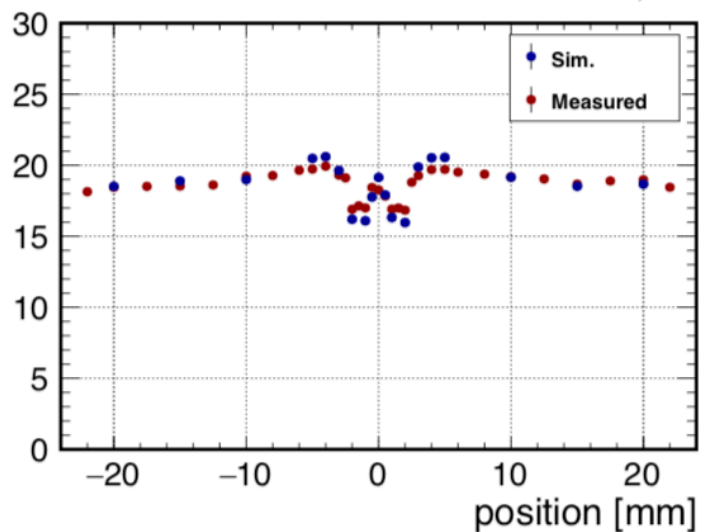
SCSN 45mm (Center hole)



43mm SCSN



photon count

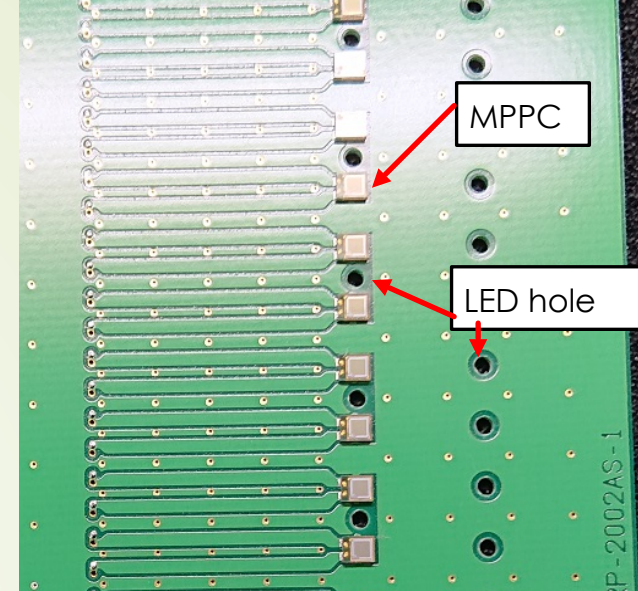
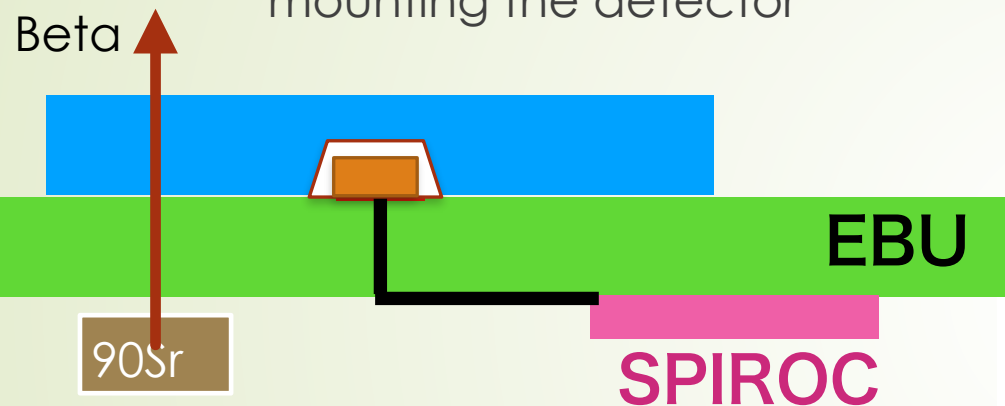


magnified around dimple

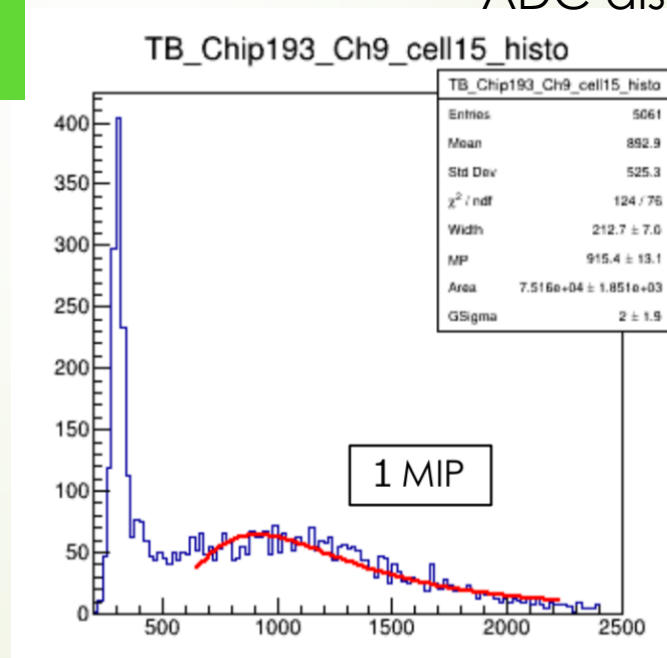
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EBU readiness

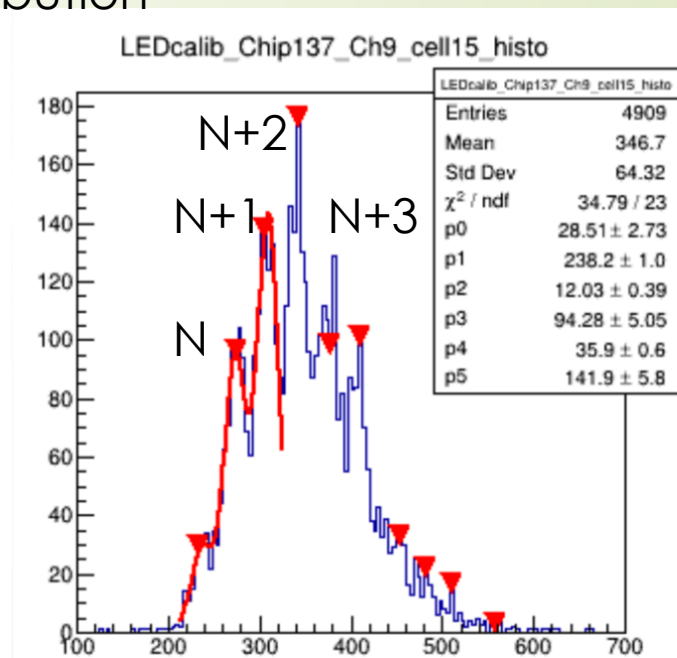
- LED calibration : detect photo-electron peaks and gain stability can be monitored
- MIP calibration: absolute gain : before mounting the detector



ADC distribution



ADC counts



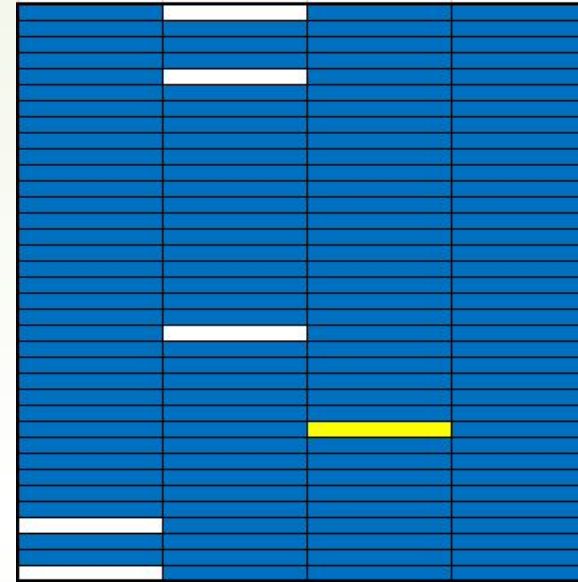
ADC counts

EBU readiness : current status

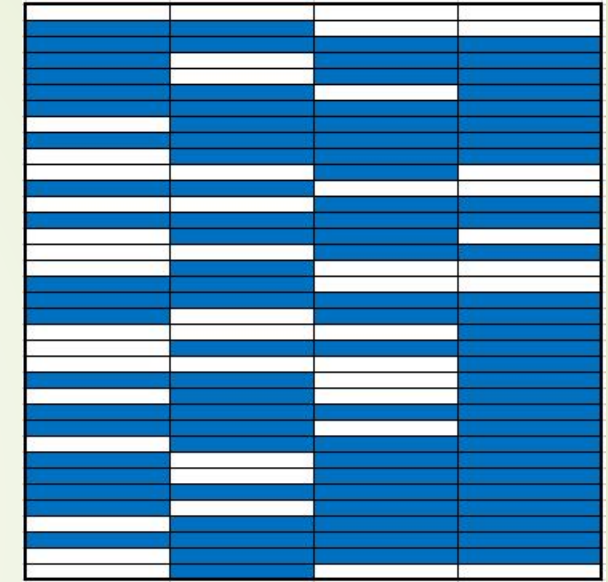
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- Bottom readout EBU
- MIP 138/144 (96%)
- LED 98/144 (68%)
- Center readout EBU
- MIP 106/144 (74%)
- LED 34/36 on going
- Need more effort to improve

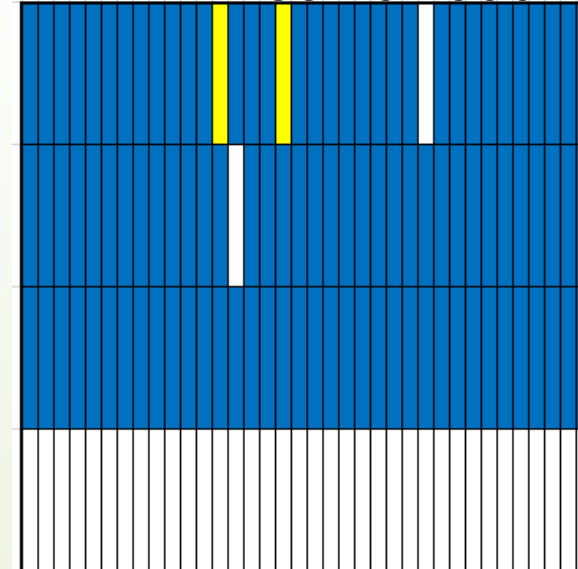
MIP with bottom read



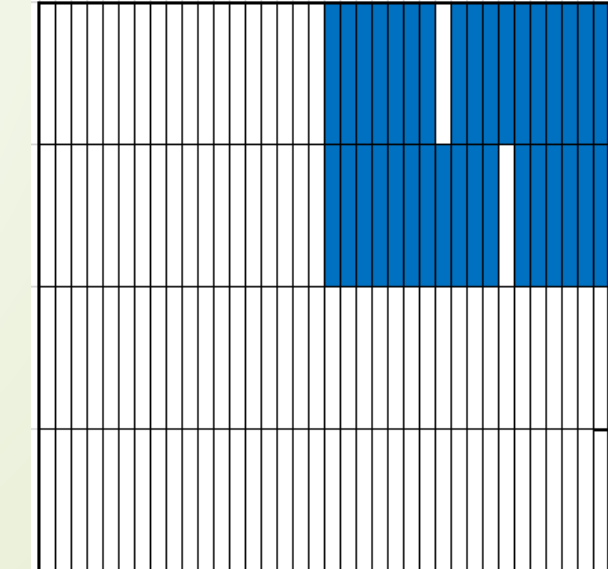
LED with bottom read



MIP with center read



LED with center read

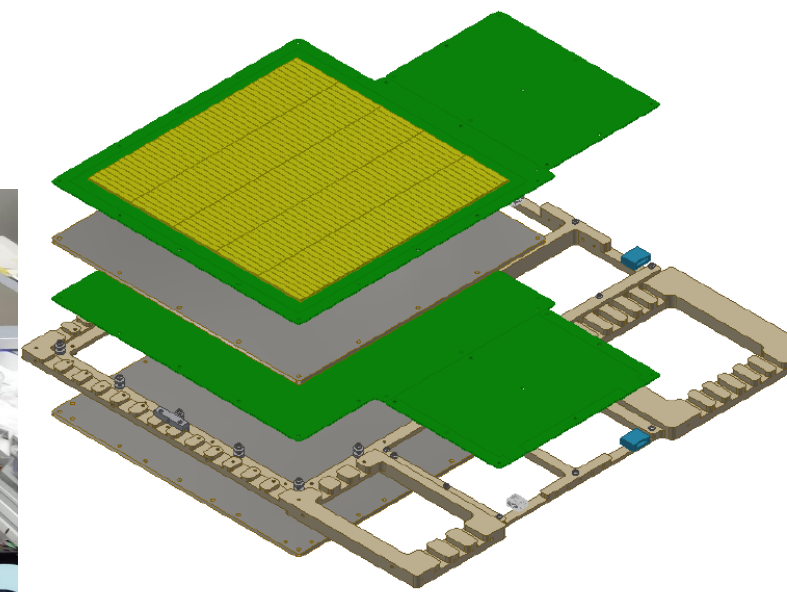
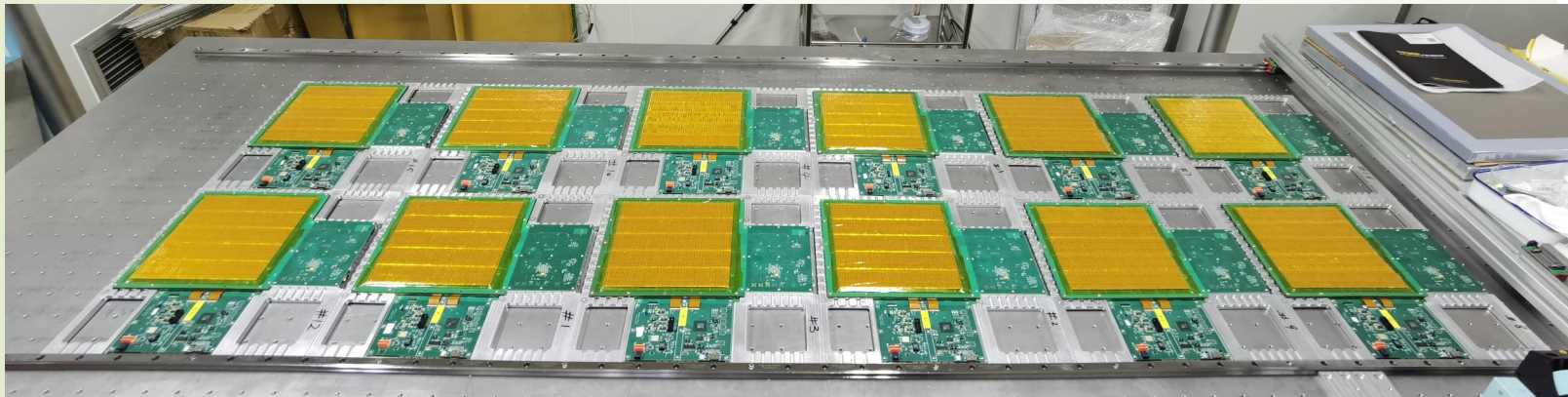
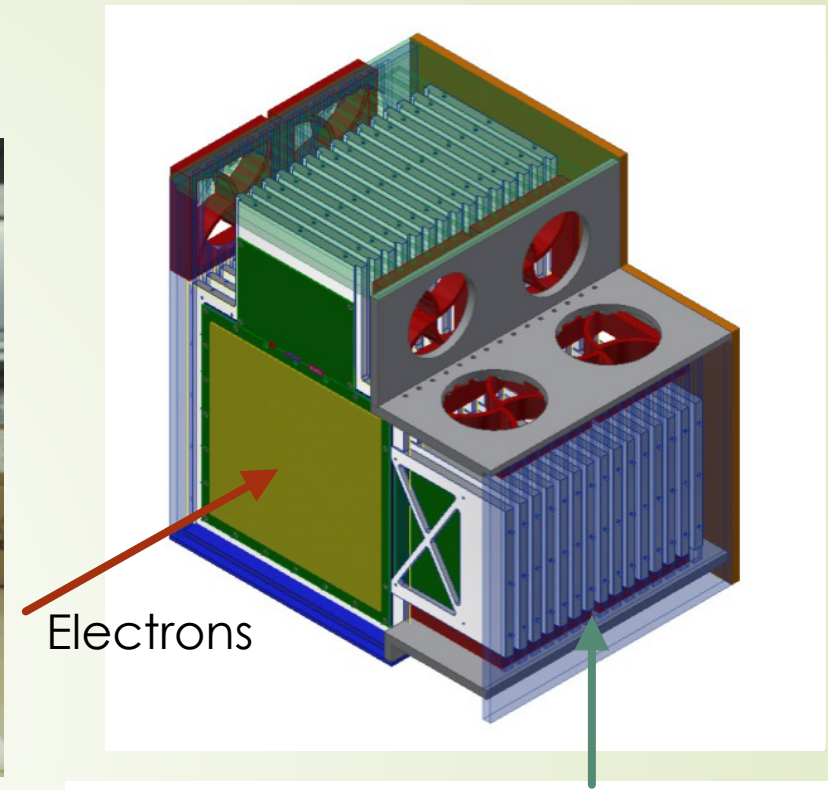
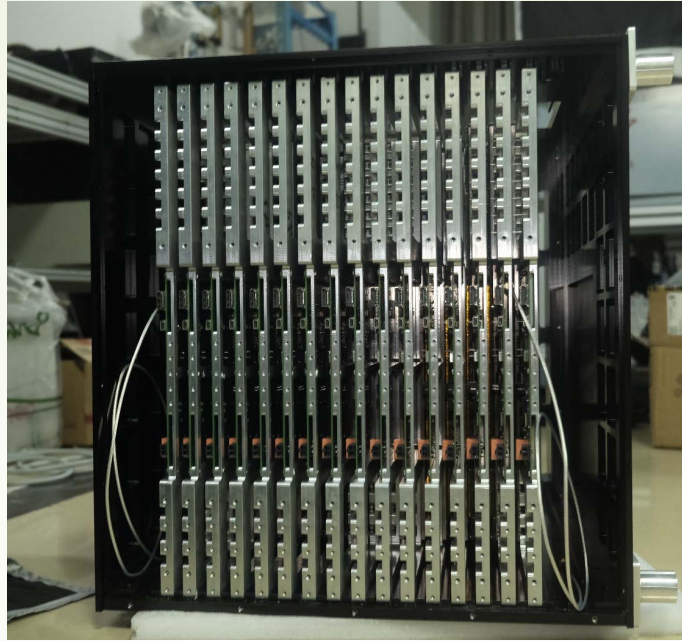


Scecal beam test at DESY

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Feb2021

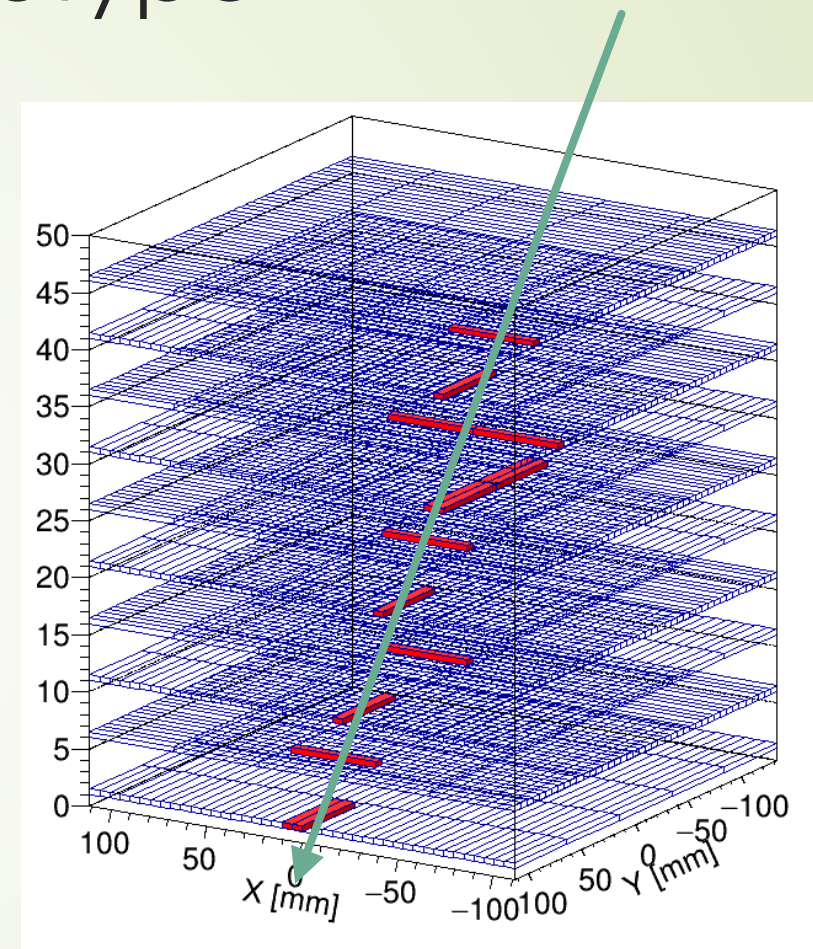
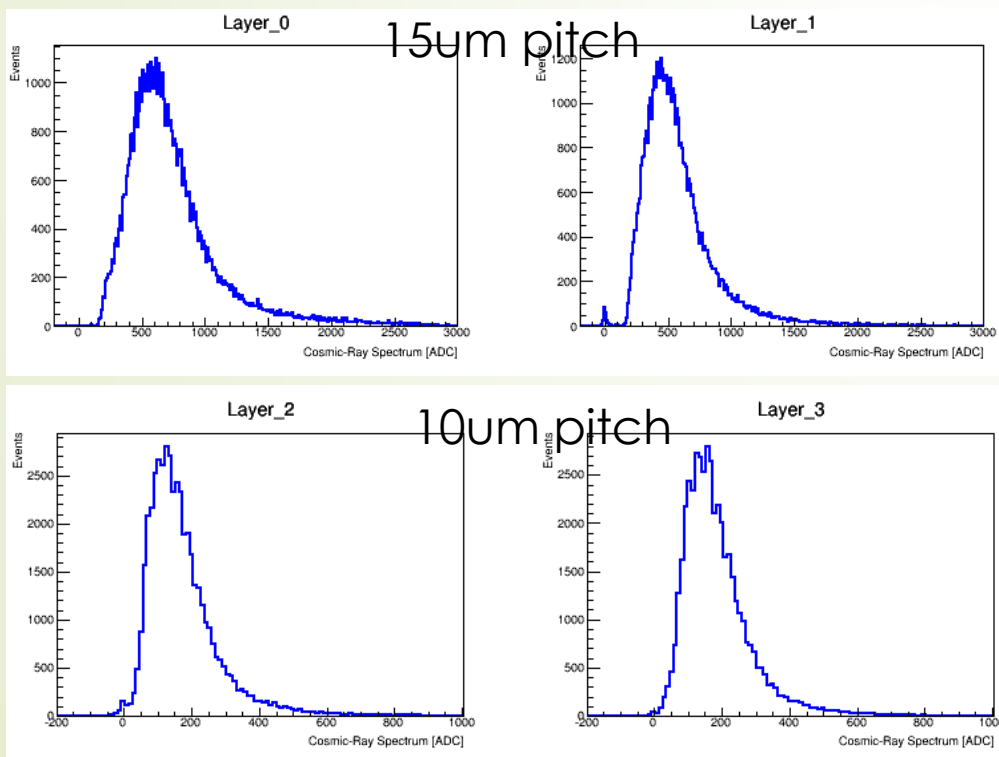
- 34 layers of scecal
- 30 : China (center read with 10+15 μm pitch MPPC) USTC+IHEP
- 2: ICEPP (double read with 15 μm)
- 2: Shinshu (center and bottom read with 15 μm)
- All fabricated



Scecal technological prototype

- In preparation
- Cosmic ray test
- 10 layers with self trigger
- 32 layers with ICEPP cosmic trigger settings in progress

ADC dist.



Scecal beam test

- With ICEPP, USTC & IHEP
- Shinshu contributes with 2 layers
 - Bottom read out layer
 - Center read out layer
 - Tuning is on going
- Feb2021 at DESY

