Status of Sc-ECAL prototype

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Outline

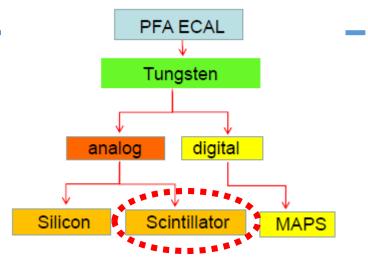
- Introduction of Sc-ECAL prototype
- Status of the prototype developing
- Joint with CEPC software

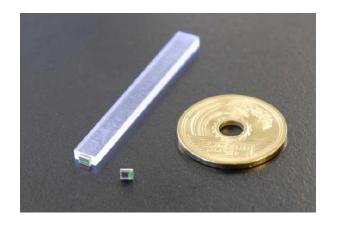
Sc-ECAL prototype

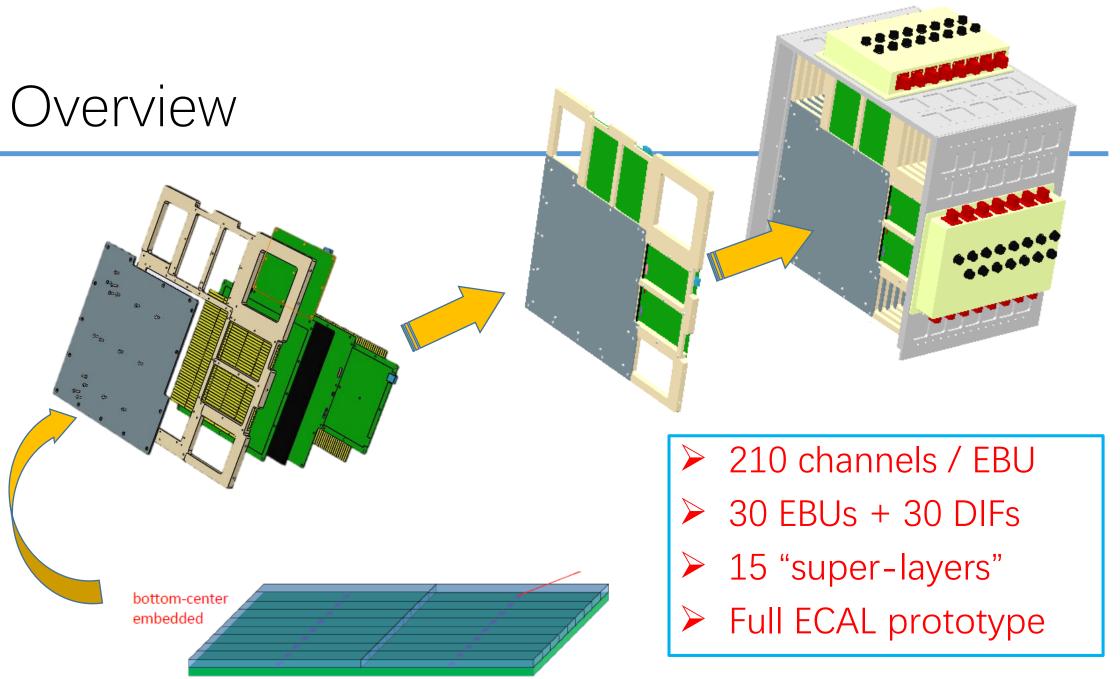
- PFA oriented electromagnetic calorimeter
- Scintillator-tungsten sandwich structure
- SiPM readout with SPIROC2e

Sc-ECAL prototype parameters:

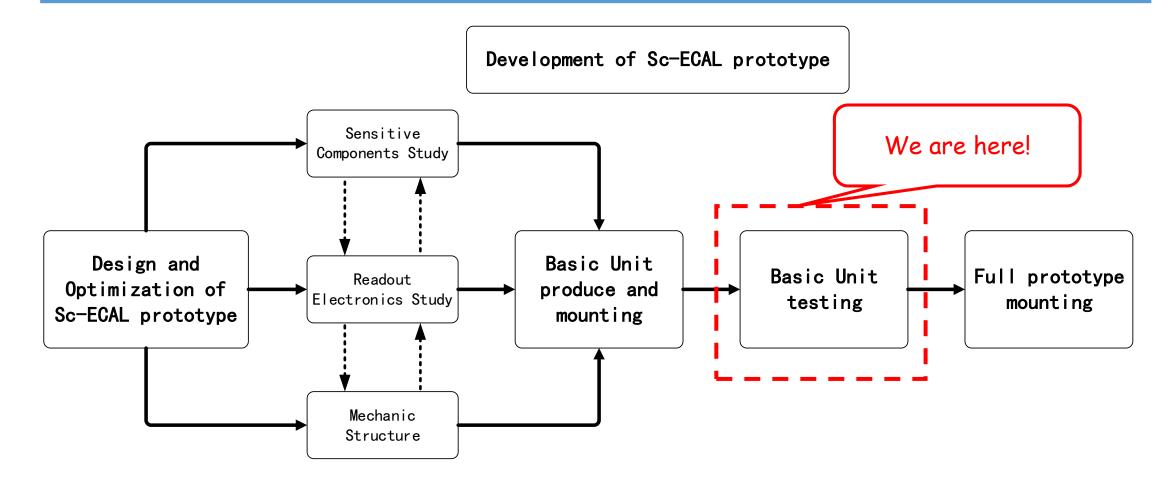
- Layers number : 30 layers
- Absorber : 3.2 mm W Cu(85:15)
- Scintillator strip : $2mm \times 5mm \times 45mm$
- SiPM : 10000 pixels & 4489 pixels



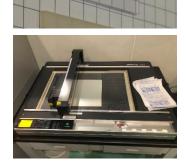




Overall progress

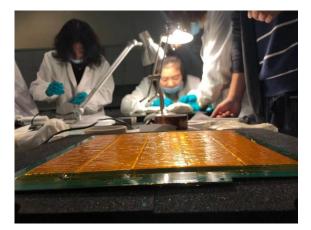


Ecal Basic Unit mass produce

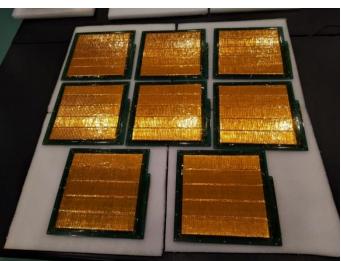




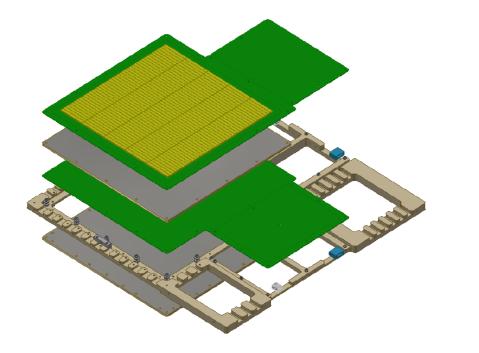


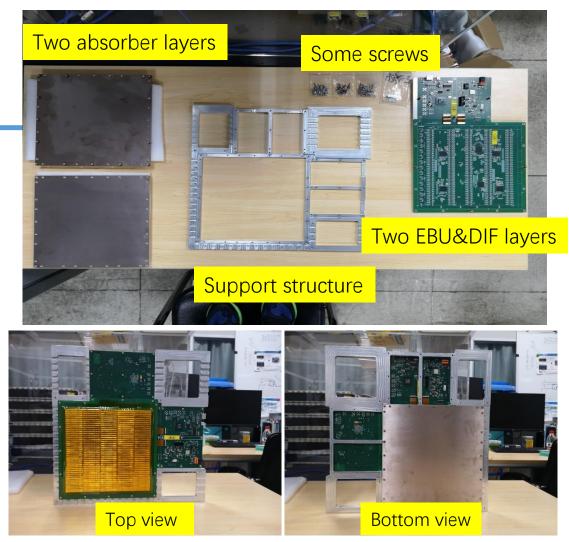


- Ecal Basic Unit mass produce
 - Scintillator strip and ESR cutting and machining
 - Scintillator strips wrapping
 - PCB soldering and testing
 - Ecal Basic Unit assembly



Super-layer mounting



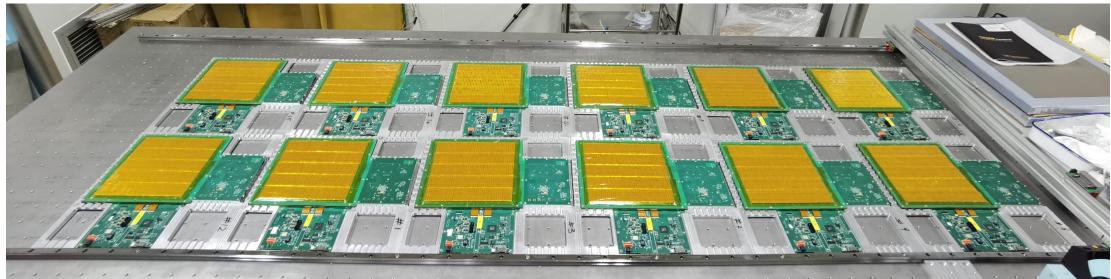


- One super-layer is a independent unit
- One super-layer consists of two EBU and inserted by two absorber layers

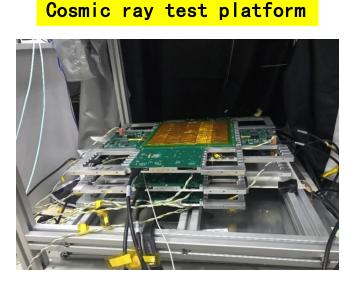
Super-layer mounting

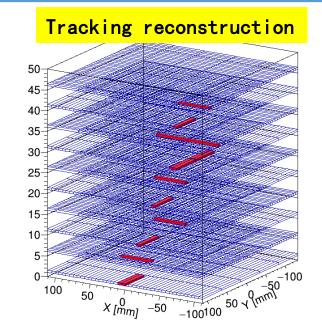


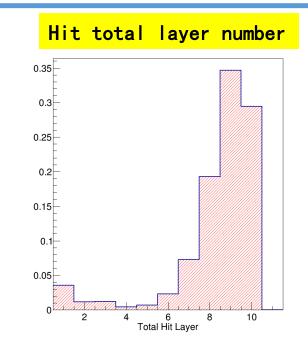
• 16 super-layer in total



5 super-layers combined commissioning





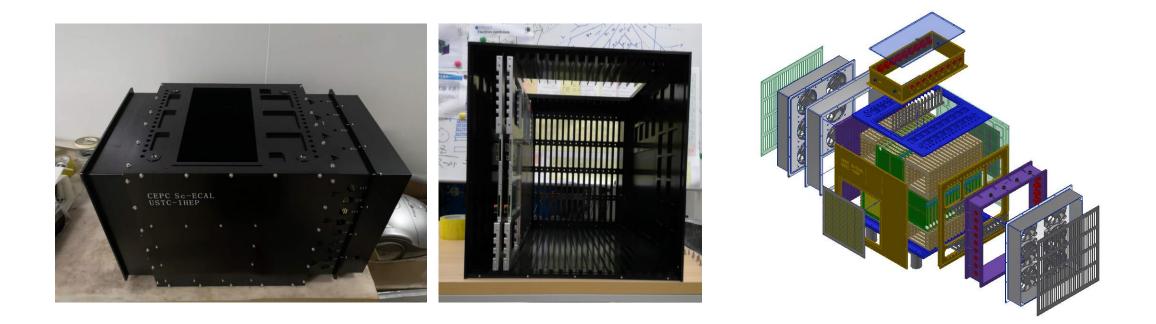


- The combined test system worked
 - Data acquisition and transmission properly
 - Event build correctly for 10 EBU layers
 - More than 95% events hit for more than 5 layers

Cosmic ray test results

EBU with 15 um SiPM Layer_0 Layer_1 Layer_9 Layer_8 Layer_0 Layer_1 Layer 8 Layer 9 Entries 78247 Entries 89355 1800 Entries 81905 Entries 124900 614.8 . ≝ 1200 – Mean 764.9 Mean Ξ, t 695.2 400.5 564.1 431.9 400 Mean RMS Mean RMS 445 RMS 365.5 ₫ 3000 匚 1600 E RMS 1200 1000 1400 2500 1200 1000 800 2000 1000 800 -600 1500 F 800 600 F 600 F 400 F 1000F 400 400 F 200 500 200 200 1500 2000 2500 1500 1000 1000 2000 25003000 1000 1500 2500 500 1000 2000 500 2500 Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC] EBU with 10 um SiPM Layer_4 Layer_5 Layer_2 Layer_3 Layer_4 Layer_5 Layer_2 Layer_3 ള 4500 r 76041 176.2 121.9 Entries Entries 71138 78350 197.8 125.3 ^뷥 4500 문 Entries Entries 79943 .≣ 5000 -146 99.02 Mean Mean [™]4000 E . 홍 4000 는 Mean 186 Mean RMS RMS BMS 129.7 RMS 4000 F 3500 3500 4000 3500 E 3000 E 3000 E 3000 F 2500 3000 2500 2500 E 2000 2000 2000 2000 1500 1500 1500 1000E 1000 E 1000 F 1000 500 F 500 E 500 F 200 Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC] Cosmic-Ray Spectrum [ADC]

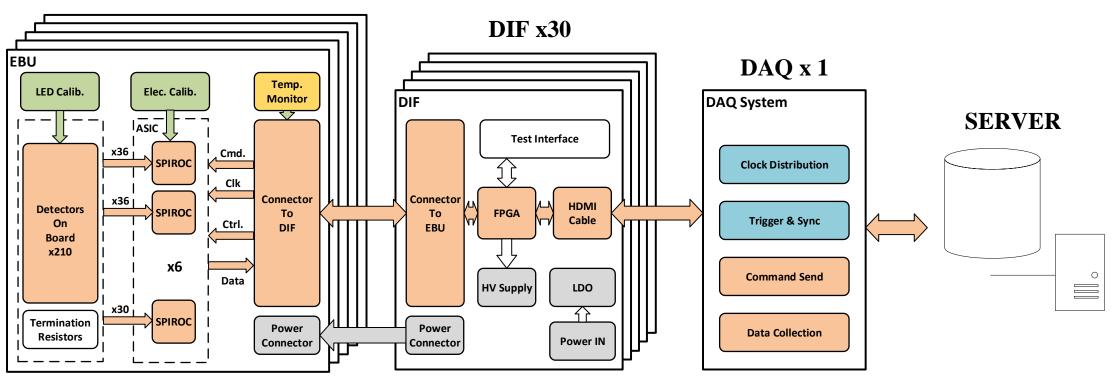
Mechanic structure of the prototype



- The mechanic structure is manufactured, hold at most 17 super-layers
- The full prototype mounting in the near future

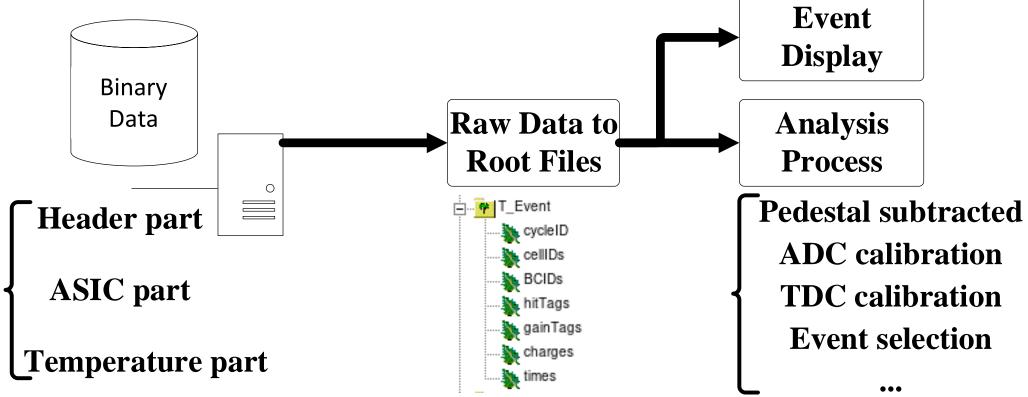
Data acquisition

EBU x30



Data analysis flow

Data Collection of Sc-ECAL



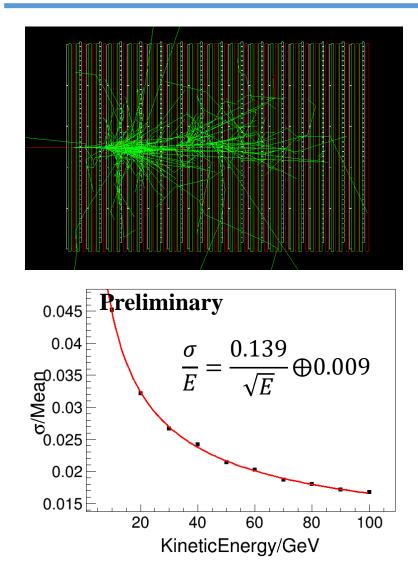
Joint with CEPC software

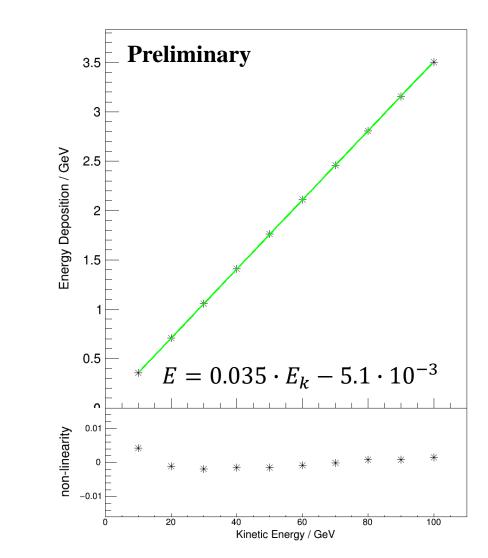
- Sc-ECAL prototype geometry description
 - Be as consistent as possible with prototype
 - Flexible parameter modification
- Data structure
 - Convert to LCIO format
- Test beam simulation
 - Energy range, position ...
- Reconstruction and analysis
 - Comparison of the simulation and the prototype test beam

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Additional

Sc-ECAL prototype simulation





Structure of ScECAL prototype

