Status of Sc-ECAL prototype

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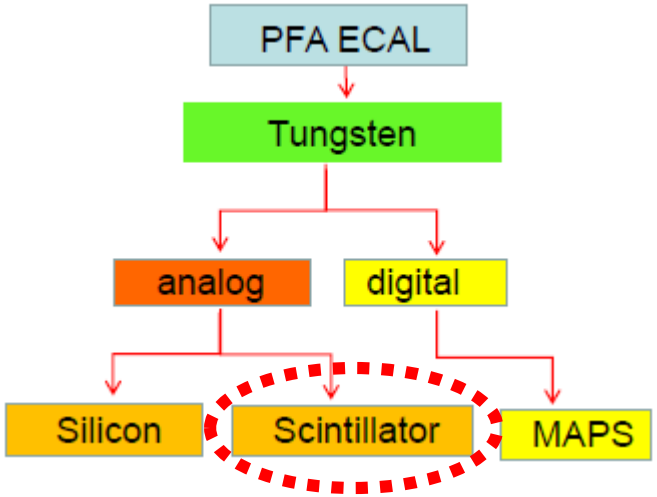
Outline

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

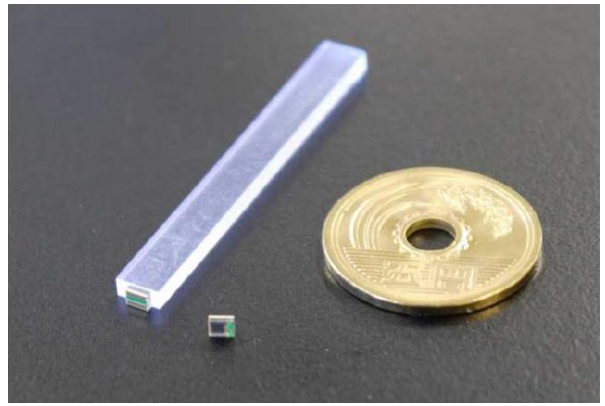
Sc-ECAL prototype

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

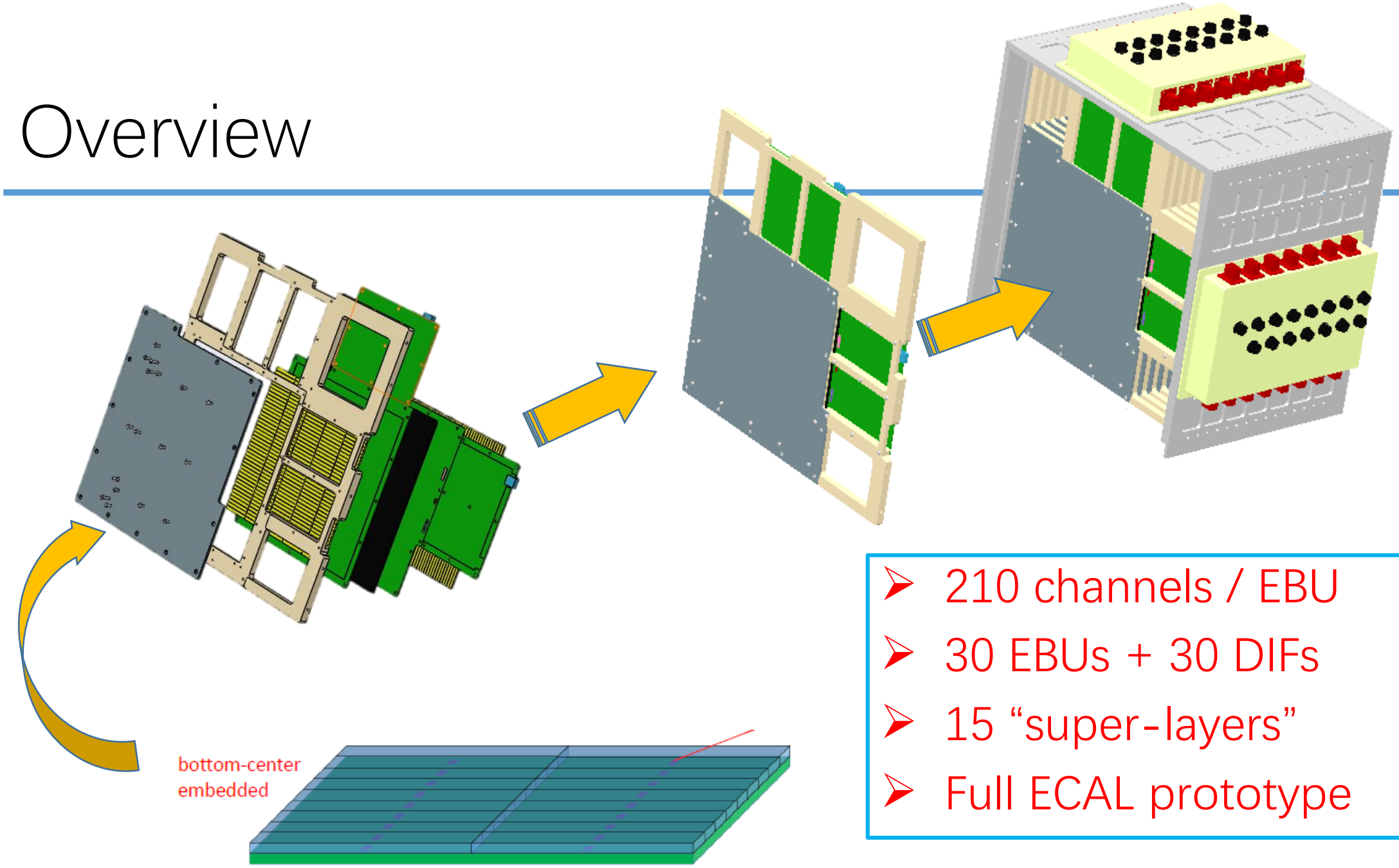


Sc-ECAL prototype parameters:

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

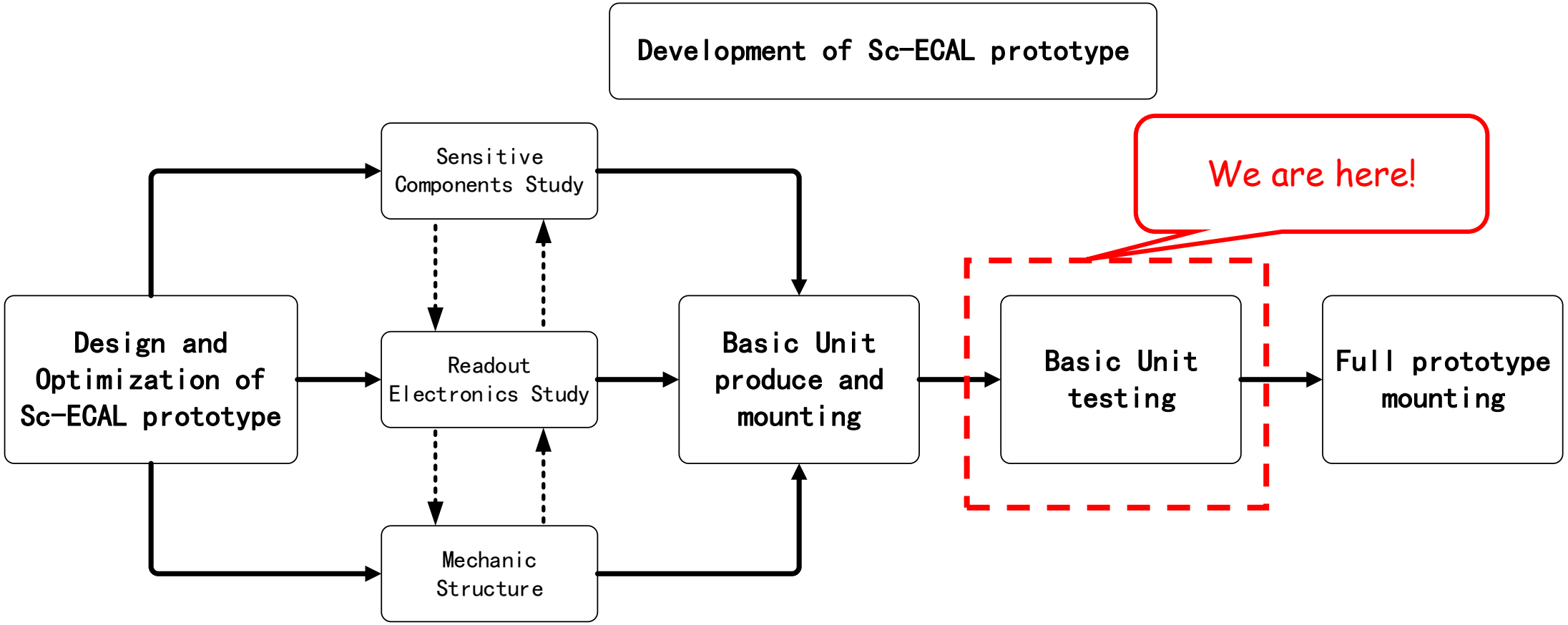


Overview

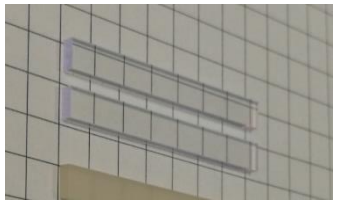


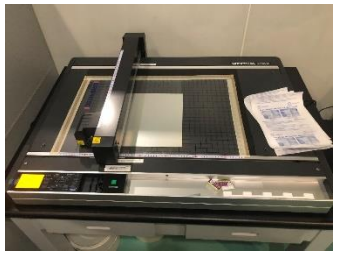
- 210 channels / EBU
- 30 EBUs + 30 DIFs
- 15 “super-layers”
- Full ECAL prototype

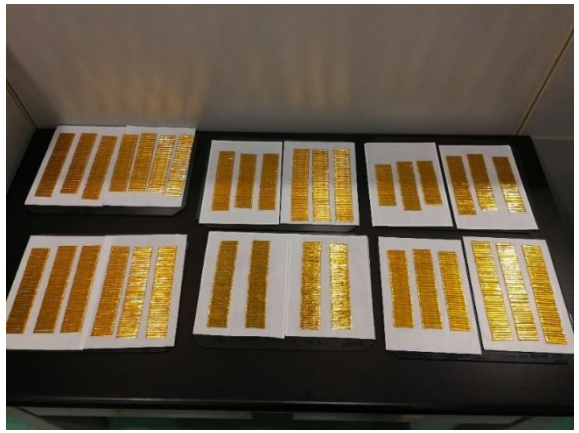
Overall progress

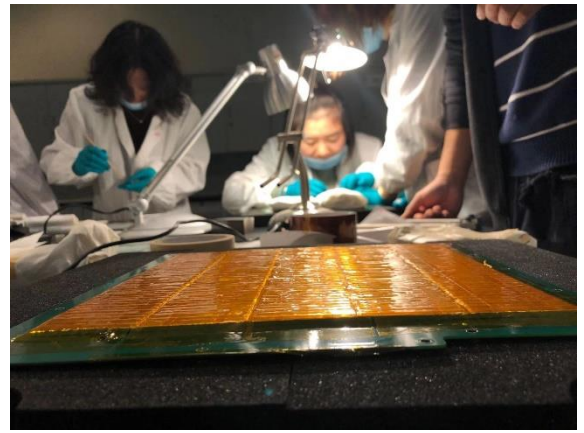


Ecal Basic Unit mass produce

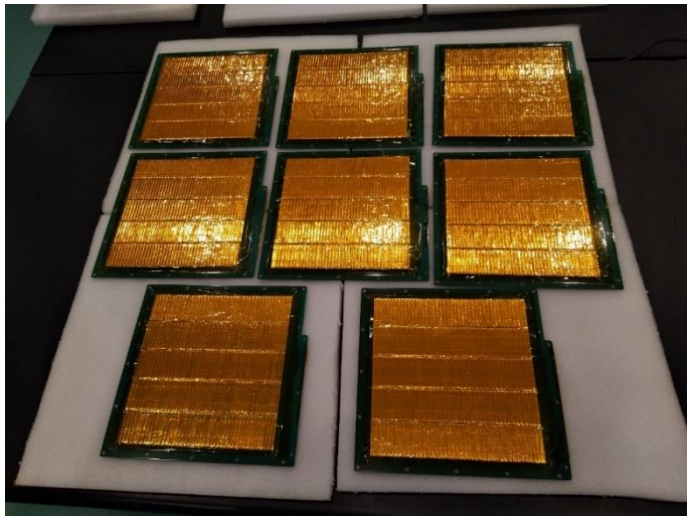




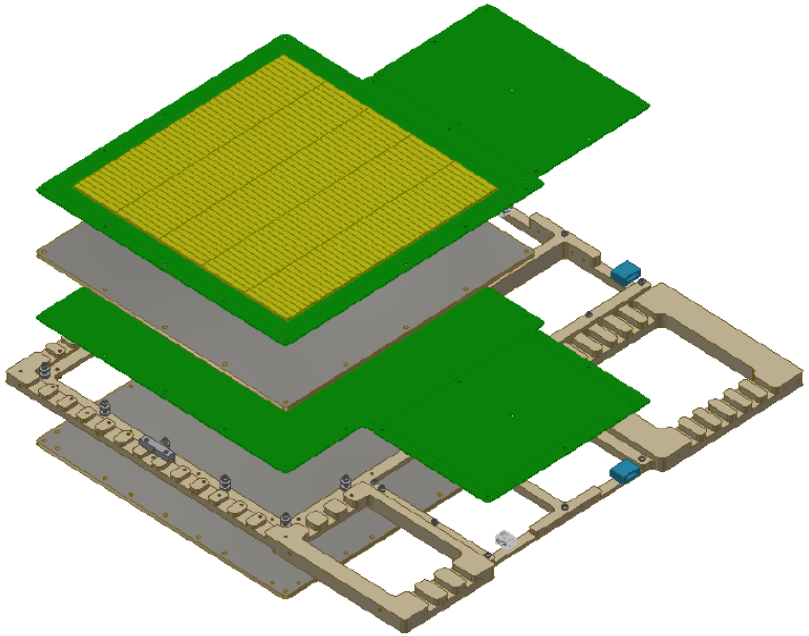


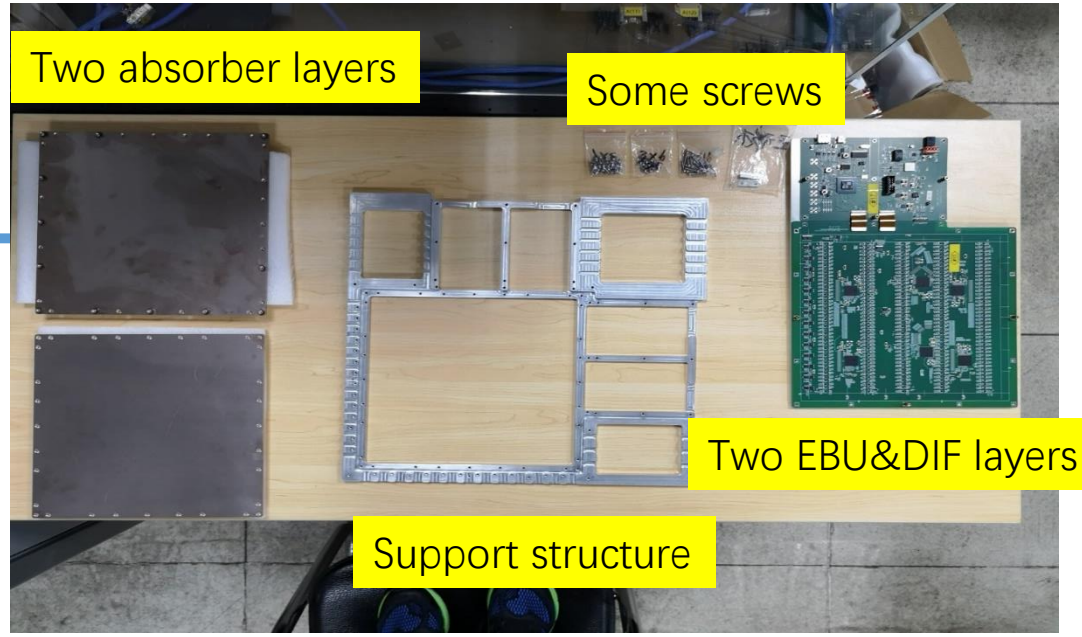


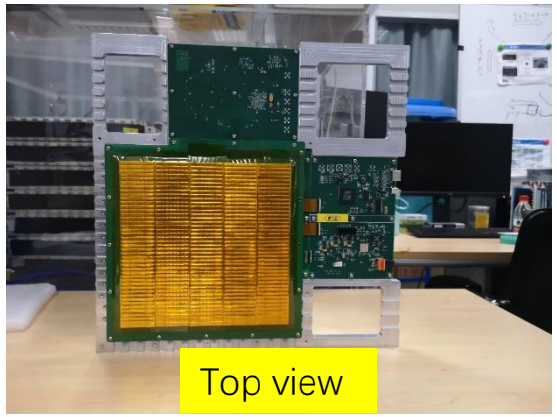
- Ecal Basic Unit mass produce
  - Scintillator strip and ESR cutting and machining
  - Scintillator strips wrapping
  - PCB soldering and testing
  - Ecal Basic Unit assembly

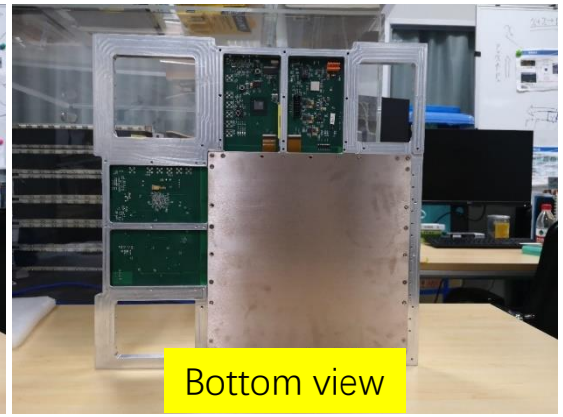


Super-layer mounting









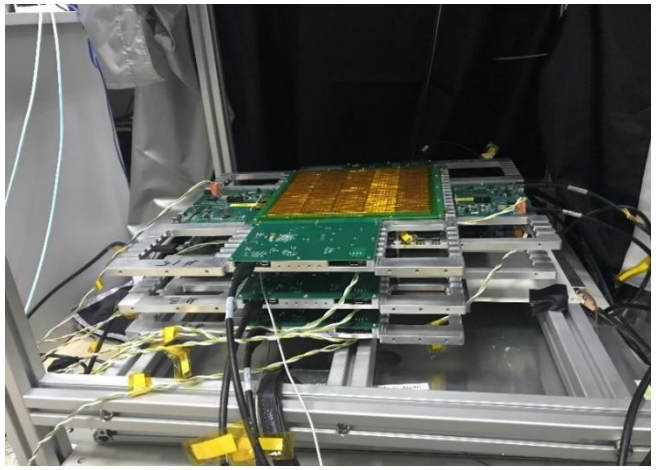
- One super-layer is a independent unit
- One super-layer consists of two EBU and inserted by two absorber layers

Super-layer mounting

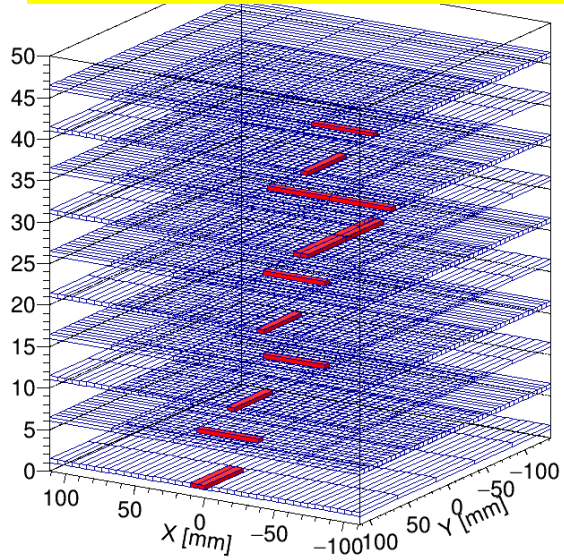
- 16 super-layer in total

5 super-layers combined commissioning

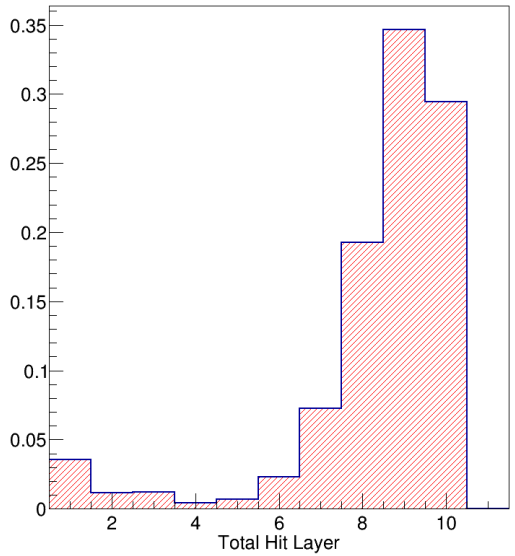
Cosmic ray test platform



Tracking reconstruction



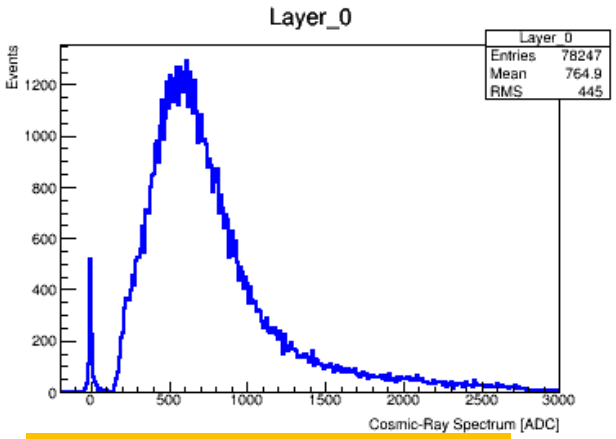
Hit total layer number

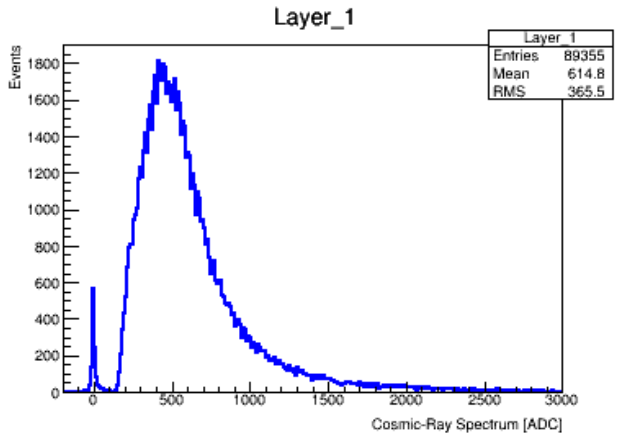


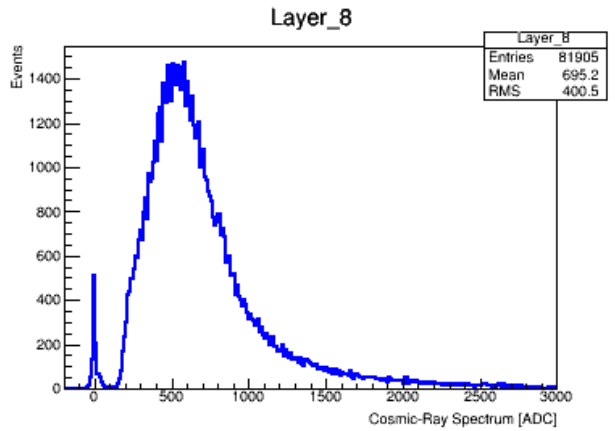
- The combined test system worked
  - Data acquisition and transmission properly
  - Event build correctly for 10 EBU layers
  - More than 95% events hit for more than 5 layers

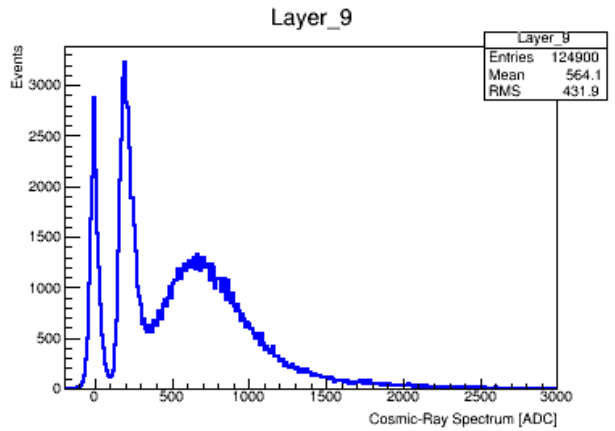
Cosmic ray test results

EBU with 15 um SiPM

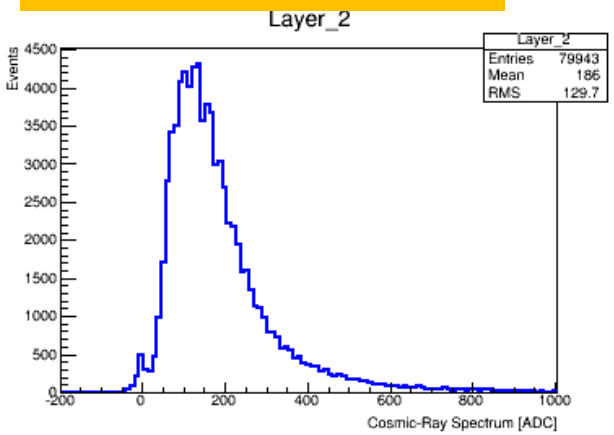


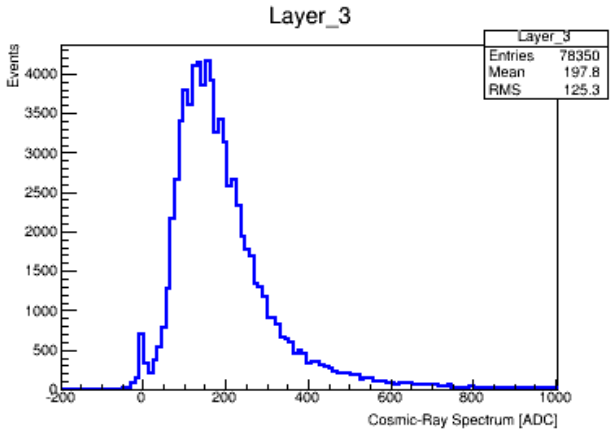


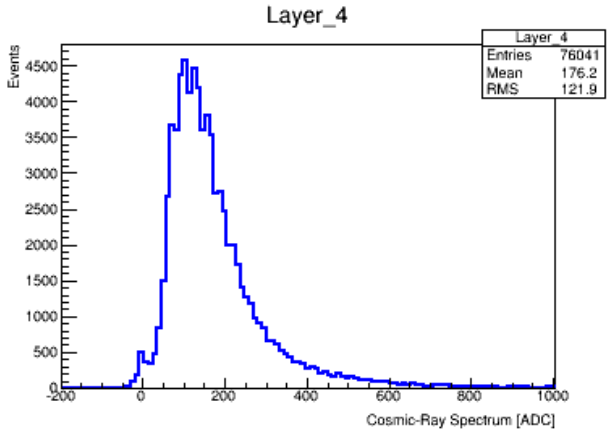


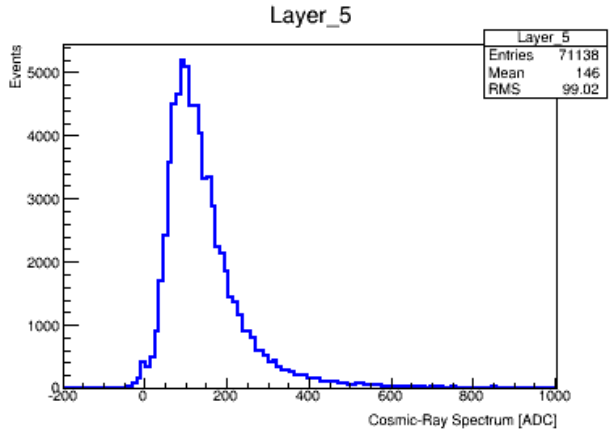


EBU with 10 um SiPM

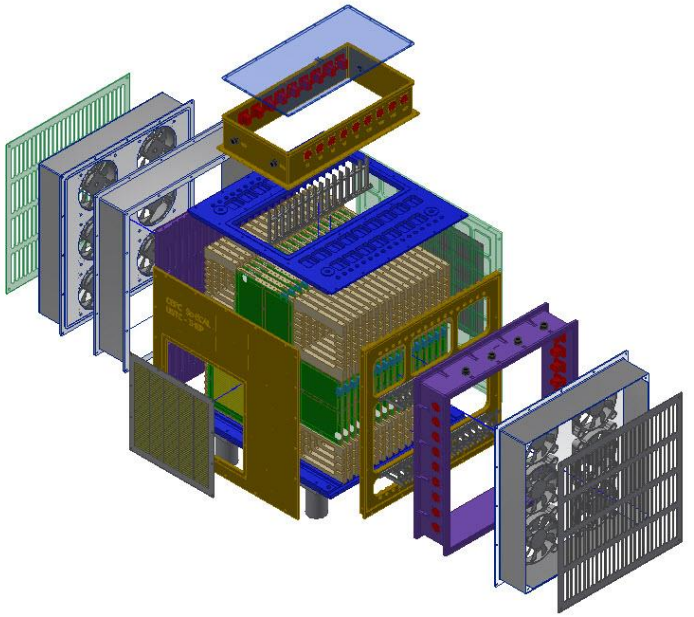






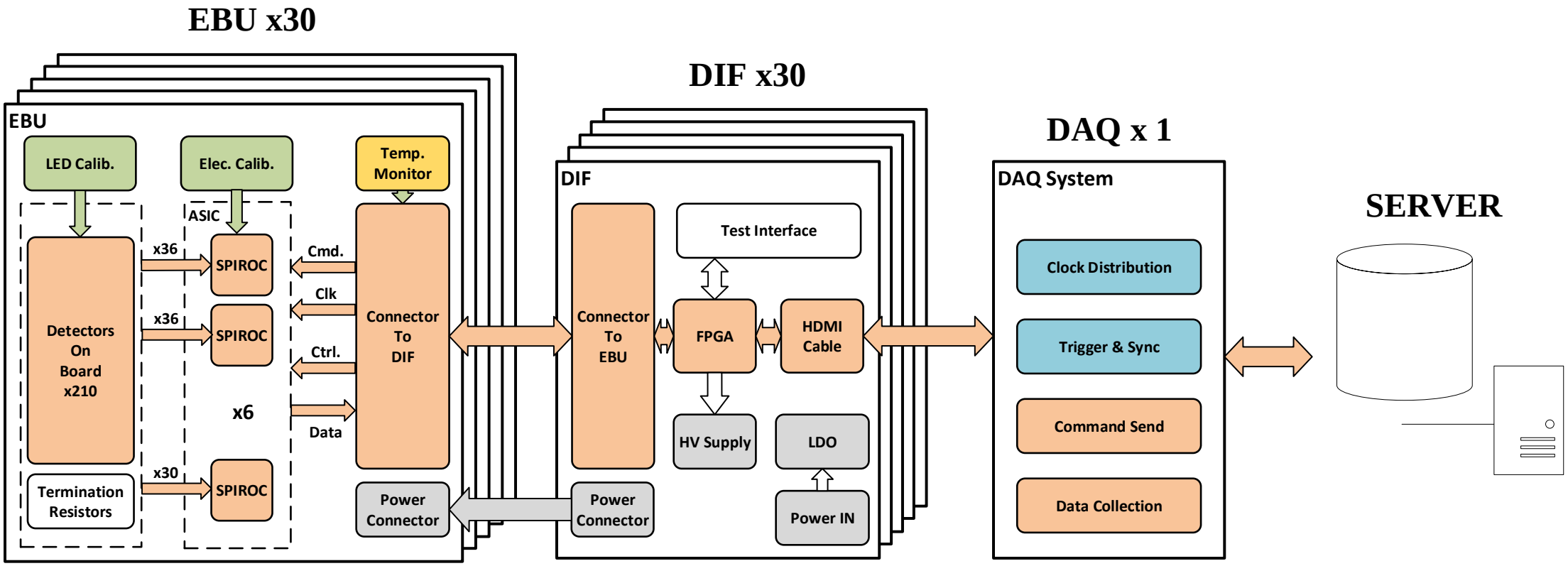


Mechanic structure of the prototype



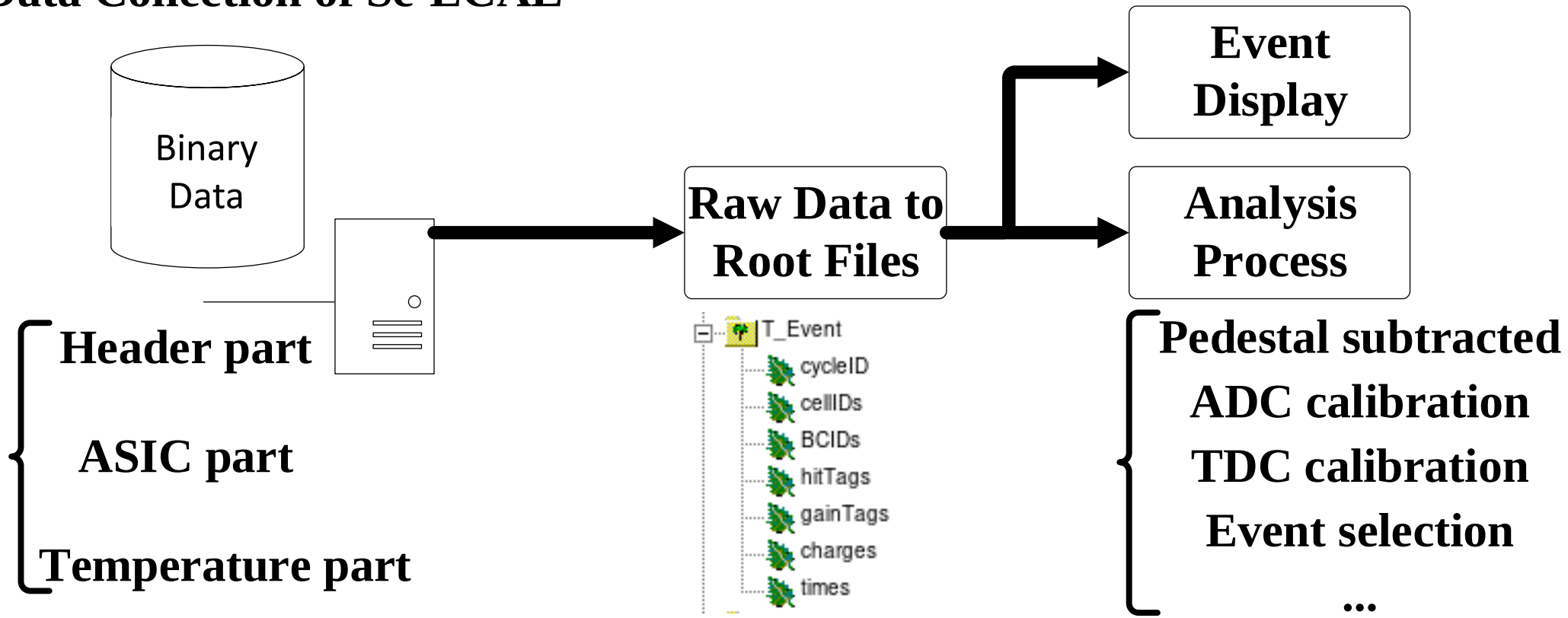
- The mechanic structure is manufactured, hold at most 17 super-layers
- The full prototype mounting in the near future

Data acquisition



Data analysis flow

Data Collection of Sc-ECAL

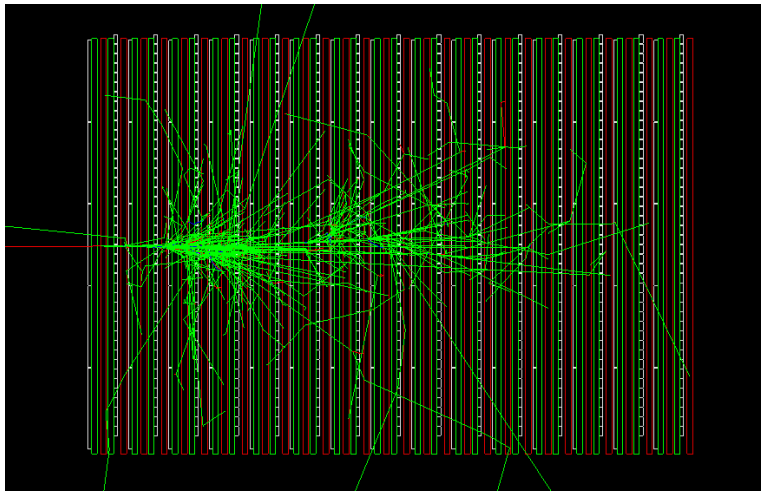


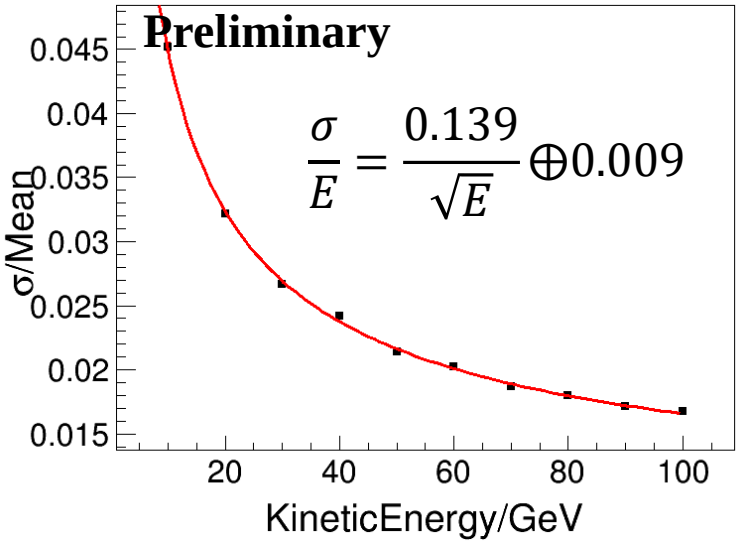
Joint with CEPC software

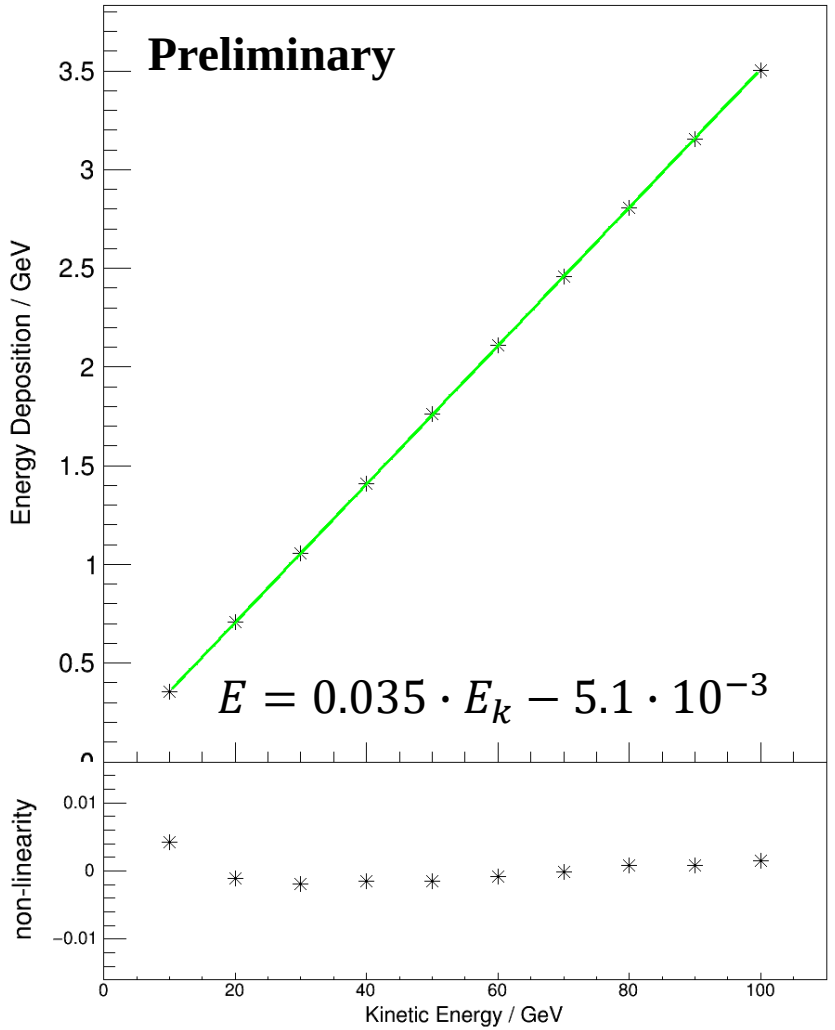
- Sc-ECAL prototype geometry description
  - Be as consistent as possible with prototype
  - Flexible parameter modification
- Data structure
  - Convert to LCIO format
- Test beam simulation
  - Energy range, position …
- Reconstruction and analysis
  - Comparison of the simulation and the prototype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

Additional

Sc-ECAL prototype simulation







Structure of ScECAL prototype