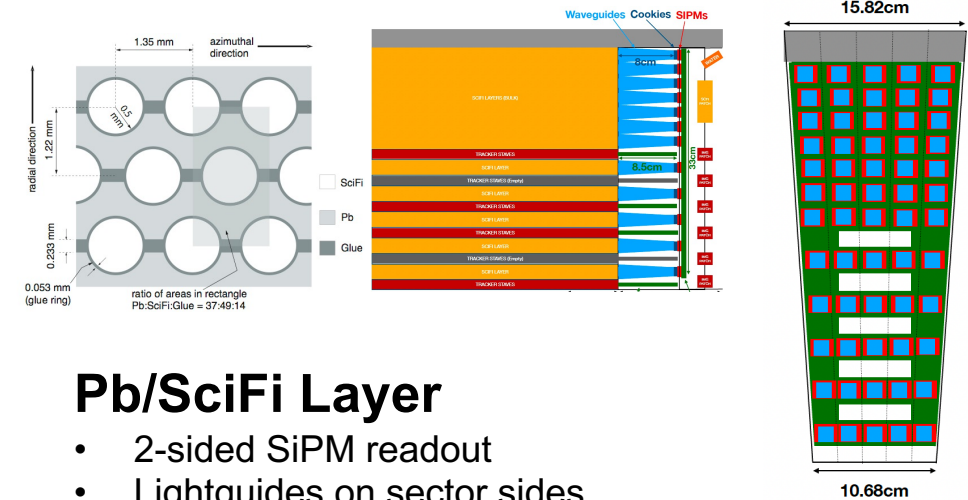
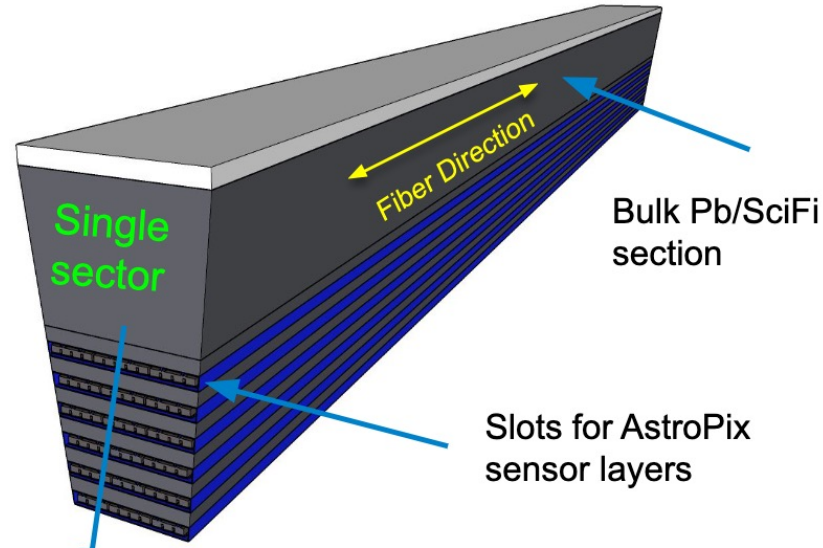
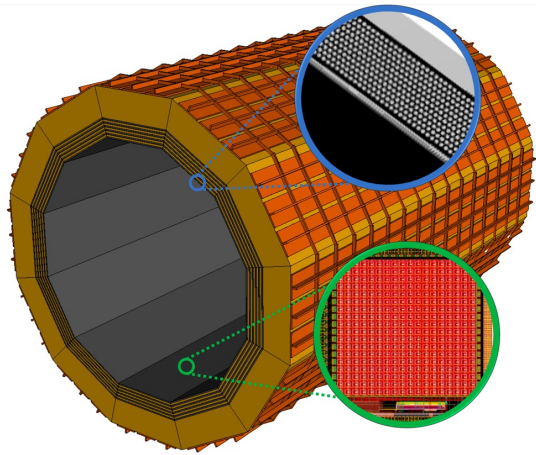


T10 Incoming Main: EIC BARREL ECAL (Week 32)

1st/Aug/24 PS/SPS User Meeting

Jeongsu Bok (Pusan National University)

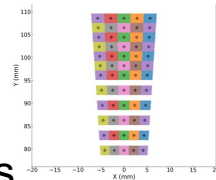
Introduction of EIC Barrel Electromagnetic Calorimeter



Pb/SciFi Layer

- 2-sided SiPM readout
- Lightguides on sector sides
- Measure energy

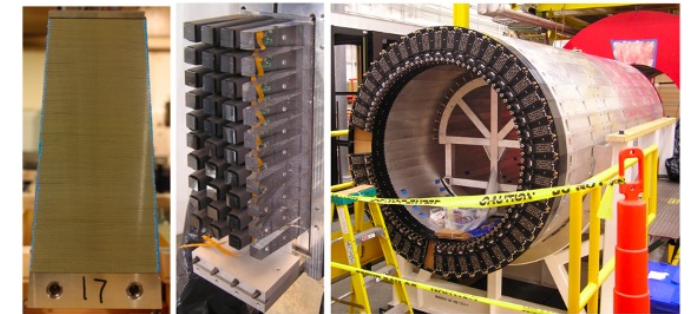
- Length: 432.5 cm
- Radius: ~ 80 cm radius
- Structure: 48 sectors
- $-1.71 < \eta < 1.31$
- EIC Barrel Ecal Requirements



- Detection of electrons/photons to measure energy and position
- Require moderate energy resolution $(7 - 10)\%/\sqrt{E} \oplus (1 - 3)\%$
- Require electron-pion separation up to 10^4 at low momenta in combination with other detectors
- Discriminate between π^0 decays and single γ up to ~ 10 GeV
- Low energy photon reconstruction ~ 100 MeV

Imaging Layer (Silicon Pixel)

- AstroPix tracking layers to capture 3D image of shower development

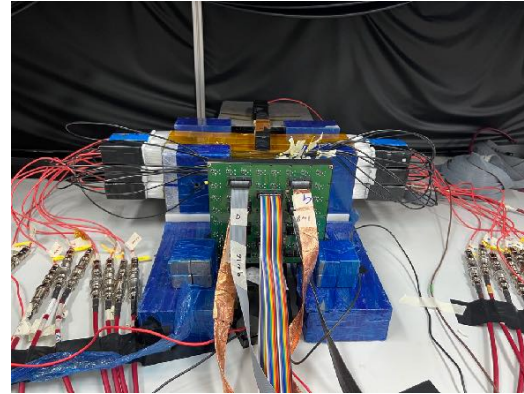


GlueX Pb/SciFi sampling calorimeter

Prototype of EIC Barrel Electromagnetic Calorimeter



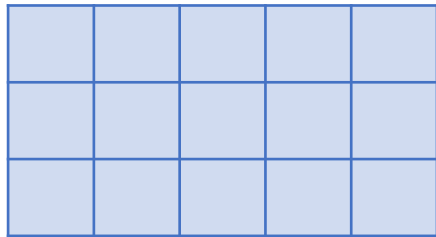
Pb/SciFi module 3x5 array



DAQ test of Pb/SciFi module

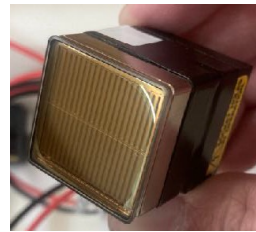
- Pb/SciFi Module
 - 3x5(4x4) of unit module(32x3x3cm³)
 - Dimension: 32x15x9 cm³
 - Readout with PMT (R11265-100)
 - One additional module with SiPM will be used for 4x4 setup
- AstroPix Module (Silicon Pixel)
 - Dimension: 2x2 cm
- Detectors will arrive at CERN tonight

3x5=15cm

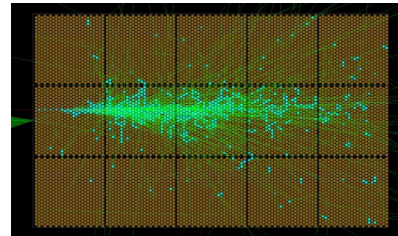


3x3=9cm

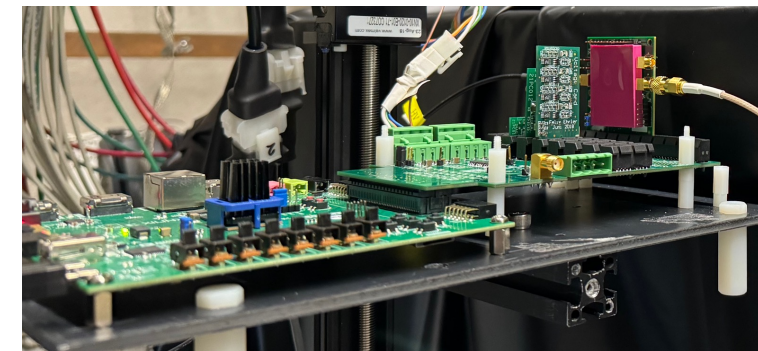
Side view



PMT

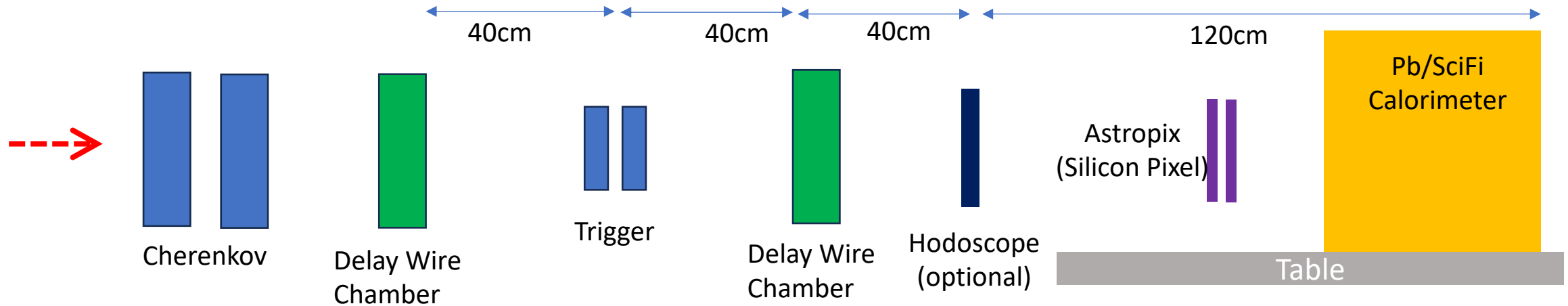


Simulation



AstroPix Chip + Carrier Board

Detector Configuration



- Auxiliary Detectors from us:
 - Trigger: ((finger) Scintillator + PMT) x2
 - Optional: SciFi Hodoscope: (1.6x1.6cm active area, 15x15cm size)
- Auxiliary detector request:
 - 2 Cherenkov Counters + 2 Delay Wire Chambers
- Setup: Pb/SciFi only → + AstroPix → + Hodoscope(optional)
- Table over 80cm is better to put AstroPix board and Pb/SciFi together
- DAQ, power supply will be installed in the side of detectors



DAQ from Dual Readout Calorimeter team



Example of other team

Physics Program

- Calibration study for prototype modules
 - Equalization of calorimeter modules using muon beam
 - Tuning HV for each module to get similar response
- Energy resolution and linearity study using electron beam 0.5~5GeV
 - Tilt the calorimeter to study various effect for more shower containment
 - Beam on the side of calorimeter to study edge effect (e.g. effect of shower leakage on PMT) and effect on timing.
 - Response from pion beam
- Study of different geometry (4x4) including a module with SiPM
 - SiPM will be used for actual product
- Study of Astropix Silicon pixel.
 - Energy deposit and dE/dx for various energy.

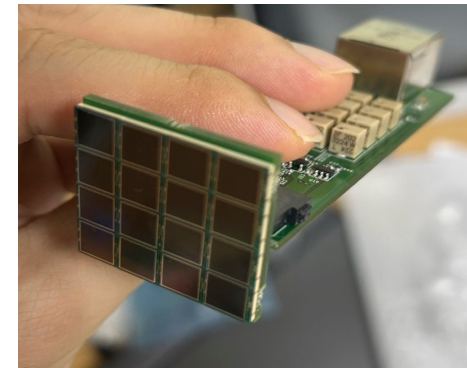
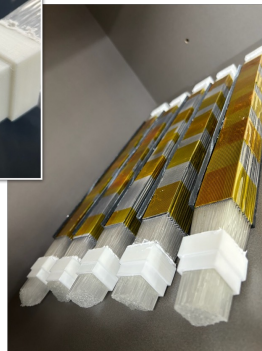
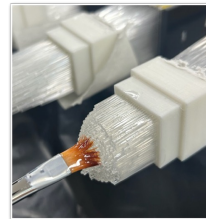
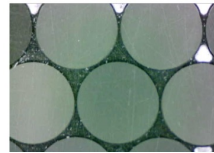
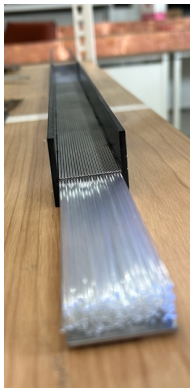
Request

- Two Delay Wire Chambers
- Two Cherenkov Counters
- DESY Table (over 80x80cm²)
 - Additional table (height-adjustable) for auxiliary detectors, if possible.
- Beam: muon, electron, pion 0.5, 1, 2, 3, 4, 5 GeV
 - interesting to use higher energy if beam purity is reasonably high

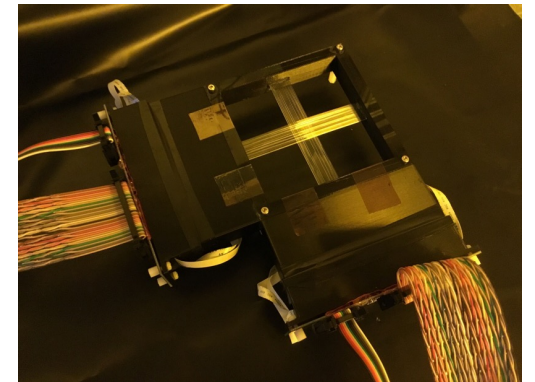
backup

Backup: Additional Information

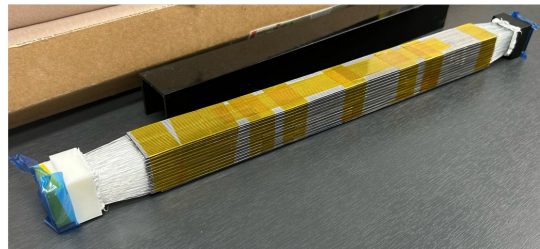
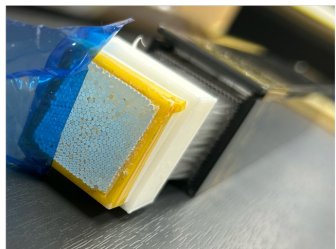
- Auxiliary Detectors from us:
 - Trigger: ((finger) Scintillator + PMT) x2
 - Optional: SciFi Hodoscope: (1.6x1.6cm active area)



SiPM for the Pb/SciFi



Hodoscope



Pb/SciFi module production