Activity at KEK and Plan for CERN TB in May 2026

June 2nd 2026 System Testing Meeting

Jeongsu Bok

Outline today

- TB at KEK in May
- Plan for CERN
  - Detector setup
  - DAQ rediness
  - Goals
- Discussion

Activity at KEK in May 2026

- Individual, summing (parallel, hybrid) board test
  - (Check with Flash ADC)
- LG test
- DAQ integration with analog signals
- AstroPix 9-chip standlone

- It will be presented in ~2 sides with setup/figure/lessons learned

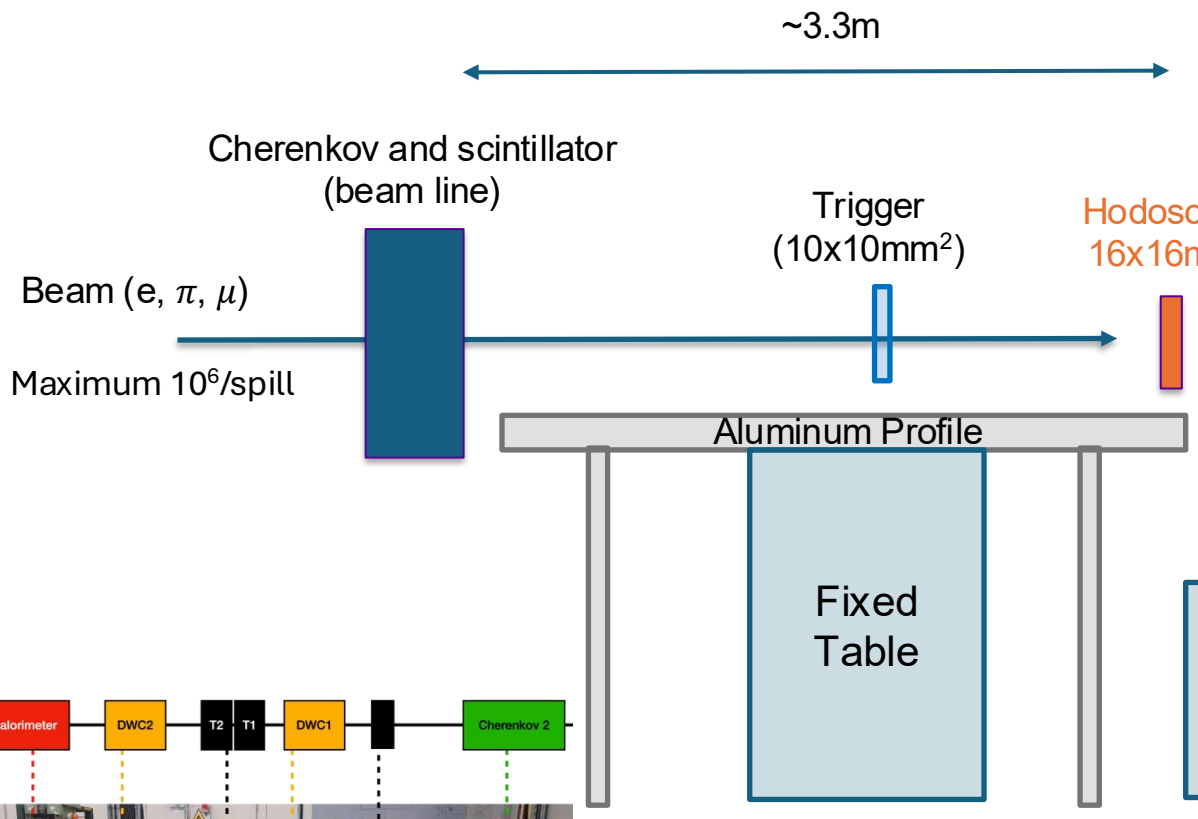
Plan for beam test at CERN in August 2026

- Schedule: 2026.08.24~31
- Beam: 0.5~10 GeV electron-pion mixed at T09
  - In our experience at T10, e/pi separation with Cherenkov was effective below ~7 GeV
  - ~0.1 GeV possible
- Goals
  - Data taking with H2GCROC (and summing board)
    - (crosscheck with Flash ADC)
  - Test of produced 70cm SFILs
  - DAQ integration (H2GCROC, Cherenkov, AstroPix)

Charge Questions

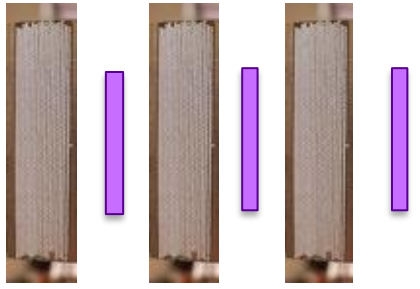
1) Do you have all necessary hardware (components) available, and if not what is the timeline to receive them?
2) Is the readout electronics and corresponding readout software running in the lab and thoroughly tested?
3) What type of "live QA" software do you have that helps you build confidence during the beam time that you are taking good data?
4) Describe your scientific goals and the specific measurements and parameter scans required to fulfill it.
5) What is the status of data analysis of previous beam tests? Which insights of previous beam tests are required to guarantee success of the upcoming beam test?
6) Which components are matched to the ePIC detector design, and which ones are being used as intermediate/ad hoc solutions?

Updated plan for detector setup



Dark Box with Aluminum Profile ~(1.2(w)x1(h)x1(d)m)

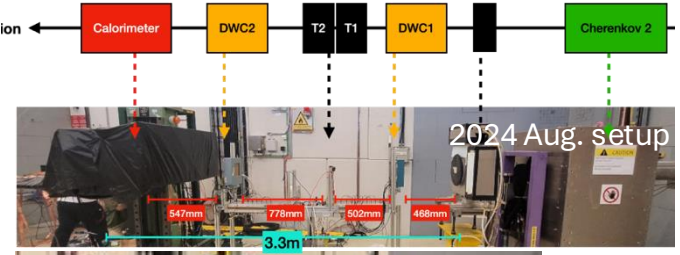
AstroPix modules (?)



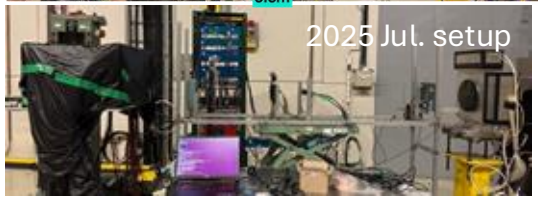
Bulk sector
Using 32x3x3 cm³
unit modules
~32x9x15 cm³

Scintillating Fiber Imaging Layers (SFILs)

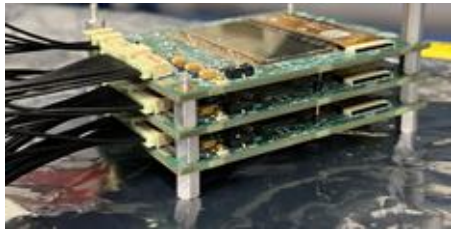
DESY Table



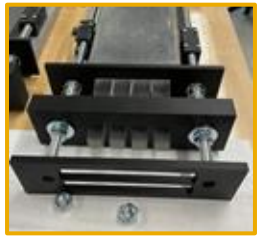
2024 Aug. setup



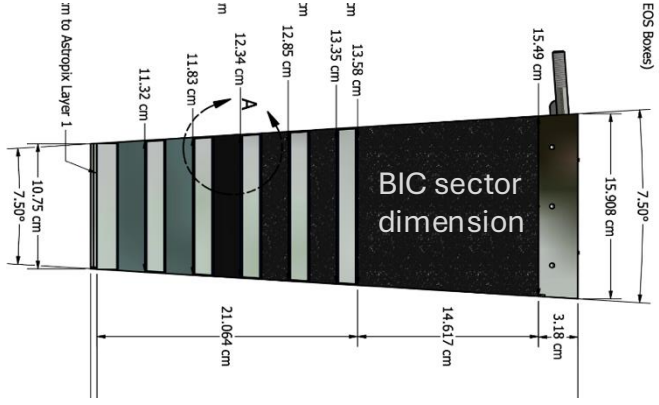
2025 Jul. setup



AstroPix quad chip modules



50cm-long SFIL at ANL
(Scintillating Fiber Imaging Layer)



Charge Questions (BIC TB@ CERN PS T09)

- 1) Do you have all necessary hardware (components) available, and if not what is the timeline to receive them?
  - AstroPix: (To be discussed)
  - H2GCROC + KCU board: (we have enough channels when we use summing board)
  - External clock : will be ready in June.
  - Pb/SciFi Imaging layer will be produced by mid-July. Shipping by flight (<30kg)
  - Pb/SciFi bulk: we will reconfigure block type (32x3x3) modules.
  - SiPM boards: will be produced by end of July.
- 2) Is the readout electronics and corresponding readout software running in the lab and thoroughly tested?
  - Readout electronics and readout software were tested at KEK PF-AR Test Beam Line in May
- 3) What type of "live QA" software do you have that helps you build confidence during the beam time that you are taking good data?
  - We monitor H2GCROC results right after each run.
  - We also run with monitor subdetectors and trigger status,

Charge Questions (BIC TB@ CERN PS T09)

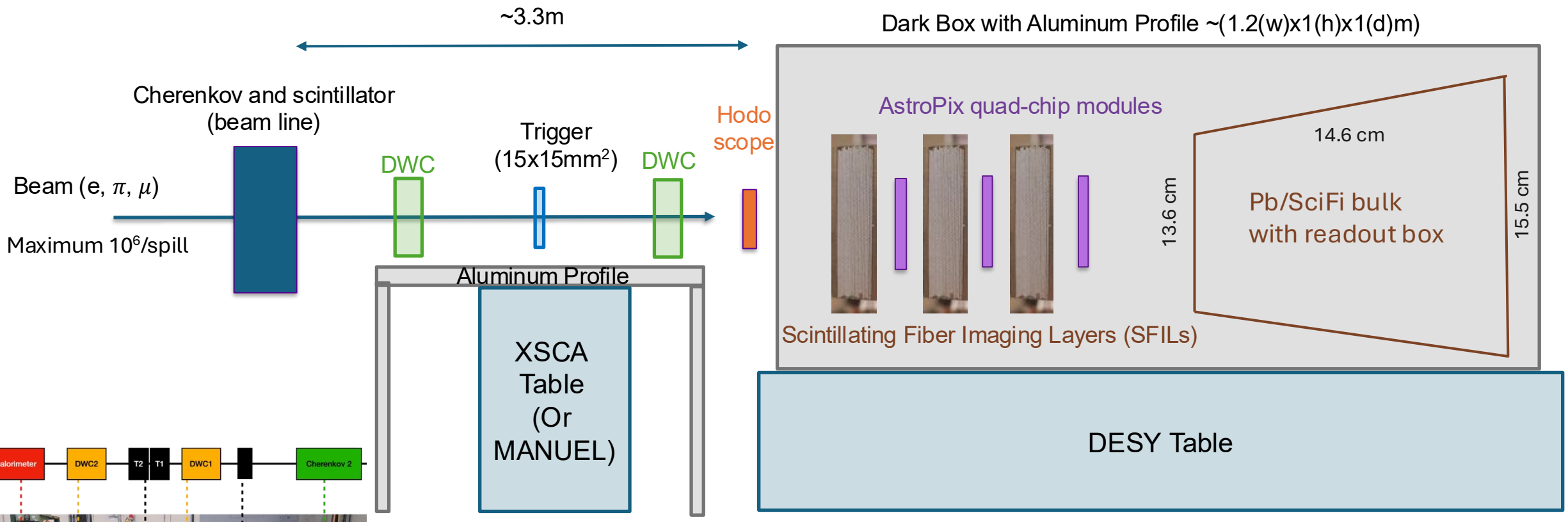
- 4) Describe your scientific goals and the specific measurements and parameter scans required to fulfill it.
  - a) Pb/SciFi Imaging layer + bulk energy resolution: bean energy scan up to 7 GeV
  - b) e/pi separation: integration of AstroPix+Pb/SciFi+Auxiliary readout
- 5) What is the status of data analysis of previous beam tests? Which insights of previous beam tests are required to guarantee success of the upcoming beam test?
  - a) We found that the energy resolution fulfills the requirement (10%⊕2~3%)
- 6) Which components are matched to the ePIC detector design, and which ones are being used as intermediate/ad hoc solutions?
  - a) Pb/SciFi Imaging layers(70cm) and bulk sector(32cm) is shorter than the design(~4.3m)
  - b) Pb/SciFi bulk sector is segmented into 3x3cm, larger than the design. Also no glue is applied. Radiation length is slightly different (~1.38cm) from the design (~1.45cm)
  - c) 9-chip AstroPix (v3) is intermediate solution, But it covers large area.
  - d) H2GCROC is intermediate solution. We need further optimize it in future beam tests.

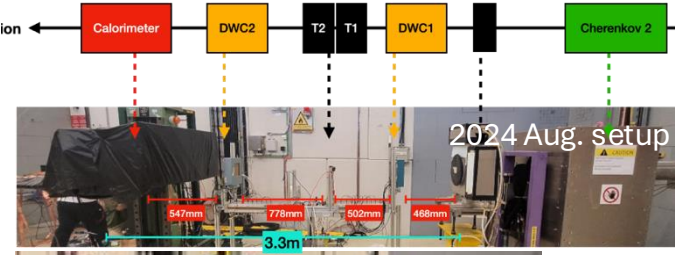
Concerns (internal)

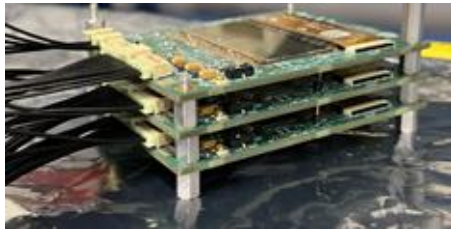
- Detector setup
  - SFIL (70cm) production schedule in Korea is not fixed.
    - We expect 1~3 by August. Press will arrive in mid-June.
    - Any remaining SFIL in North America?
    - Backup plan: reconfigure 32cm unit modules as SFIL.
  - AstroPix?
- Goals
  - Data taking with H2GCROC (and summing board)
    - (Crosscheck with Flash ADC)
  - Energy resolution and e/pi separation

  - Is there more goals to be achieved? Or can be done separately?
  - Calibration strategy that we can test at CERN? (pion, muon)
  - Something more with AstroPix?
- DAQ
  - Korean group still need to integrate other detectors with AstroPix.

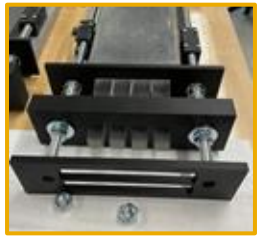
Backup: Detector setup in proposal







AstroPix quad chip modules



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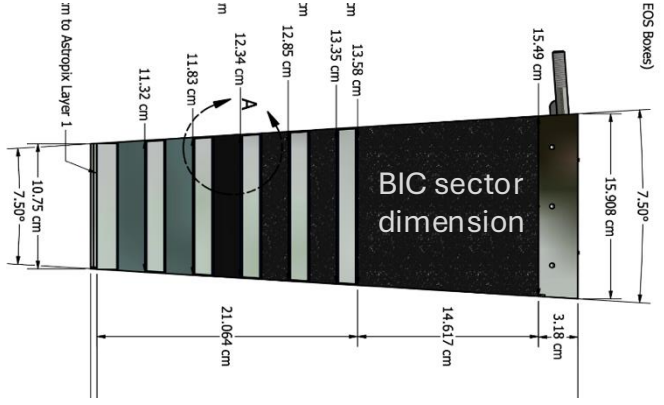
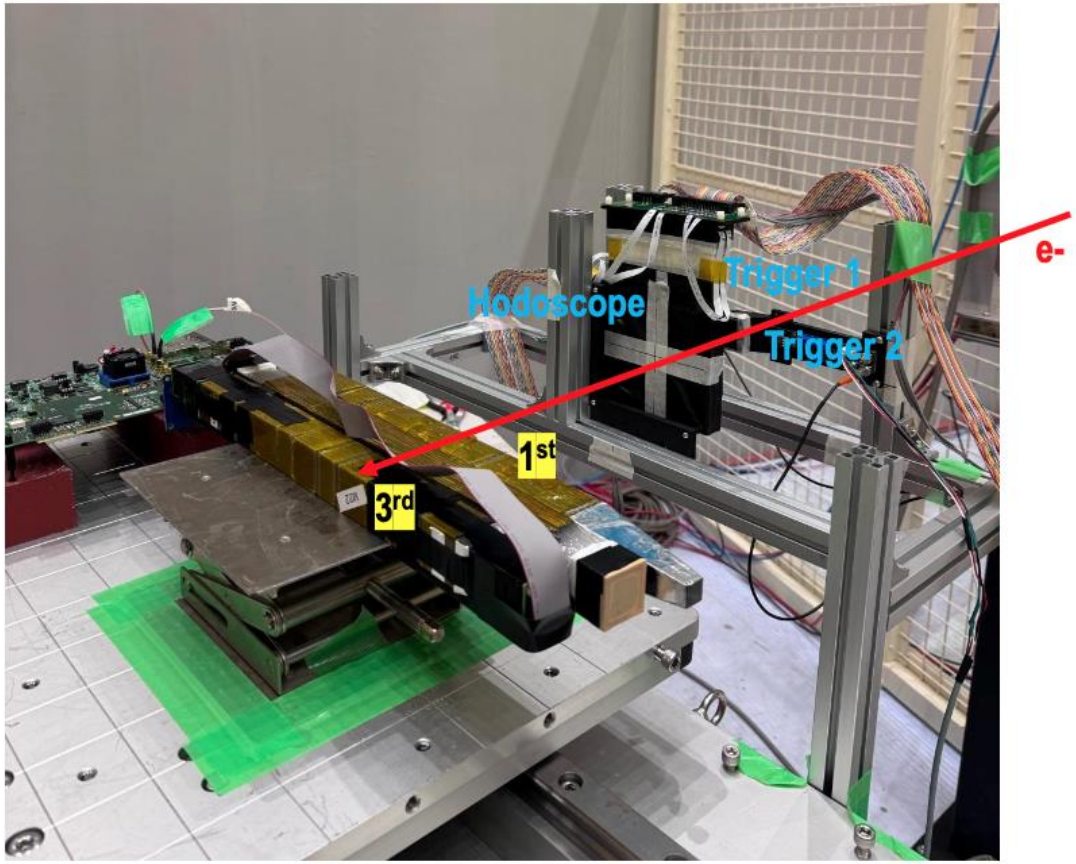


Backup: Setup at KEK



Measured Npe (2507 CERN TB)

	Mean Npe per SiPM (9 cm²)		
e- (GeV)	1st	2nd	3rd
0.5	600	1100	700
1	700	1800	1500
2	1000	2800	3000
3	1100	3800	4500
4	1150	4500	6000
5	1300	5500	7500