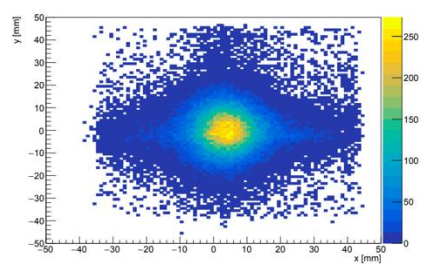
# BIC system testing plan KEK, CERN

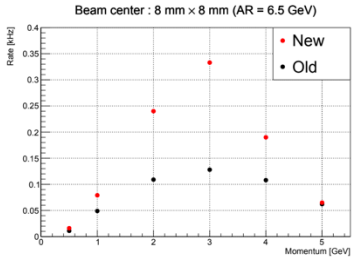
Feb 11th 2025

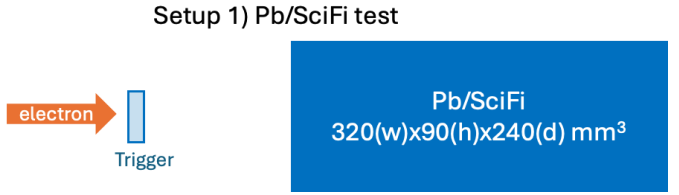
Jeongsu Bok (Pusan National University)

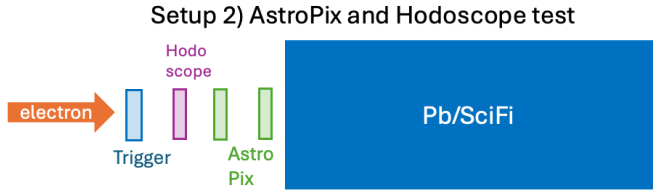
# Schedule

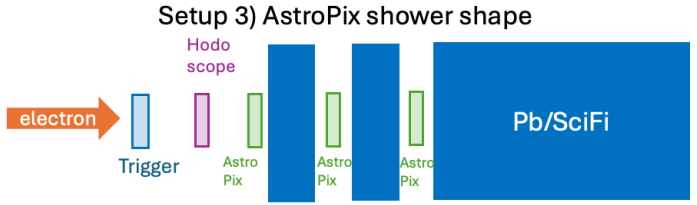
- March 19-24 at KEK
  - 1-5GeV Electron
  - May have another chance to apply in May, Oct-Dec
  - 350Hz in 8x8mm$^2$ at 3GeV
    - (Δp/p)max~10% , may cause ~2.5% additional constant term
  - Program
    - Energy response of deeper(240mm) prototype
    - Integrated system
    - AstroPix test: sync between chips(if possible), energy response
    - Calibration of separated Pb/SciFi modules
- July 23-30 at PS T10
  - AstroPix+Pb/SciFi event matching
  - Electron, pion, muon



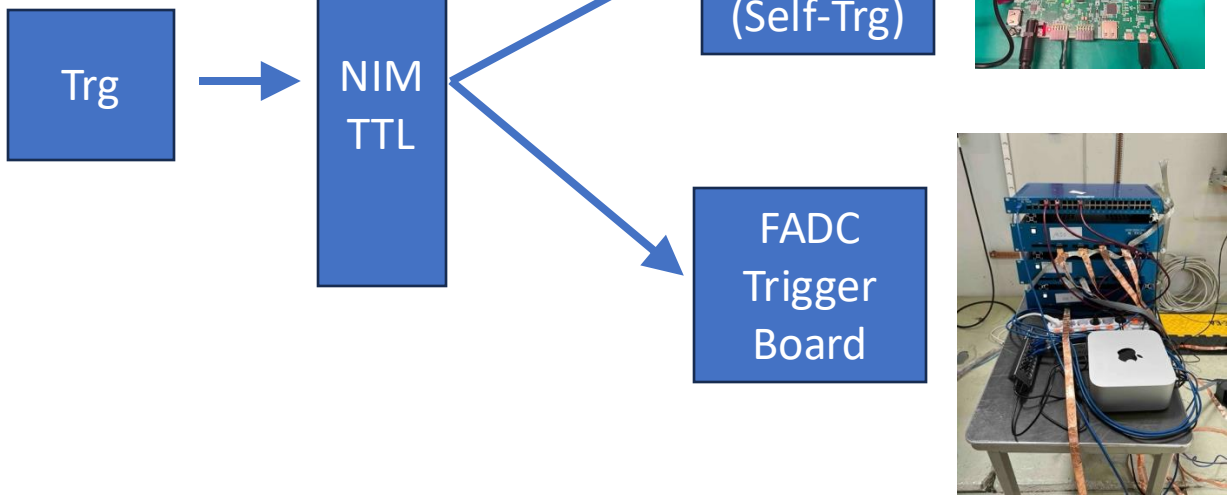



# Idea for AstroPix + Pb/SciFi at testbeam
# (1) Trigger Mode



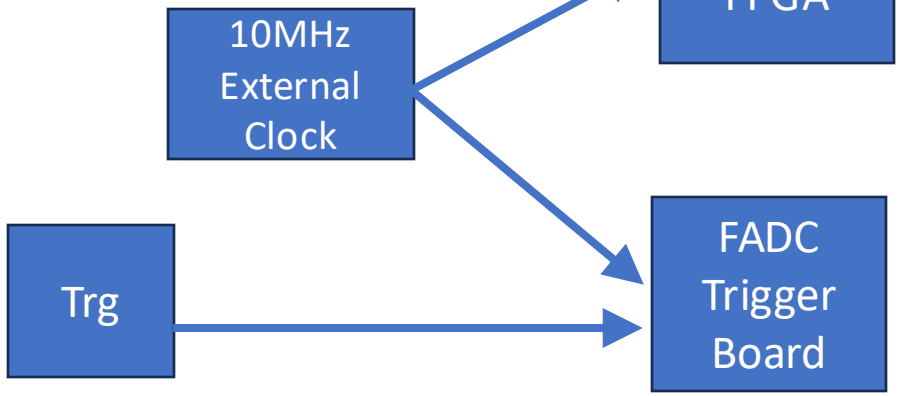

Trg#1 AstroPix data…
Trg#3 AstroPix data…
+…



Trg#1 FADC data
Trg#2 FADC data
Trg#3 FADC data
+…

- (1) Trigger Mode: probably easier solution for the testbeam
  - Trigger –(NIM/TTL)–→ FADC: Trigger number counting, independent of trigger.
    - It can be ready in Korea in a week, upon our decision.
  - Trigger –(NIM/TTL)–→ FPGA: Trigger number counting
    - Possible support from AstroPix/FPGA side? (To make FPGA accept NIM/TTL signal from trigger and include the count in the data, although AstroPix run independently)
- Matching between AstroPix would be also very useful

# Idea for AstroPix + Pb/SciFi at testbeam
# (2) Global Clock

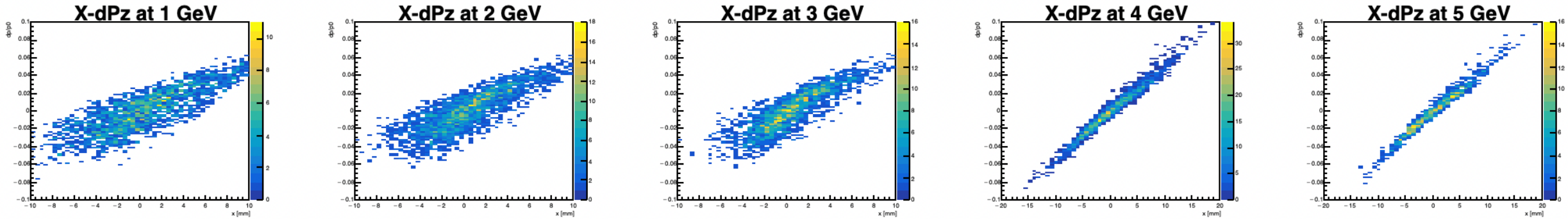


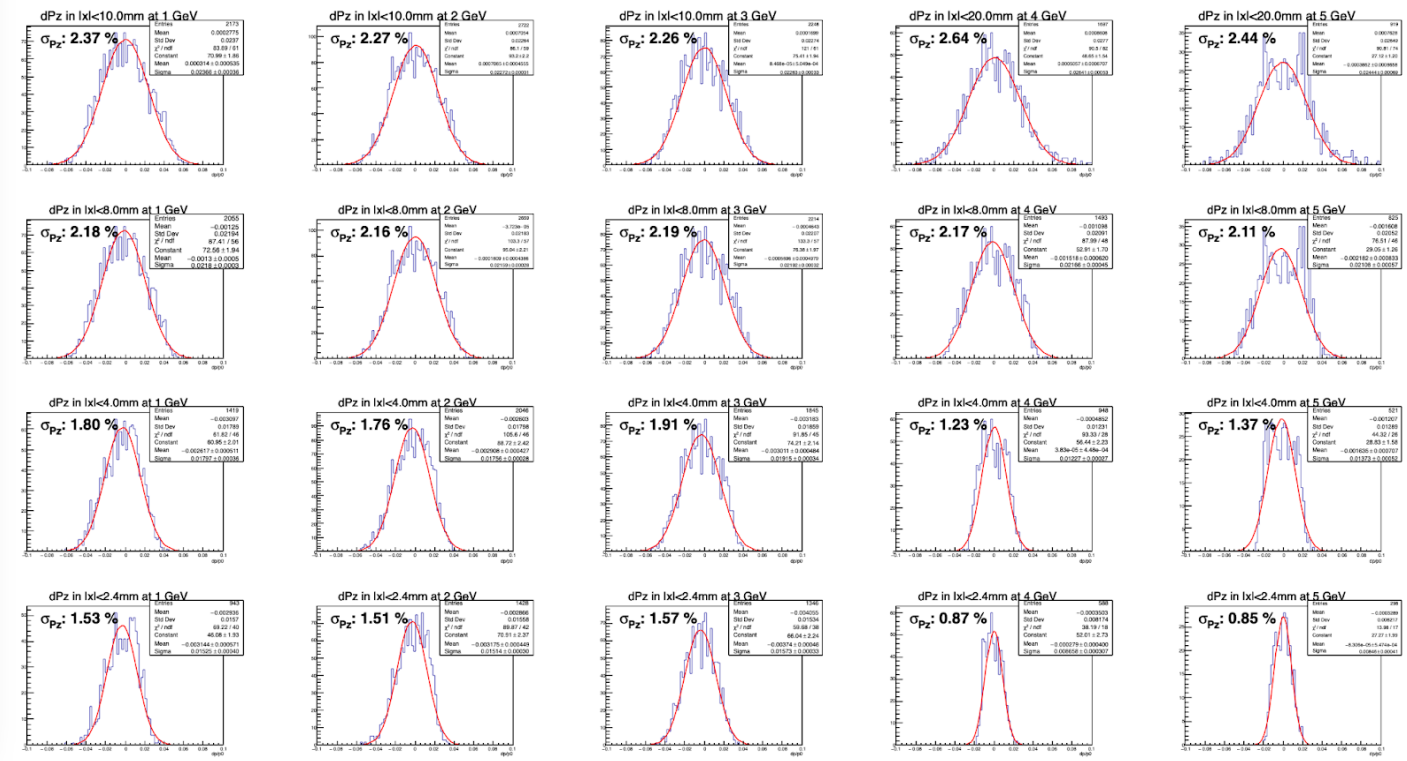

Timestamp 010000 AstroPix data
Timestamp 010003 AstroPix data
+

Timestamp 010000 FADC data
Timestamp 010001 FADC data
Timestamp 010003 FADC data
+

- It requires extra matching between AstroPix & Pb/SciFi
  - Delay
  - We don’t have a good idea for matching yet. occasional sync using analog signal at a channel?
  - Internal clock of FADC: 62.5MHz or 80MHz depending on our decision.

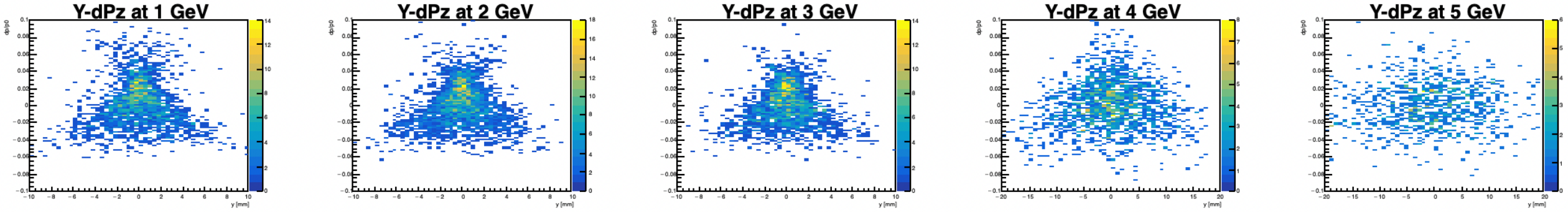
# KEK beam profile: x position vs Δp/p

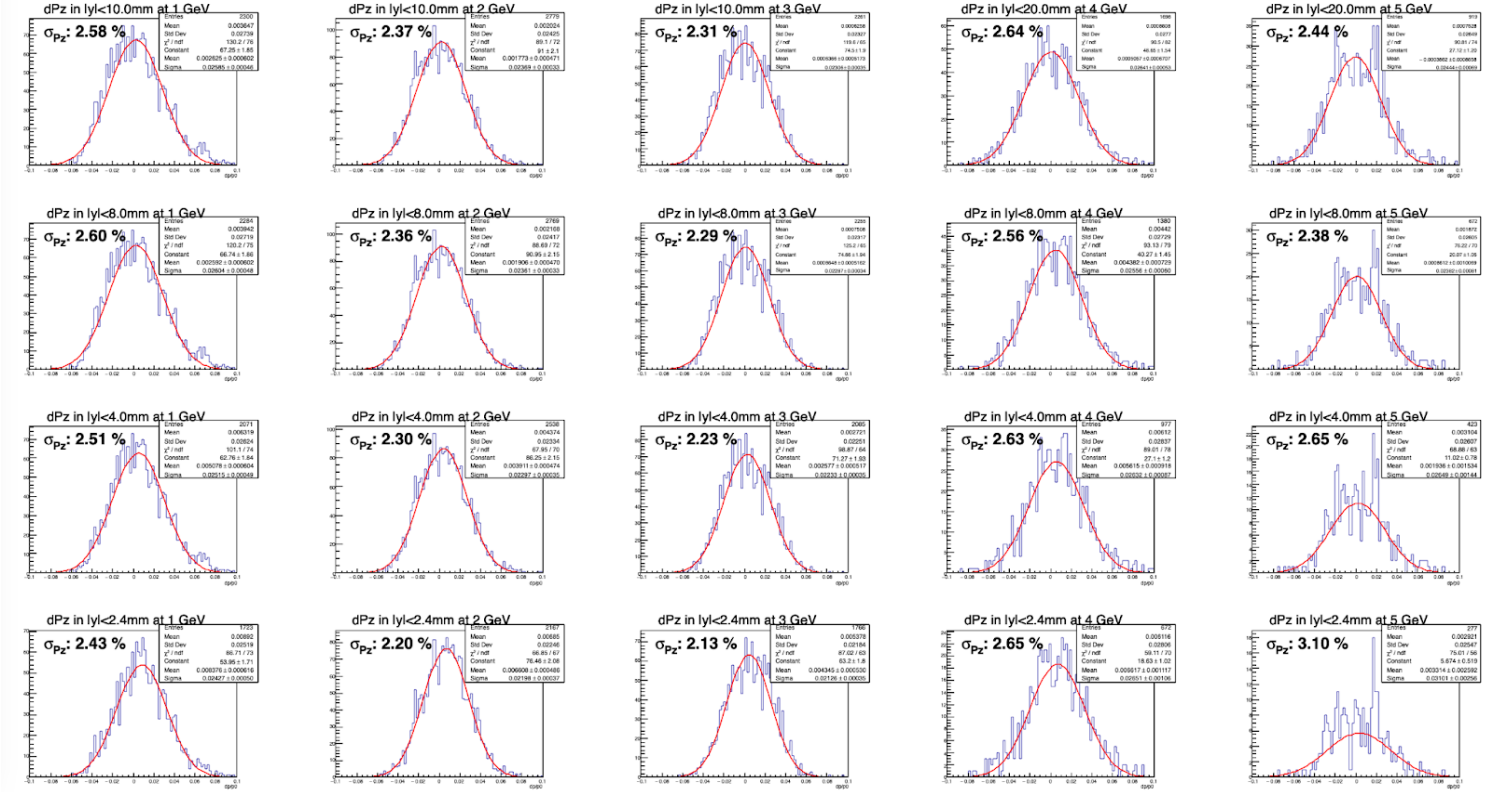



- https://wiki.kek.jp/pages/viewpage.action?pageId=411961546
- The reason for the difference in profile is p = 4 or 5 GeV is that the maximum current limit of the Q magnet cannot provide the same convergence force as other momentums.
- Projection: $\sigma(\Delta p/p)$ ~2.5% may cause additional ~2.5% term in the Energy resolution
  - Below 2% within 8x8 $mm^2$

# KEK beam profile: position vs Δp/p




- No strong correlation between hit y-position and momentum spread
- Projection: $\sigma(\Delta p/p)$ ~2.5% may cause additional ~2.5% in the Energy resolution.
  - Regardless of y-position