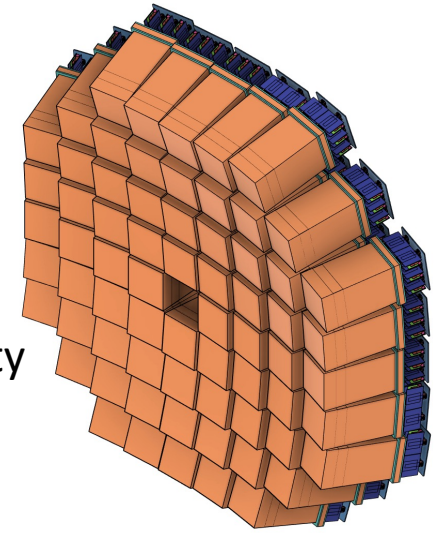
Backwards RICH Review: mRICH



Murad Sarsour
Georgia State University

The review should address the following questions:

1. Reminder of the proposed **detector configuration** for the use in the ePIC detector.
2. **Input information**:
   a. Pertinent **information on similar technology/design** that is used by other experiments or R&D efforts (example references could be literature or conference talks).
   b. **Prototypes and their tests**: done so far, ongoing effort, future planning (with timelines); results from prototypes and their tests
   c. **Simulation studies**: already performed, ongoing and planned (with timelines); results from the simulations; particular care in (i) showing how realistic the parameters used in simulations are and (ii) reporting what is missing for a fully realistic simulation (backgrounds, specific event categories, …) (iii) Does the simulation take into account the **realistic response of the selected photosensors and related FEE**?
3. **Performances**:
   a. Comparison of the **present assessment of the Cherenkov PID detector performance compared with the YR requirements**?
   b. Performance perspectives **beyond the YR requirements (if any)** ?
   c. **Efficiency** figures: single particle Pi/Kaon/Proton identified as Pi/Kaon/Proton as a function of the truth momentum in a 3x3-panel figure?
   d. **Please quantify the performance for electron/hadron separation**
   e. **Active area** or /dead area as 2D function of eta and phi; and comment on the edge effects?
   f. **Performance or potential as ToF detector, providing both timing resolution and acceptance coverage in eta and phi.**
   g. **Under the coordination of the SIDIS working group, provide Kaon Purity in the kinematic region of (x. .. Q2…) via parameterized hadron PID performance.**
4. **Radiator**
   a. Status of **radiator selection**
   b. **Status of the radiator** development and related potential issues?
   c. **Perspectives of radiator mass production** and timelines for the production period?
5. **Sensors and FEE**:
   a. Status of **photosensor selection** (a single consolidated option, more options under consideration); please provide photo sensor and pixel segmentation characteristics?
   b. **Status of the sensor** development and related potential issues?
   c. **Perspectives of sensor mass production** and timelines for the production period?
   d. Status of **FEE selection** (a single consolidated option, more options under consideration)?
   e. **Characteristics of the ASIC and FEEs** considered?
   f. Status of the **FEE development** and related potential issues?
   g. Perspectives of **FEE mass production** and timelines for the production period?
6. **Integration**:
   a. **Status of the proposed detector integration** into the current baseline detector?
      i. z-space and effect to tracking: in coordination with the tracking DWG, produce backward momentum resolution for the tracker that fit into the z-spaced allowed by the proposed RICH detector
      ii. Material effect to backward EMCal: in coordination with the calorimeter DWG, produces electron lineshape in the backward EMCal with the proposed RICH detector in front.
   b. Status of the **design of the electrical/electronic infrastructure** (channels, power supplies, heat, rate)?
   c. **Cooling** strategies?
7. **Workforce**:
   a. **List of groups** engaged in the proposed detectors and of other groups potentially interested;
   b. **Workforce needed with timelines and qualification of the required professional profiles;** please, include also physicists needed for dedicated simulation studies;
   c. **Available workforce** (specifying: granted, expected, possible) by the groups proposing the detector;
8. **Cost and scheduling**:
   a. up-to-date cost estimate for the different components and expenditure categories;
   b. In-kind contributions (specifying: granted, expected, possible).
   c. Envisioned schedule for full scale production
9. **Envisioned risk and risk mitigation strategy**

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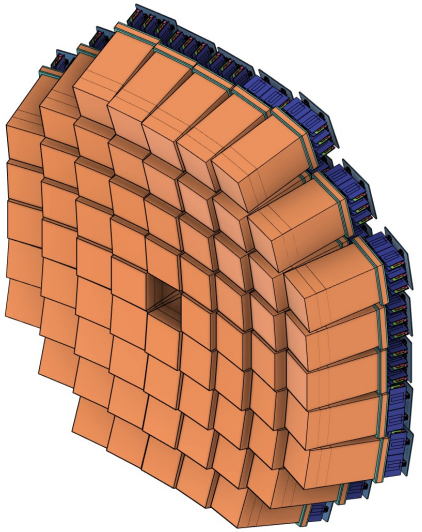


Tentative mRICH agenda

Monday, 3/20

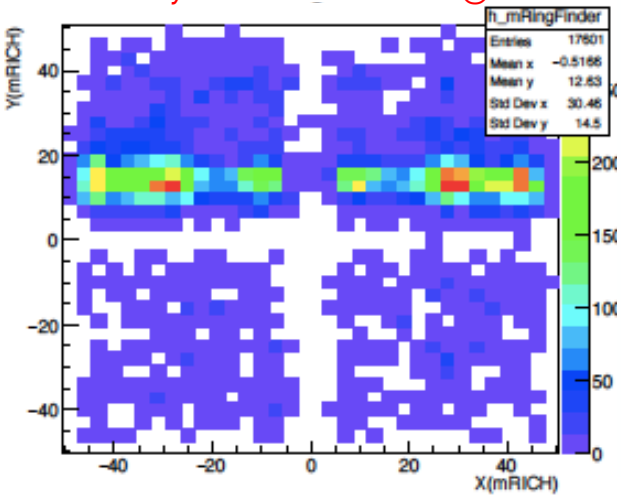
Overview & input information	Xiaochun He
Recent R&D and mRICH performance in ePIC	Murad Sarsour
Mechanical design and integration	Alex Eslinger

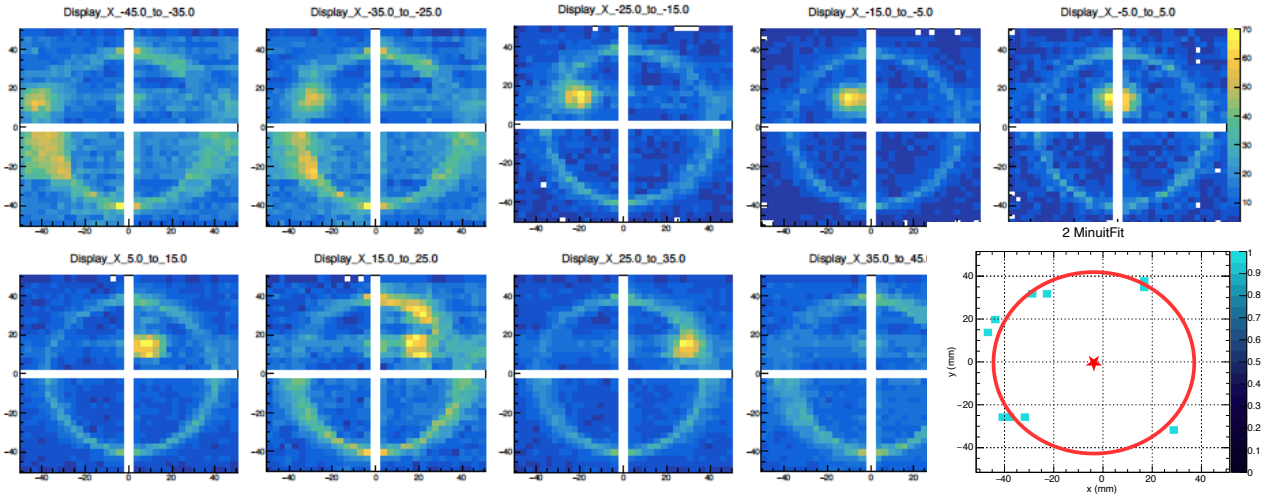
Tuesday, 3/21

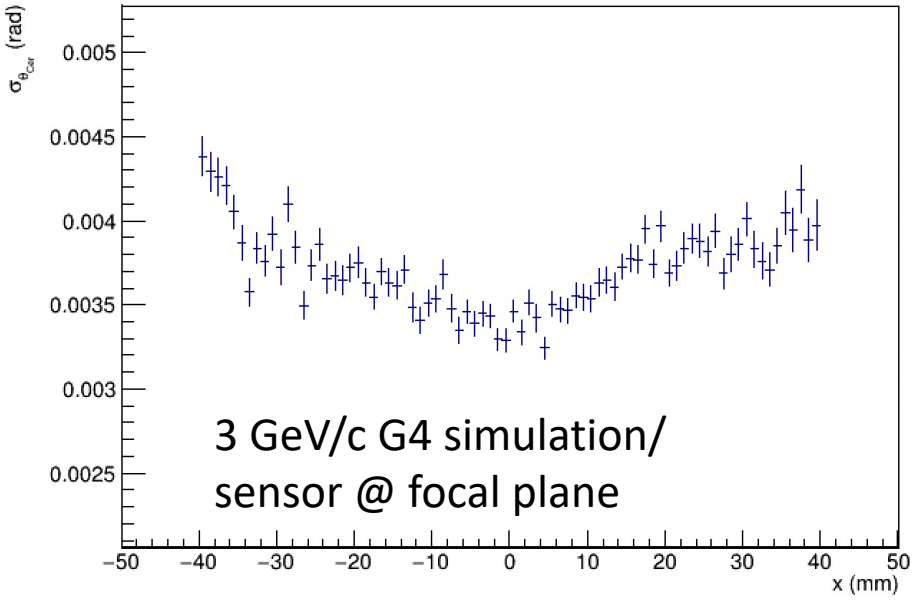
Sensor and readout	Rachel Montgomery
Aerogel production and characterization	Zhihong Ye Alexander (Sasha) Barnyakov
Workforce, Cost and Schedule, Risk Mitigation	Xiaochun He

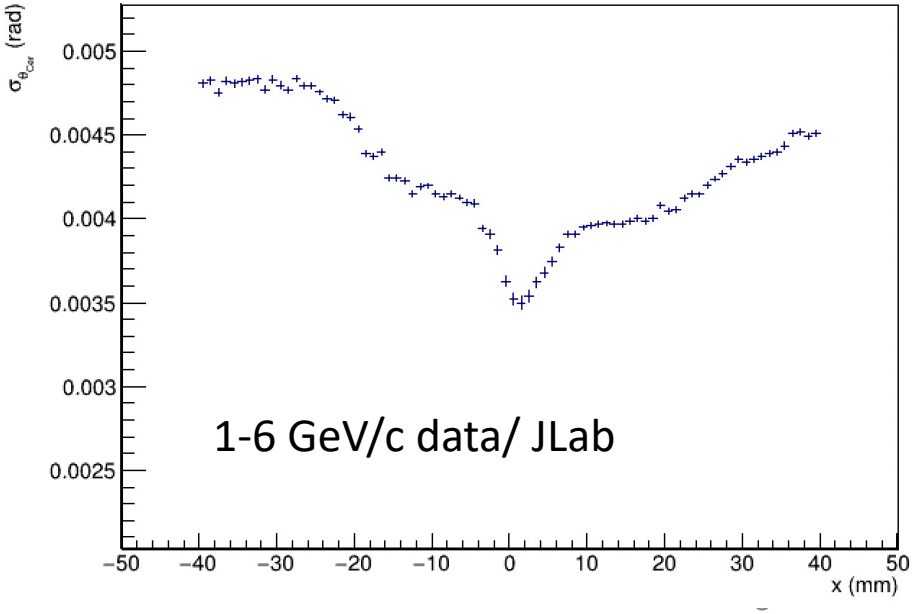
R&D: JLab beam test

Secondary e- beam at Hall-D/Jlab @ 1-6 GeV/c

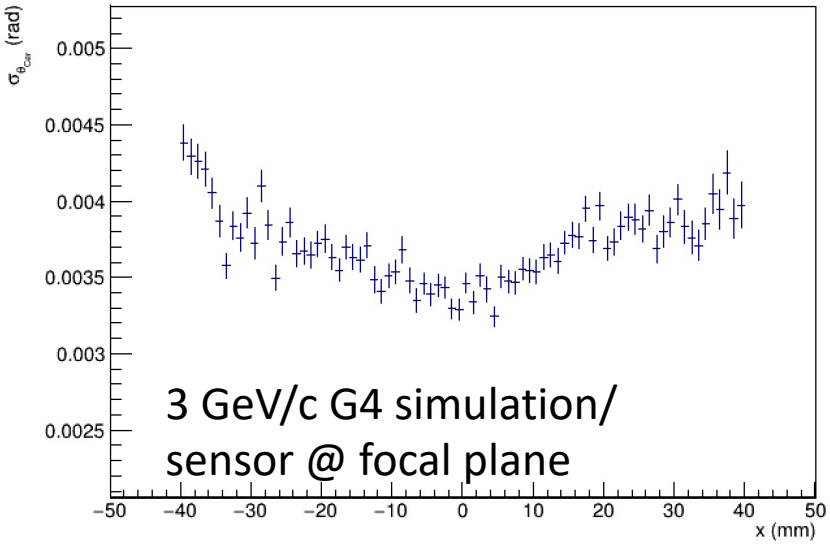


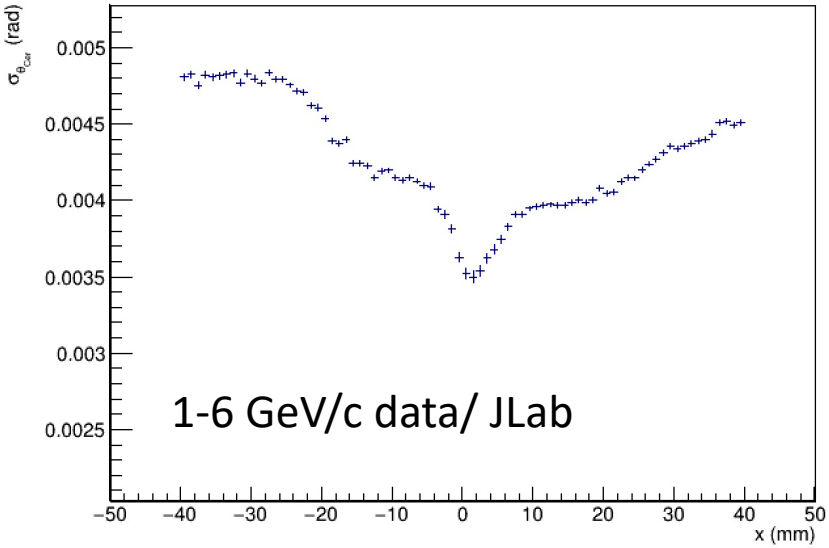


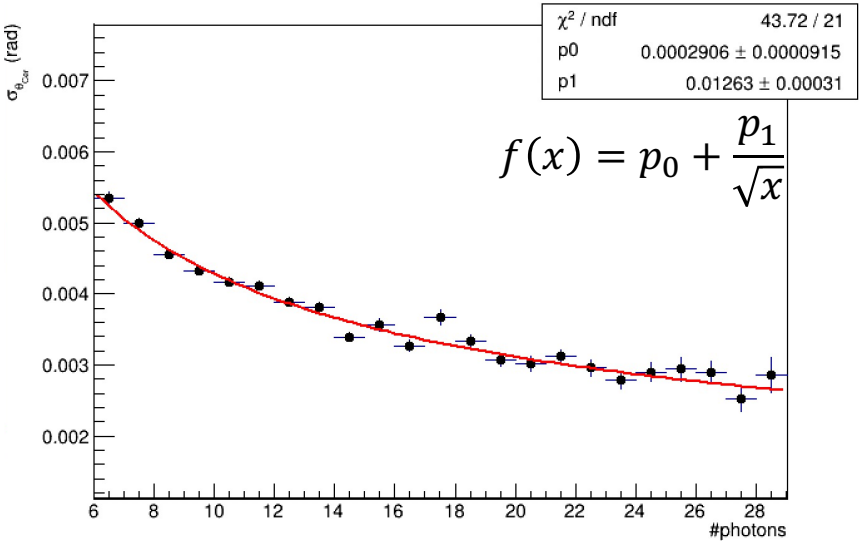


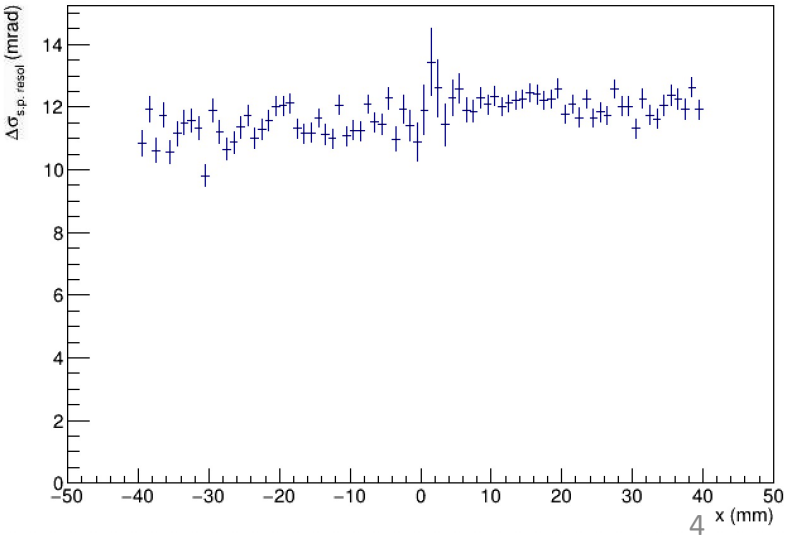


JLab beam test update

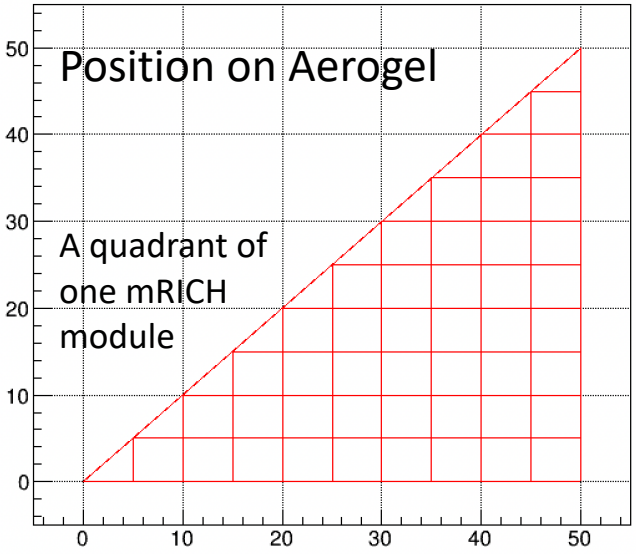




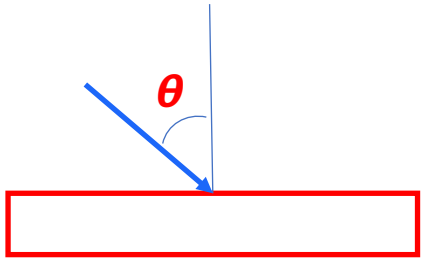


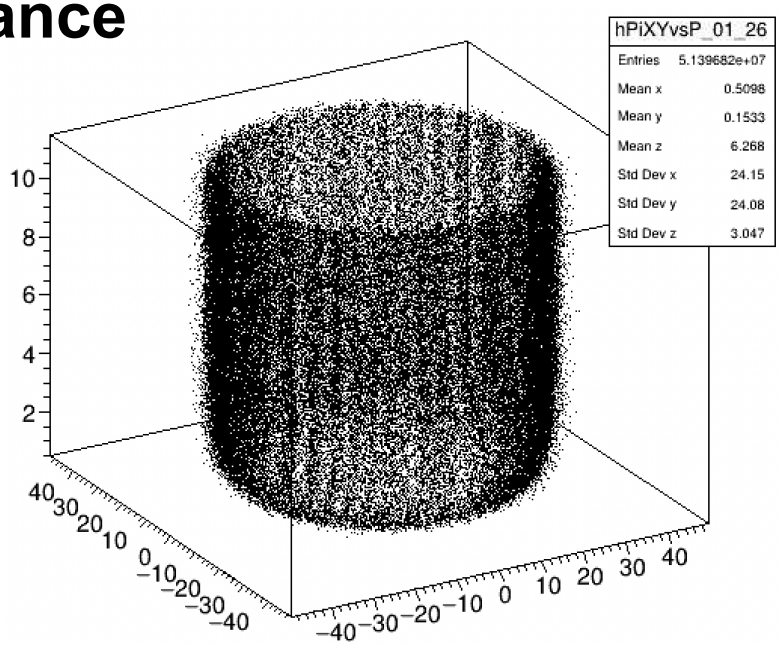


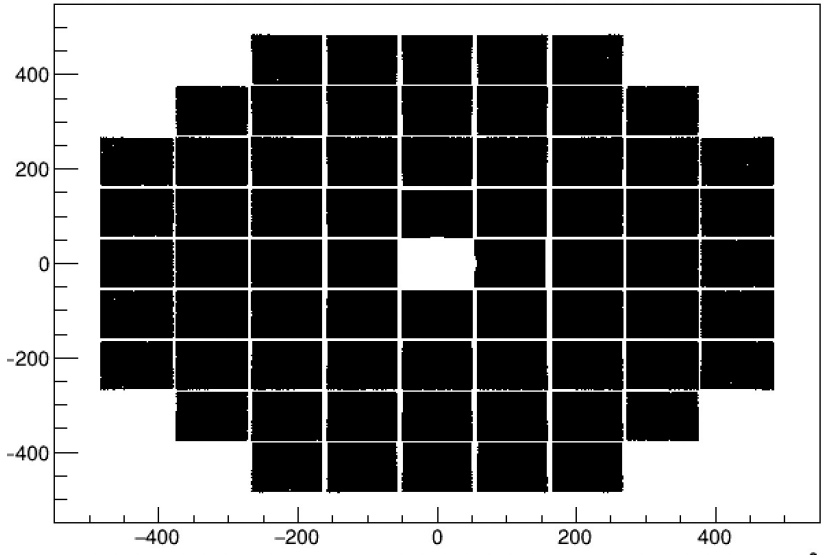
Performance: DB Set-up & Acceptance

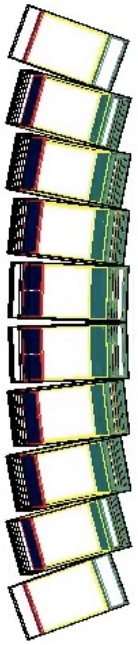


Angle w.r.t. normal

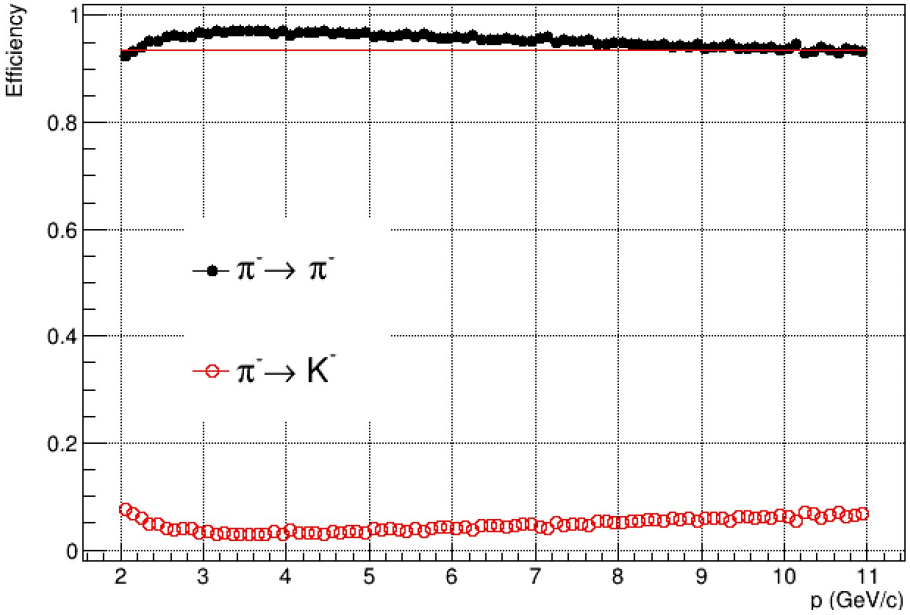


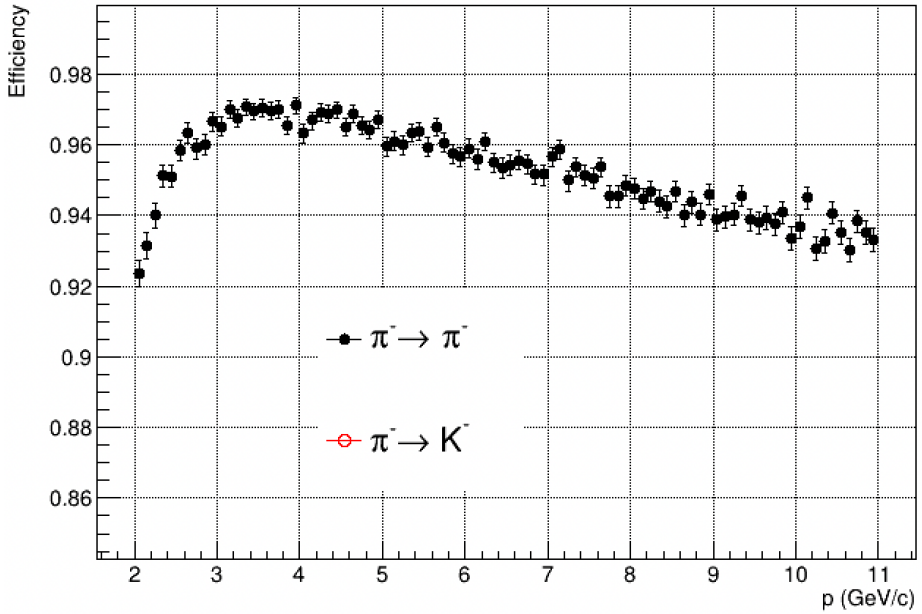


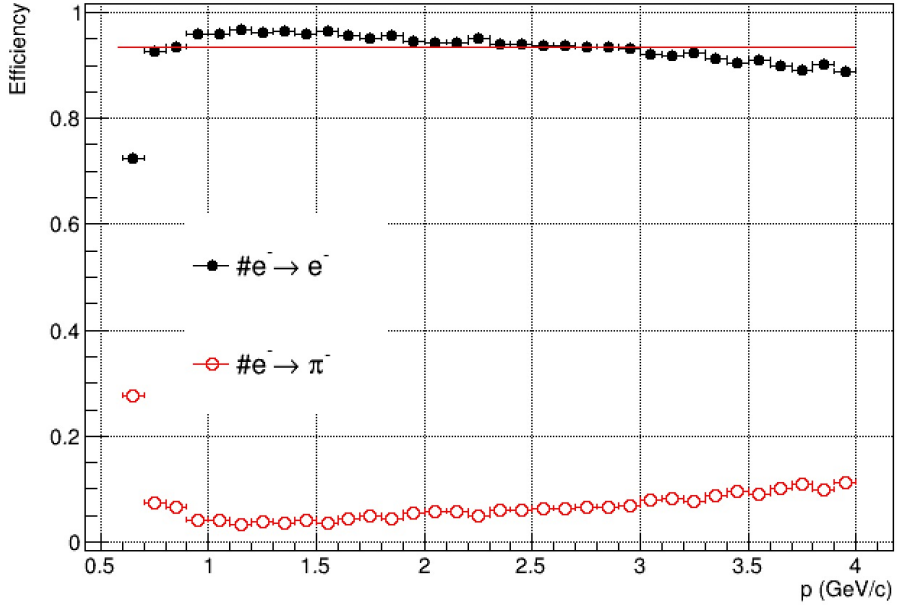


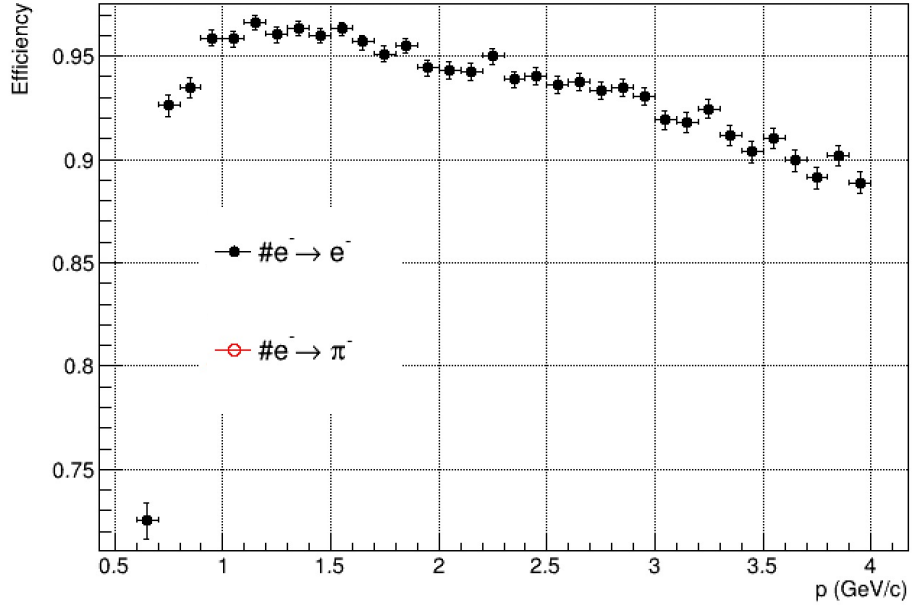


Performance – Truth Information









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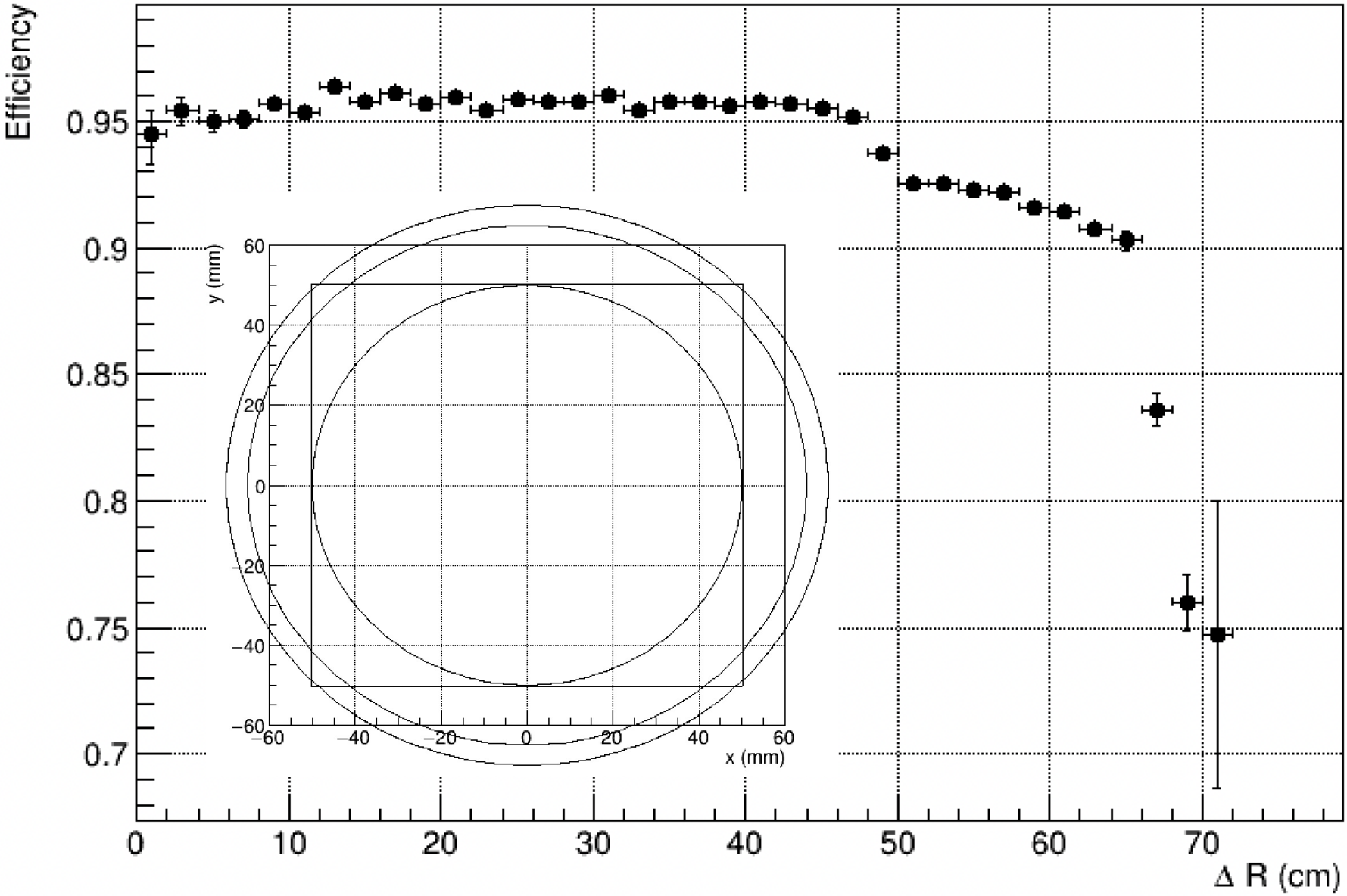
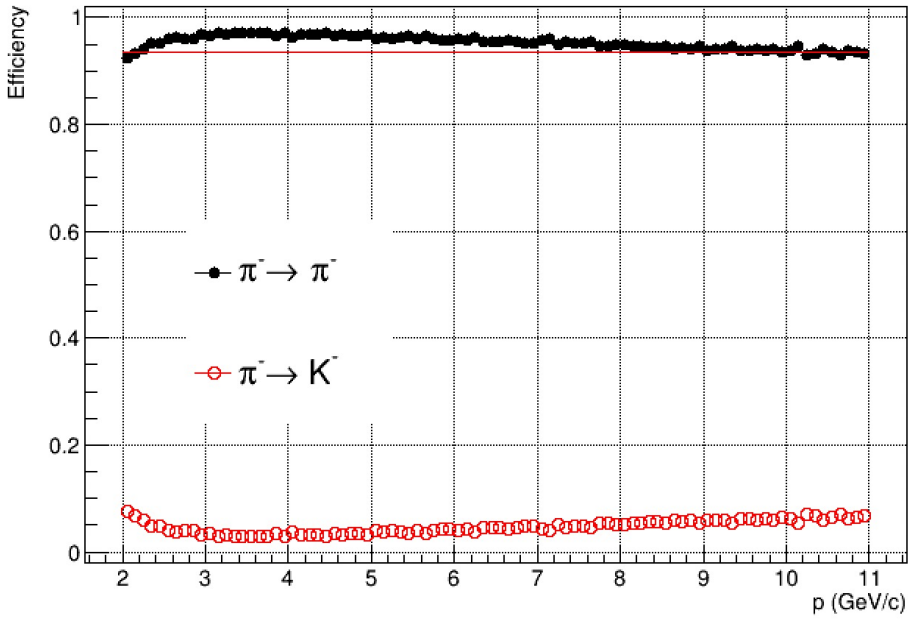
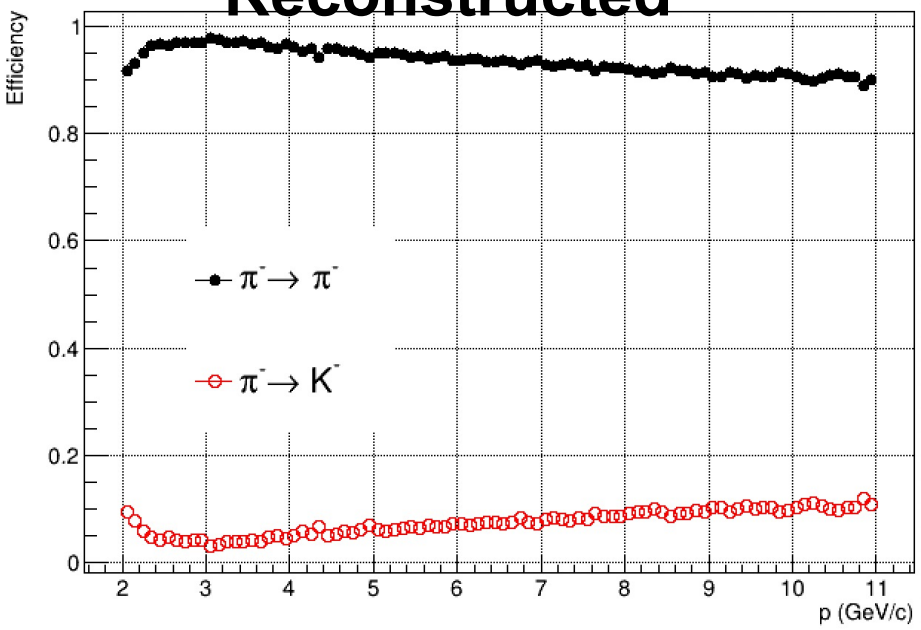


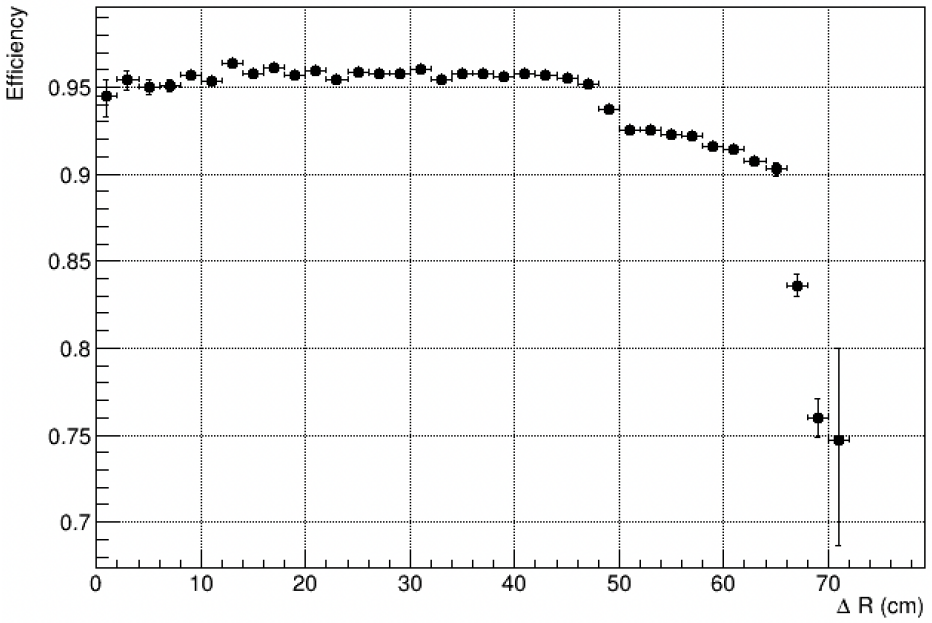
Performance:

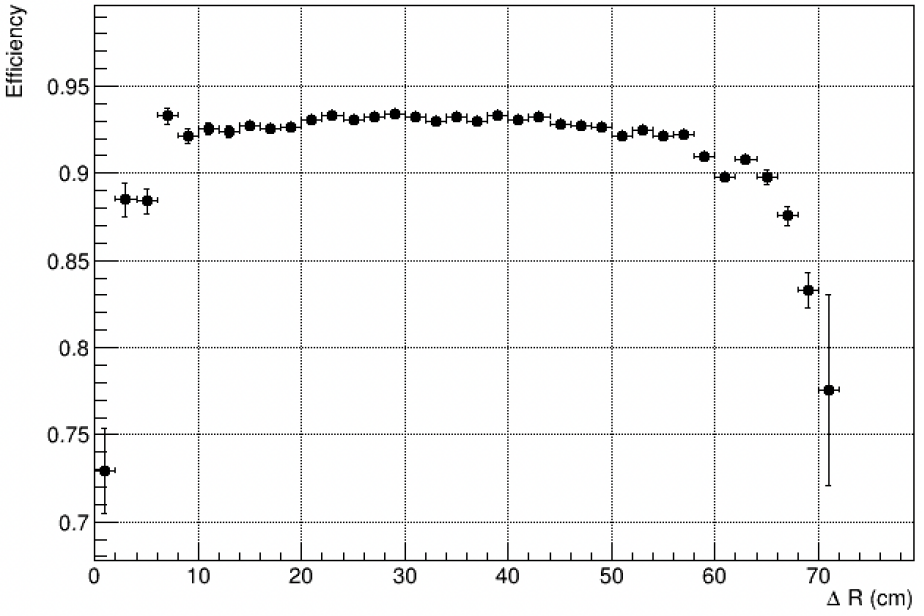
Truth



Reconstructed







TO DO …

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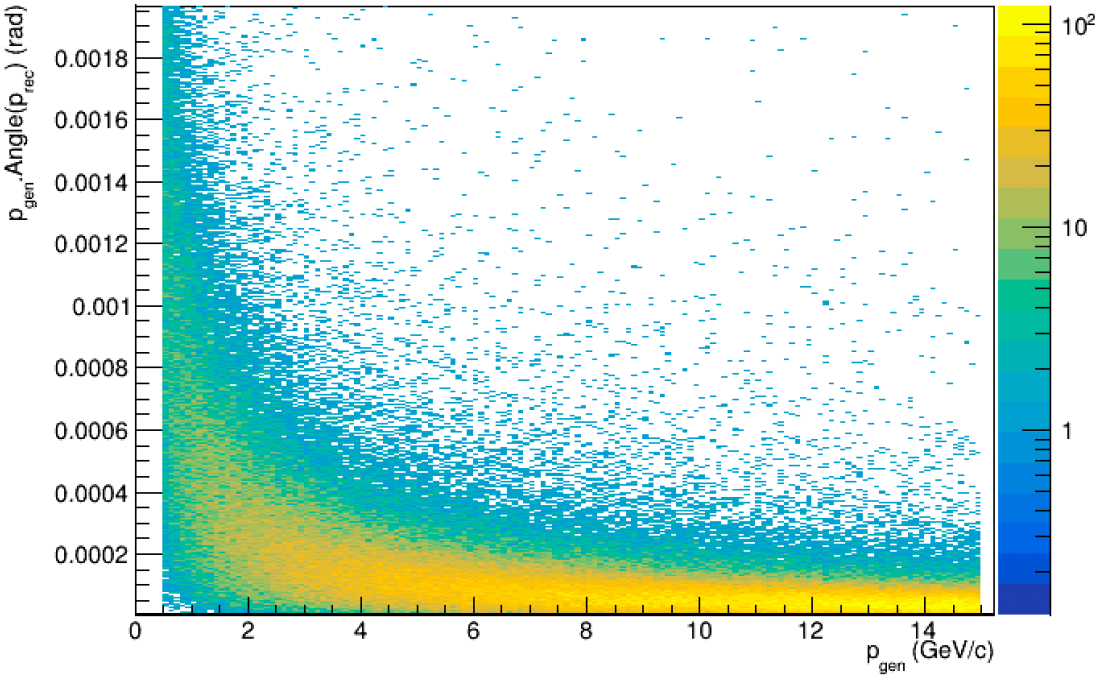
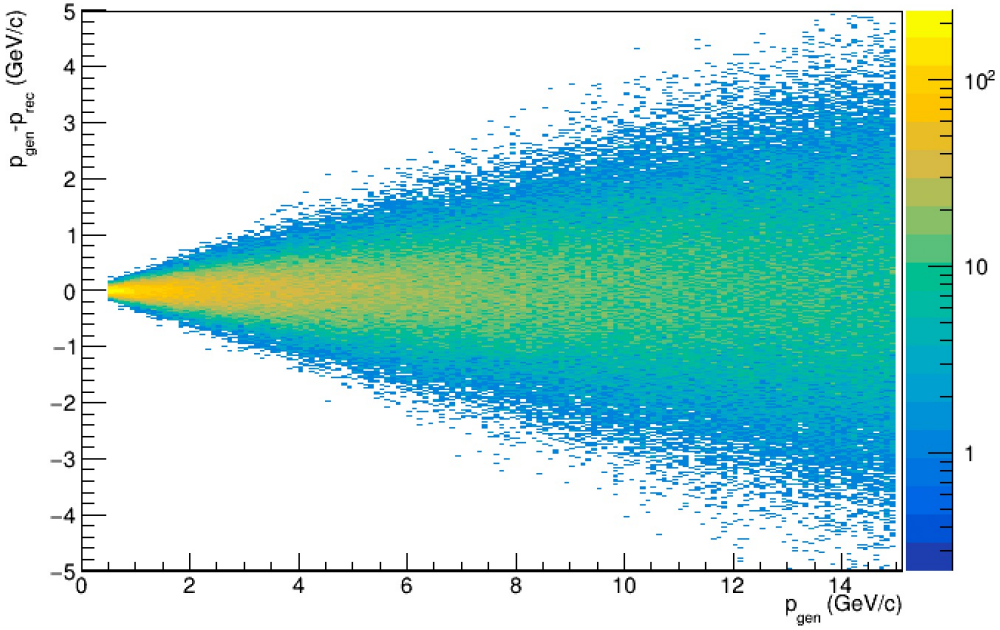
Backup

Tracking Resolution

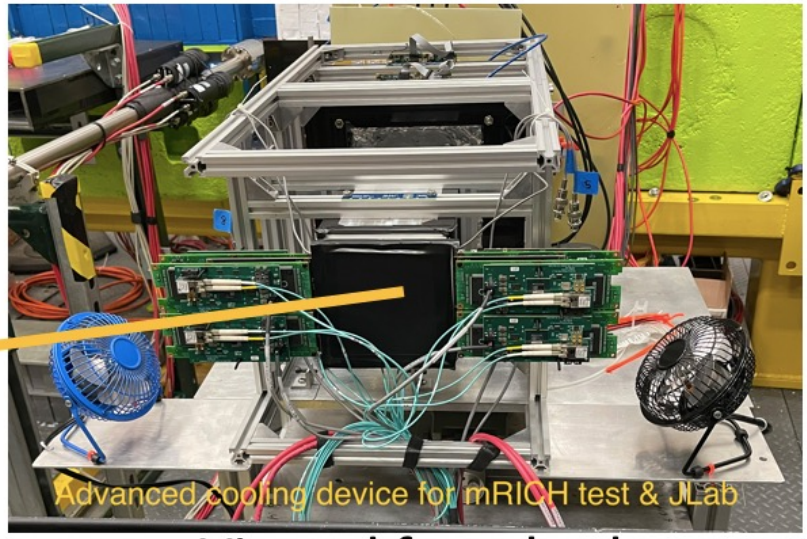
At $\eta = -2.1$



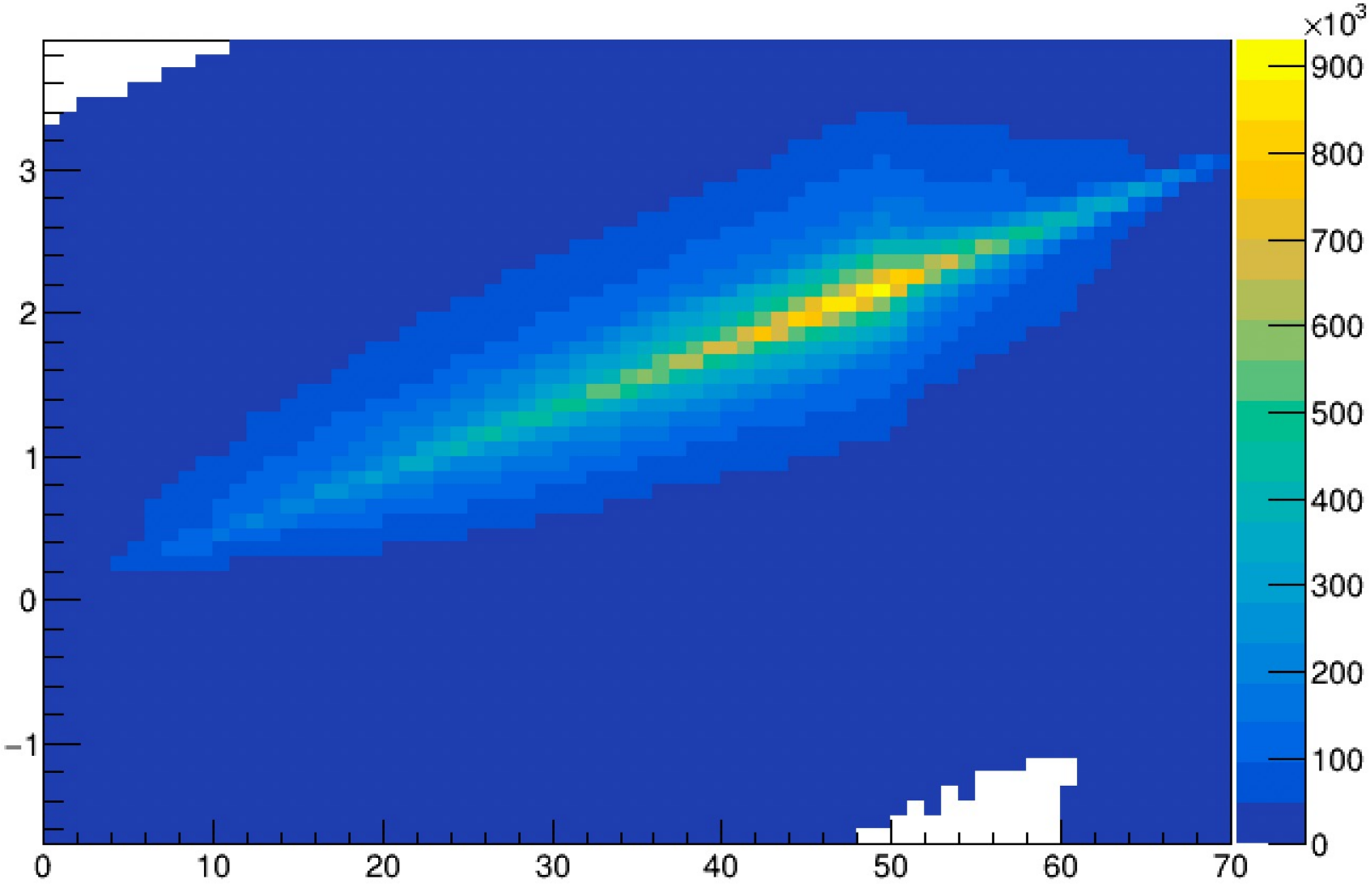


JLab Beam Test

Area view of the setup



Viewed from back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