ANGULAR RESOLUTION SIMULATIONS WITH HYBRID BASELINE
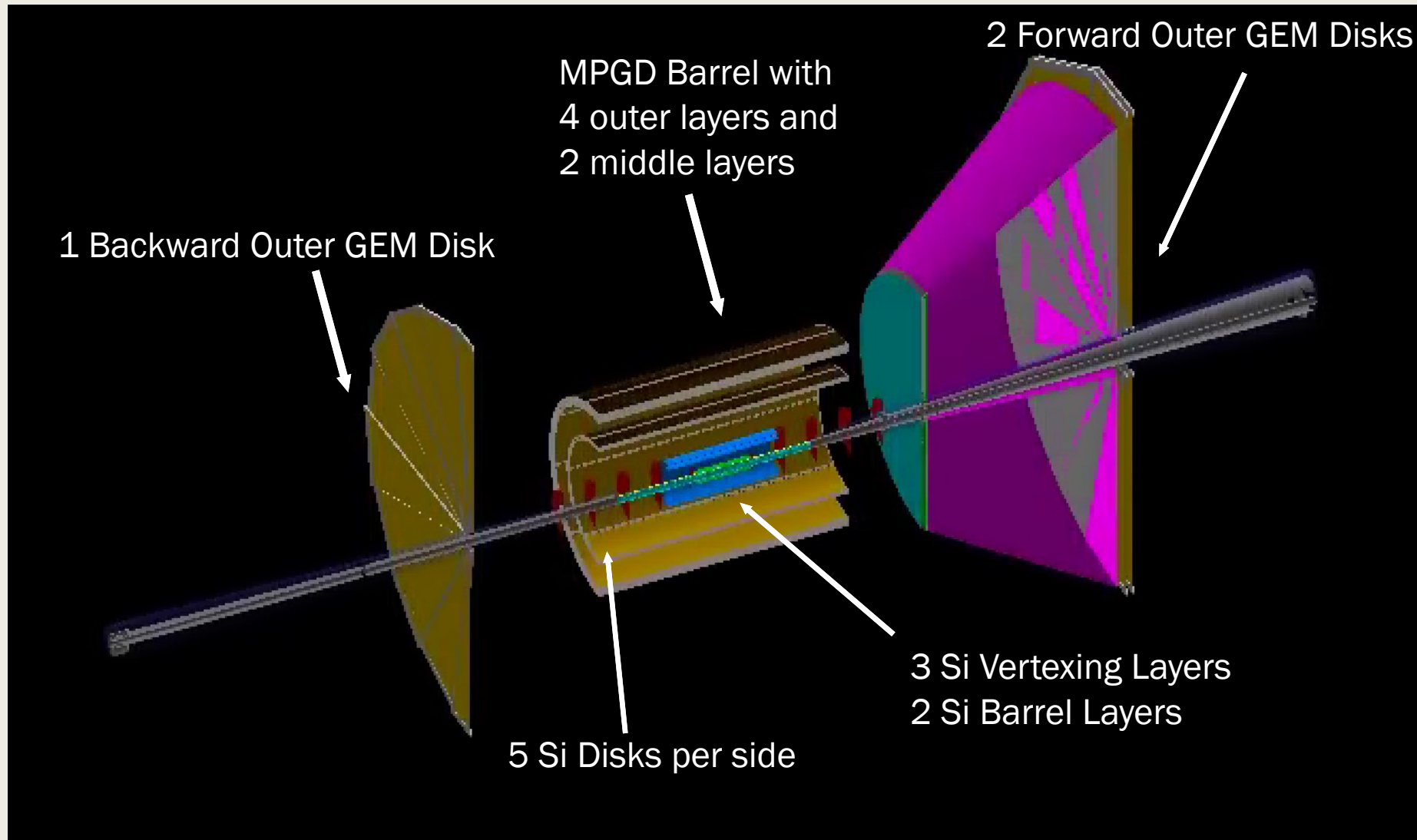
Nick Lukow

July 27, 2021

ATHENA Tracking Working Meeting

Baseline Hybrid Detector Configuration

2 Forward Outer GEM Disks

MPGD Barrel with
4 outer layers and
2 middle layers

1 Backward Outer GEM Disk

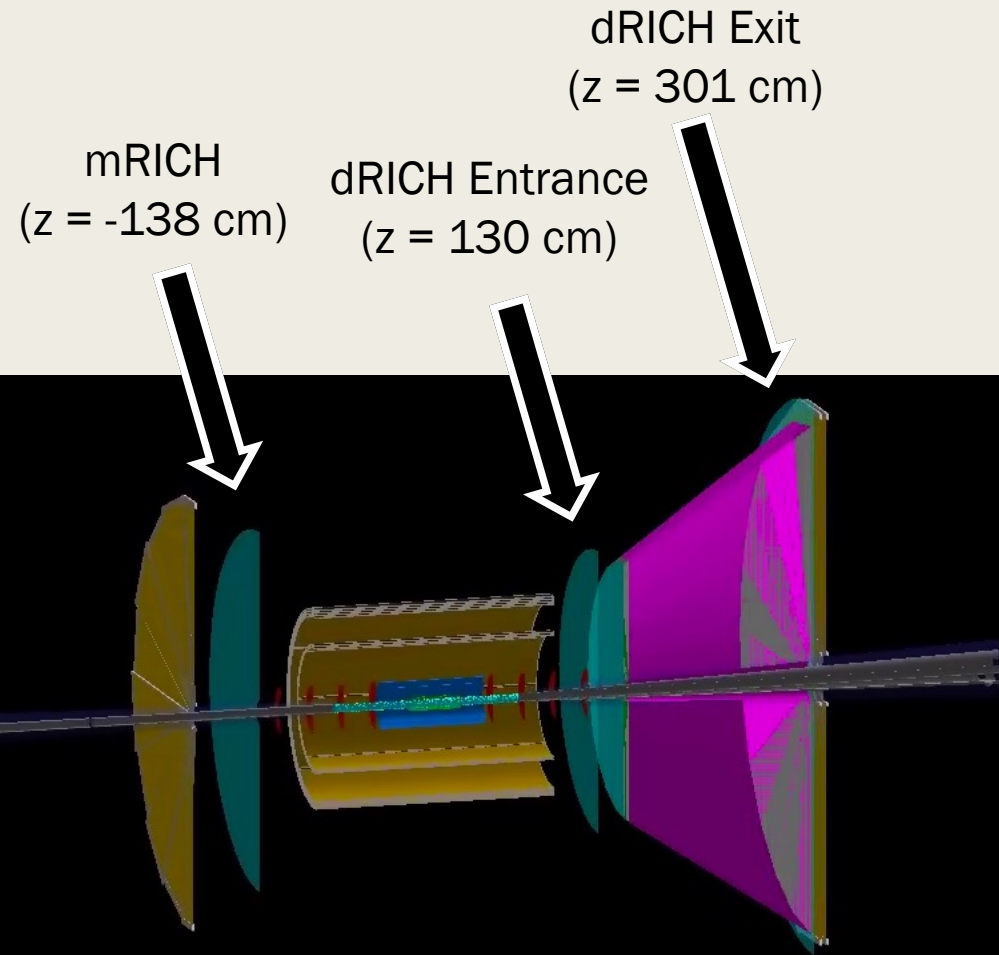3 Si Vertexing Layers
2 Si Barrel Layers

5 Si Disks per side

Dummy PID Layers

- Layers are placed to find truth and reconstructed track parameterizations at these locations
- Layers cannot be placed within other volumes
  - *For dRICH, entrance and exit layers were made to approximate mid-gas resolution*
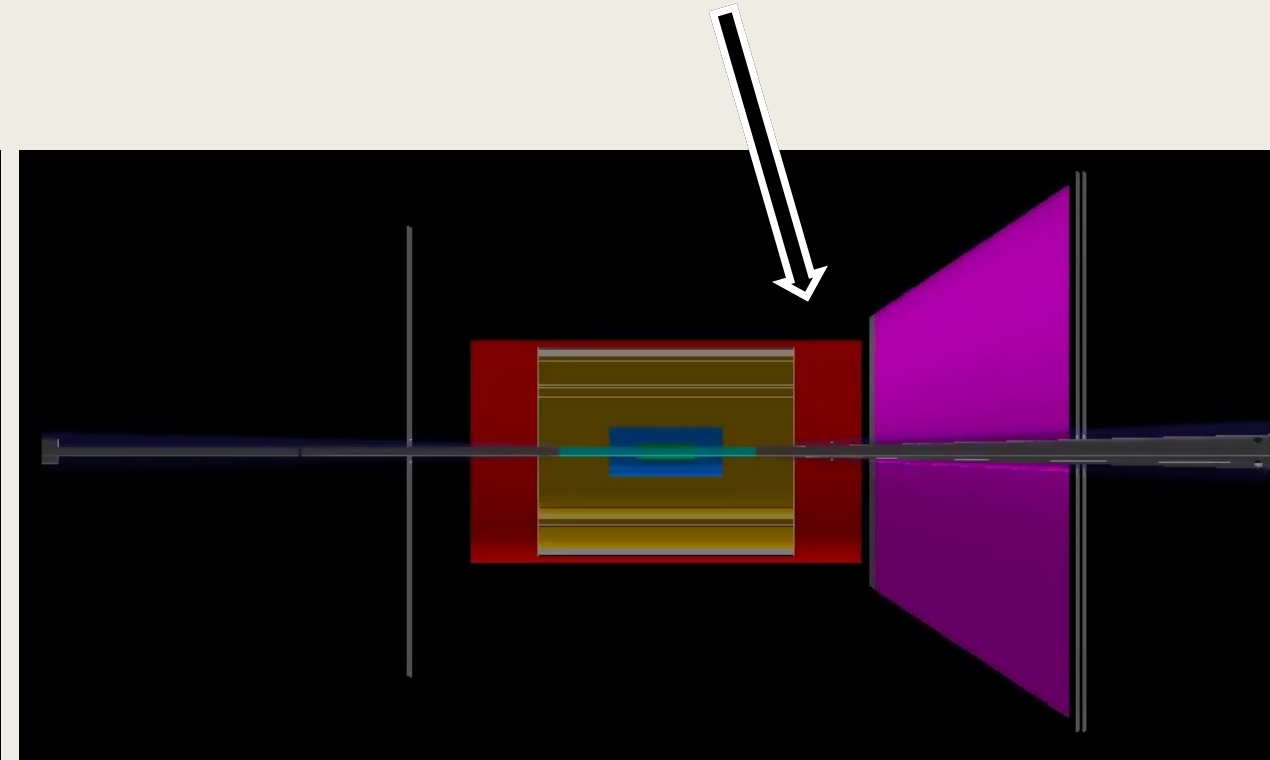- Layers are made of air
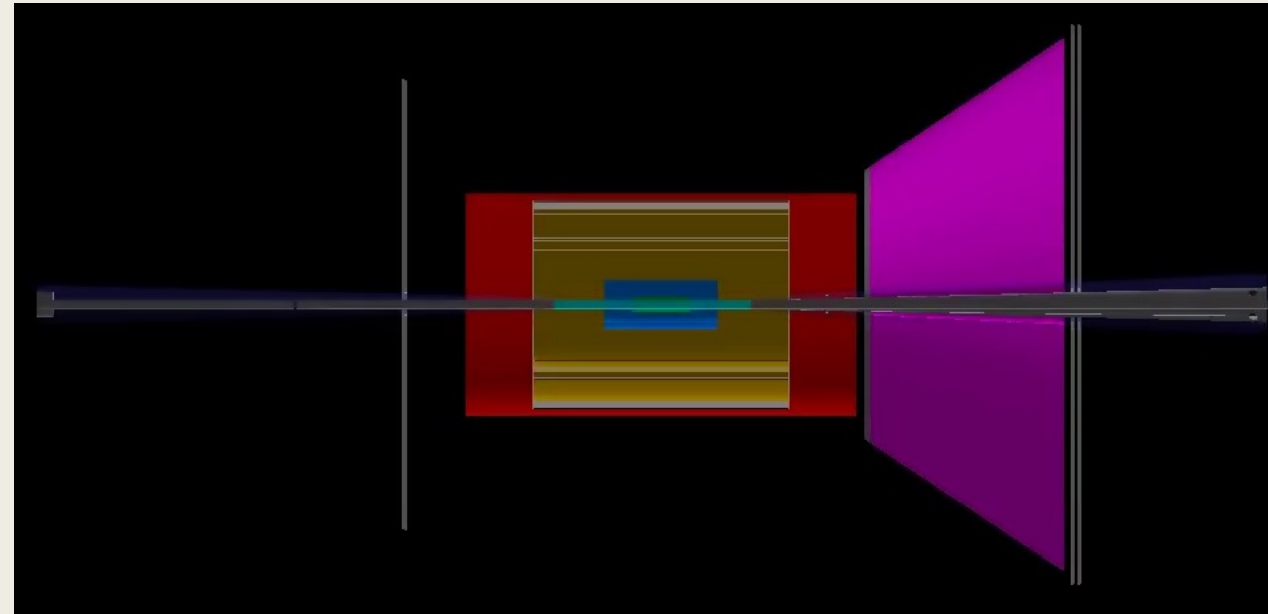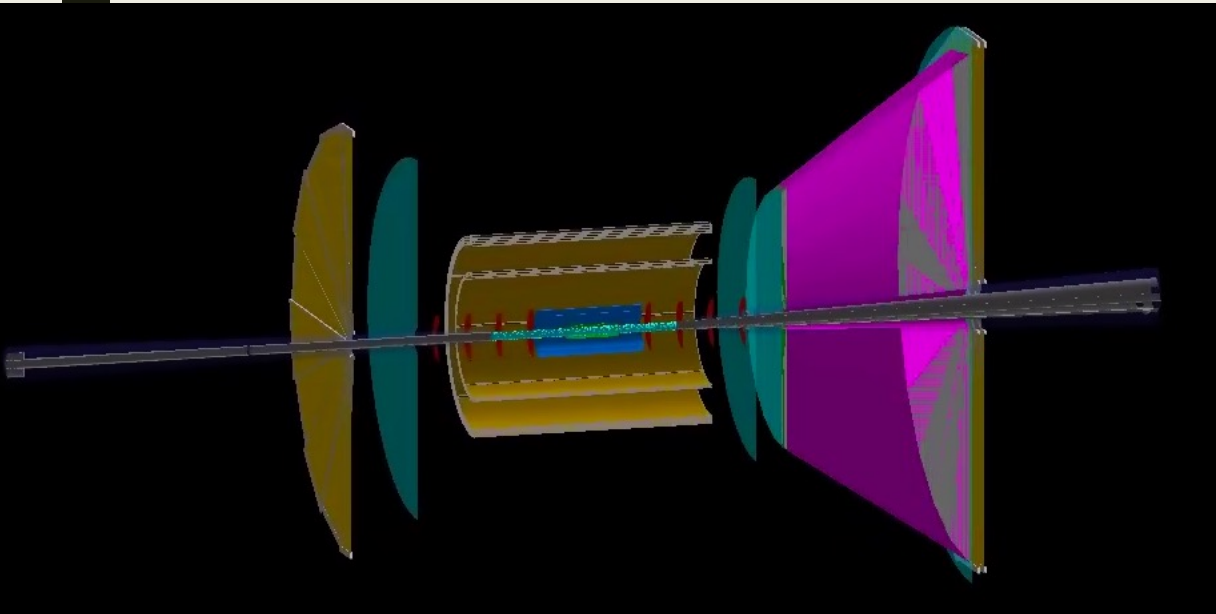
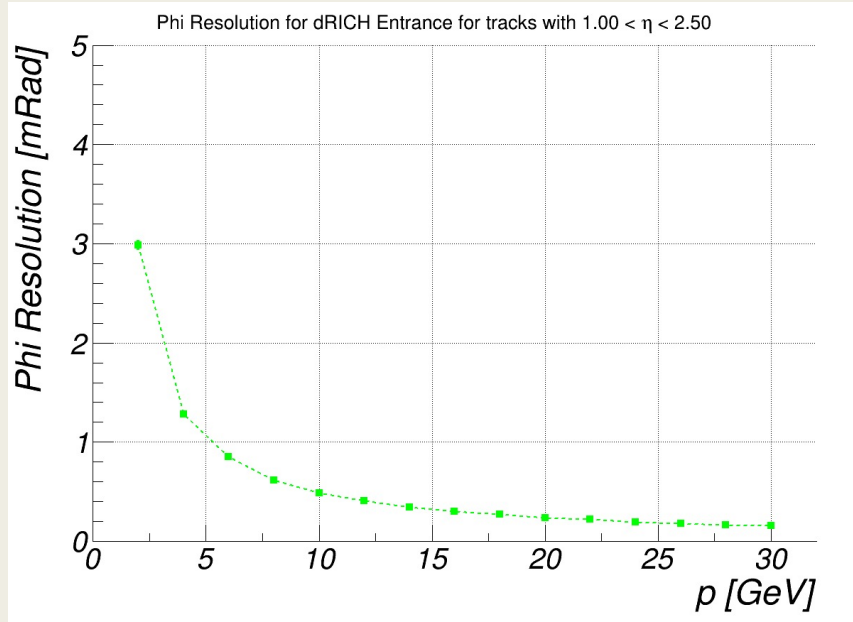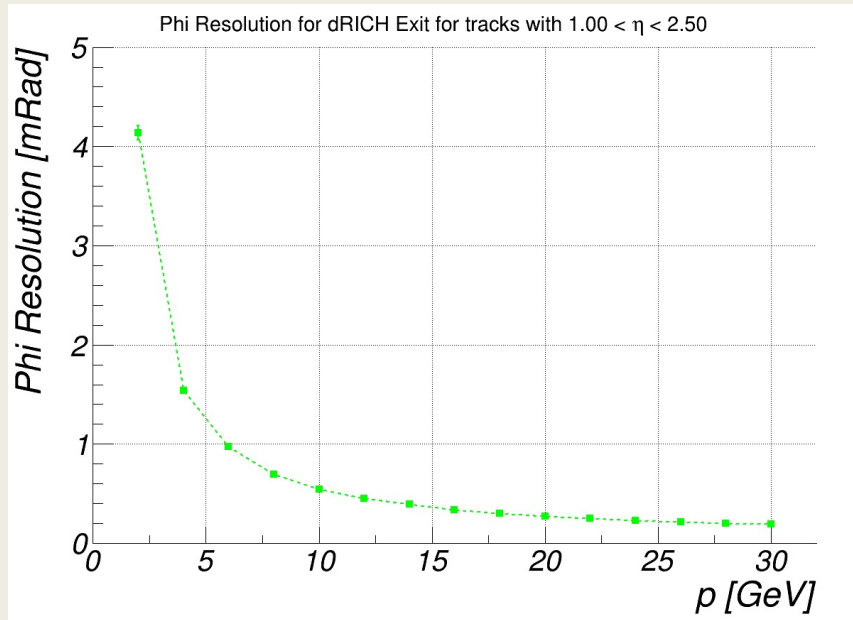# Dummy PID Layers

Dummy RICH Layers (in cyan)

dRICH Exit
(z = 301 cm)

Dummy DIRC Layer (in red)
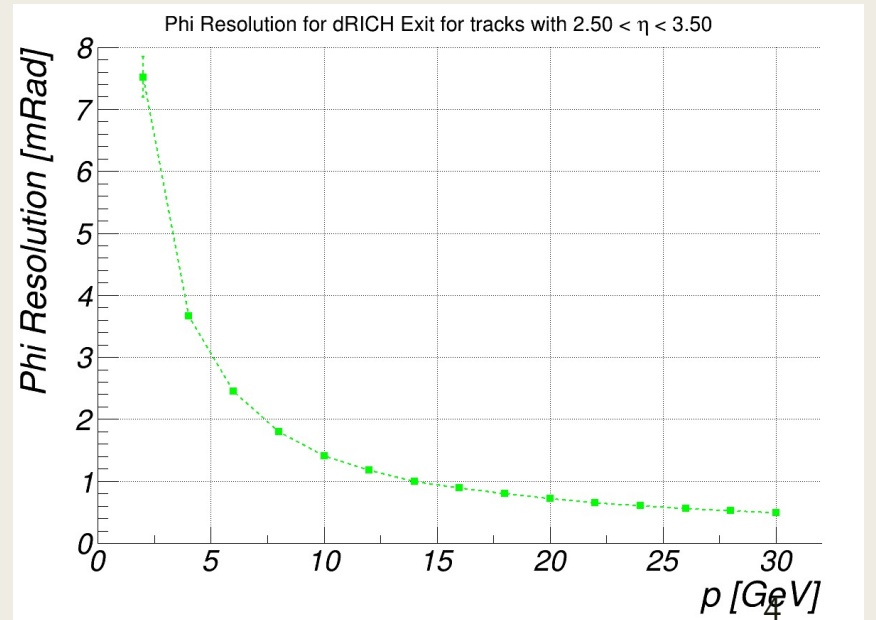(r = 82 cm)

mRICH
(z = -138 cm)

dRICH Entrance
(z = 130 cm)

Phi Resolution at dRICH
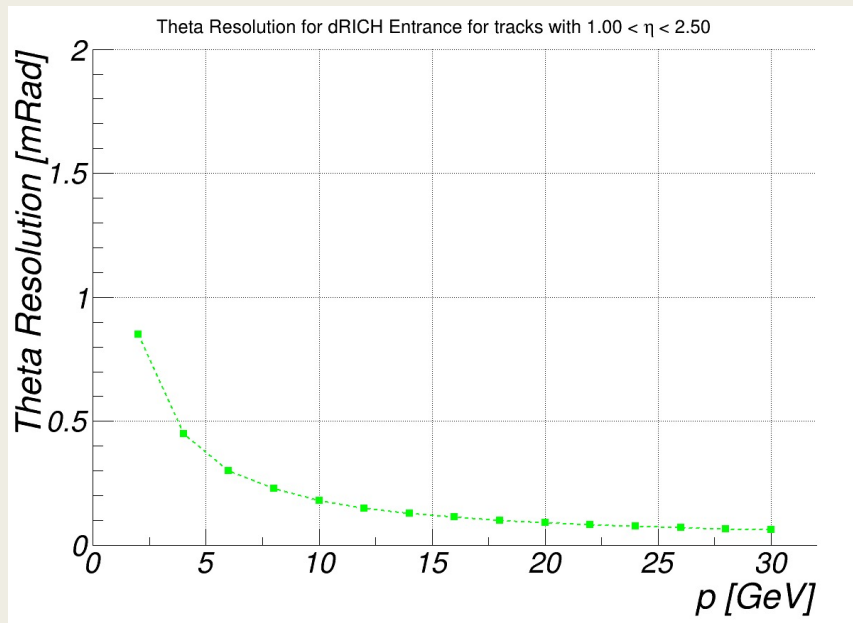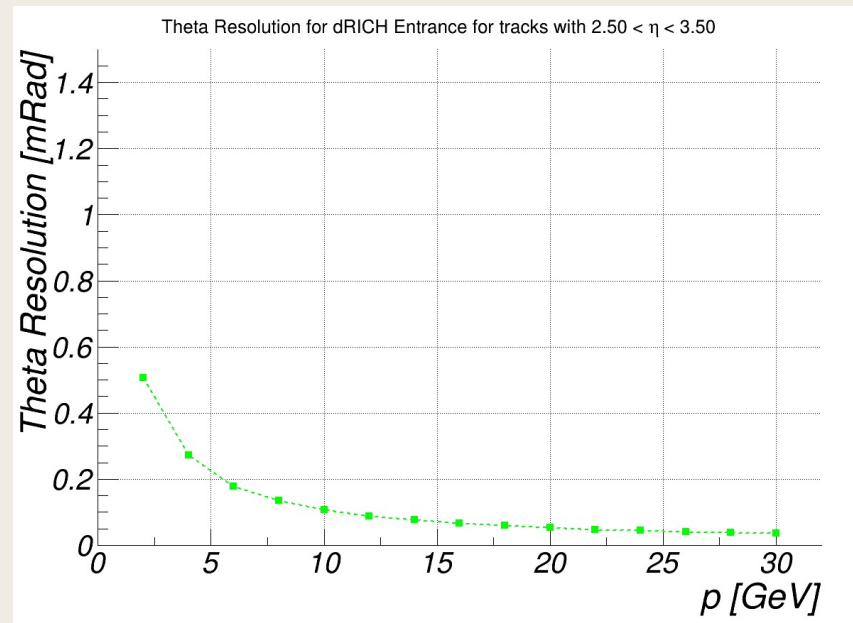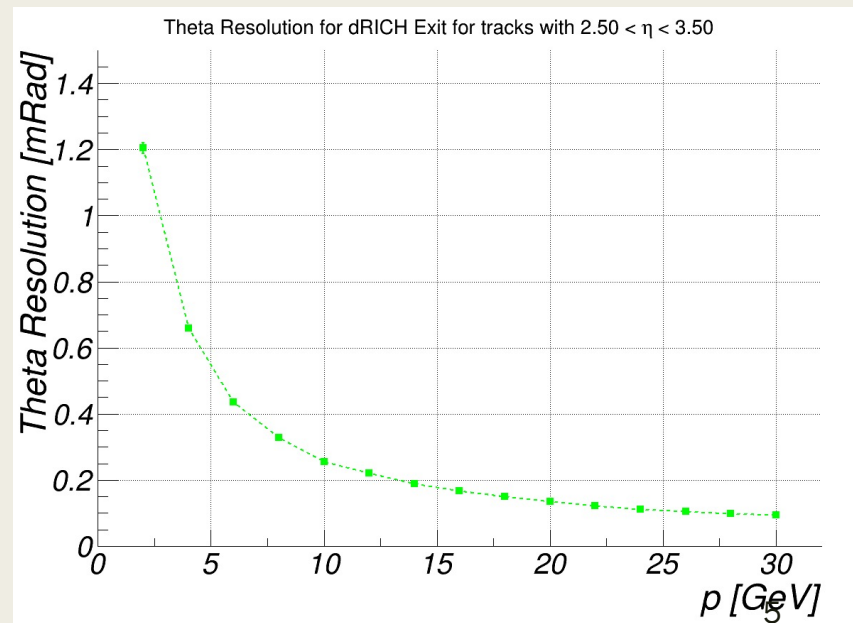

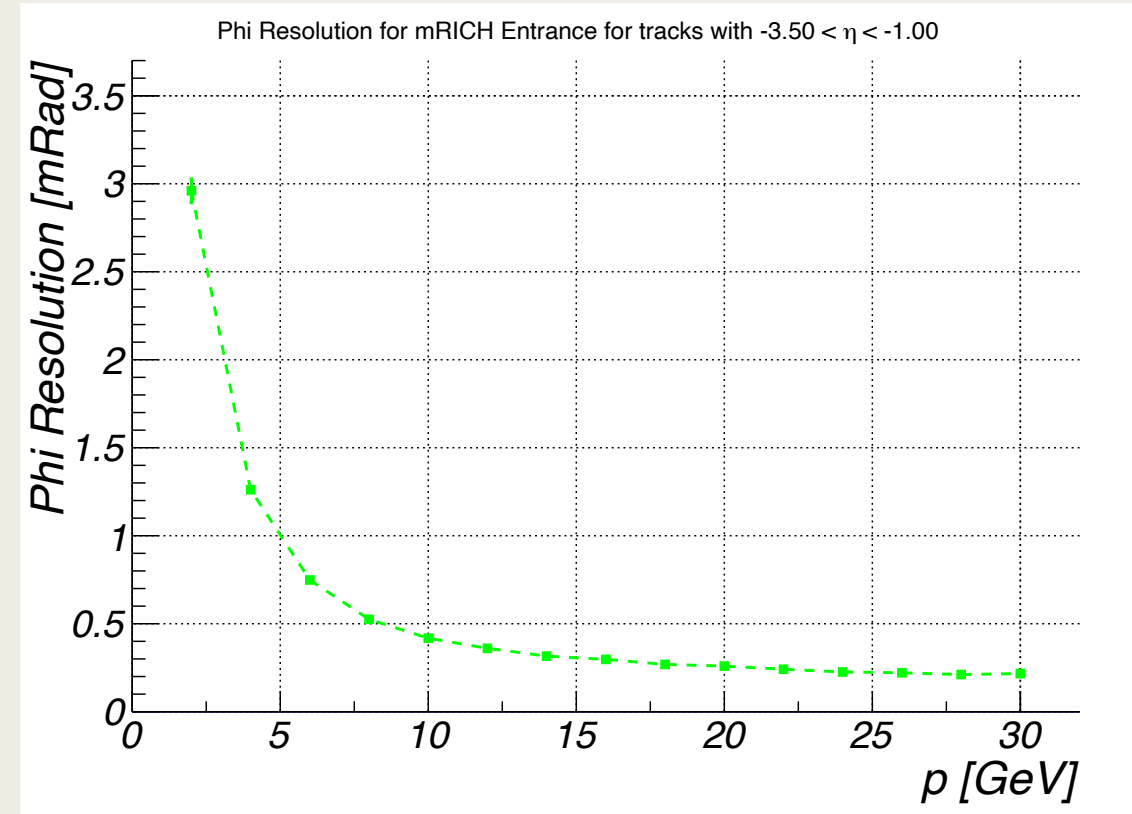dRICH Entrance
(z ~ 130 cm)

dRICH Exit
(z ~ 301 cm)

Theta Resolution at dRICH

Theta Resolution for dRICH Entrance for tracks with 1.00 < η < 2.50

dRICH Entrance
(z ~ 130 cm)

Theta Resolution for dRICH Entrance for tracks with 2.50 < η < 3.50

Theta Resolution for dRICH Exit for tracks with 1.00 < η < 2.50

dRICH Exit
(z ~ 301 cm)

Theta Resolution for dRICH Exit for tracks with 2.50 < η < 3.50
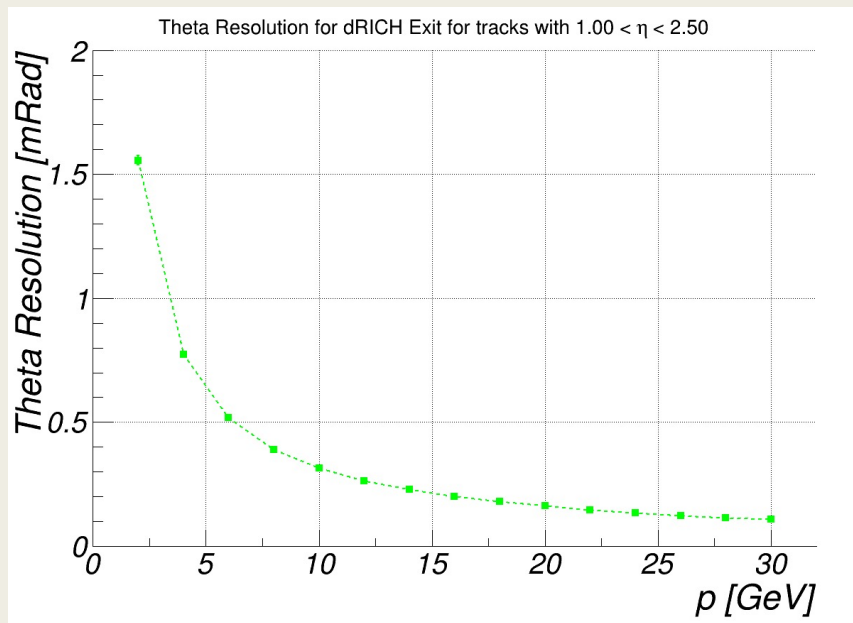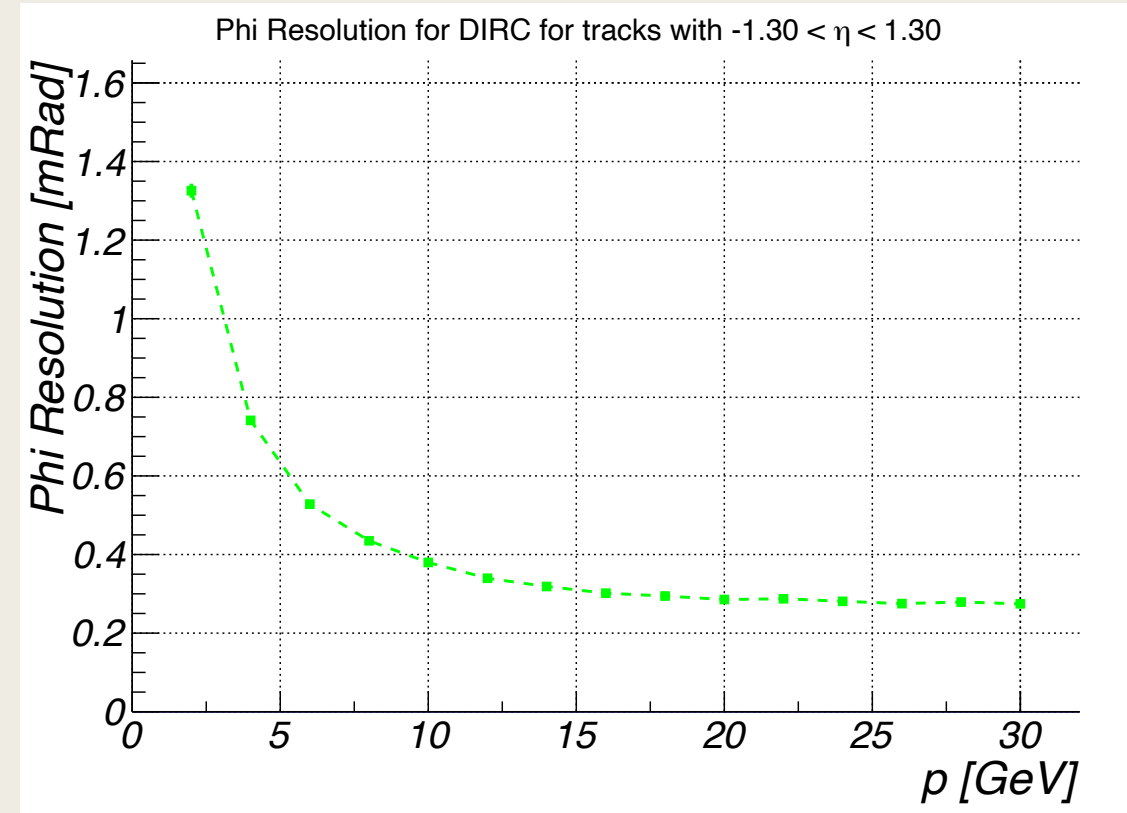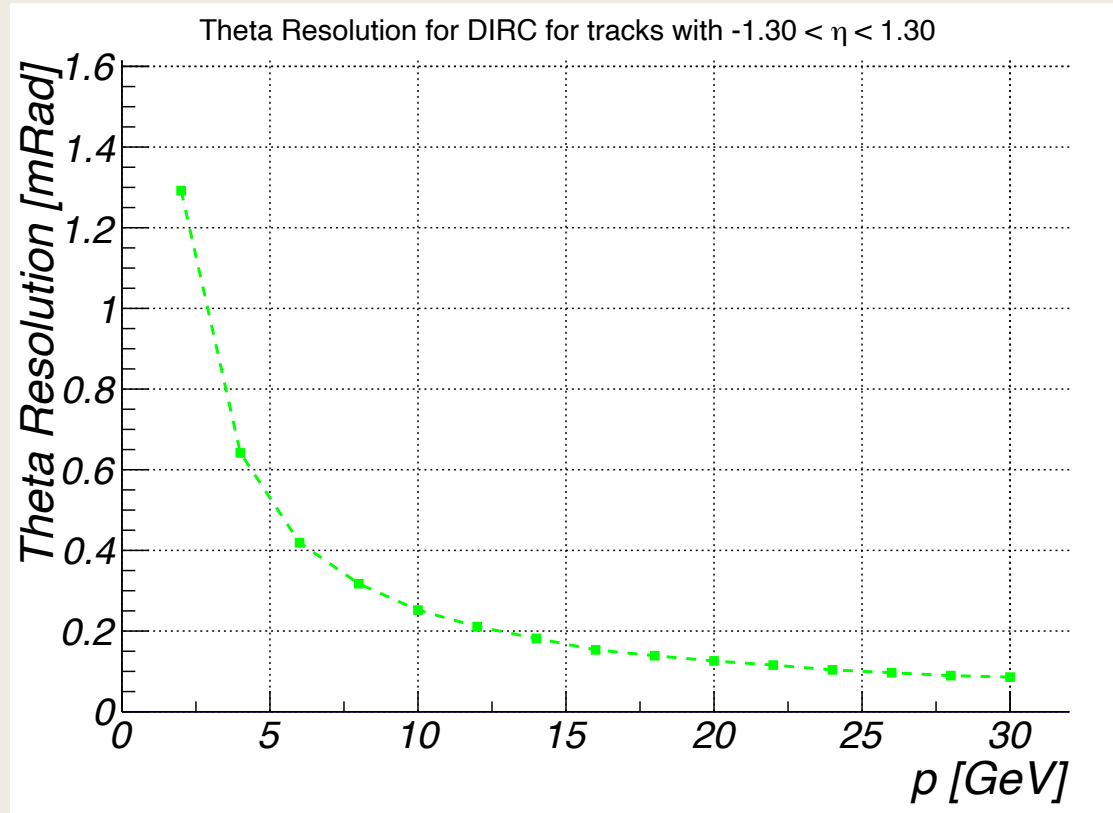
Angular Resolution at mRICH Entrance
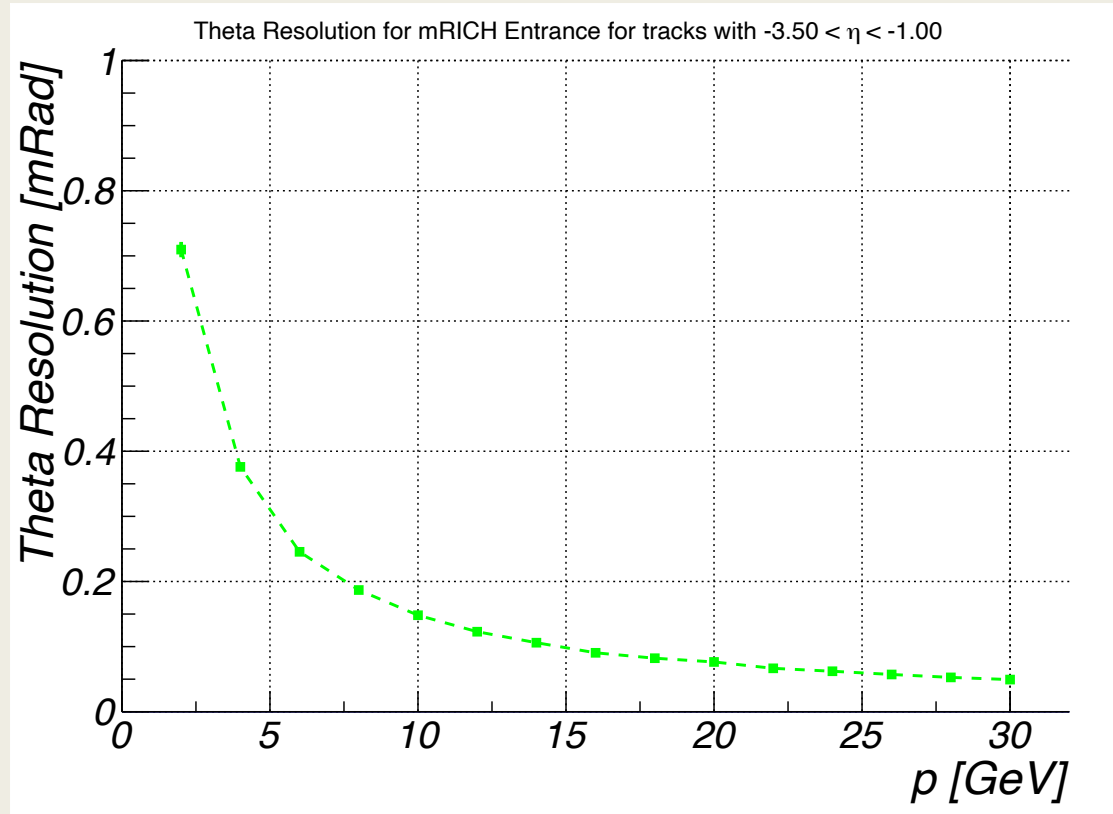
Measured at z = -138cm

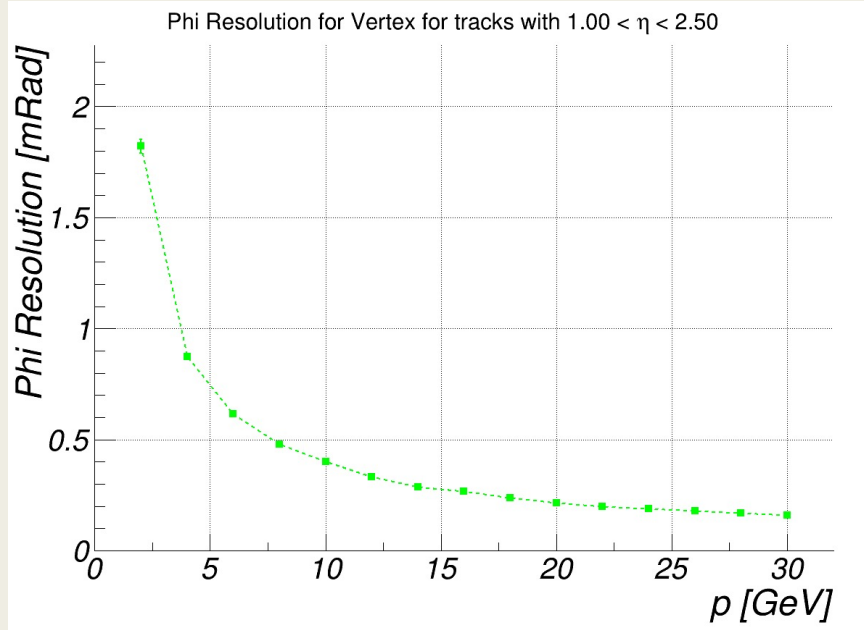# Angular Resolution at DIRC Entrance

Theta Resolution for DIRC for tracks with -1.30 < η < 1.30
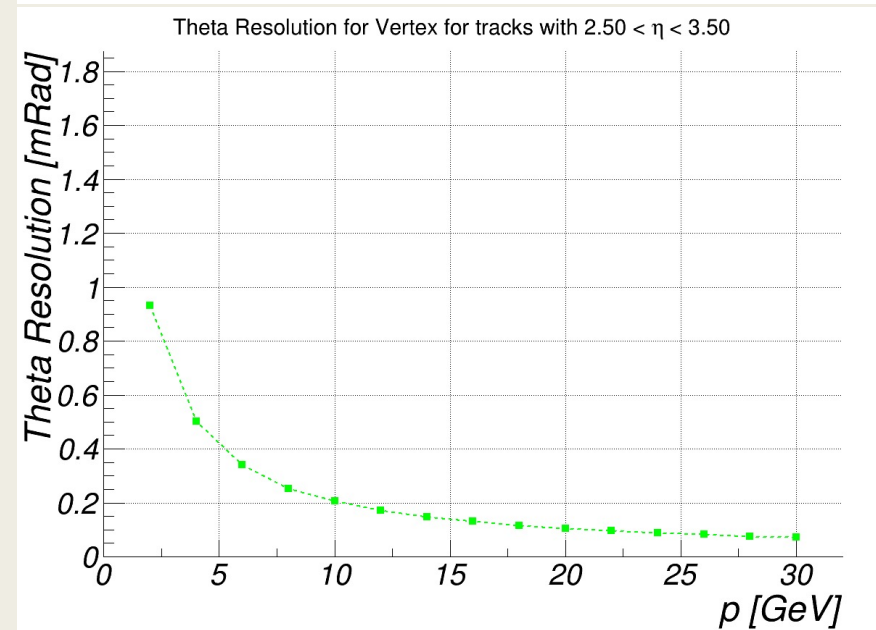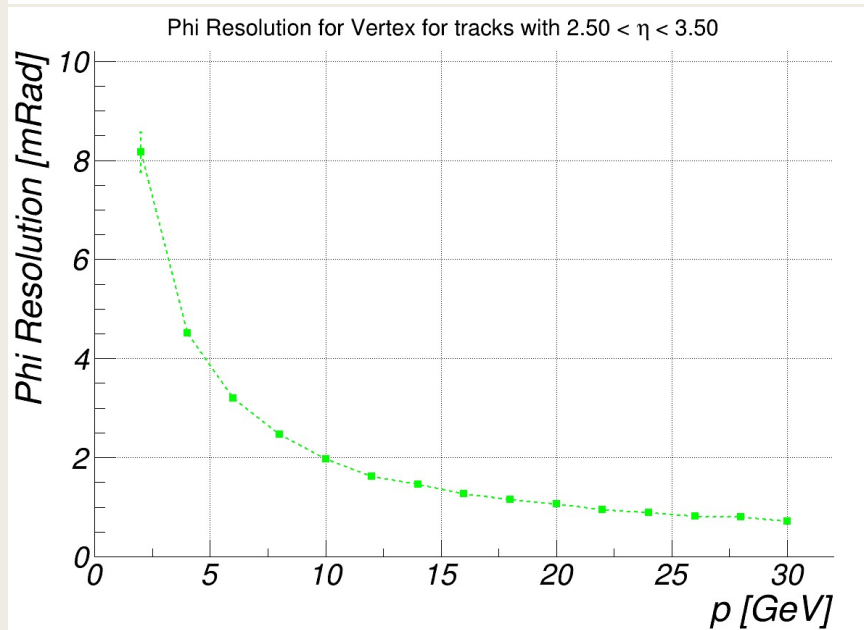
Phi Resolution for DIRC for tracks with -1.30 < η < 1.30

Measured at r = 82cm

Angular Resolutions At Vertex – Forward

1.0 < η < 2.5

2.5 < η < 3.5

Phi Resolution for Vertex for tracks with 1.00 < η < 2.50

Theta Resolution for Vertex for tracks with 1.00 < η < 2.50

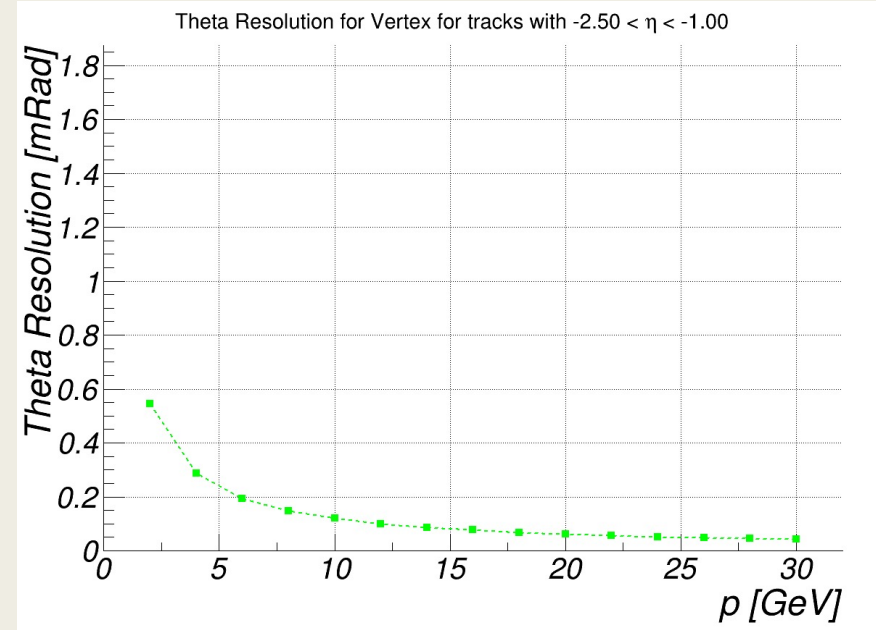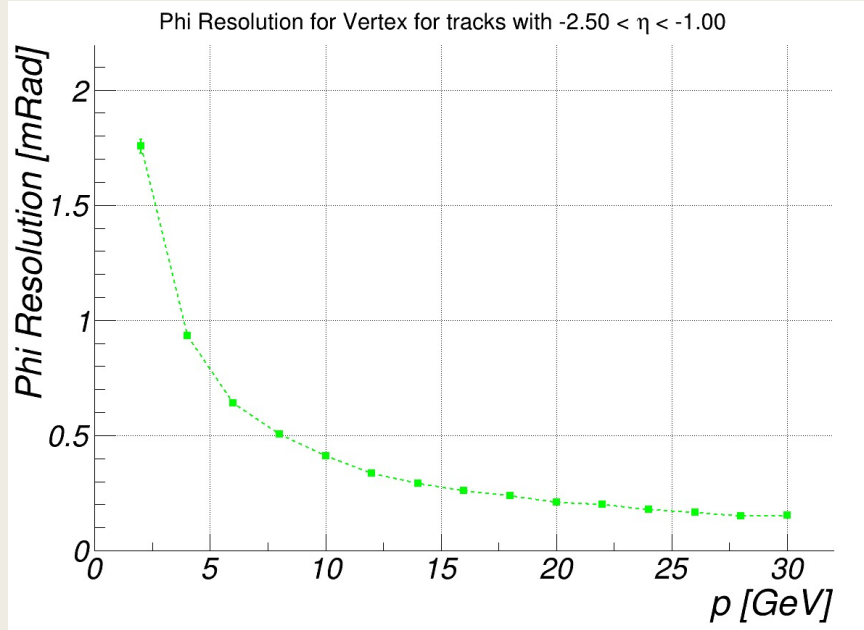Phi Resolution for Vertex for tracks with 2.50 < η < 3.50
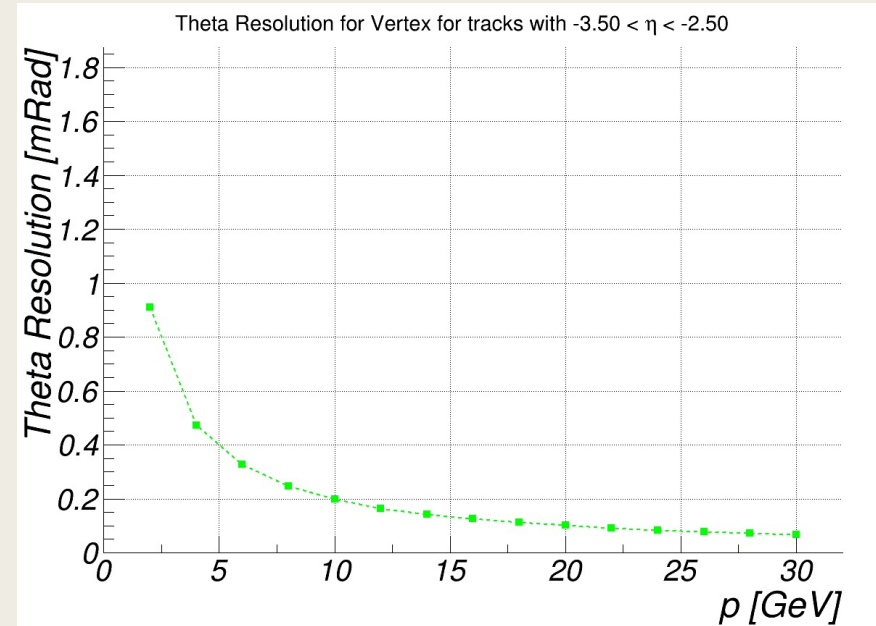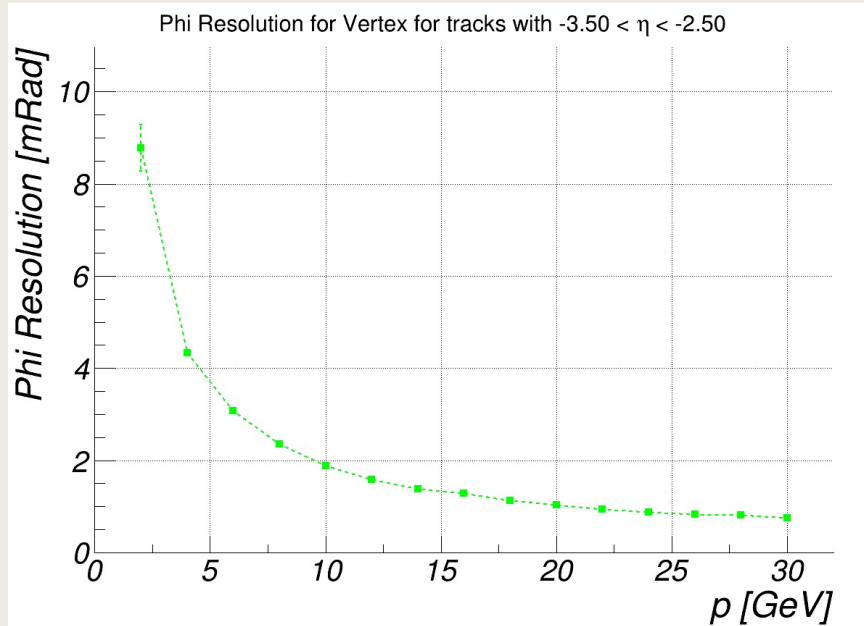
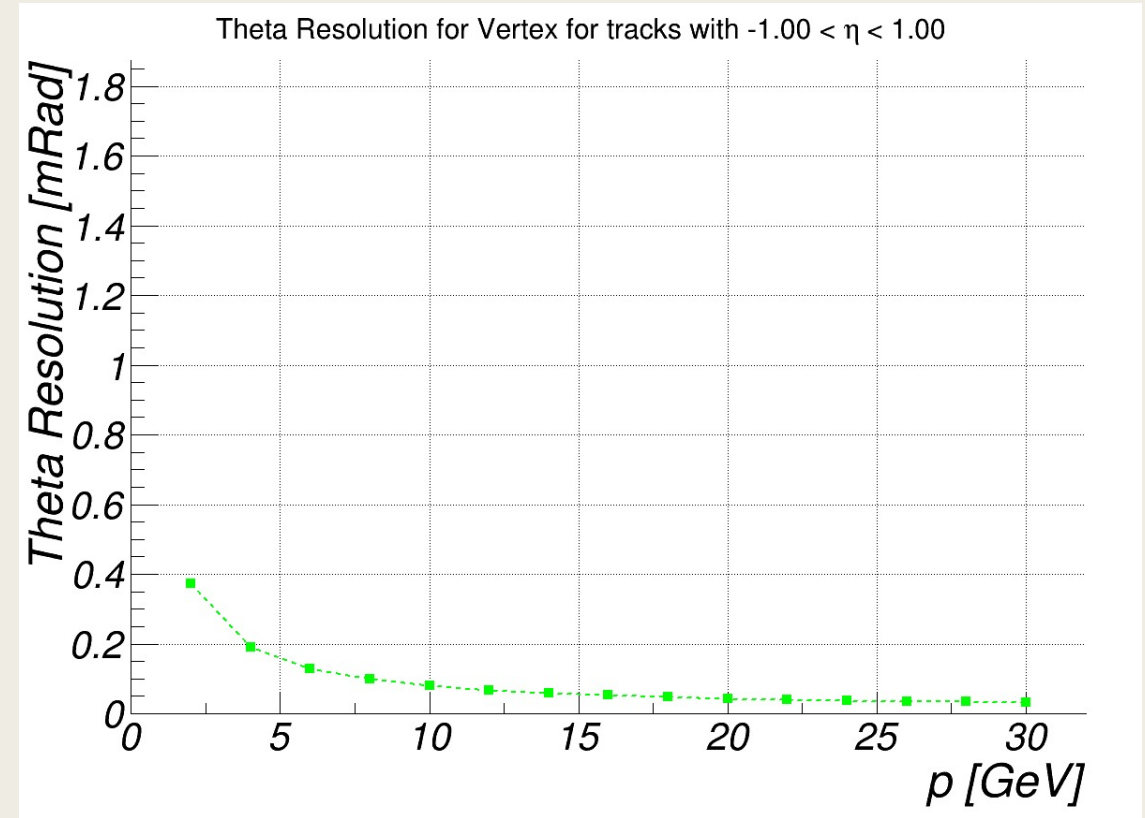Theta Resolution for Vertex for tracks with 2.50 < η < 3.50
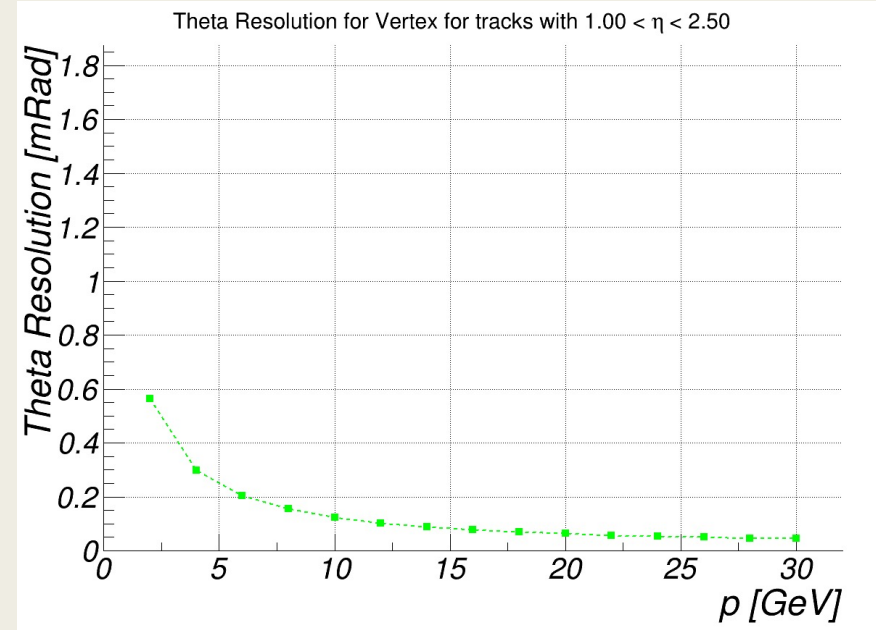
Angular Resolutions At Vertex – Backward

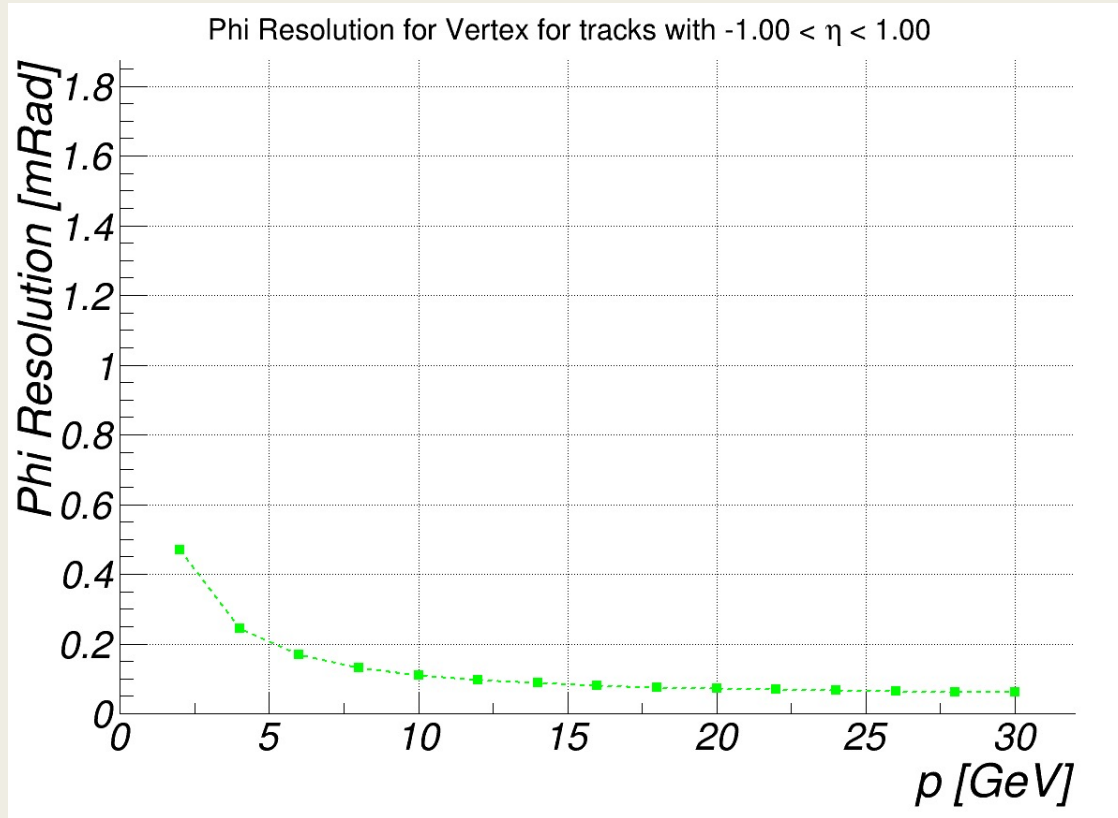$-2.5 < \eta < -1.0$

Phi Resolution for Vertex for tracks with -2.50 < η < -1.00

Theta Resolution for Vertex for tracks with -2.50 < η < -1.00

$-3.5 < \eta < -2.5$

Phi Resolution for Vertex for tracks with -3.50 < η < -2.50

Theta Resolution for Vertex for tracks with -3.50 < η < -2.50

Angular Resolution at Vertex - Central

Phi Resolution for Vertex for tracks with -1.00 < η < 1.00

Theta Resolution for Vertex for tracks with -1.00 < η < 1.00
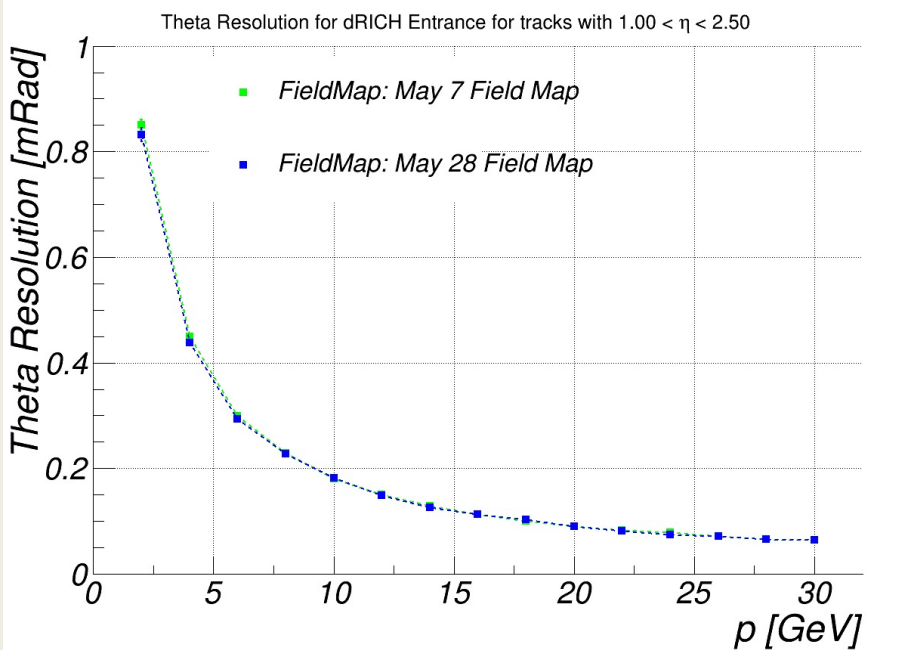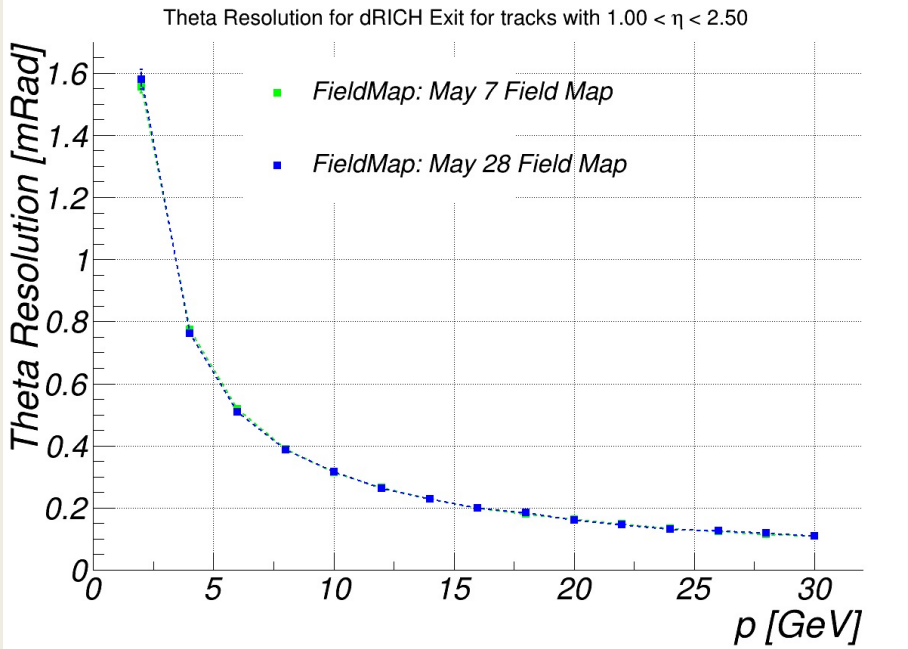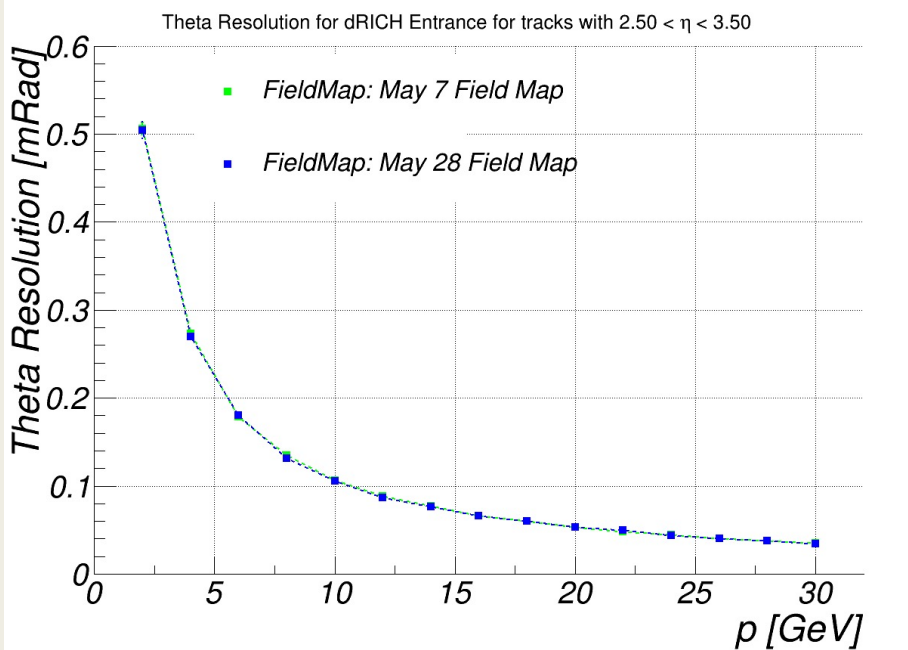
Angular Resolutions for Different Field Maps

■ Angular resolutions in the forward region were examined for two different field maps:

– *Version from 5/7*

– *Version from 5/28*

Field maps found here: https://github.com/eic/BeastMagneticField/tree/master/data
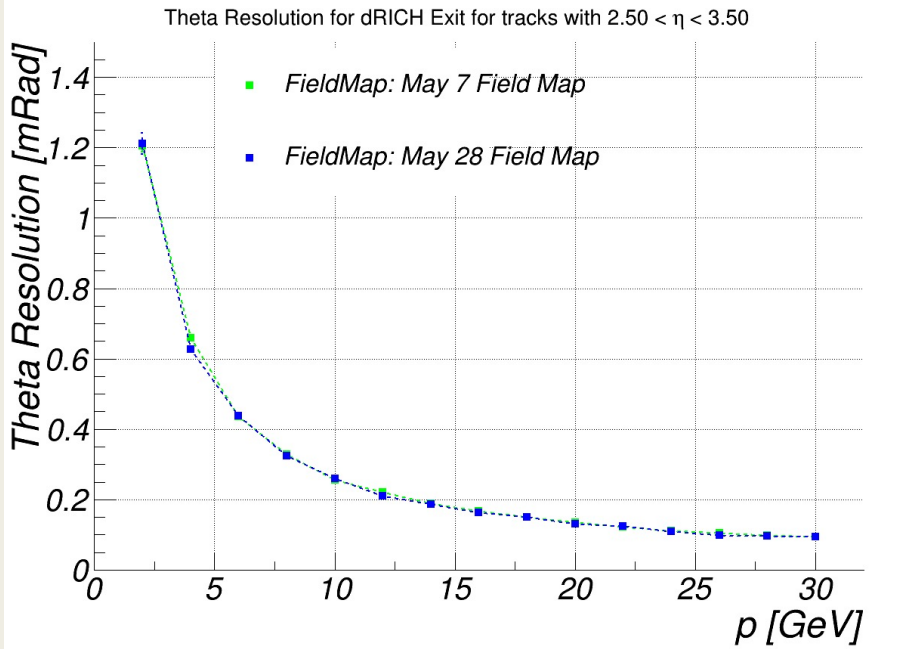
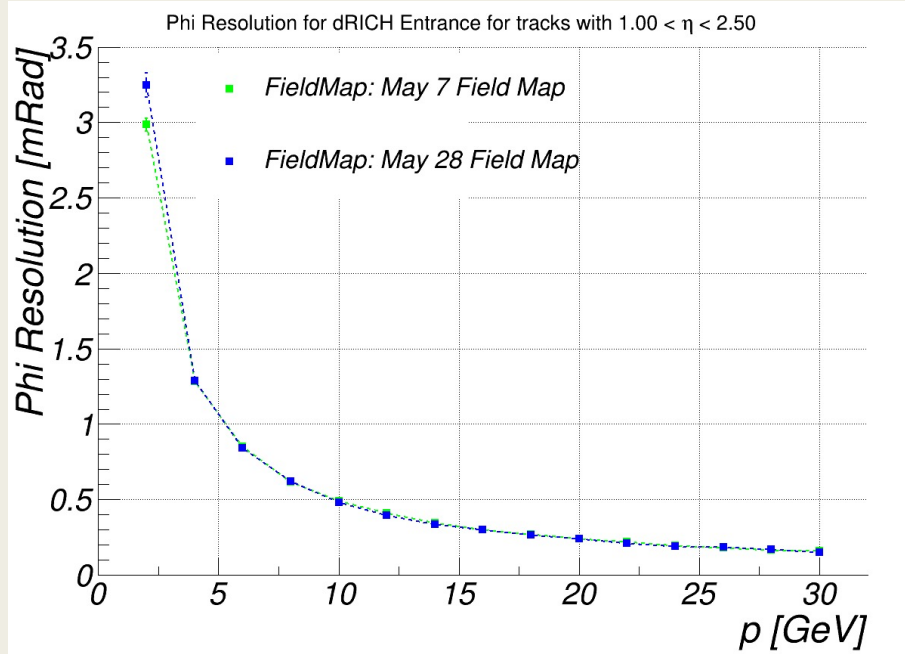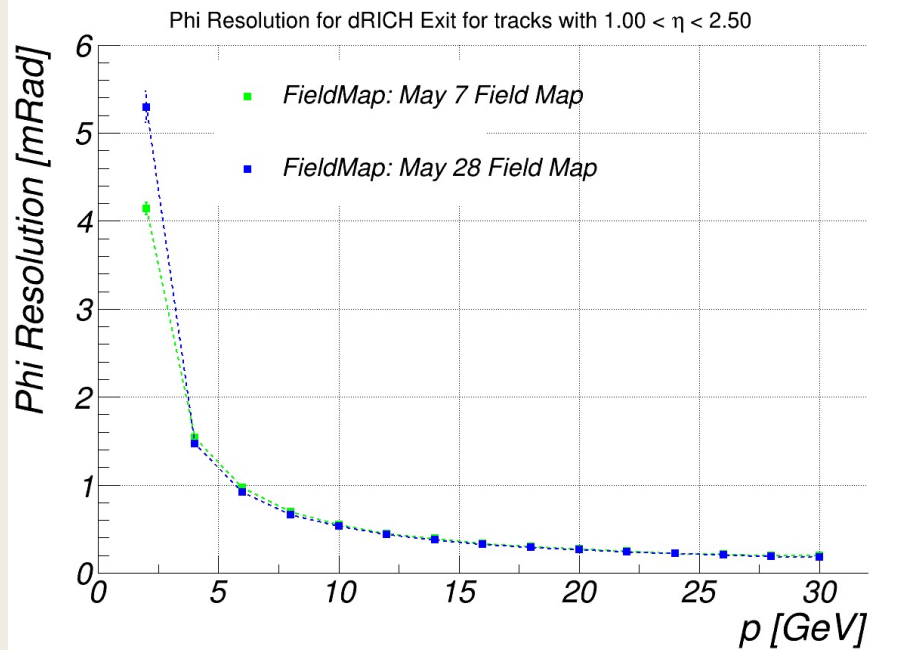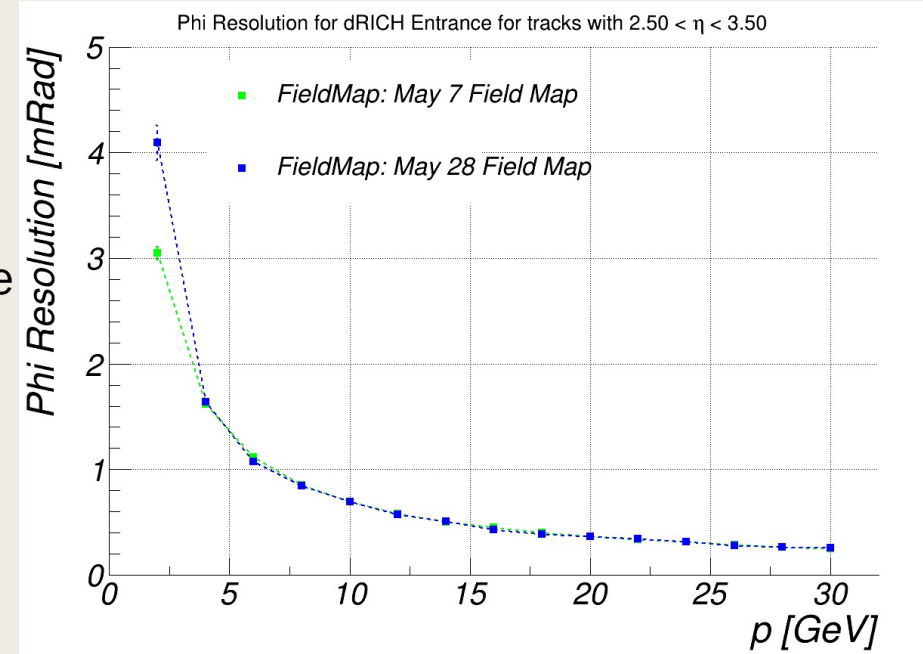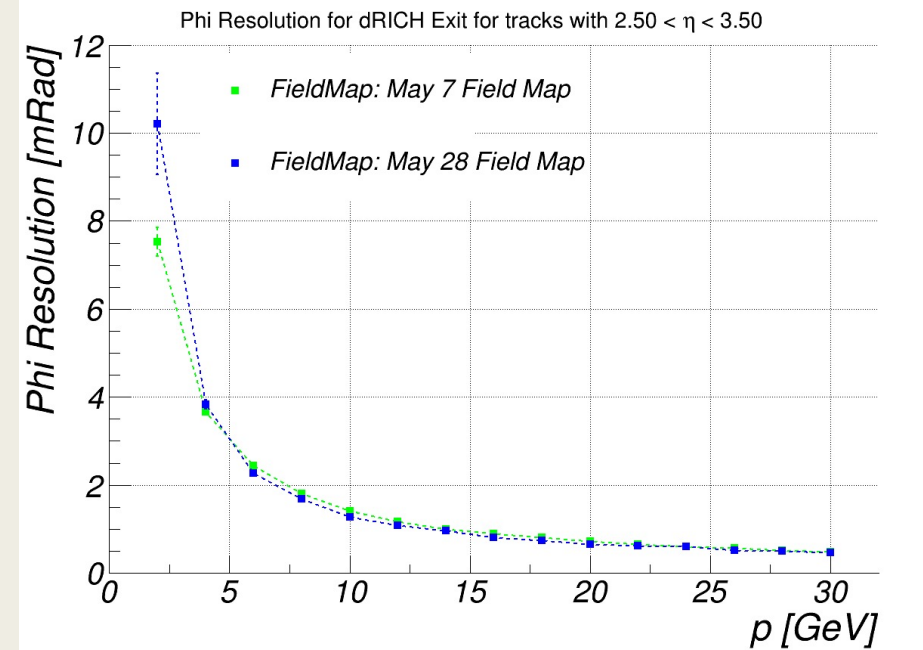# dRICH Theta Resolutions <u>without</u> Support Material

dRICH Entrance

dRICH Exit

dRICH Phi Resolutions <u>without</u> Support Material

Phi Resolution for dRICH Entrance for tracks with 1.00 < η < 2.50

FieldMap: May 7 Field Map

FieldMap: May 28 Field Map

Phi Resolution for dRICH Entrance for tracks with 2.50 < η < 3.50

FieldMap: May 7 Field Map

FieldMap: May 28 Field Map

dRICH Entrance

Phi Resolution for dRICH Exit for tracks with 1.00 < η < 2.50

FieldMap: May 7 Field Map

FieldMap: May 28 Field Map

Phi Resolution for dRICH Exit for tracks with 2.50 < η < 3.50

FieldMap: May 7 Field Map

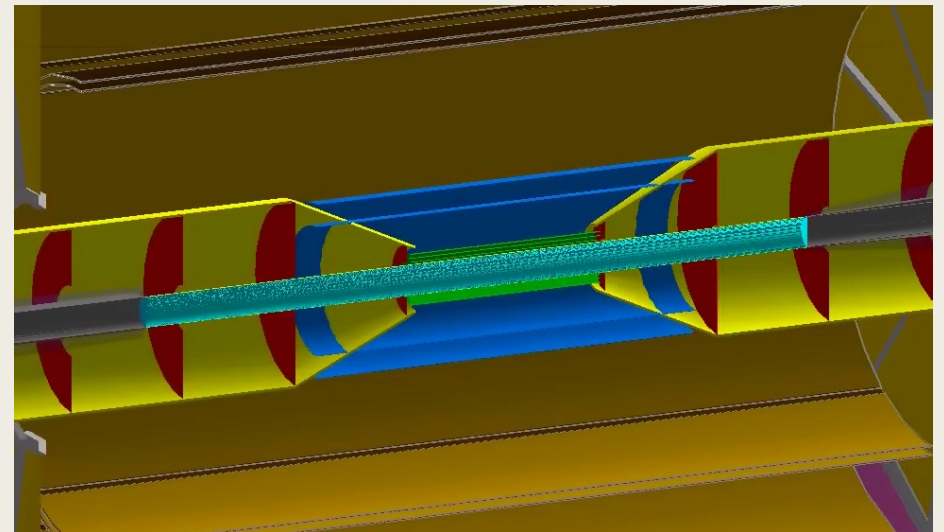FieldMap: May 28 Field Map

dRICH Exit

Backup Slides
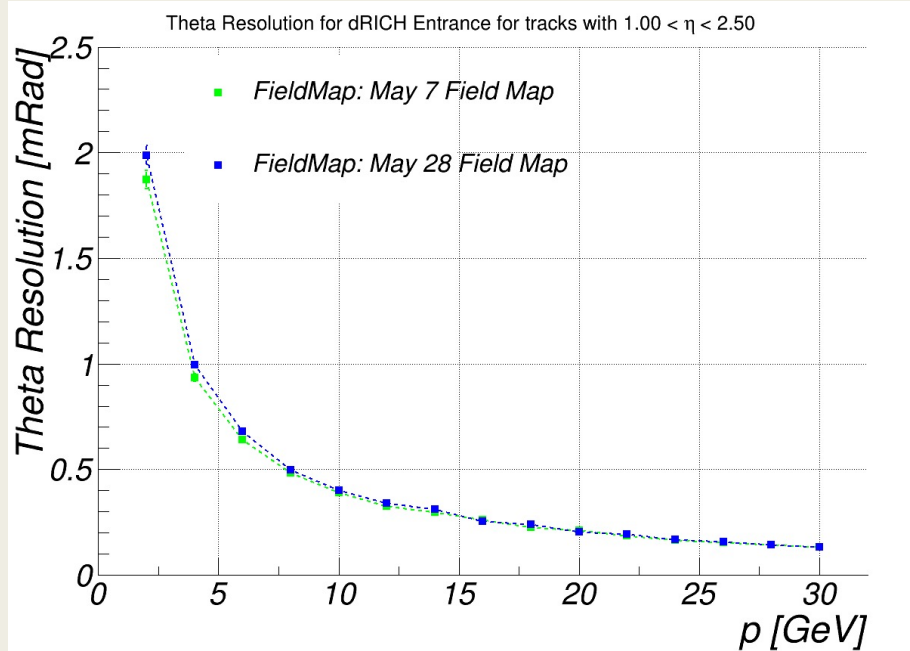
Angular Resolutions for Different Field Maps

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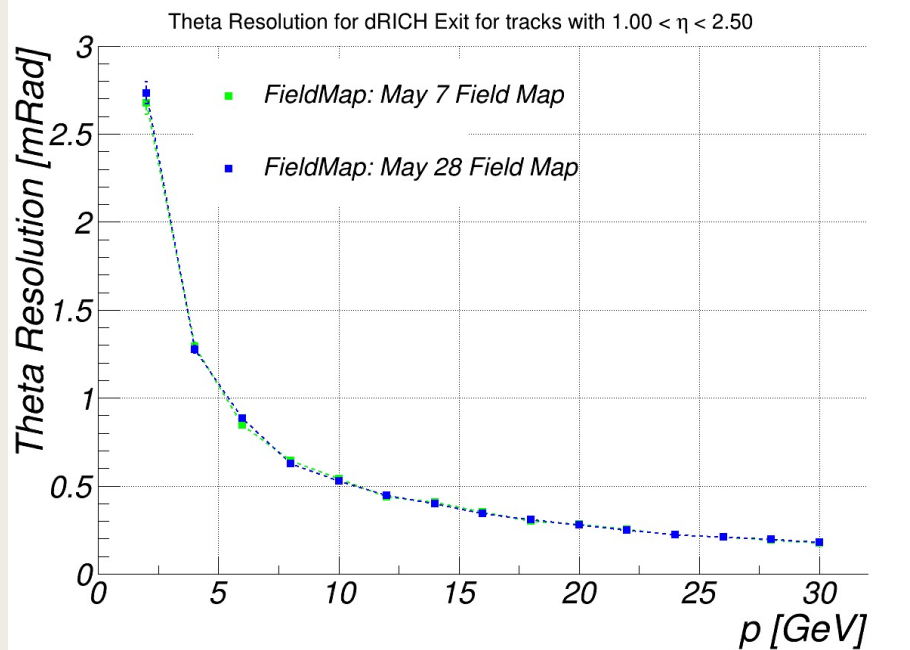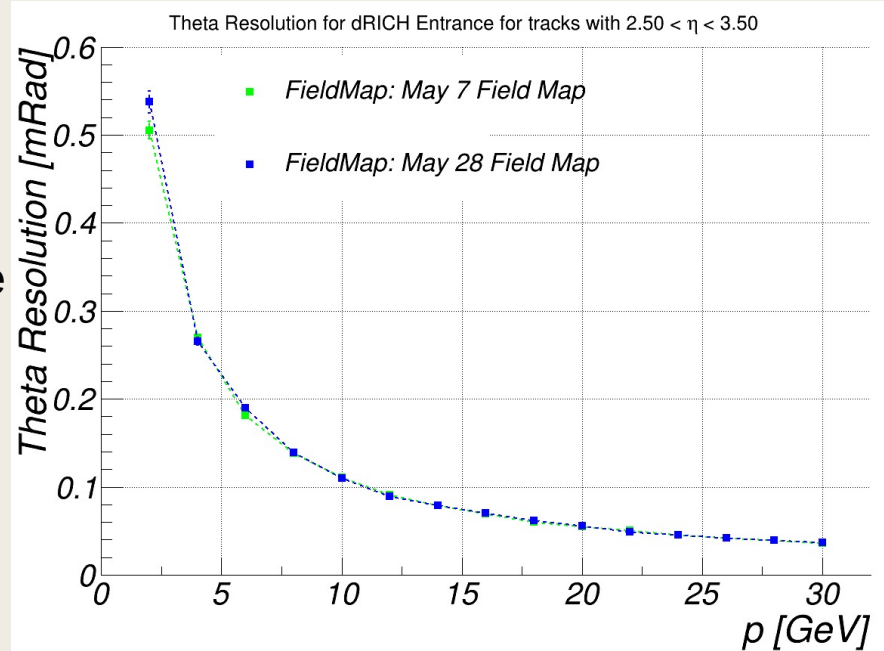Field maps found here: https://github.com/eic/BeastMagneticField/tree/master/data

■ Following slides contain corresponding simulations which include the "pseudo" support structure shown below to view its the impact on angular resolutions
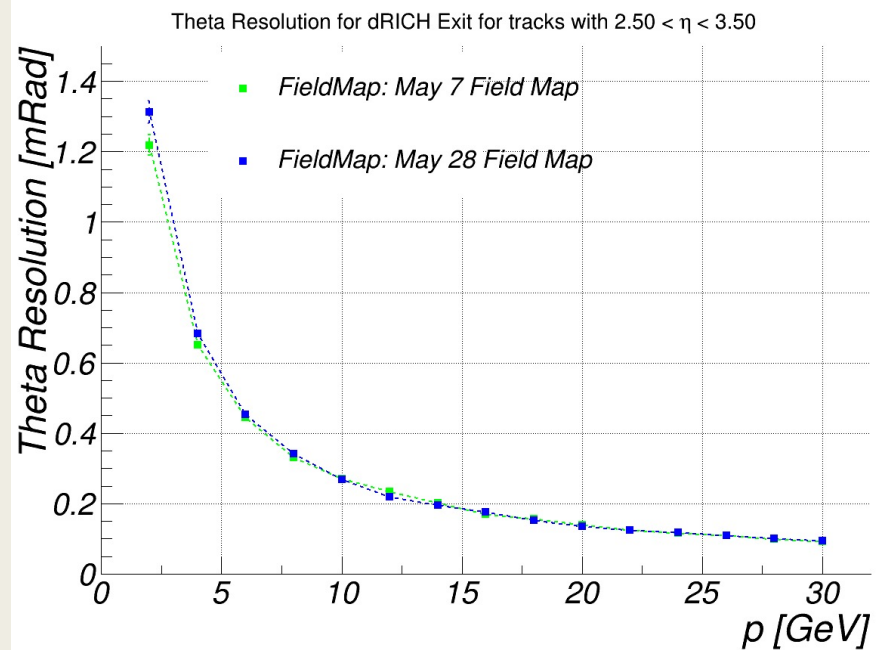
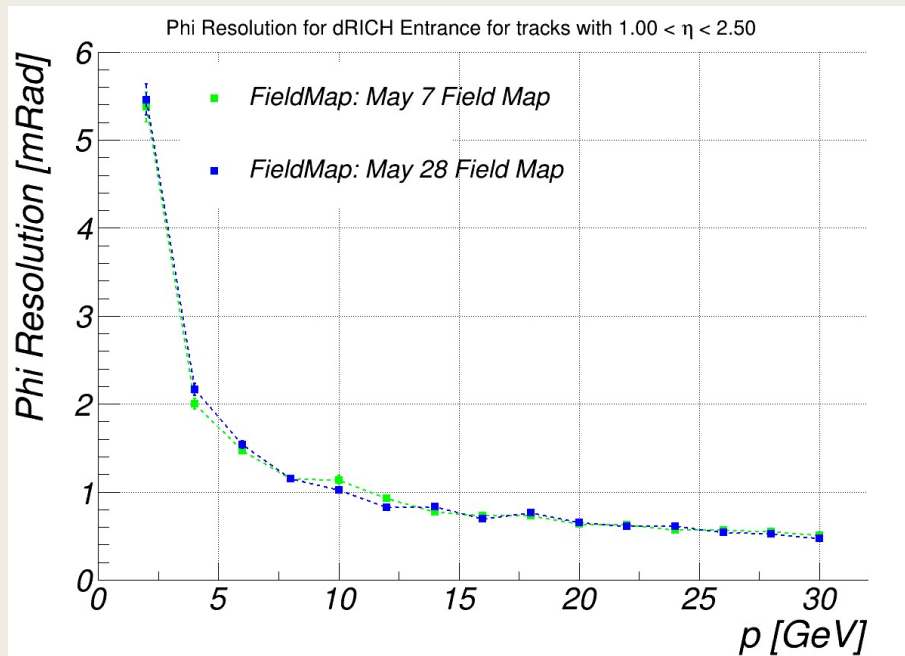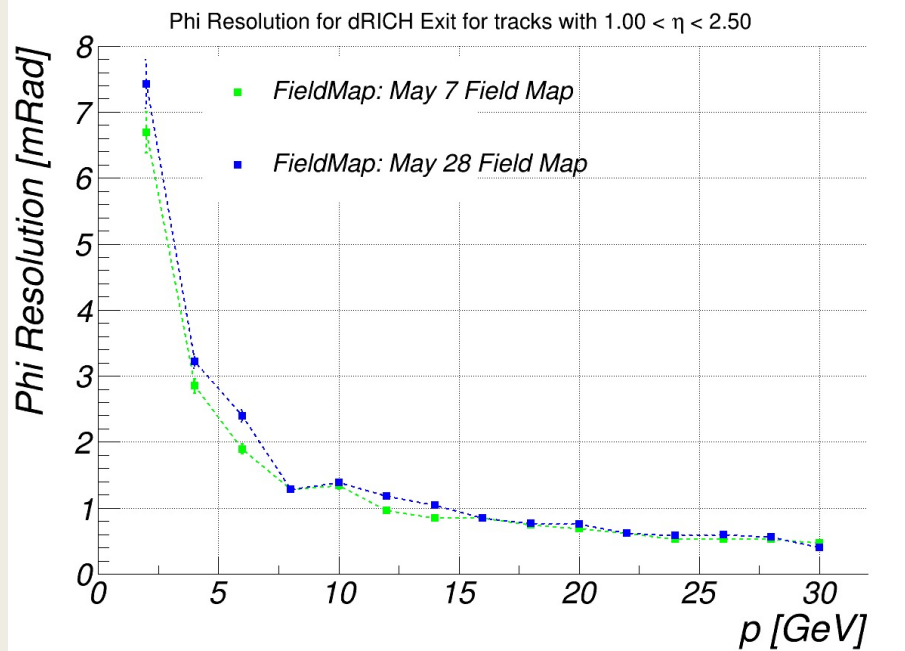# dRICH Theta Resolutions <u>with</u> Support Material
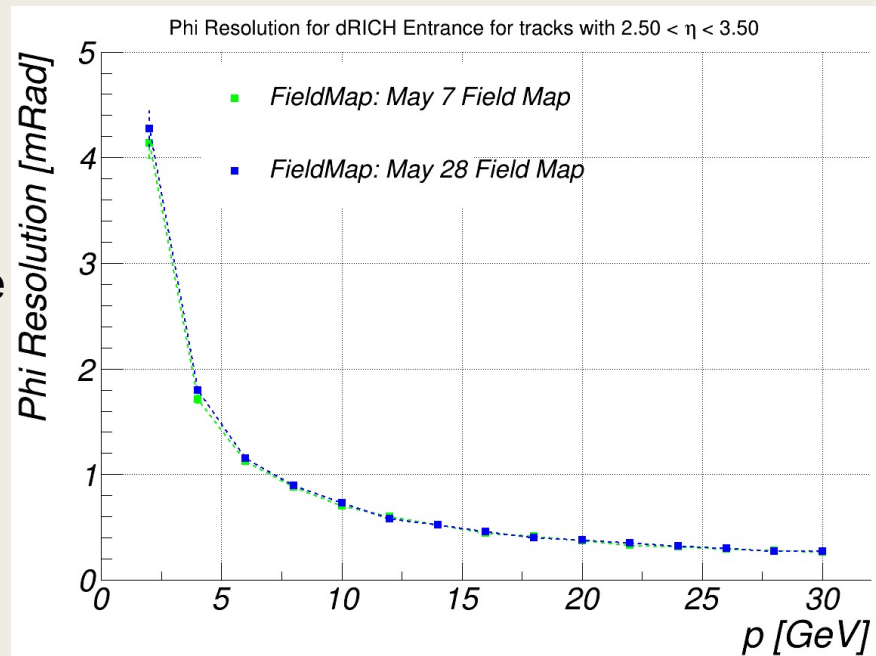
dRICH Phi Resolutions <u>with</u> Support Material