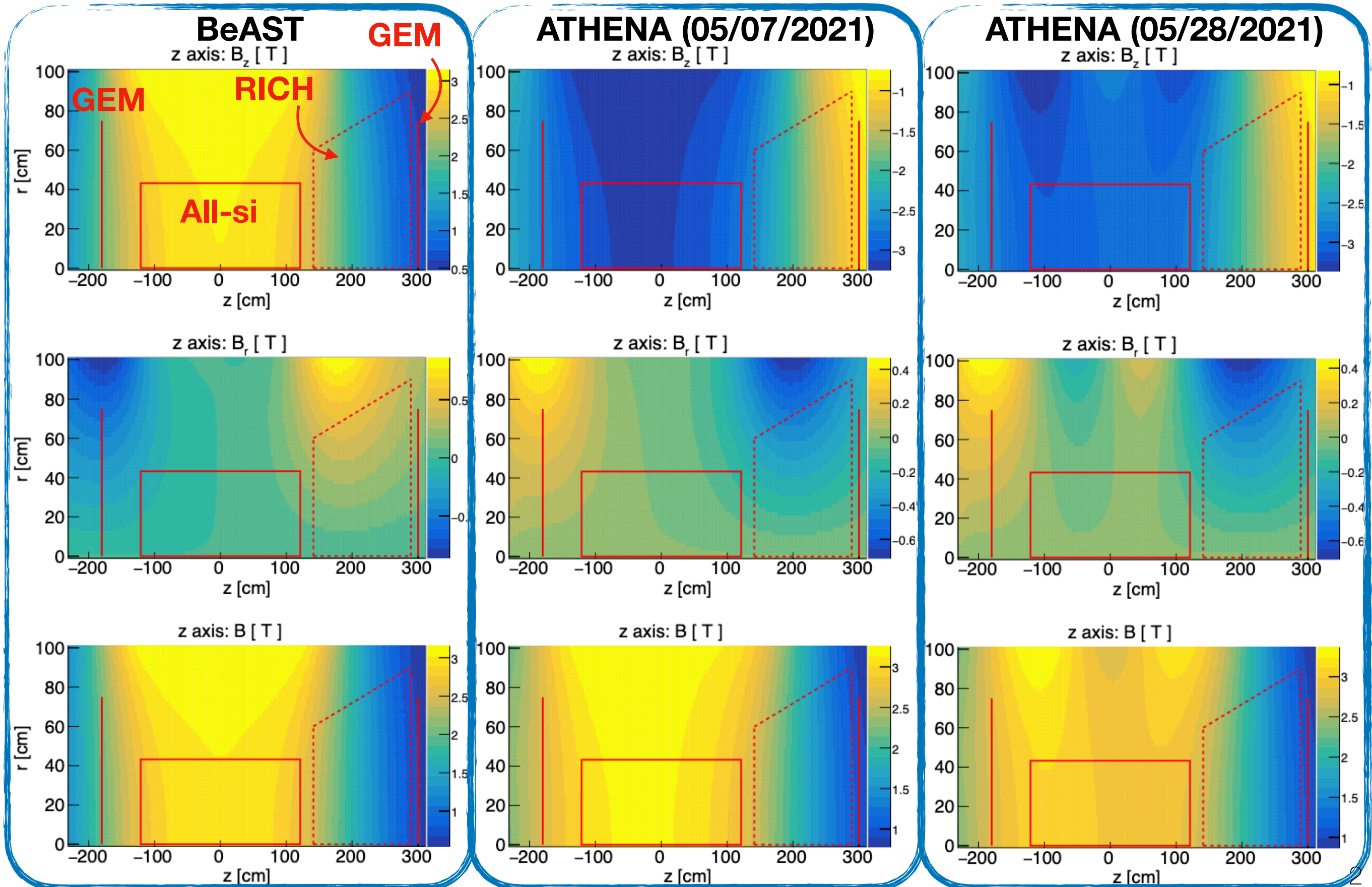# Momentum-resolution changes due to new ATHENA B-field map

Rey Cruz-Torres
ATHENA Tracking Meeting
06/29/2021

Comparison between magnetic-field maps
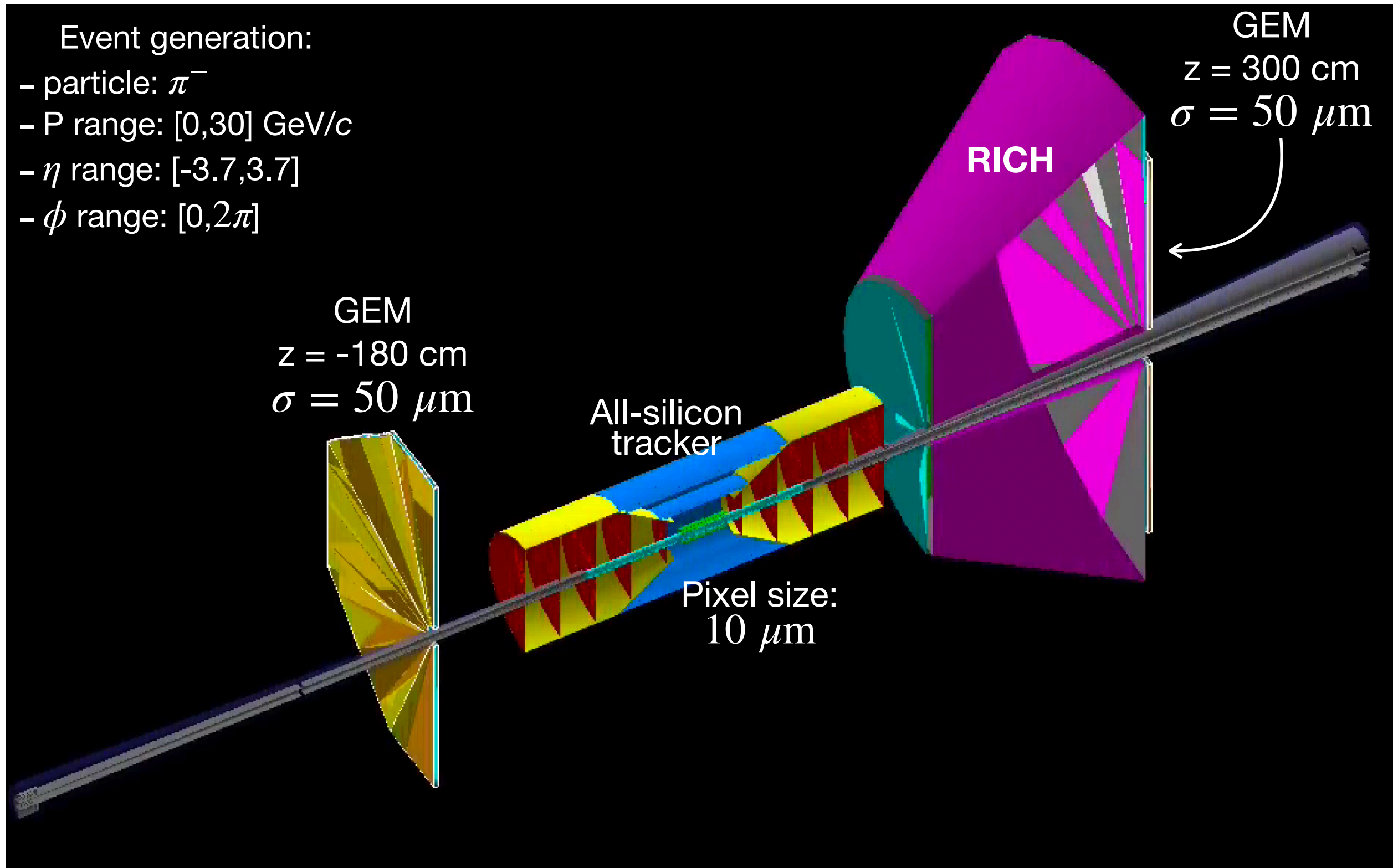
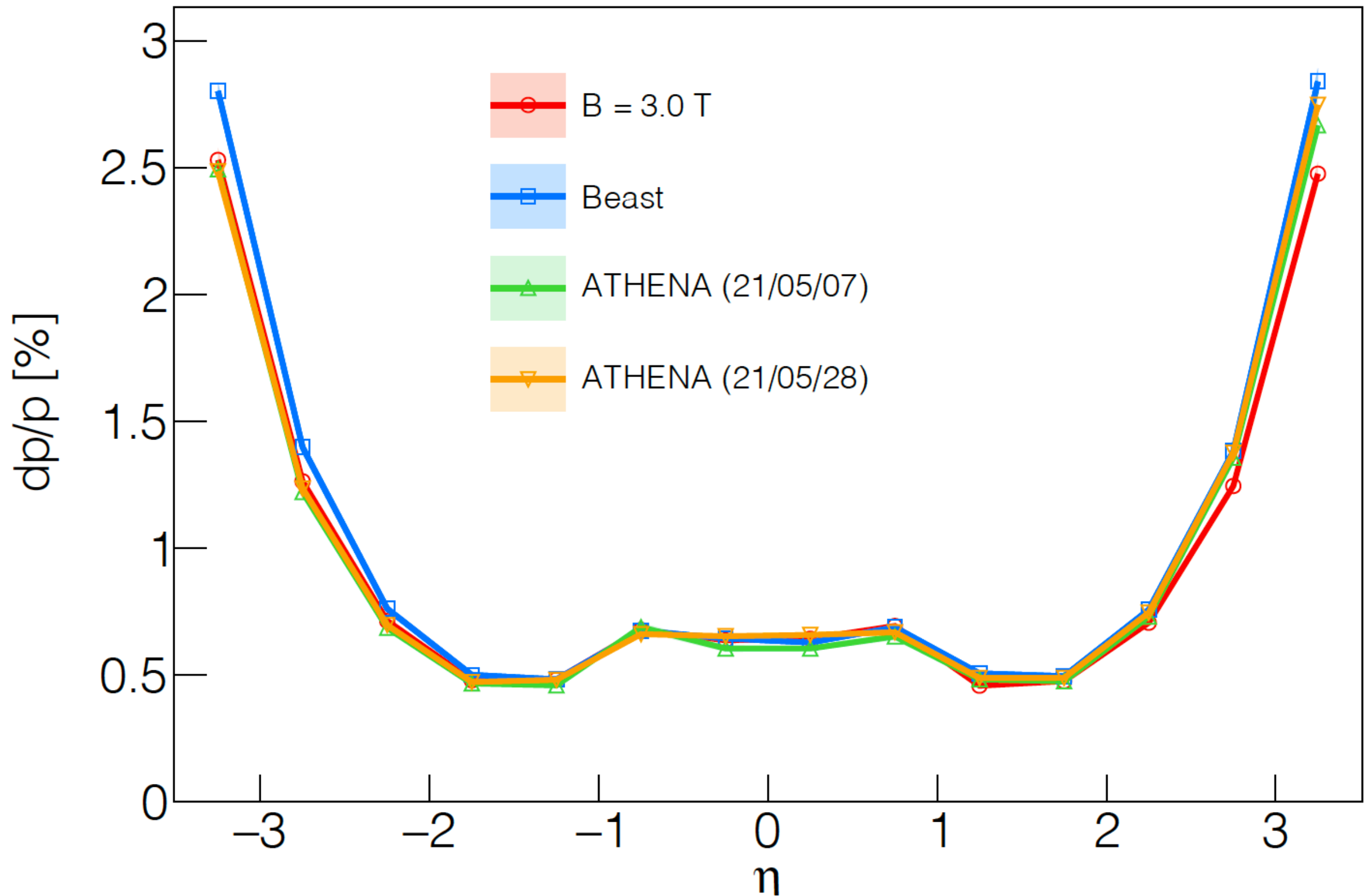https://github.com/eic/BeastMagneticField

Setup

Event generation:
- particle: π^-
- P range: [0,30] GeV/c
- η range: [-3.7,3.7]
- ϕ range: [0,2π]

GEM
z = 300 cm
$\sigma = 50\ \mu m$

RICH

GEM
z = -180 cm
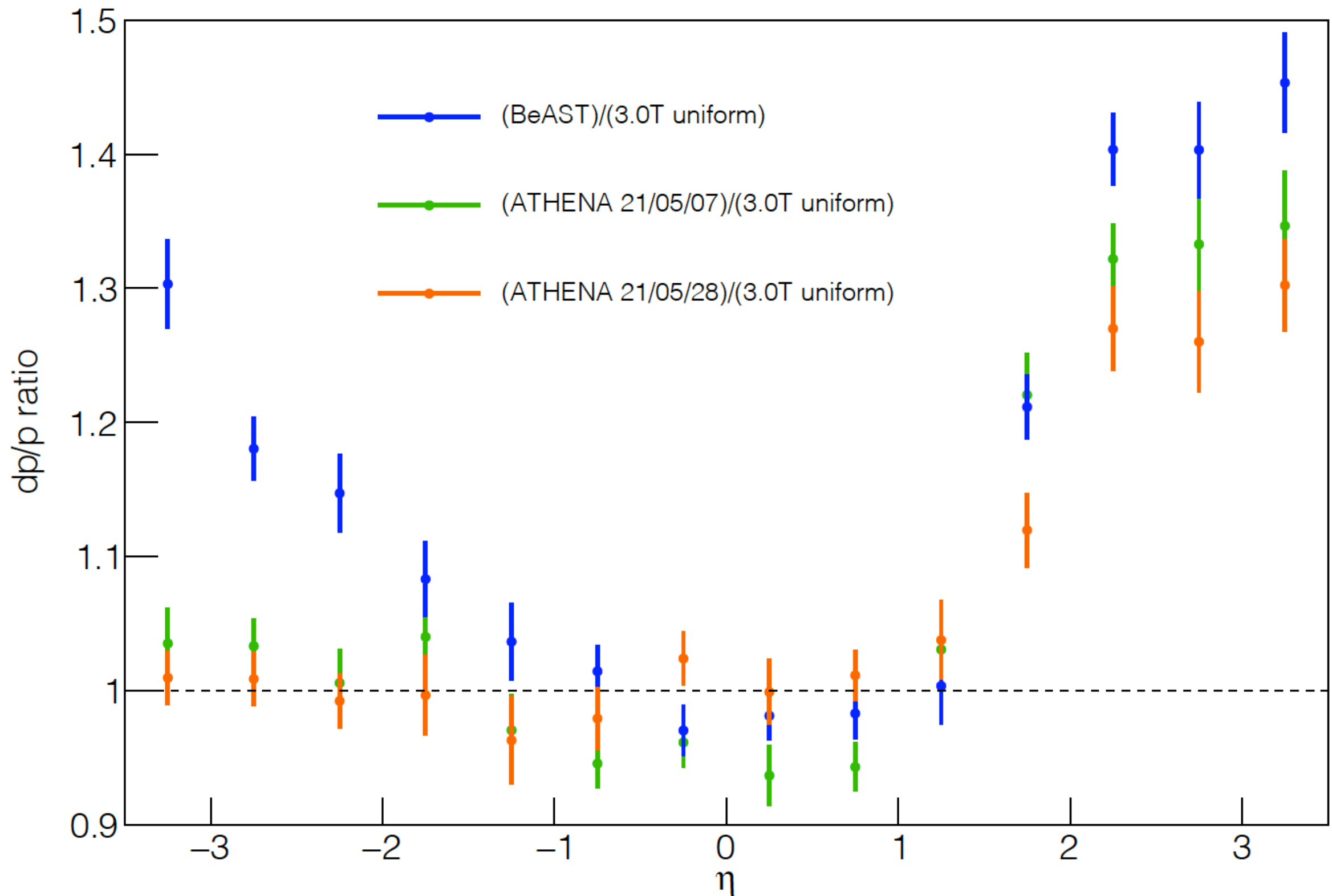$\sigma = 50\ \mu m$

All-silicon tracker

Pixel size:
10 μm

3

Momentum-Resolution Impact

Momentum-Resolution Impact

10.0 < p < 12.0 GeV/*c*

Legend:
- B = 3.0 T (GEM)
- Beast (GEM)
- ATHENA (21/05/07) (GEM)
- ATHENA (21/05/28) (GEM)

Momentum-Resolution Impact

$10.0 < p < 12.0$ GeV/c

Legend:
- (BeAST)/(3.0T uniform)
- (ATHENA 21/05/07)/(3.0T uniform)
- (ATHENA 21/05/28)/(3.0T uniform)

y-axis: dp/p ratio
x-axis: η
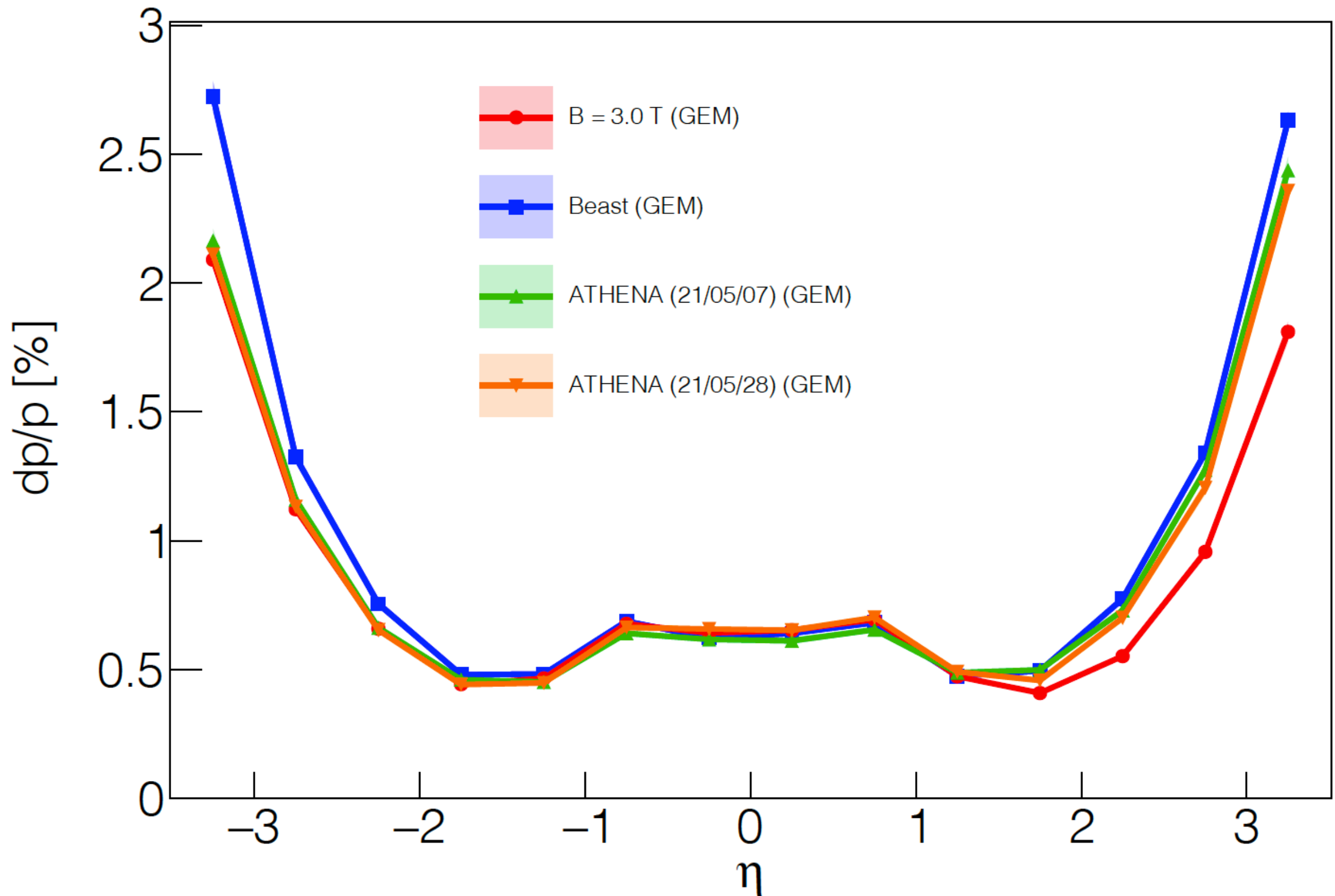
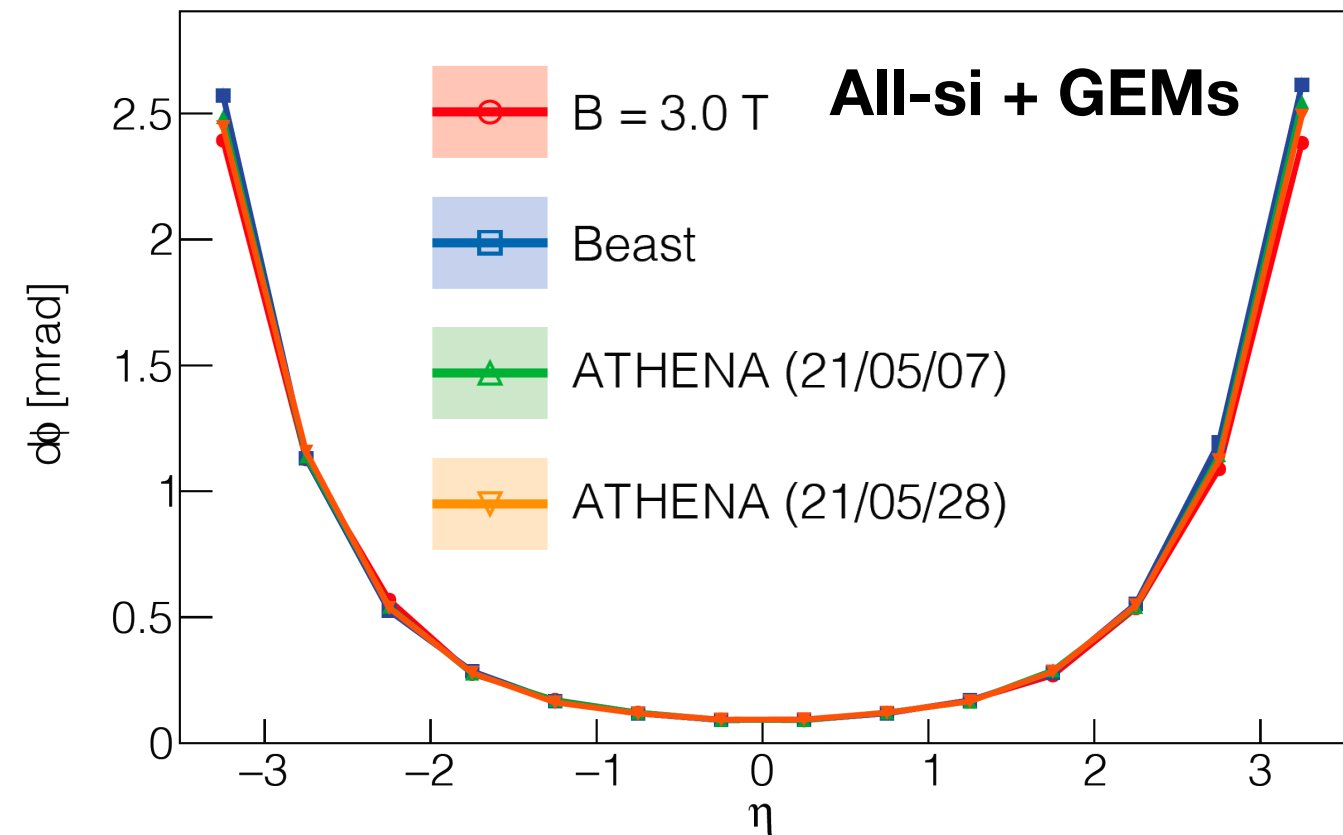# Angular resolutions at vertex
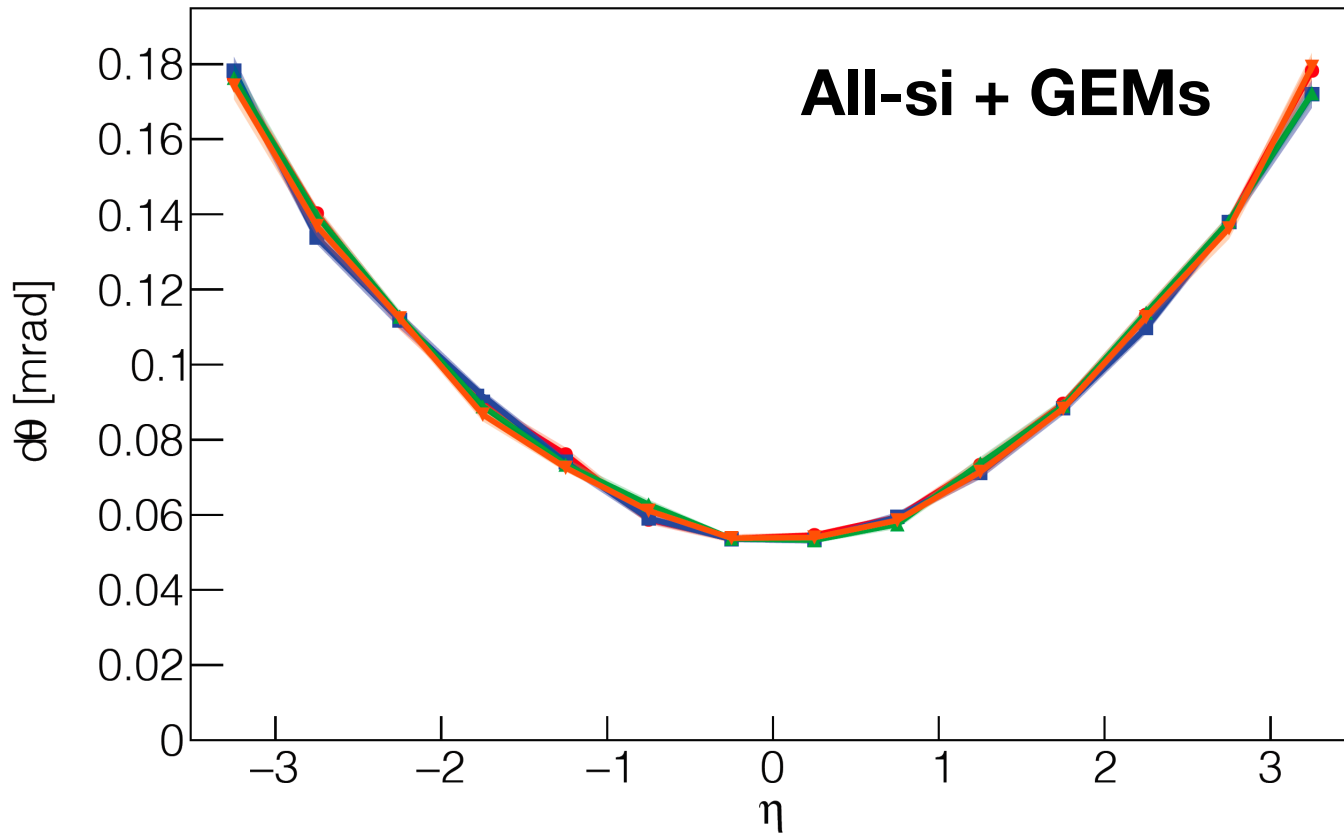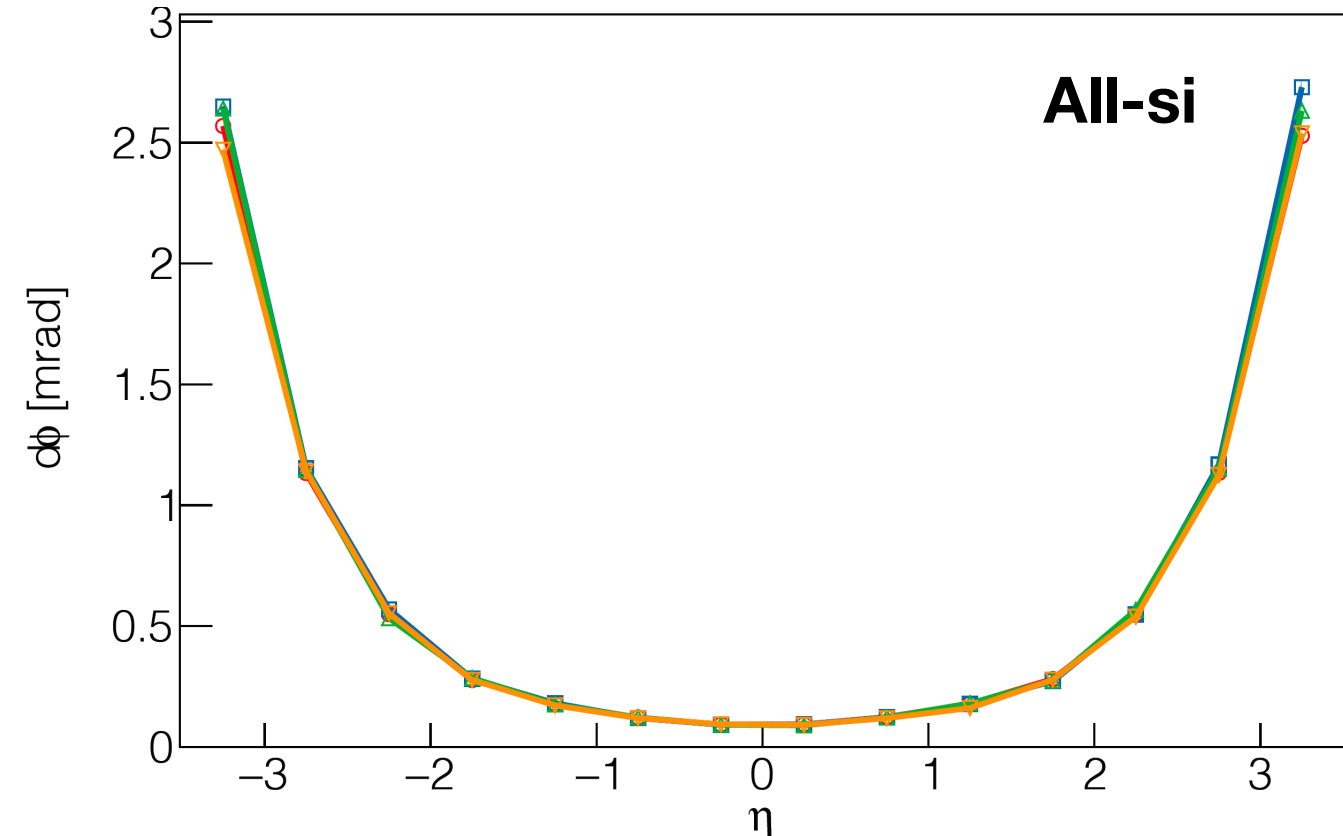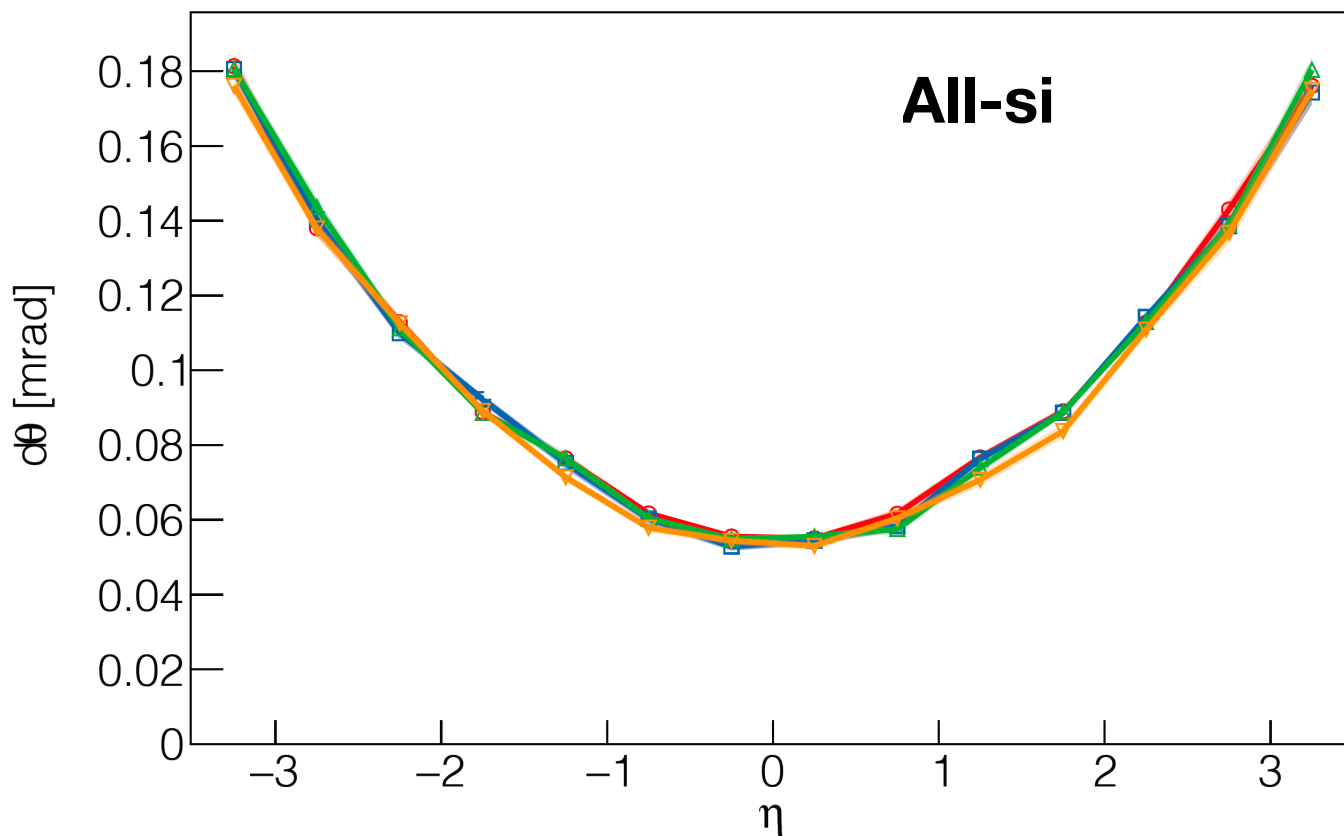
Summary

- Added new ATHENA magnetic-field maps to local Fun4All repository

- New ATHENA maps have the B-field z component inverted with respect to the previous BeAST map

- Studied impact of new map on momentum resolution in configuration with all-si tracker + backward GEM ($\sigma = 50~\mu\mathrm{m}$) + forward GEM ($\sigma = 50~\mu\mathrm{m}$) behind RICH

- Momentum resolution value (in the highest $|\eta|$ bin studied) gets smaller by ~few % in the forward (hadron-going) region and by ~20% in the backward (electron-going) region

- No significant differences observed in the momentum-resolution performance between 05/07/21 and 05/28/21 maps

- No significant differences in angular-resolution performance