

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



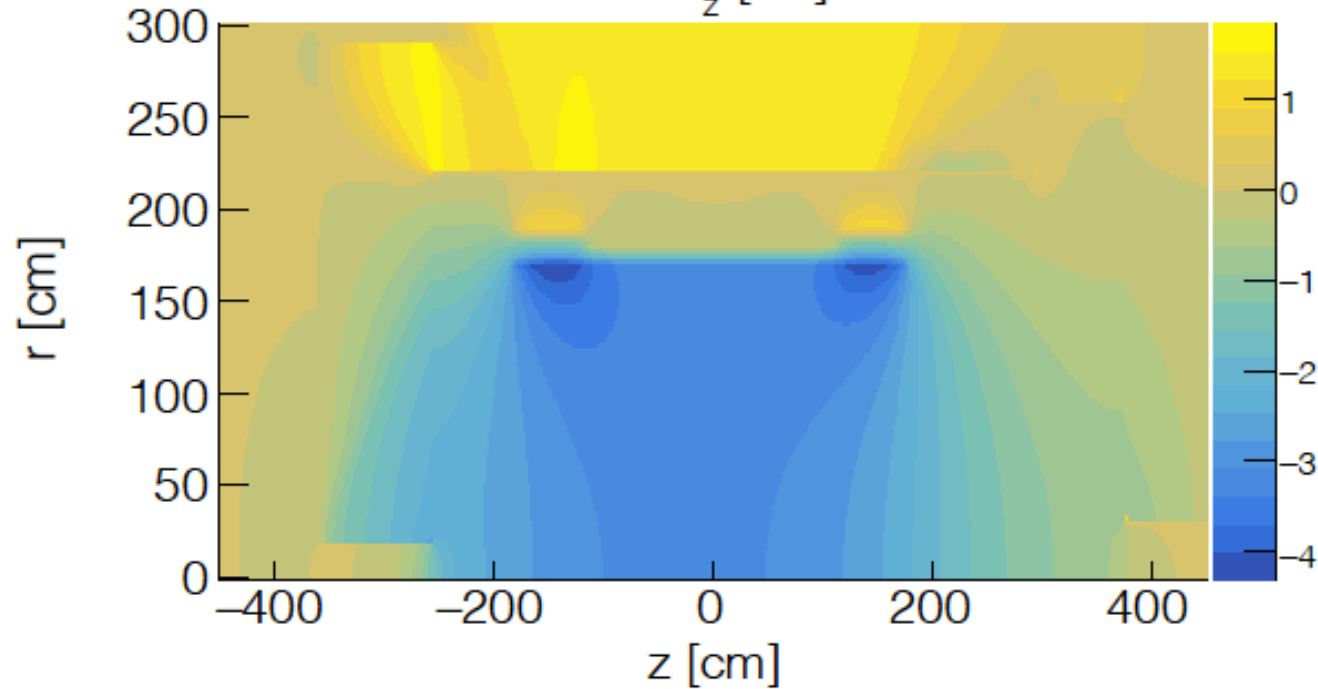
Rey Cruz-Torres
ATHENA Tracking Meeting
06/08/2021

3.0T maps in Fun4All

<https://github.com/eic/BeastMagneticField>

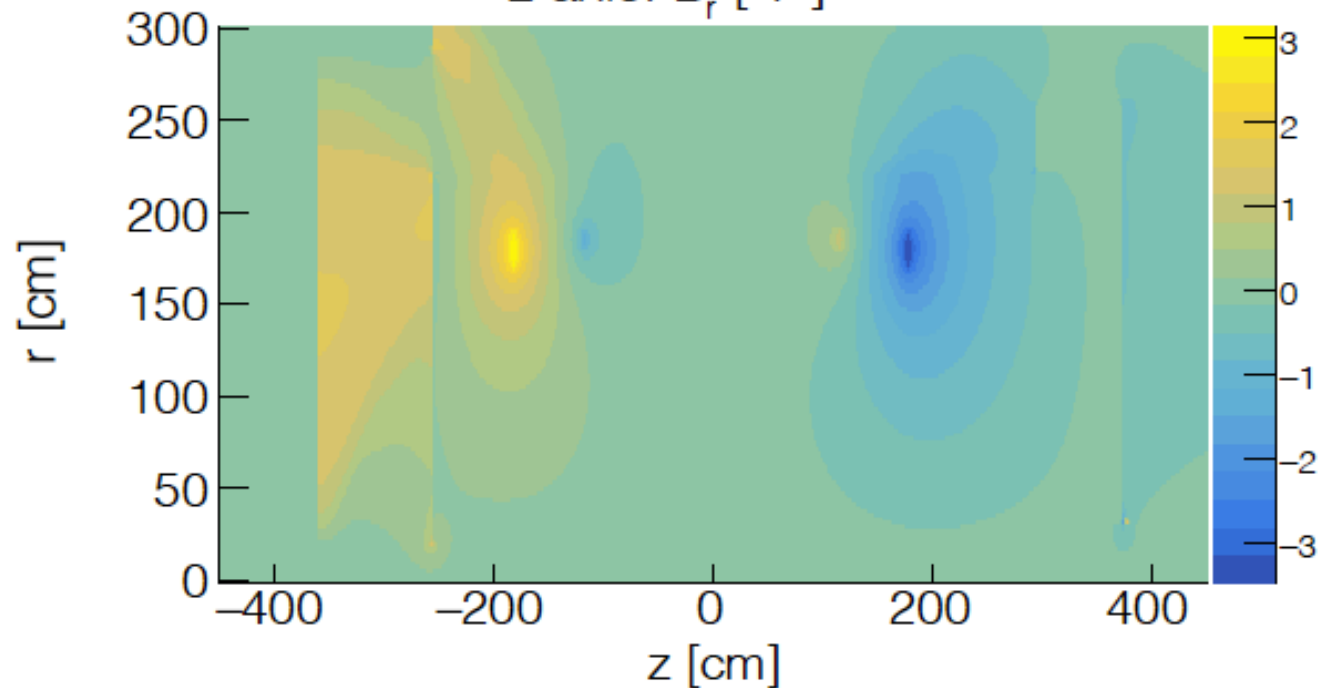
New ATHENA Map (05/07/2021)

z axis: B_z [T]

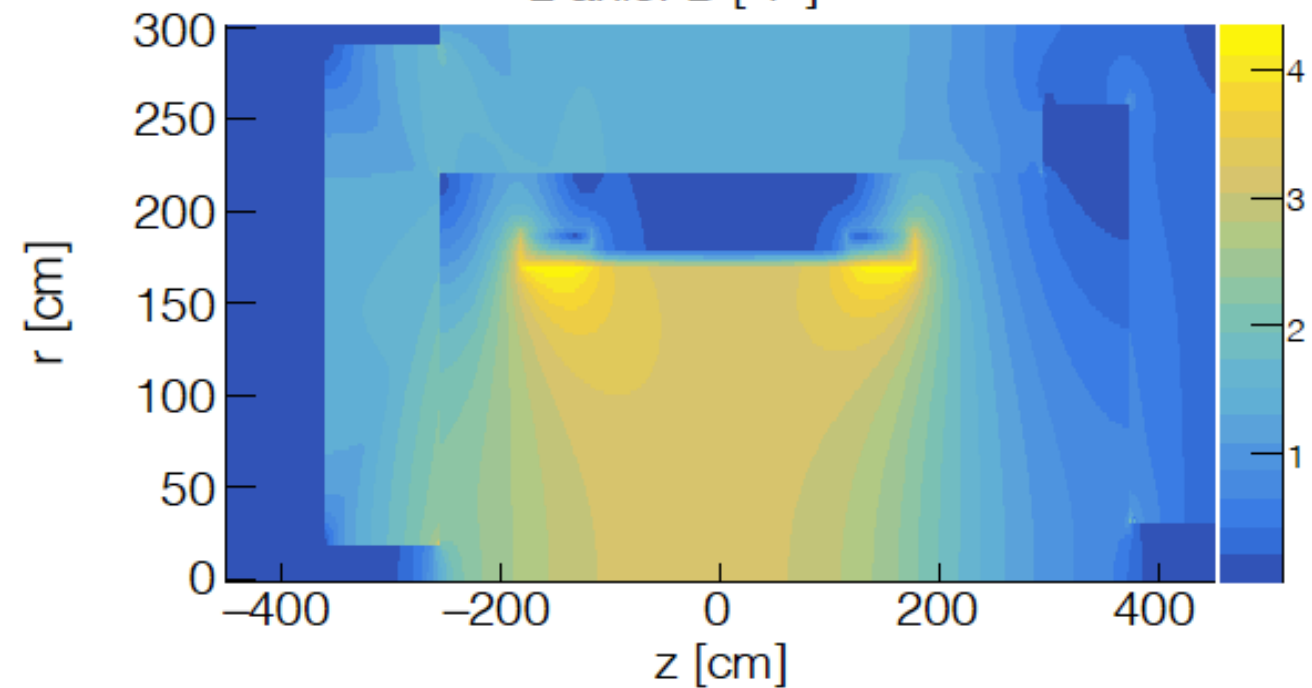


Map is an ASCII file with four columns:
 r [cm], z [cm], B_r [T], B_z [T]

z axis: B_r [T]



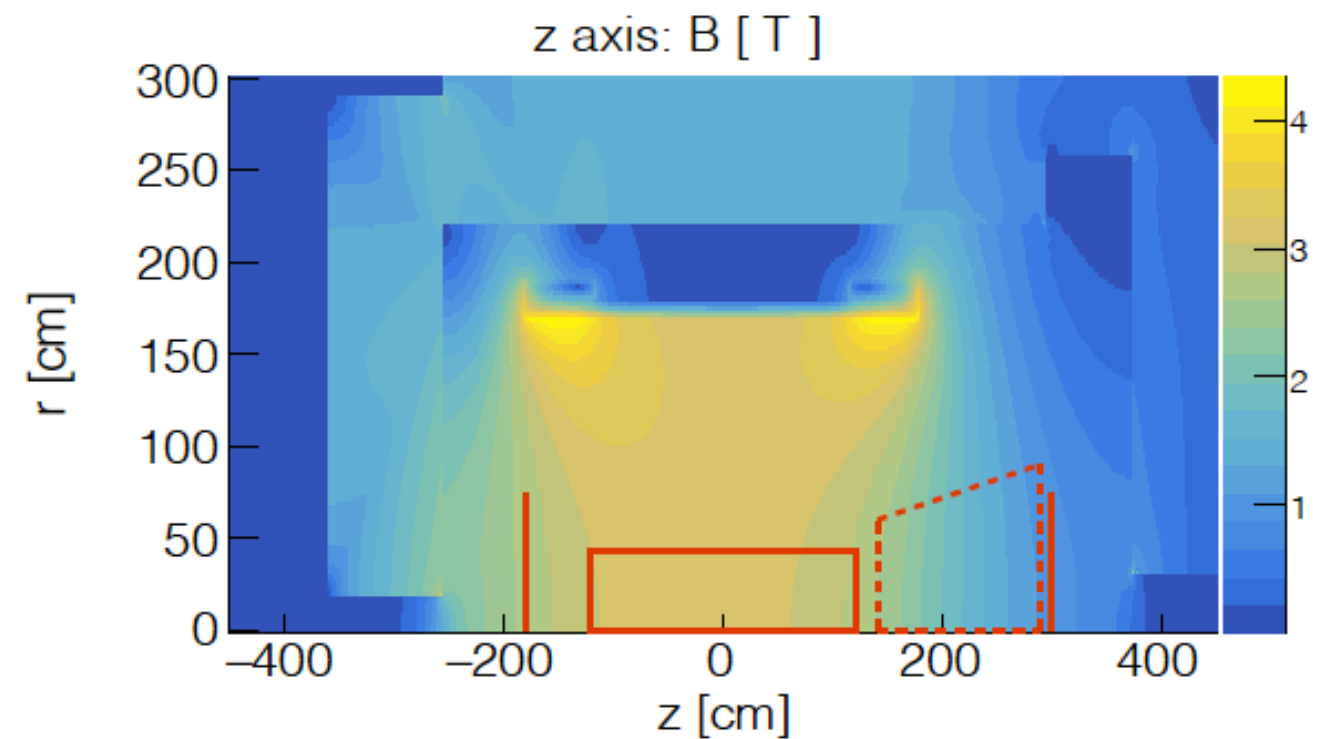
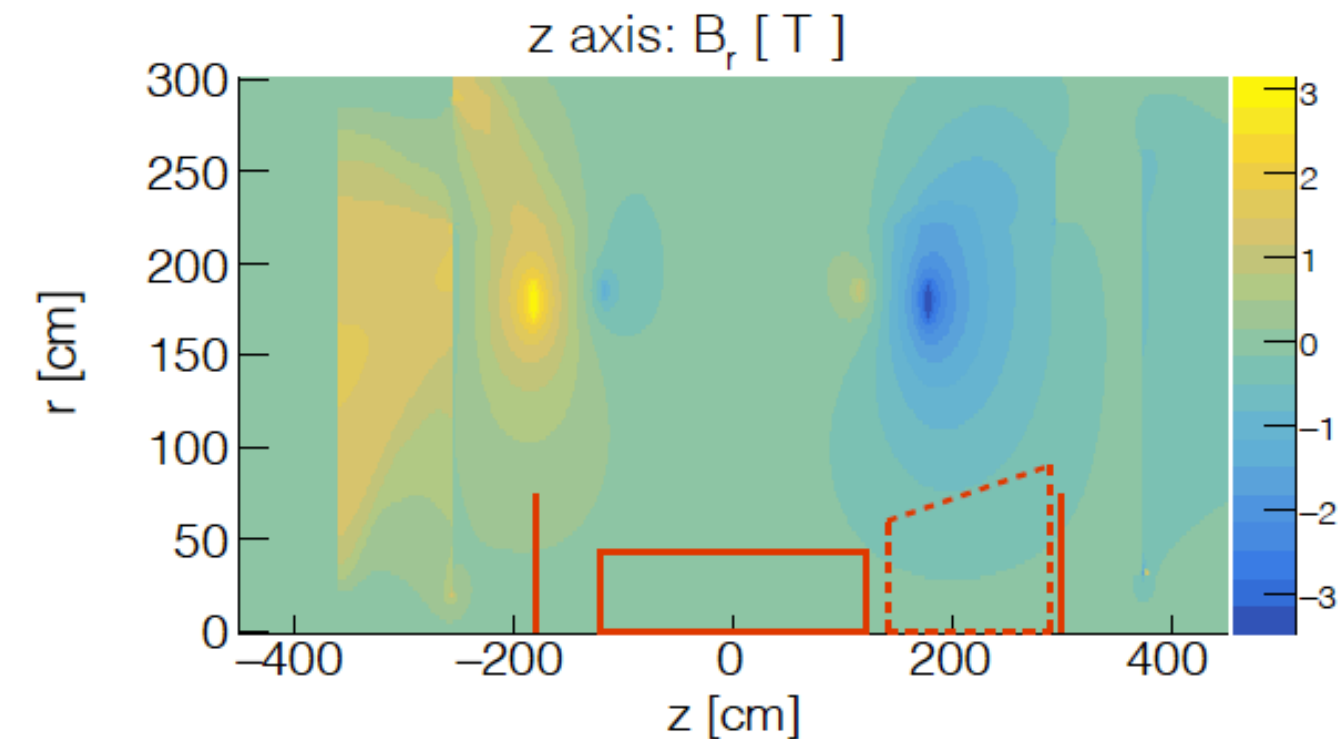
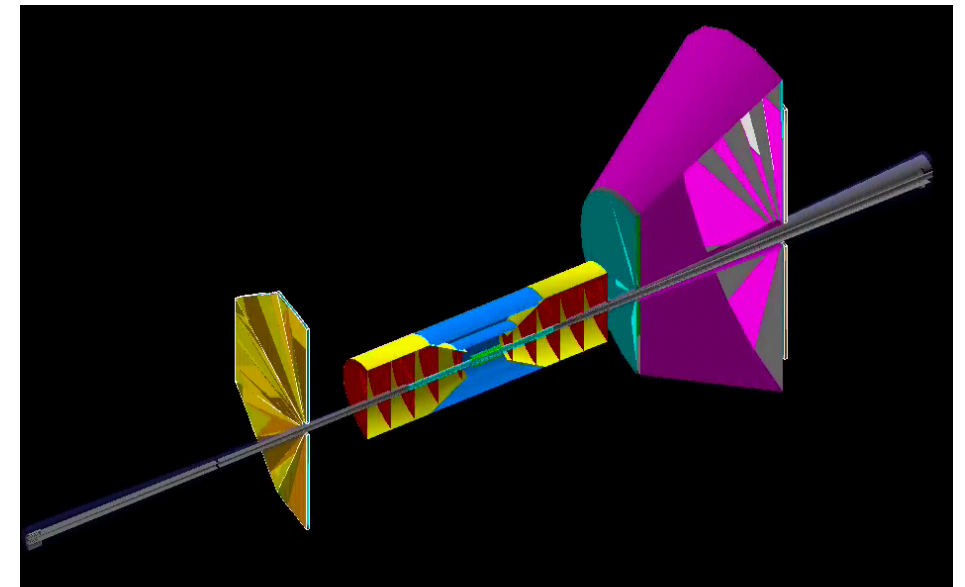
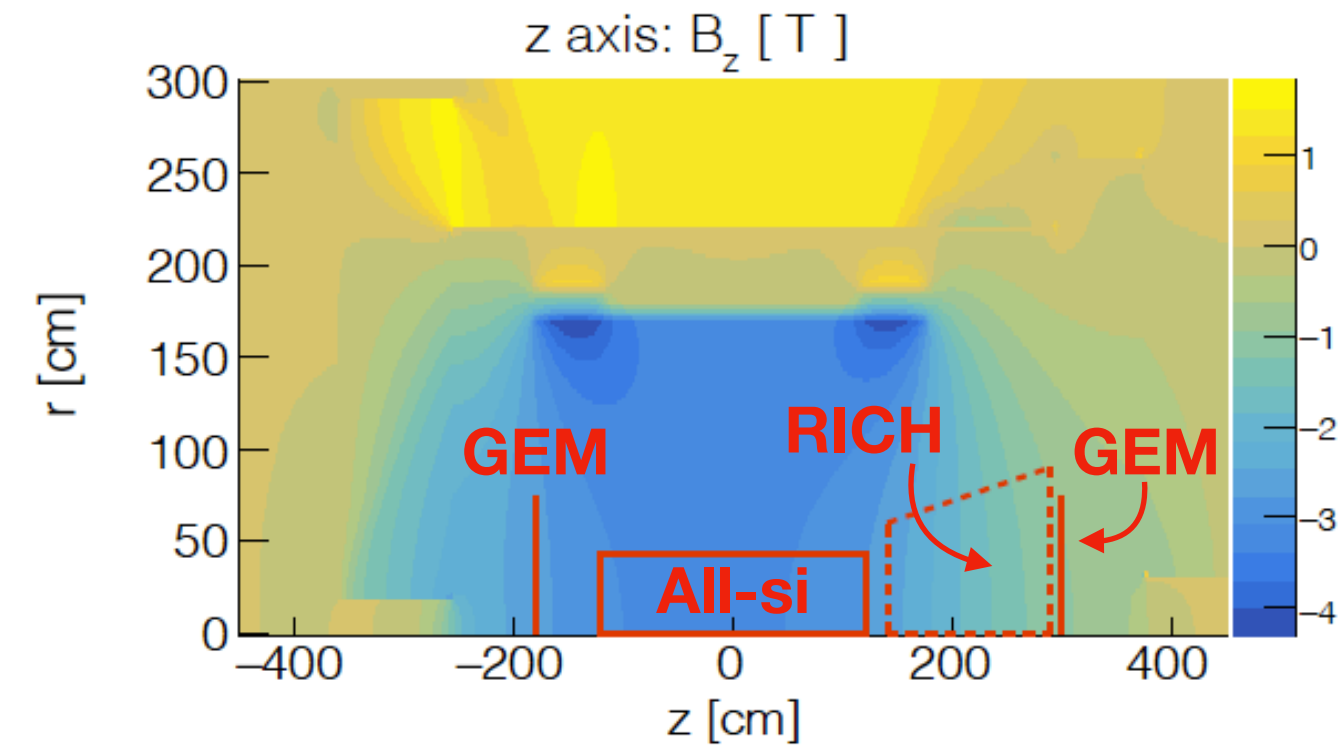
z axis: B [T]



3.0T maps in Fun4All

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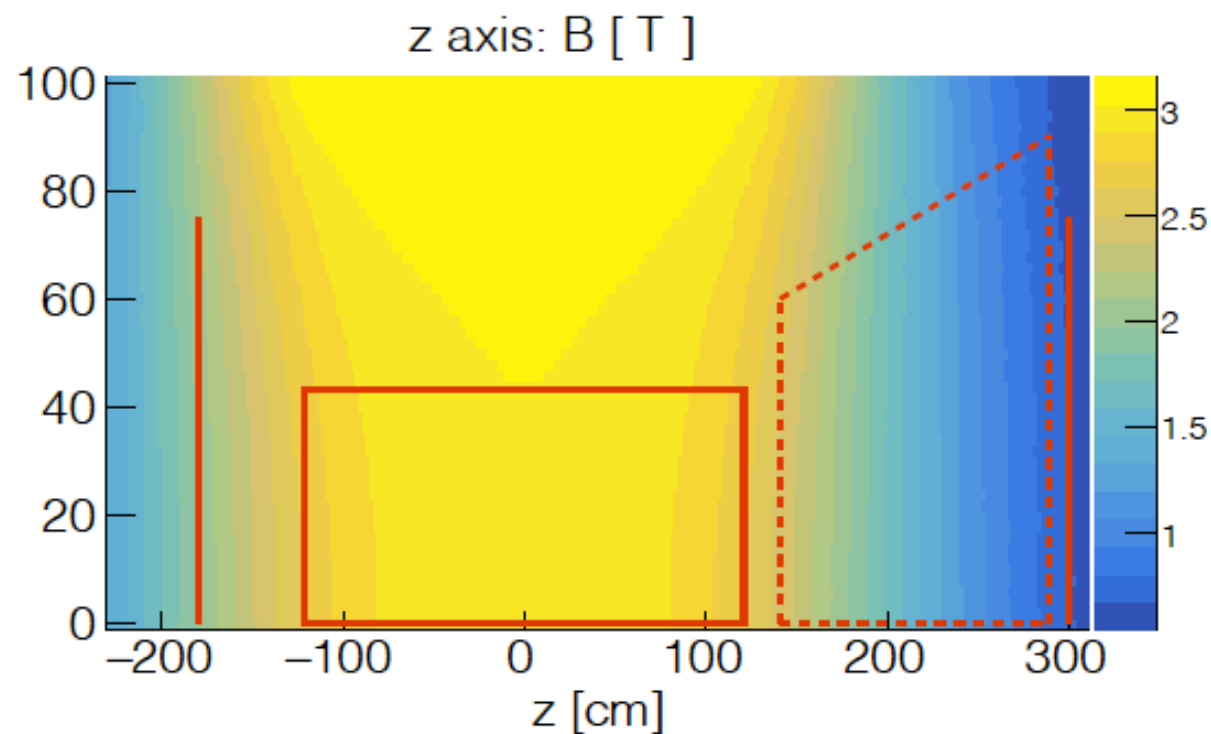
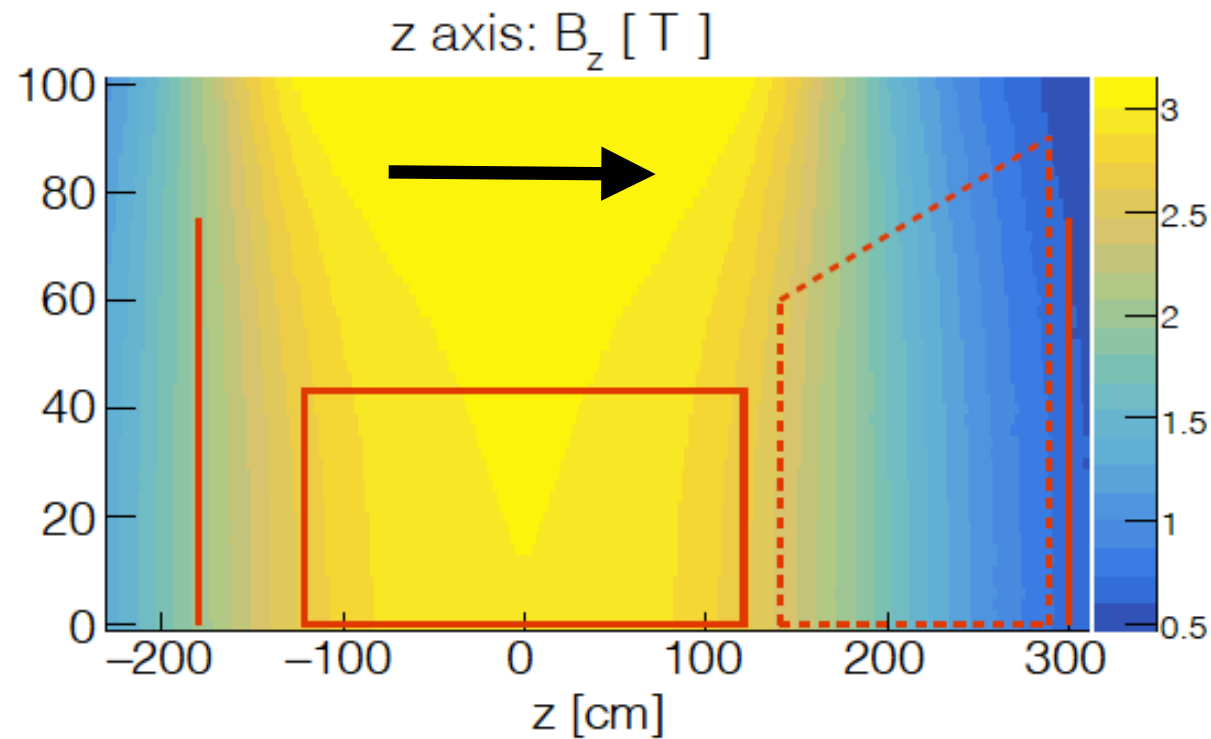
New ATHENA Map (05/07/2021)



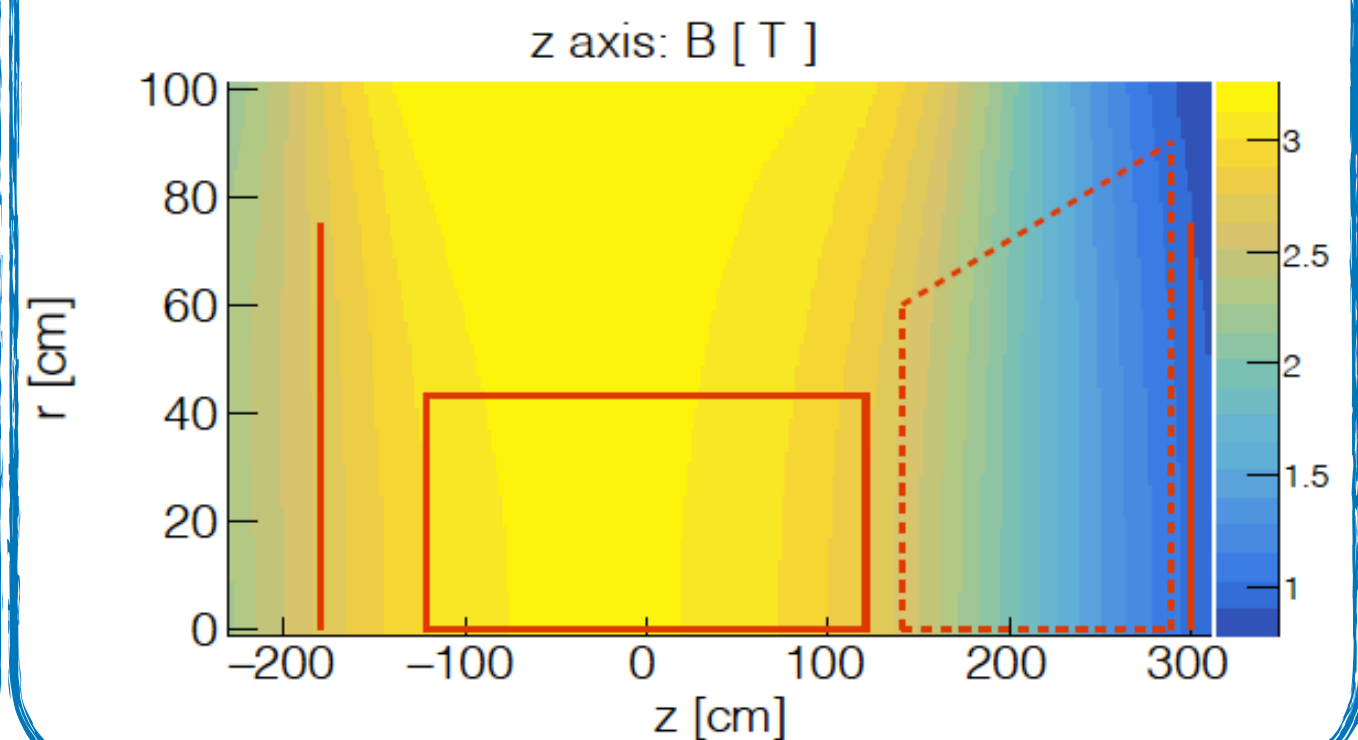
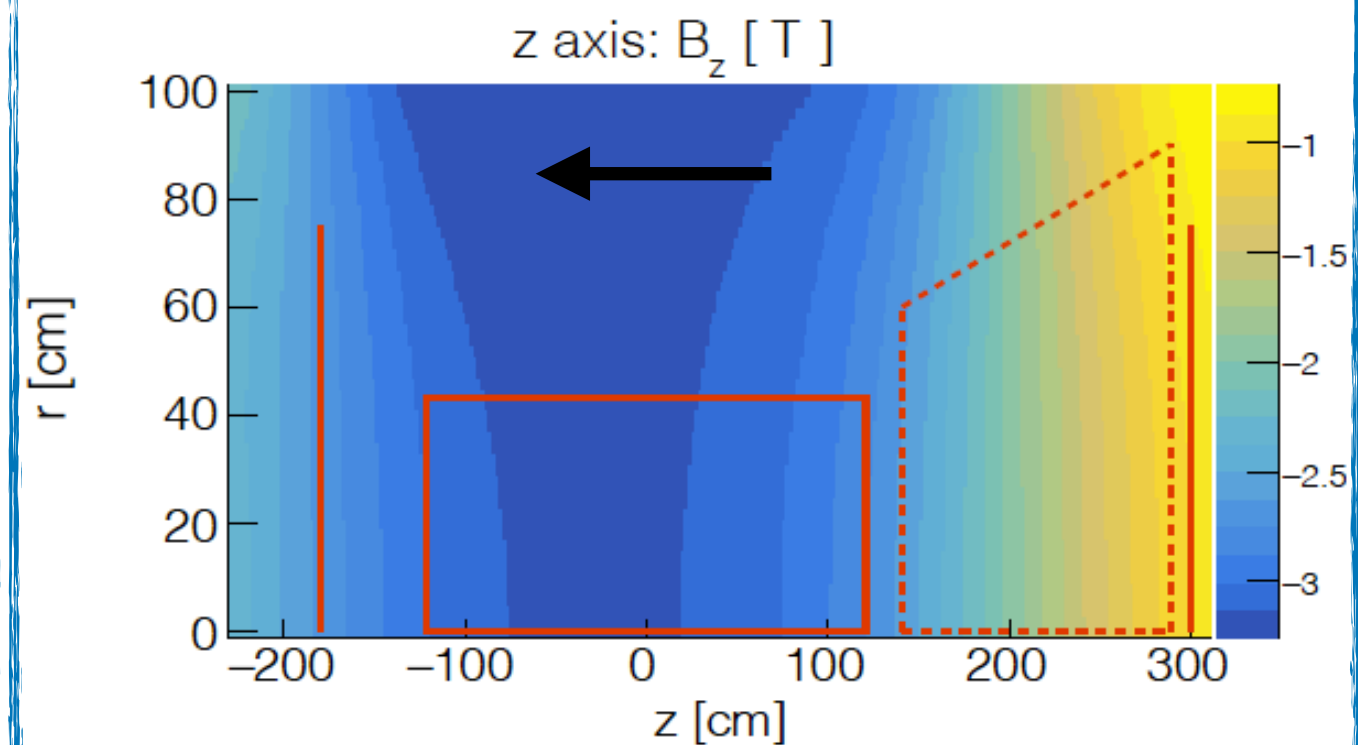
3.0T maps in Fun4All

<https://github.com/eic/BeastMagneticField>

Previous Beast Map



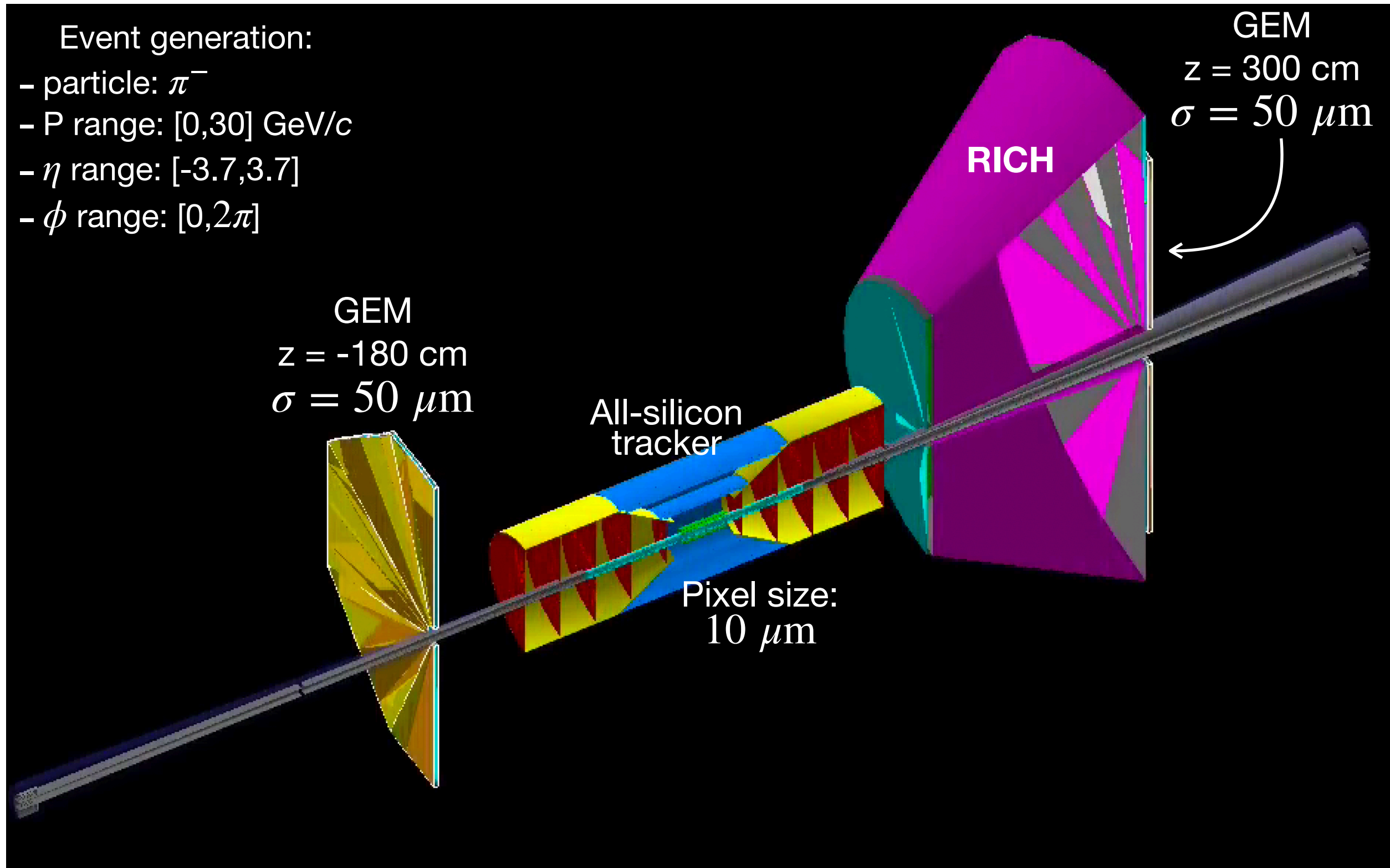
New ATHENA Map (05/07/2021)



Setup

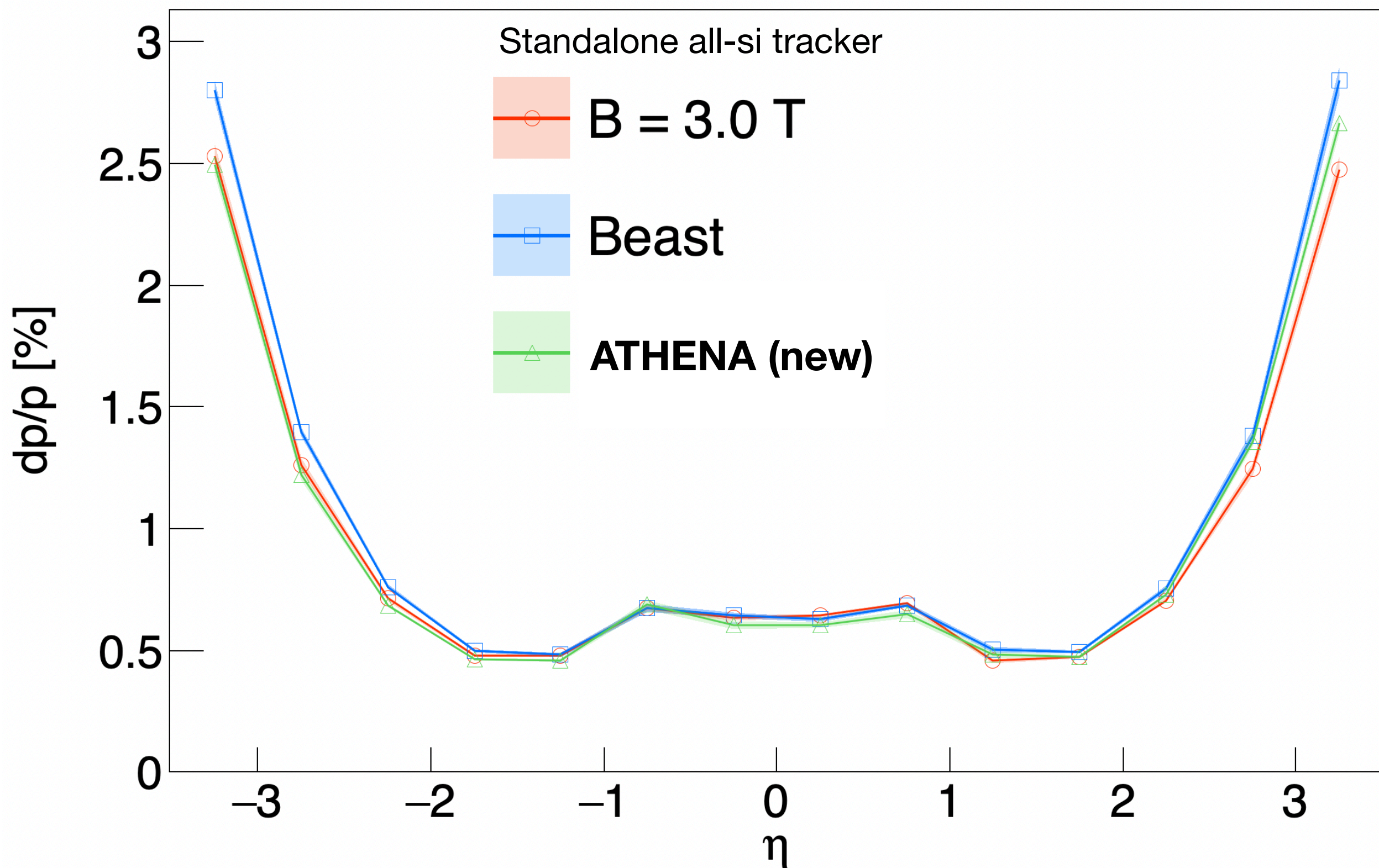
Event generation:

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



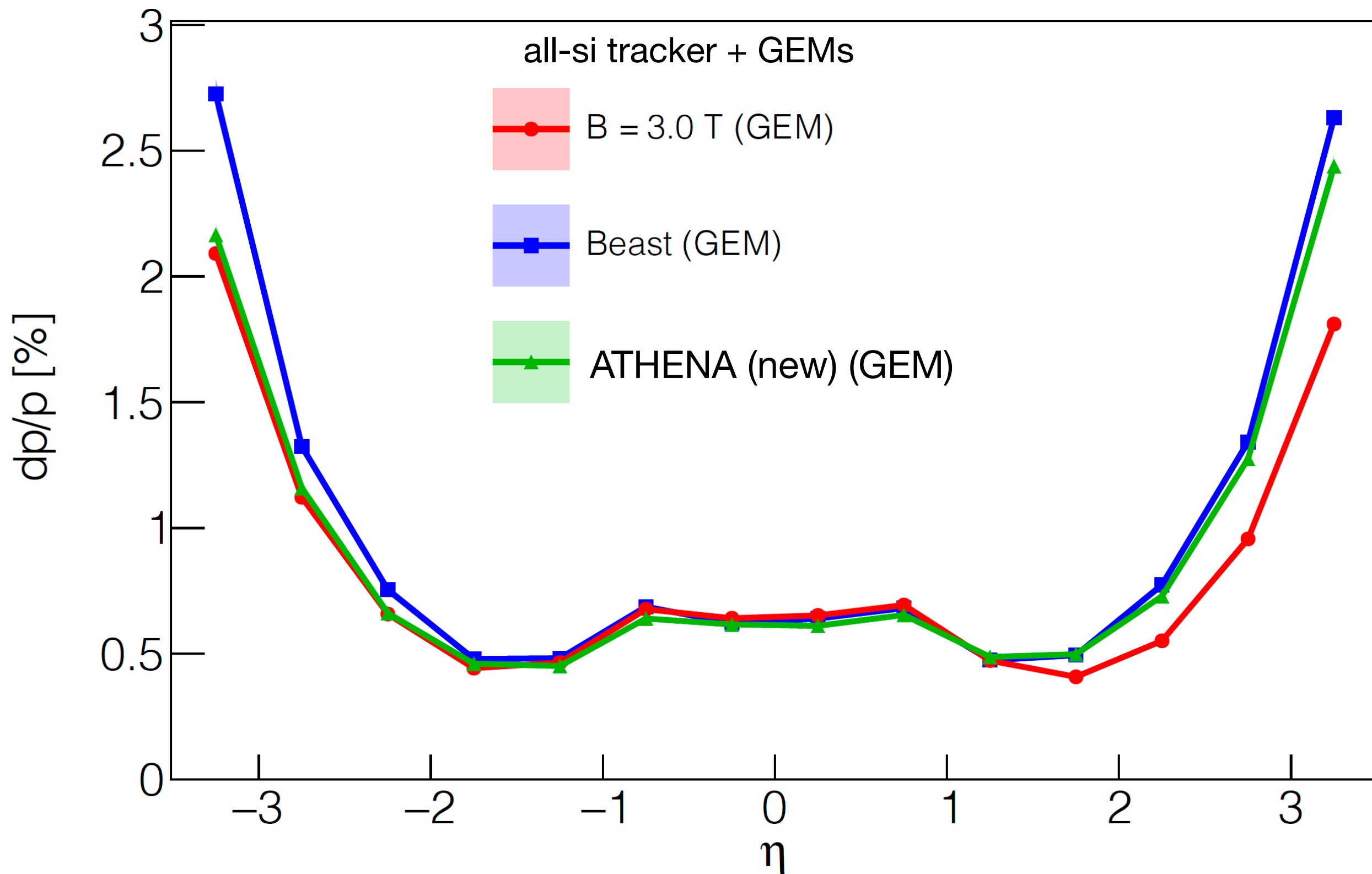
Momentum-Resolution Impact

$10.0 < p < 12.0 \text{ GeV}/c$



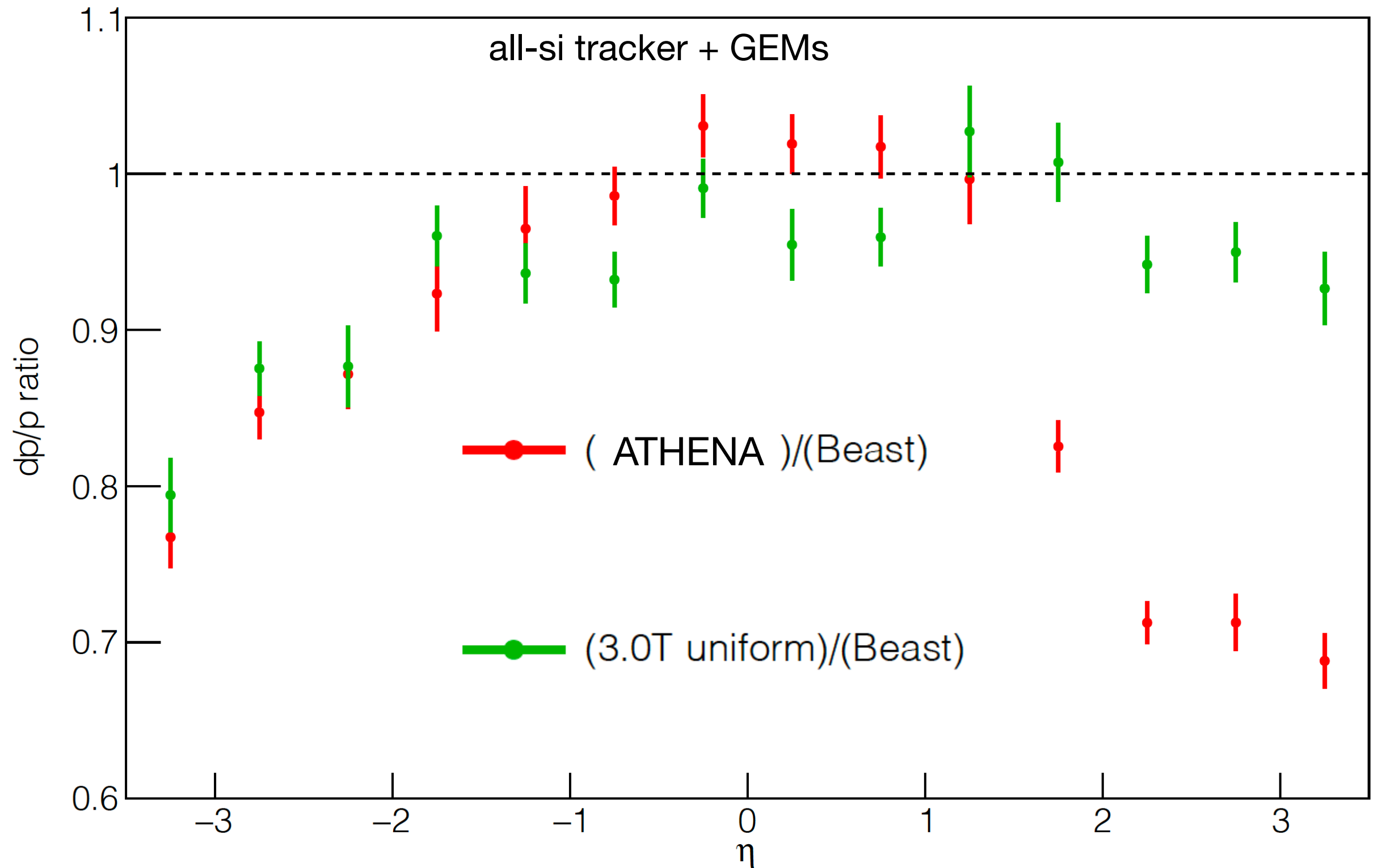
Momentum-Resolution Impact

$$10.0 < p < 12.0 \text{ GeV}/c$$



Momentum-Resolution Impact

$$10.0 < p < 12.0 \text{ GeV}/c$$



Summary

- Added new ATHENA magnetic-field map to local Fun4All repository
- New ATHENA map has the B-field z component inverted with respect to the previous map
- Studied impact of new map on momentum resolution in configuration with all-si tracker + backward GEM ($\sigma = 50 \mu\text{m}$) + forward GEM ($\sigma = 50 \mu\text{m}$) 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