Magnetic Field Strength and Tracking Resolutions

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March 20, 2020

1st Yellow Report Meeting

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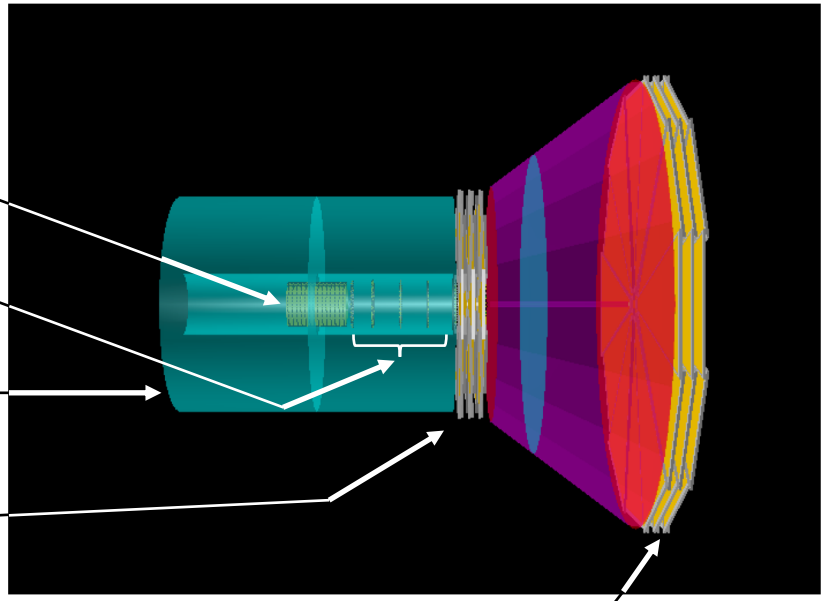
Detector - BeAST

All “naïve” default resolution parameters*

Detectors:

- **Silicon Vertex Tracker**
  - $5.8\ \mu m \times 5.8\ \mu m$ resolution
- **Forward Silicon Trackers**
  - $5.8\ \mu m \times 5.8\ \mu m$ resolution
- **TPC**
  - Intrinsic longitudinal resolution: $500\ \mu m$
  - Intrinsic transverse resolution: $200\ \mu m$
  - Longitudinal dispersion: $1\ \mu m/\sqrt{D[cm]}$
  - Transverse dispersion: $15\ \mu m/\sqrt{D[cm]}$
  - Vertical pad size: 0.5 cm
- **Forward Gem Trackers**
  - $50\ \mu m \times 50\ \mu m$ resolution
- **Far Forward Gem Trackers**
  - $100\ \mu m \times 100\ \mu m$ resolution

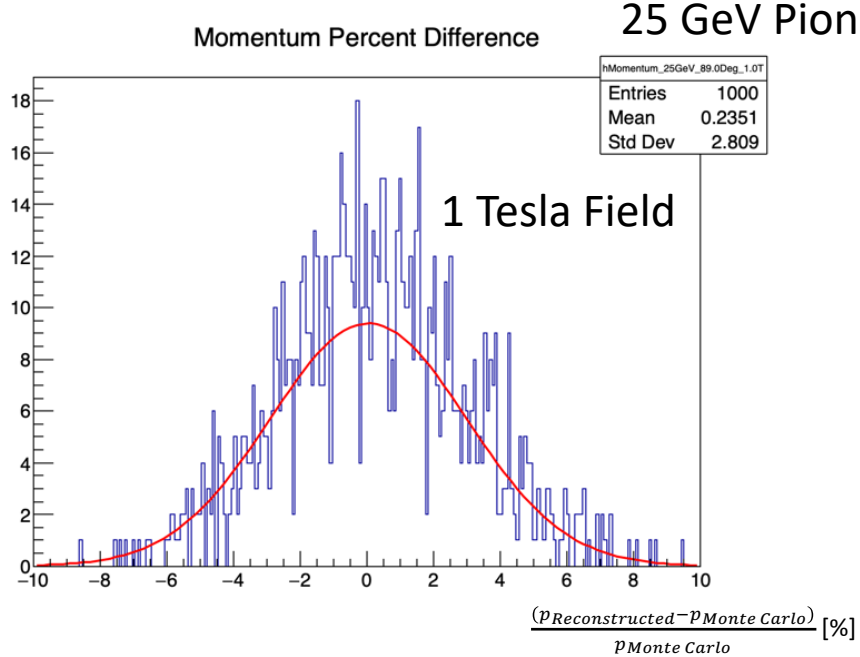


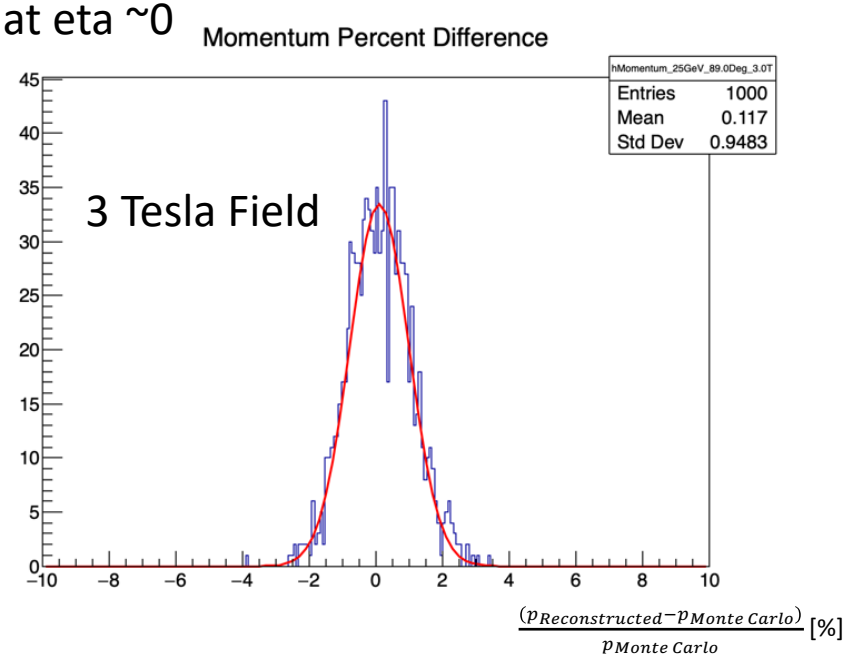
** Can be updated to more realistic parameters*

Details

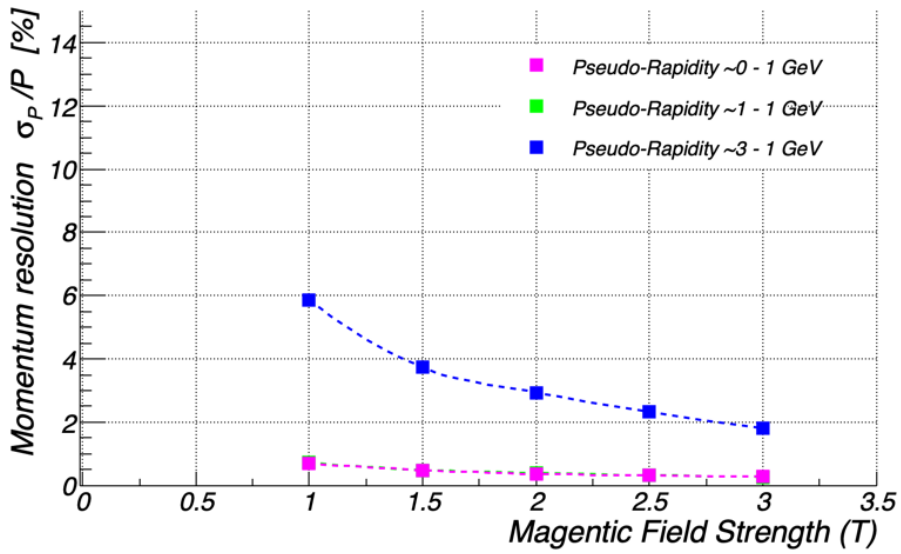
Simulations were performed in EICRoot.
1000 pions were thrown at $\eta = \{0, 1, 3\}$ and $p = \{1, 10, 25, 50\}\ GeV$
This was done for magnetic fields of {1.0, 1.5, 2.0, 2.5, 3.0} Tesla
The tracks were reconstructed, and the reconstructed momentum was compared to the actual momentum of the generated track.
Distributions of $\frac{(p_{Reconstructed} - p_{Monte\ Carlo})}{p_{Monte\ Carlo}}$ are made, and the standard deviation is taken as the momentum resolution.

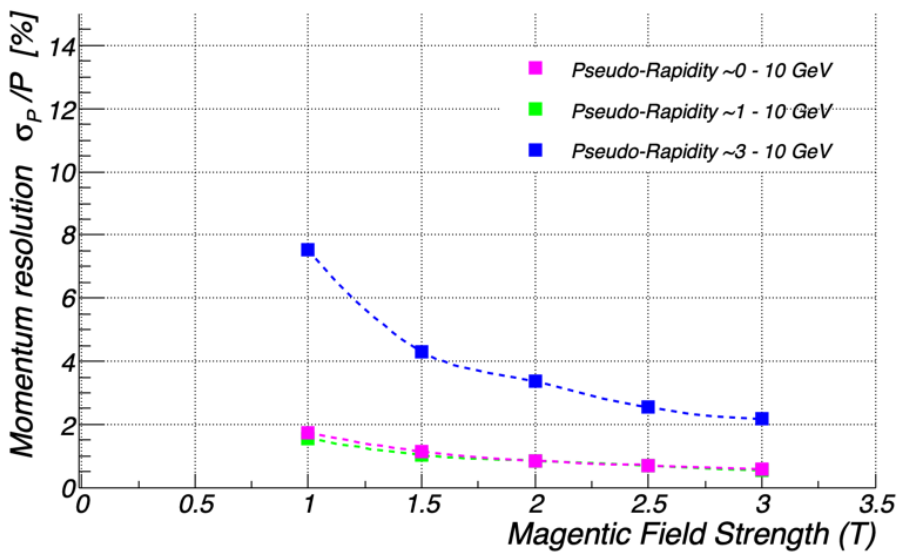
25 GeV Pions at eta ~0

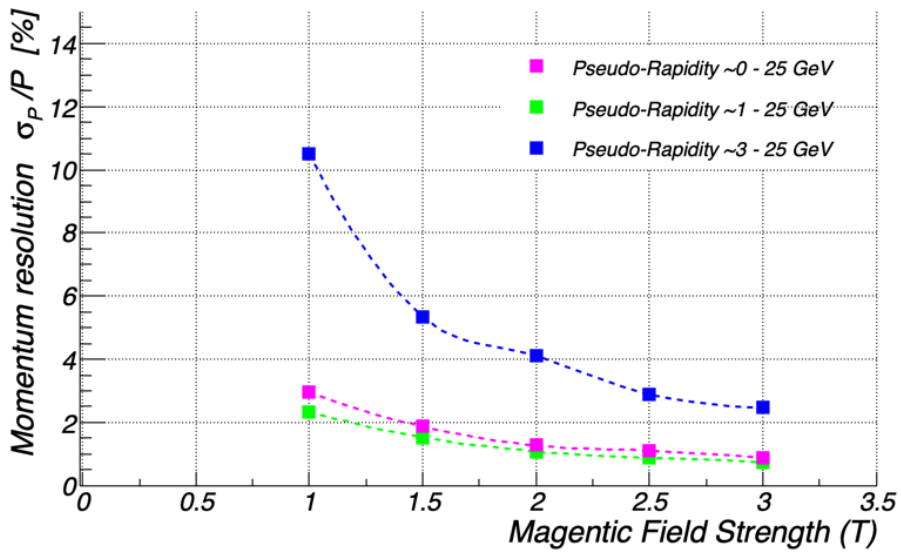


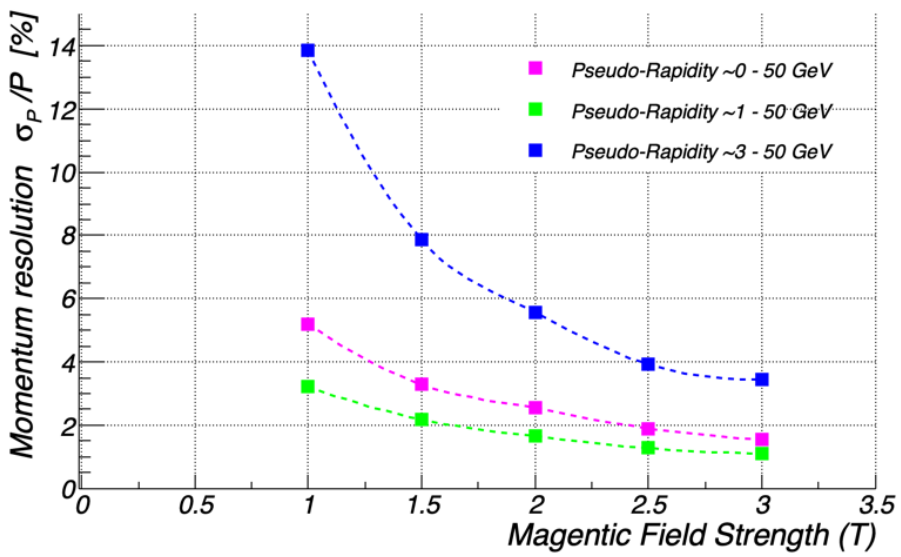


$\frac{\sigma_p}{p}$ vs B for Constant p

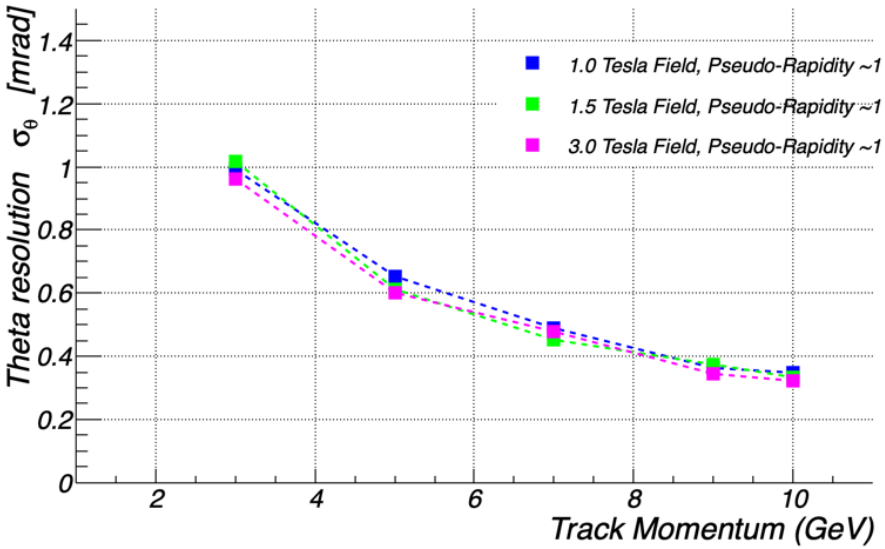


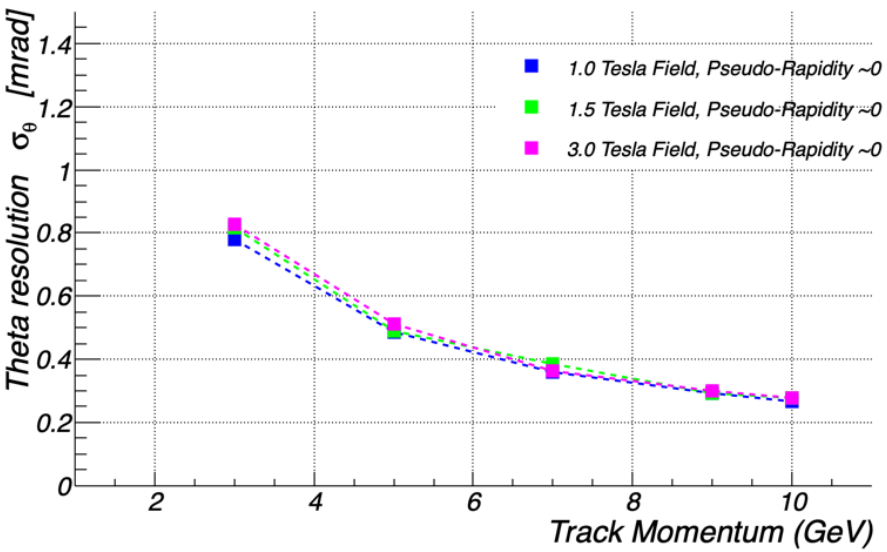






σ_θ vs p for Different Values of B





Mid-rapidity theta resolution appears relatively independent of the field strength

Summary

- These studies are still in early stages
  - Can be improved with more statistics
  - Edit detector parameters to more realistic values

- Going forward we will produce acceptance, momentum resolution and angular resolution parameterizations for a number of well-defined detector configurations, which can then be used in smearing generators.