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University of Birmingham Simulations update

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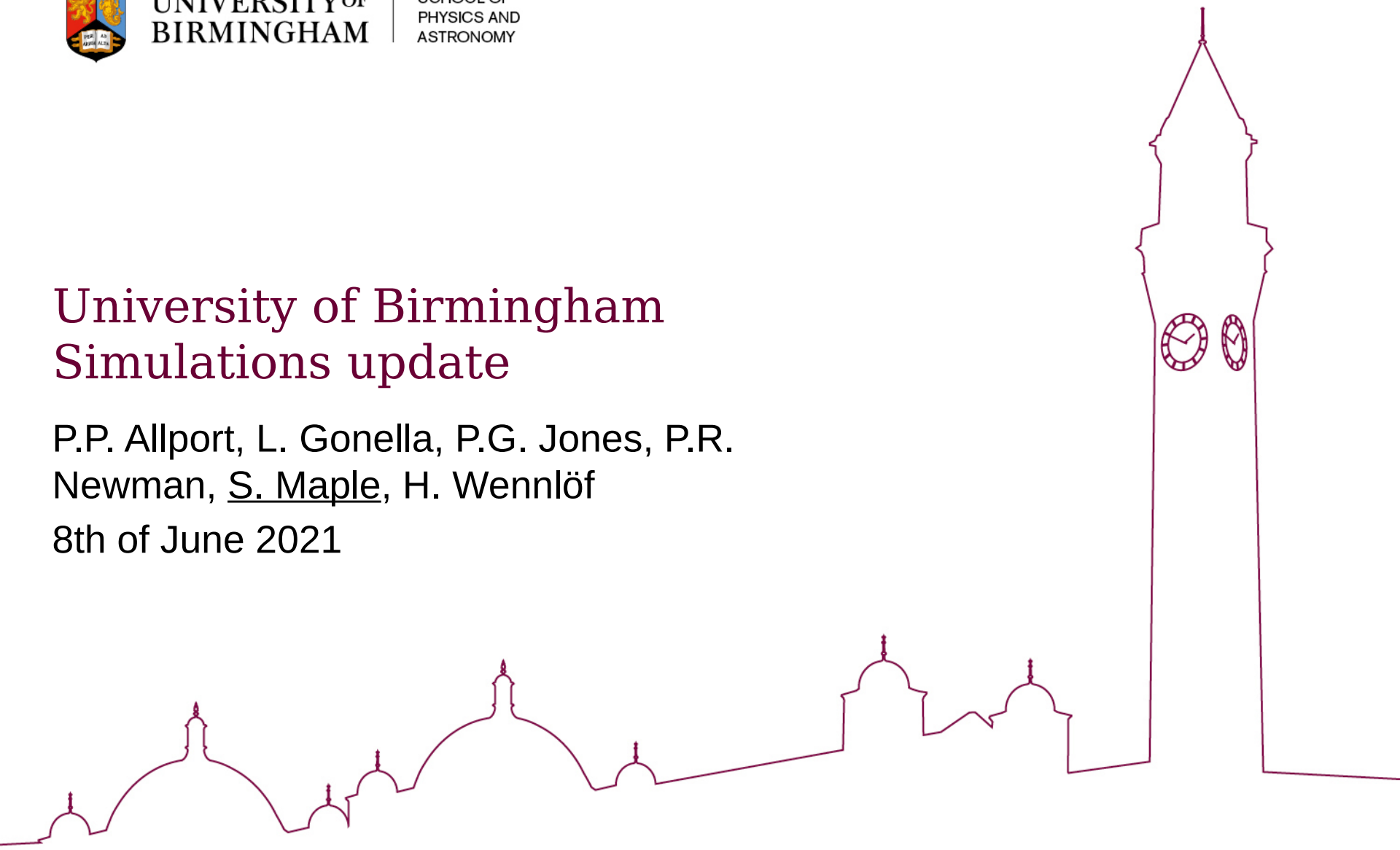
8th of June 2021

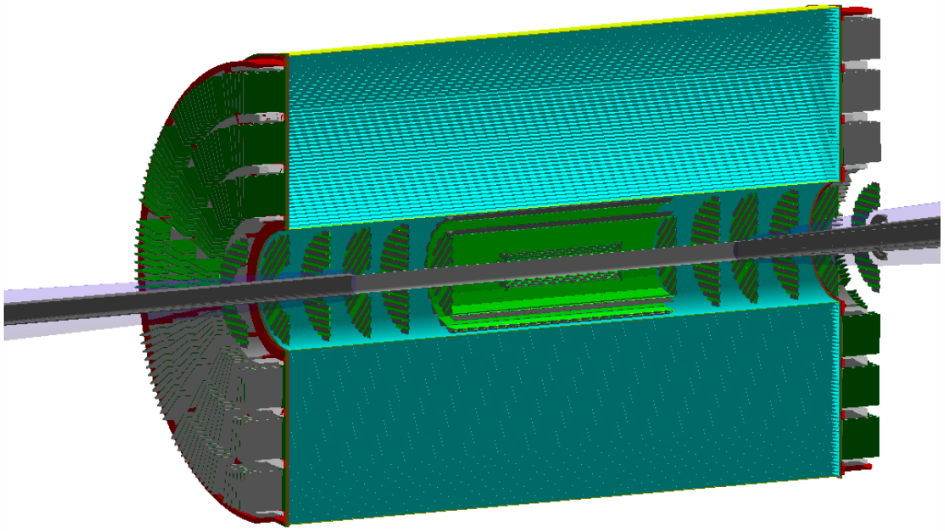


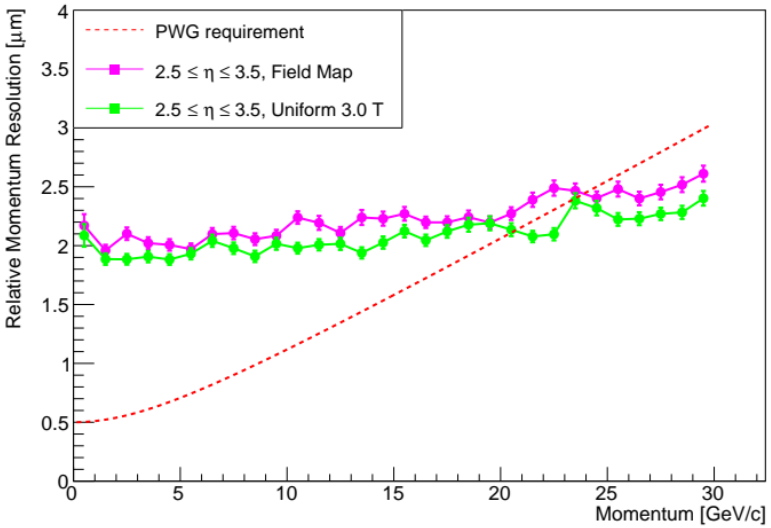
Overview

- Update on magnetic field comparison
  - Compared Relative Momentum resolution for the Fun4All Uniform 3T field and 2021-4-30 Field map in range $0 \leq \eta \leq 3.5$ for YR Hybrid Baseline
- Update on Simplified implementation
  - Updated Simplified Hybrid implementation to include TPC endcaps and compared resolutions to previous implementation
  - Compared Relative Momentum resolution for updated simplified implementation and stave-based hybrid model for $0 \leq \eta \leq 3.5$
  - Performed material scans for simple and stave-based hybrid implementation

Field Maps vs Uniform 3T

- Used YR Hybrid Baseline setup
- Difference in Relative Momentum resolution for Uniform 3T and Field map in forward region*
  - → Plotted resolution vs η at fixed momenta

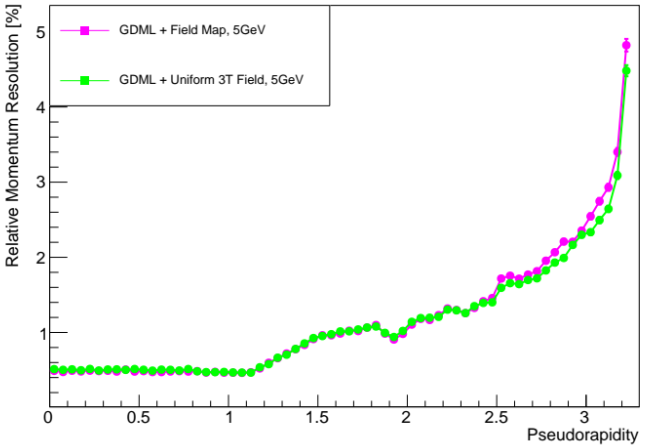




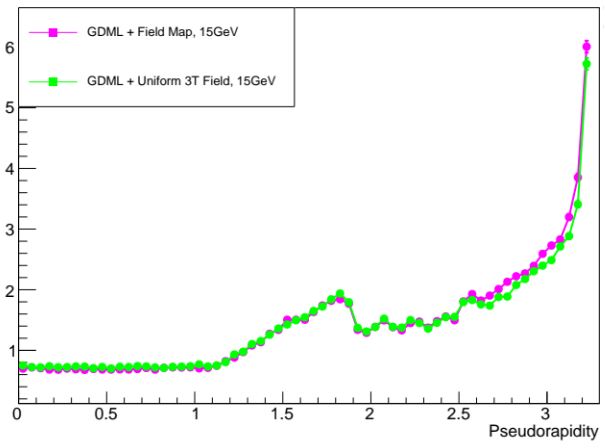
* See slides from S. Maple
https://indico.bnl.gov/event/11960/

Field Maps vs Uniform 3T

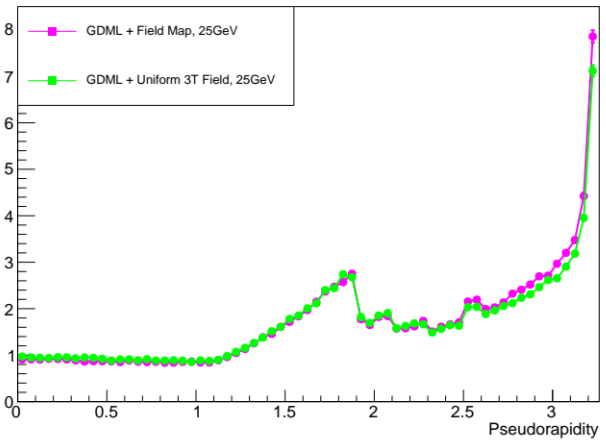
5 GeV/c



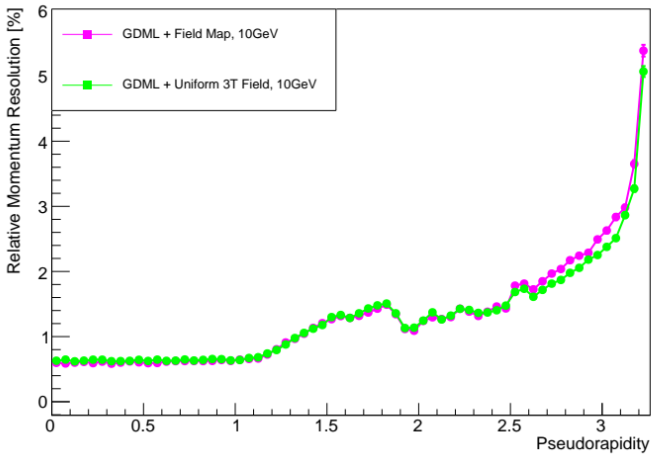
15 GeV/c



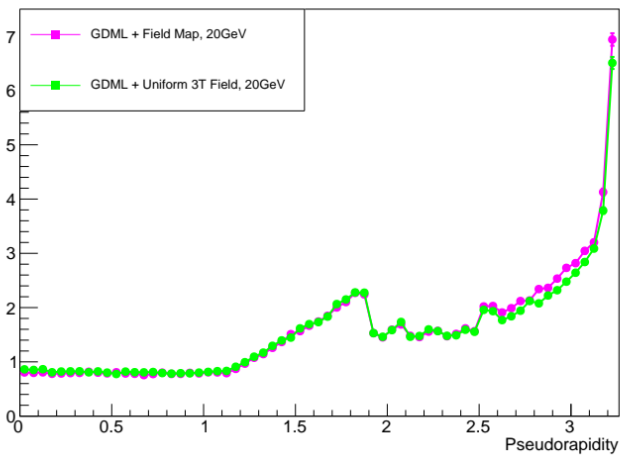
25 GeV/c



10 GeV/c

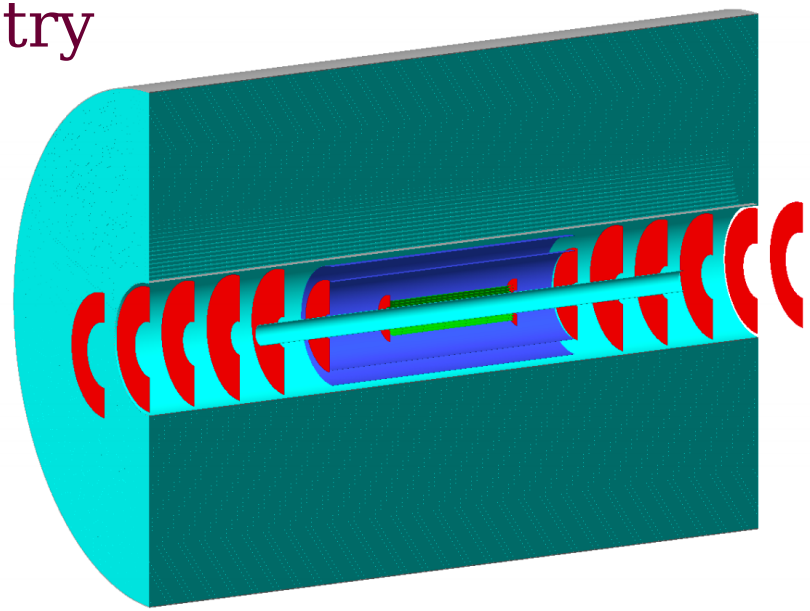


20 GeV/c

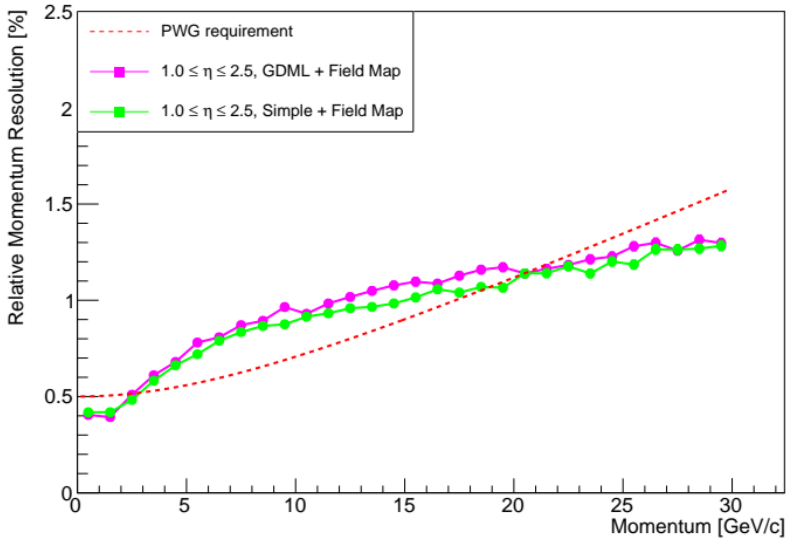


Simple vs Stave-based geometry

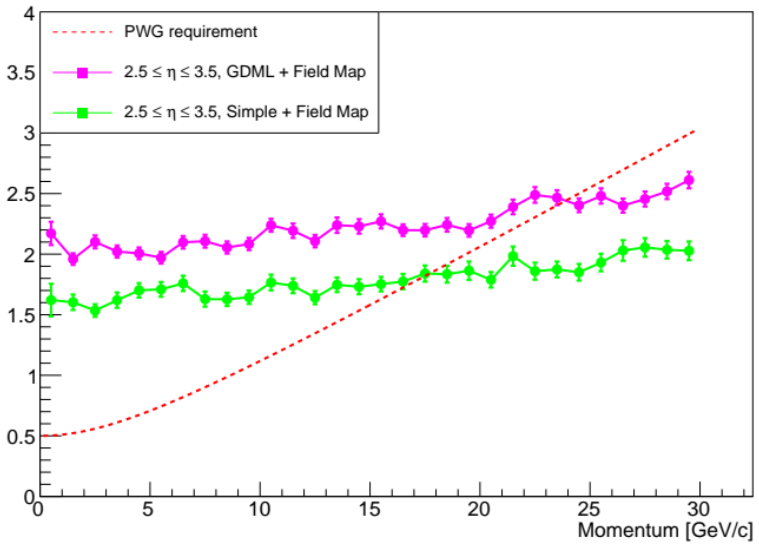
- Previously benchmarked simple implementation against stave based implementation → differences seen in forward region



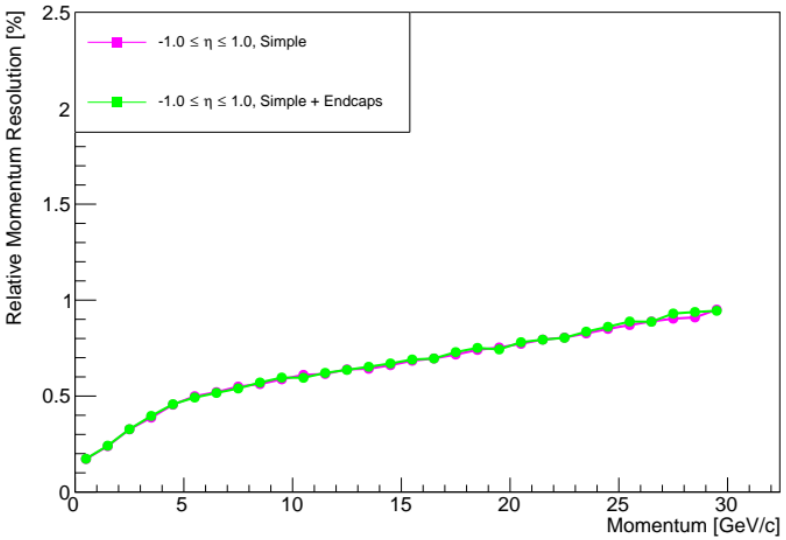
1 ≤ η ≤ 2.5



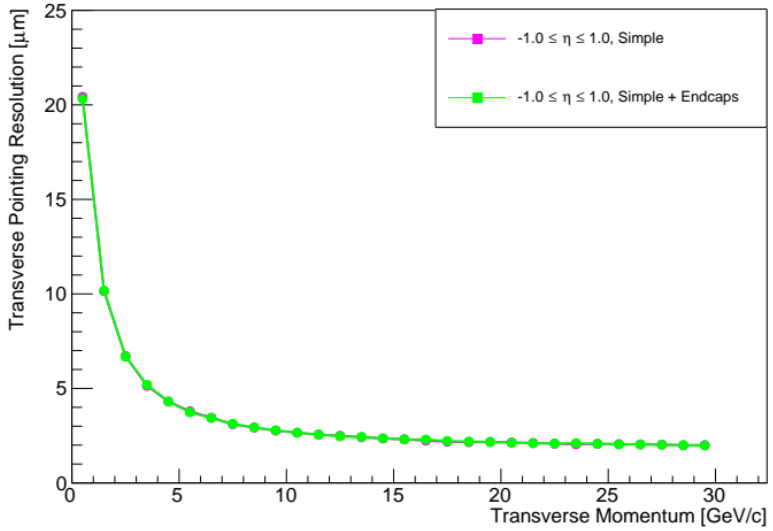
2.5 ≤ η ≤ 3.5

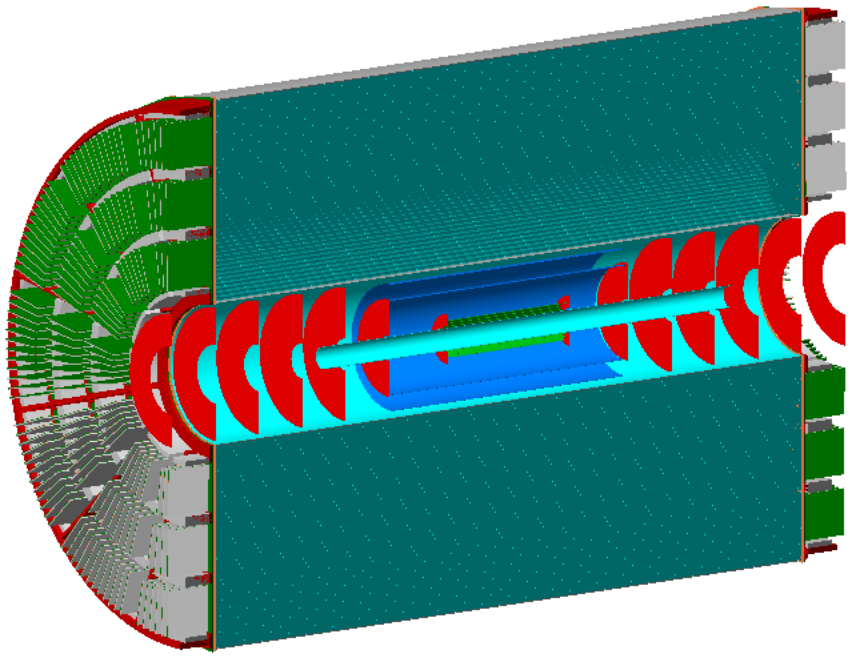


TPC End Caps added to Simple setup



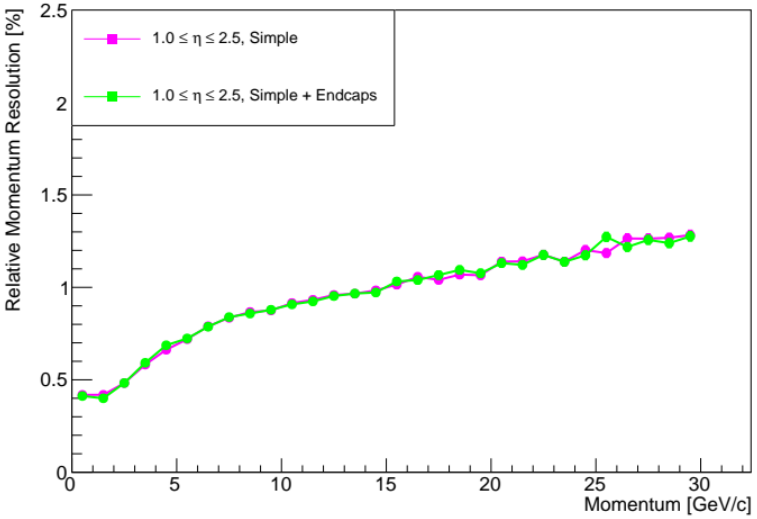
-1 ≤ η ≤ 1



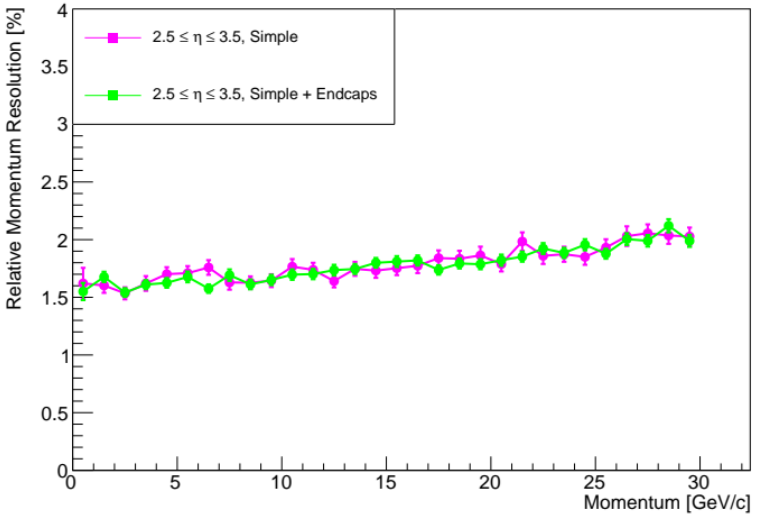


- Benchmarked against setup with no end caps

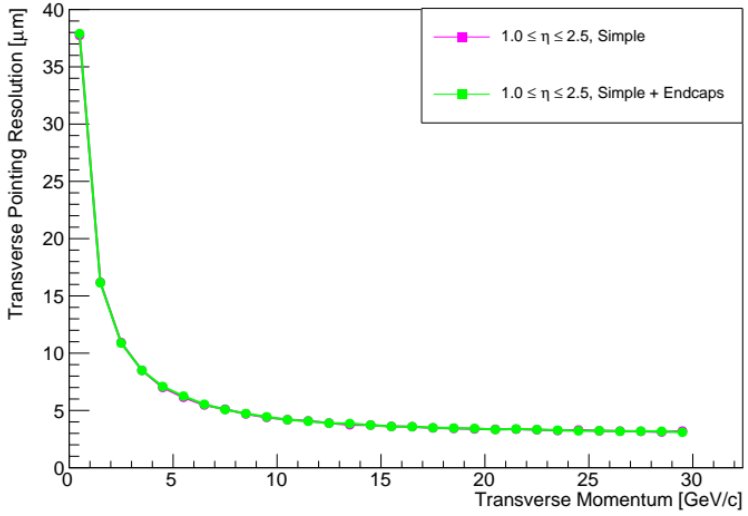
TPC End Caps added to Simple setup

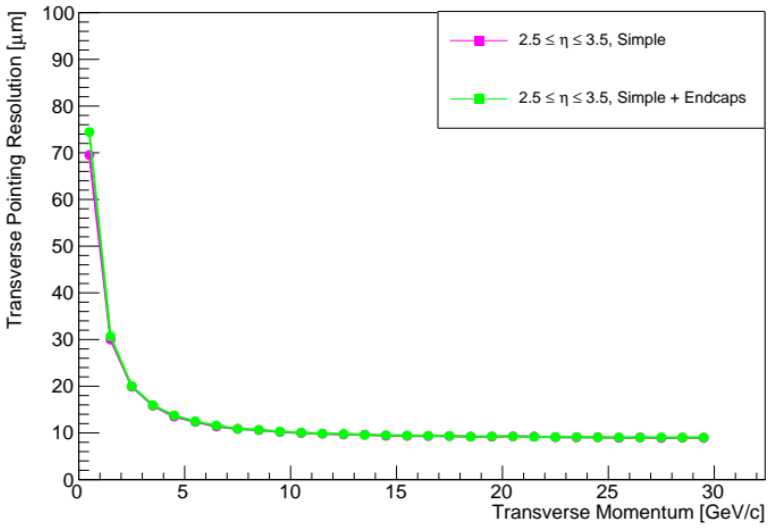


1 ≤ η ≤ 2.5



2.5 ≤ η ≤ 3.5

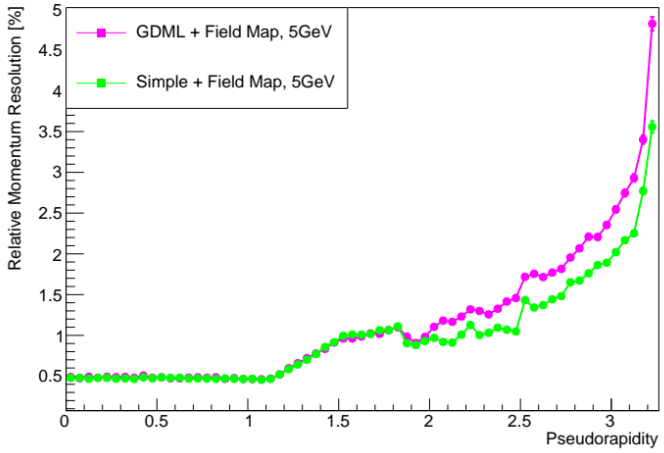




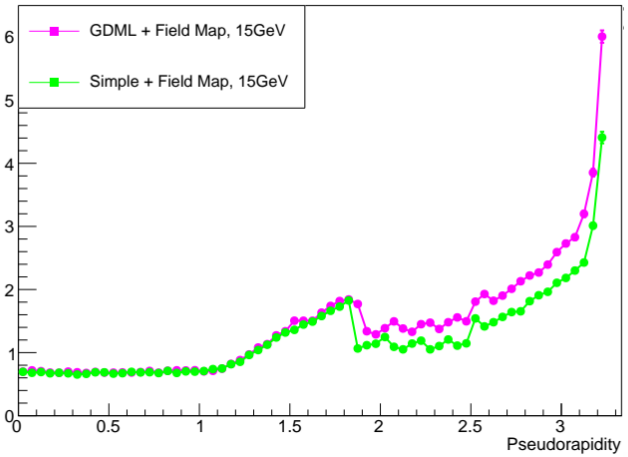
Simple vs Stave-based

- Compared Simple and Stave-based models as a function of pseudorapidity

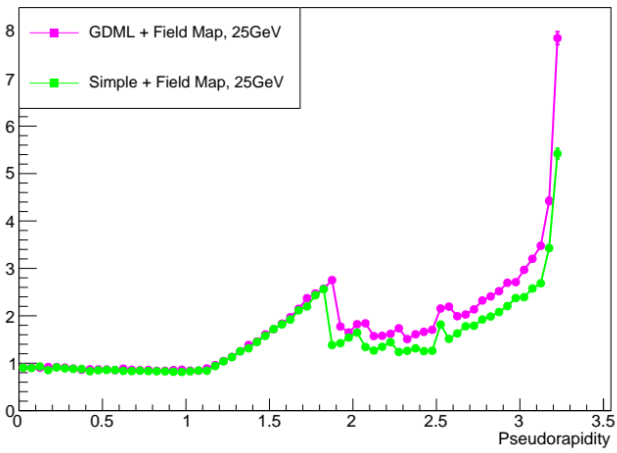
5 GeV/c



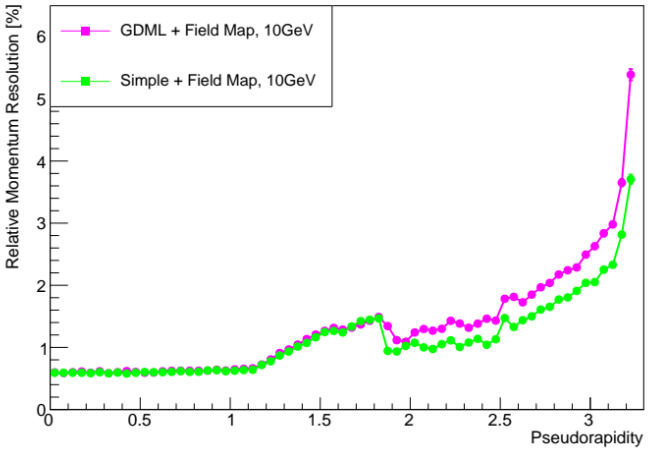
15 GeV/c



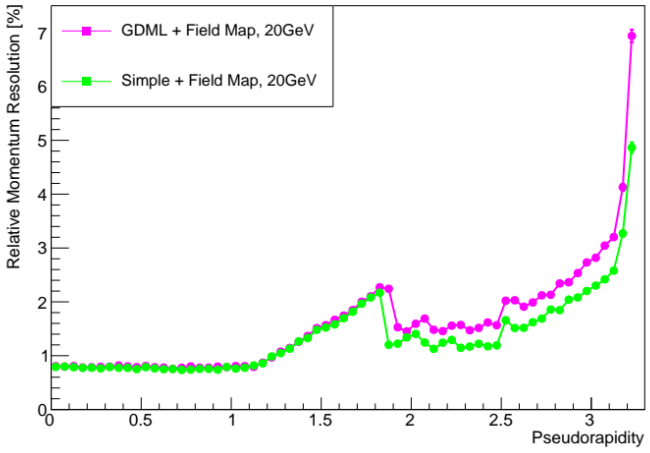
25 GeV/c



10 GeV/c

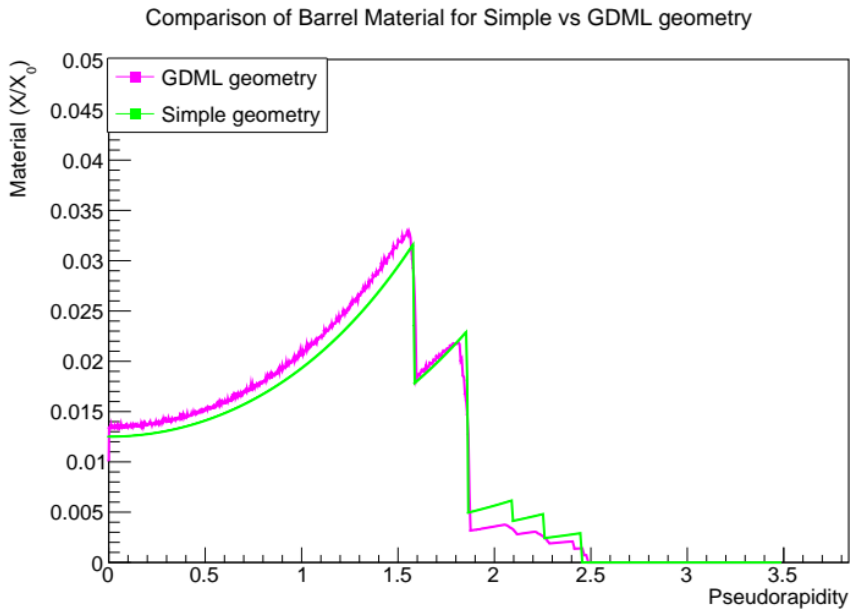


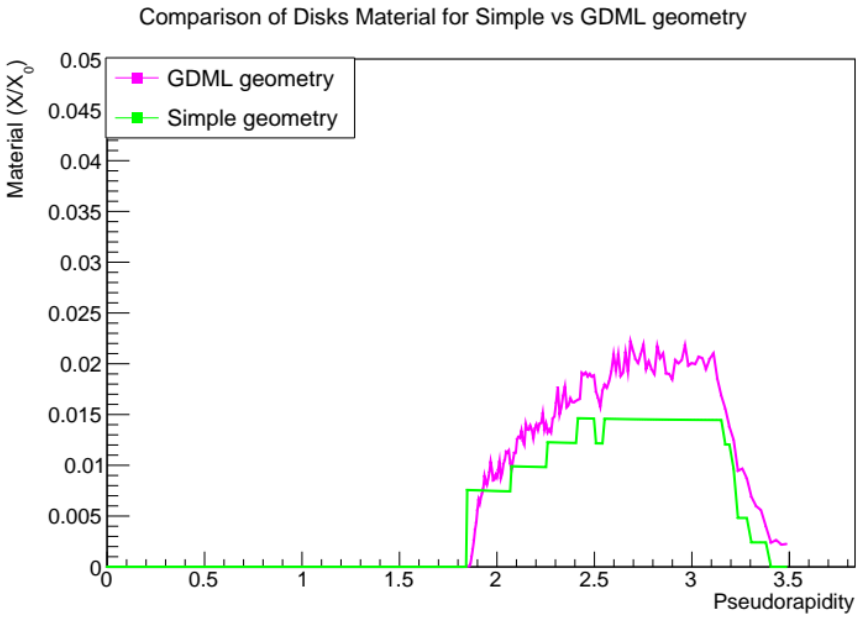
20 GeV/c



Material Scans

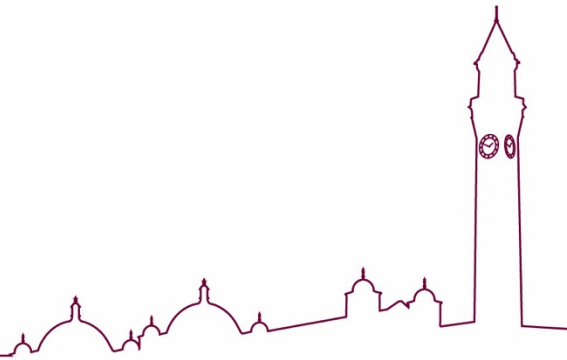
- Comparing material in stave-based geometry to simple geometry
- Higher material in stave-based → due to stave overlaps?
- Lower material in stave-based for η between ~1.85 and ~2.5 in the barrel layers





Summary and Next Steps

- Compared uniform 3T field and field map → field map performs slightly worse at high pseudorapidity
- Investigated differences in resolutions for simple and stave-based implementations
  - Added TPC endcaps
  - Resolution plotted vs pseudorapidity → differences begin at η=~2.5
  - Material scans performed
- Next step is to switch out TPC for MPGD and GEM in the barrel and endcaps respectively



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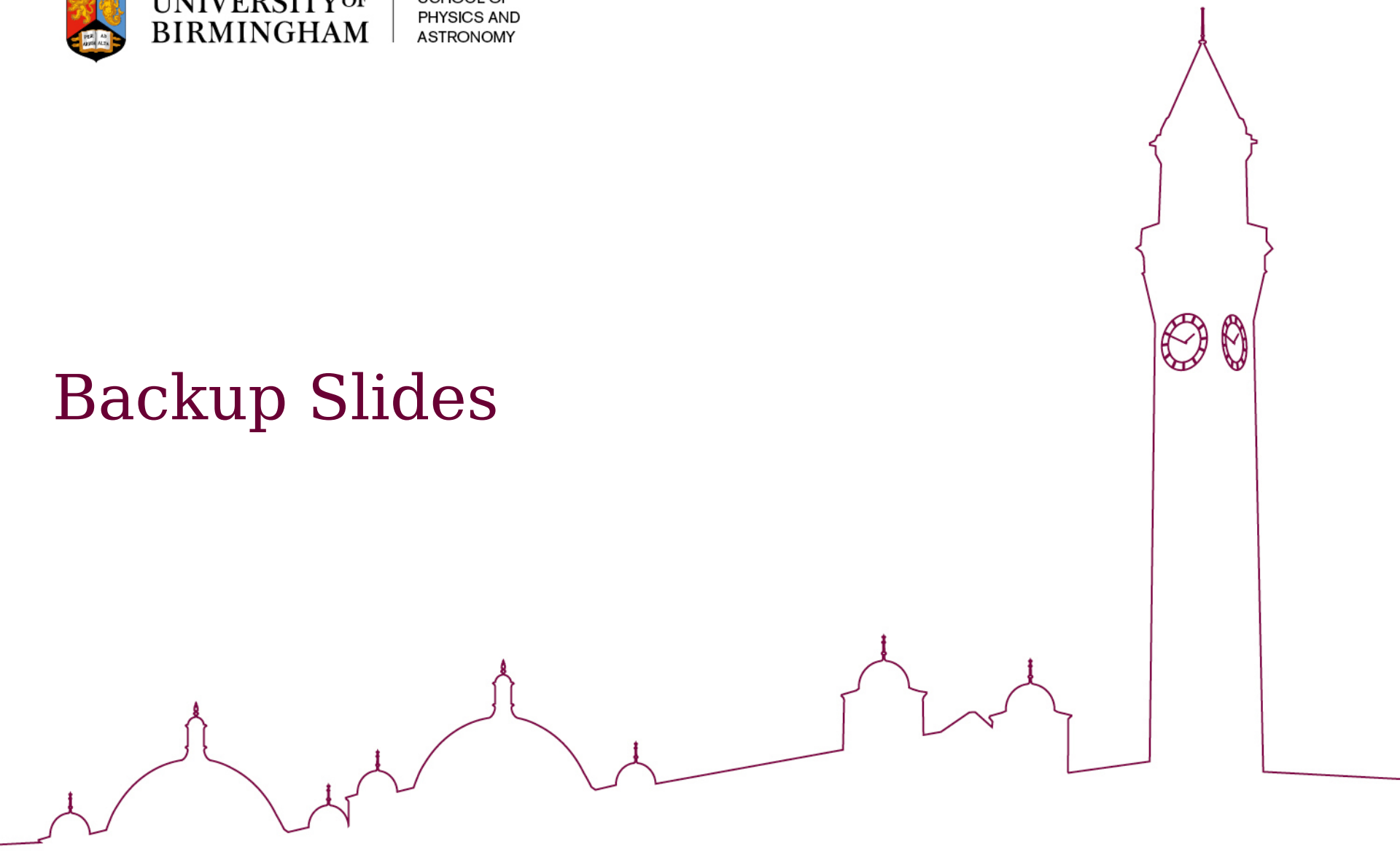
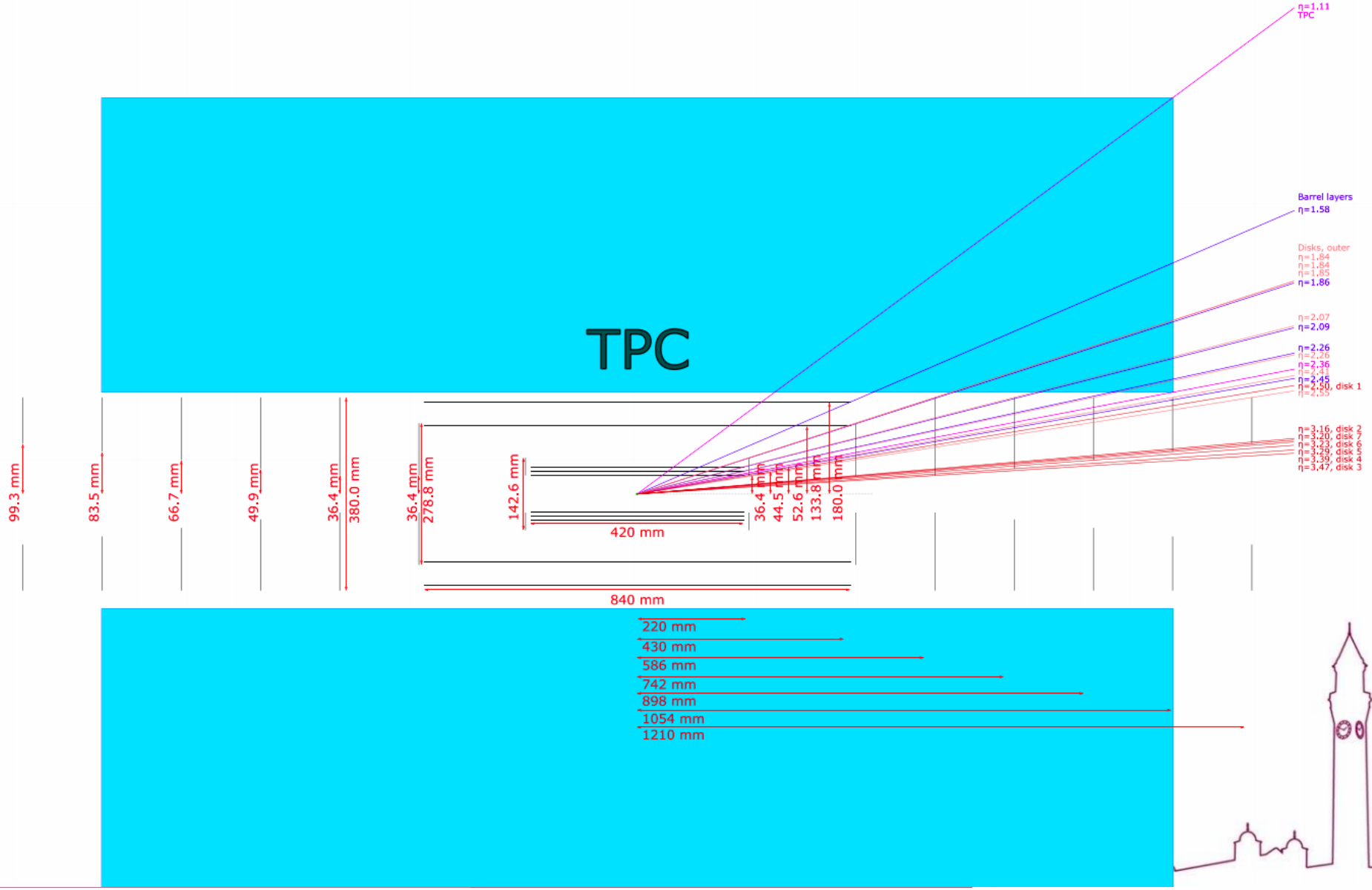
Backup Slides



Full Layout Sketch

* H. Wennlöf
https://indico.bnl.gov/event/7919/



Full Material Scan