

Updated MPGD simulation geometry

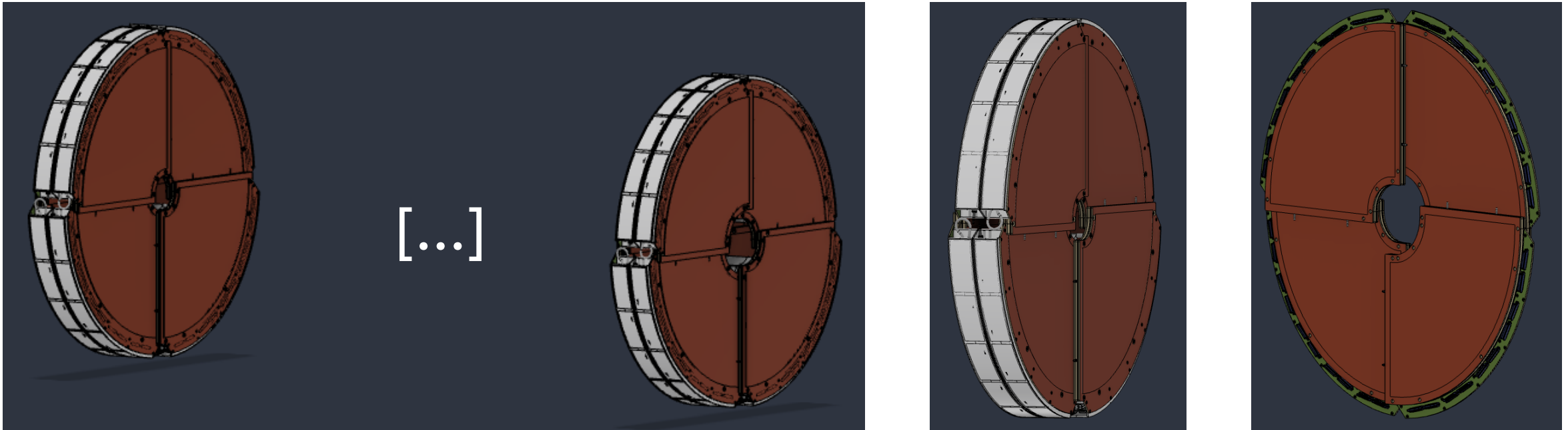
M. Bondì, M. Posik, M. Spreafico

Update on MPGD endcap implementation in simulation:

- Detector design
- Status of simulation geometry
- Updated geometry
- Geometry testing
- Work in progress and future updates

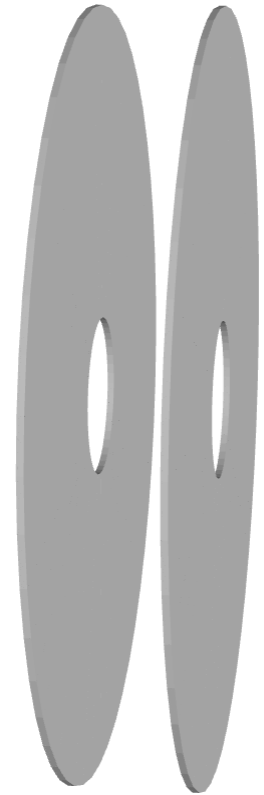
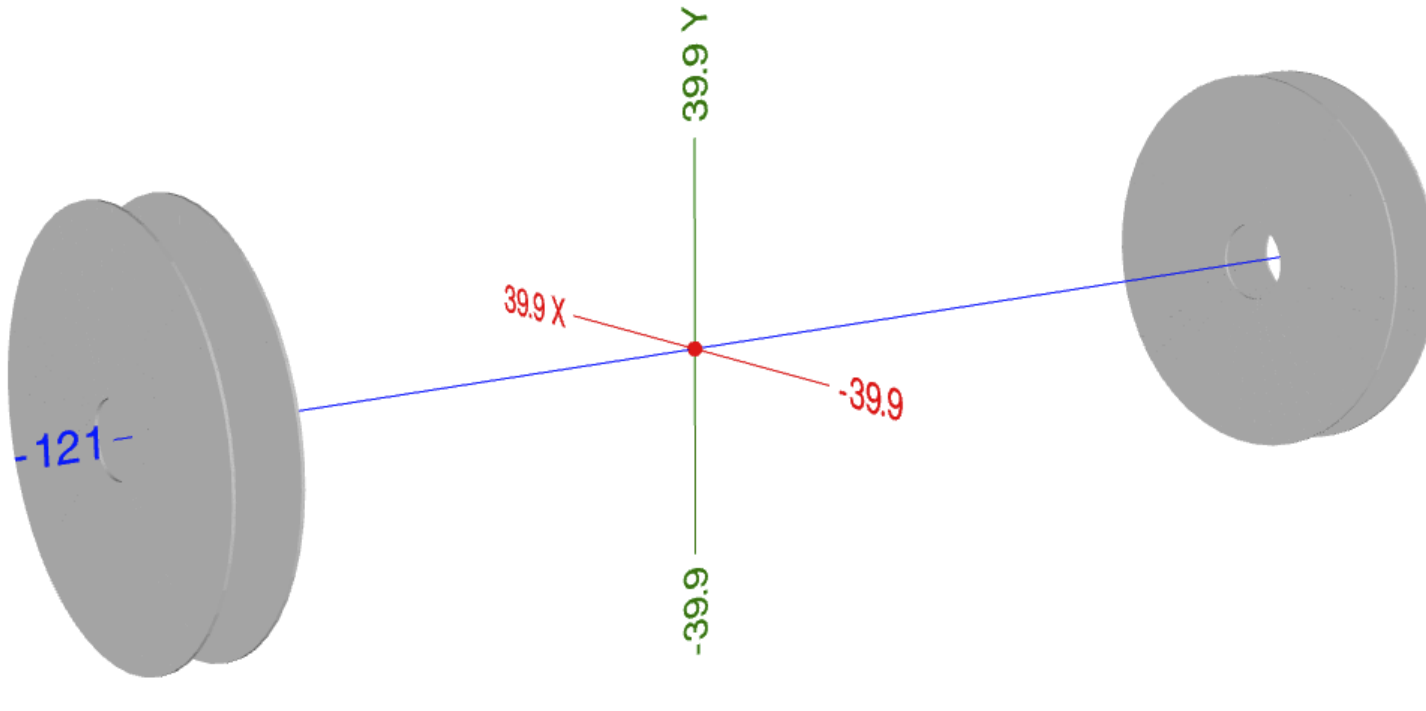
MPGD endcap design:

- Two disks per endcap
- Each disk made of **4 overlapping quadrants**
- Layers of different sizes (anode and PCB protruding from disk)



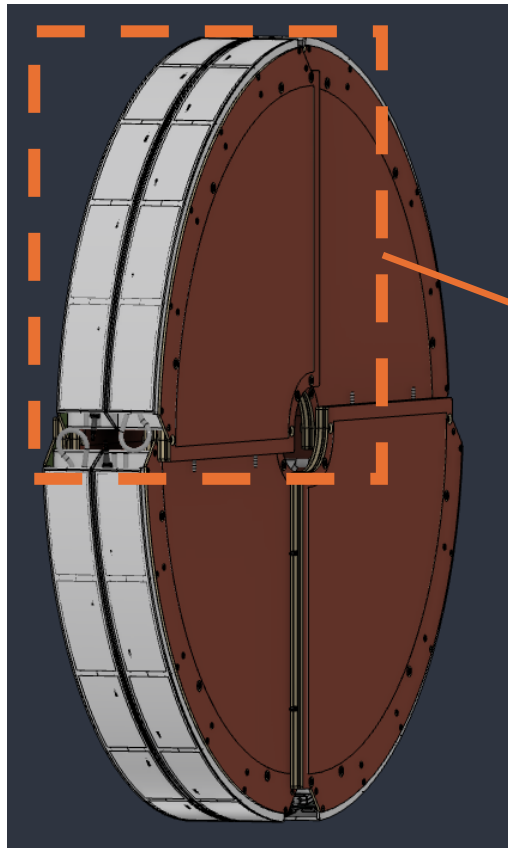
MPGD design in simulations:

- Two disk per endcap
- Each disk is approximated with trapezoidal volumes

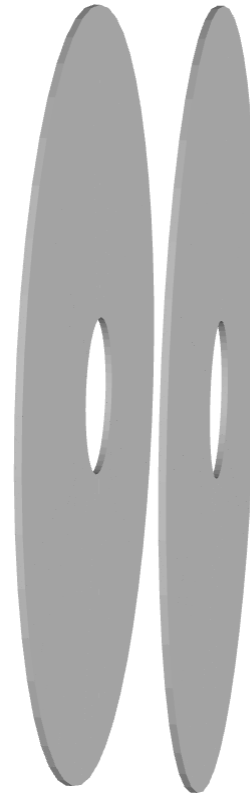


Features to implement:

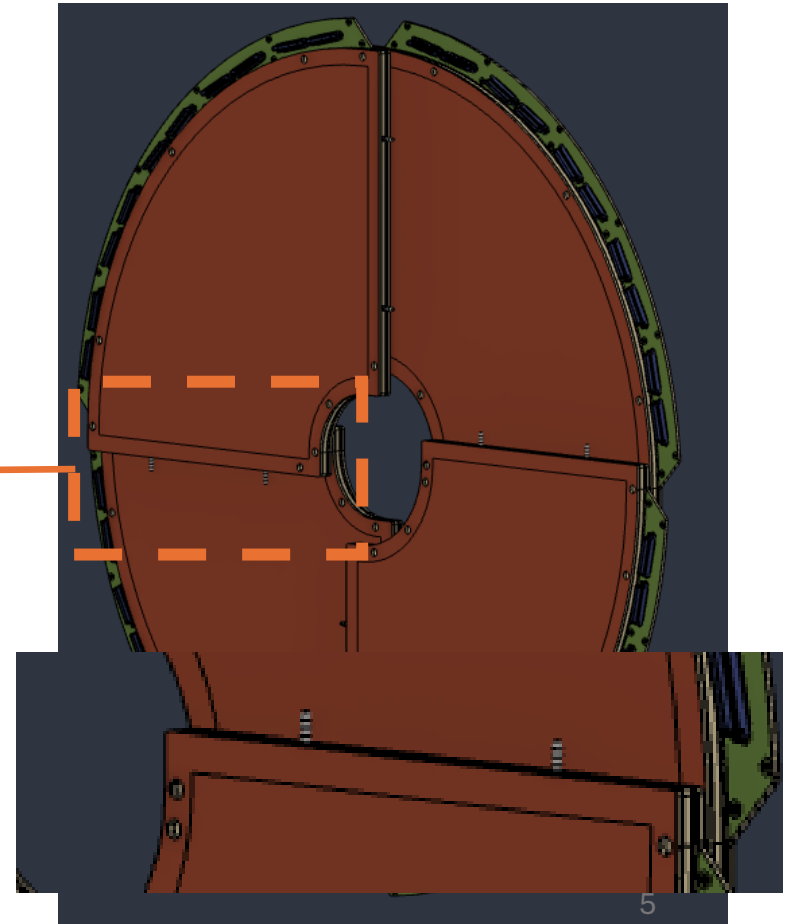
- Quadrant division
- Correct quadrant shape with overlap region



Quadrant

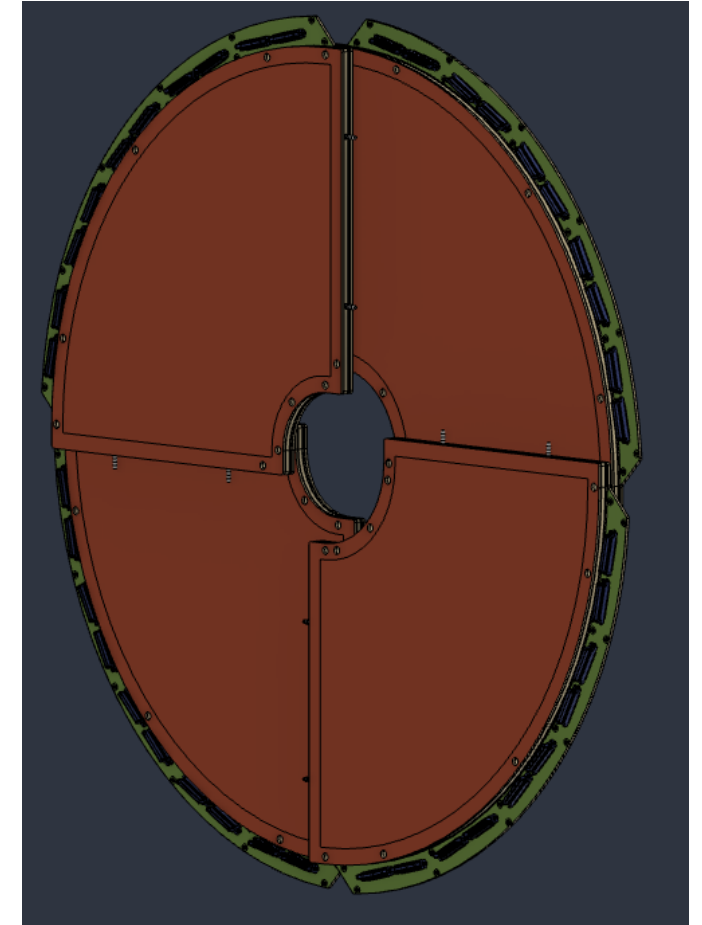
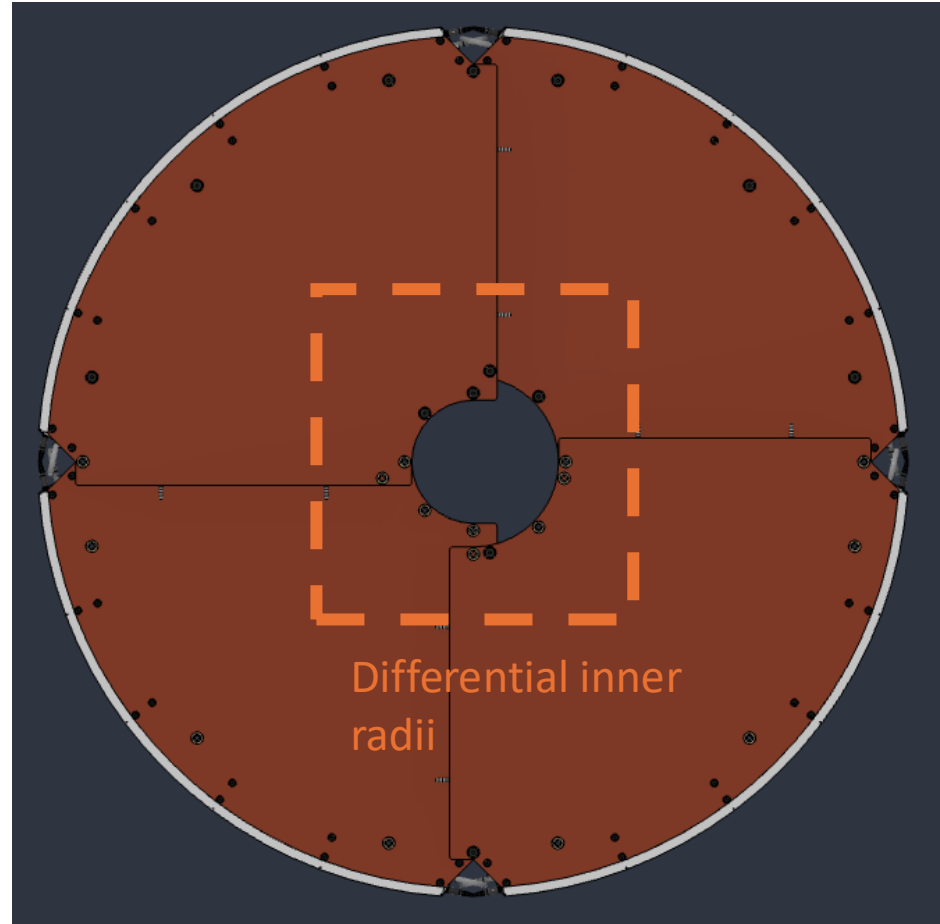
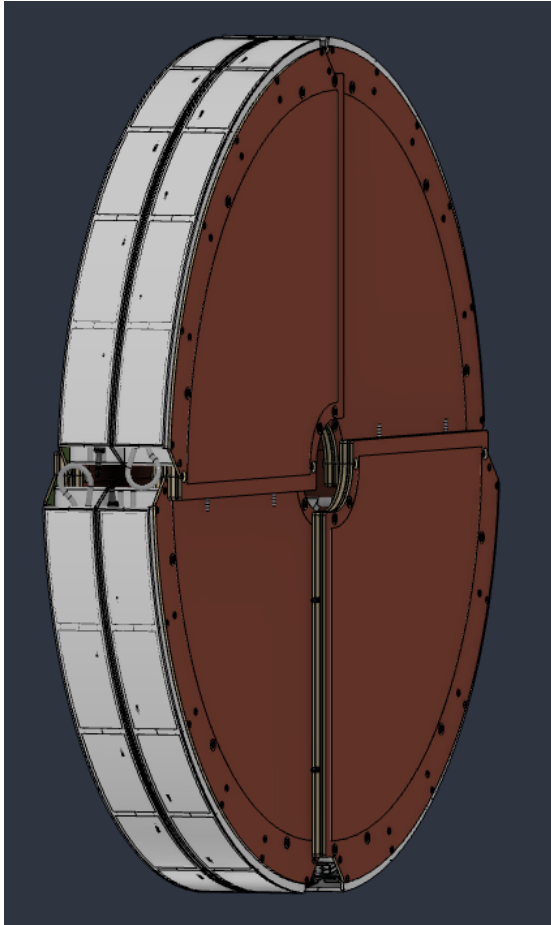


Overlap



Additional features:

- Different inner radii for Hadron endcap



Modified geometry in simulation framework:

- Started from **trapezoid** approximation (working, ACTS safe)
- Divided disk in quadrants and added **staggering**
- Added box volume to model **overlap** region
- Added support for **different inner radii**

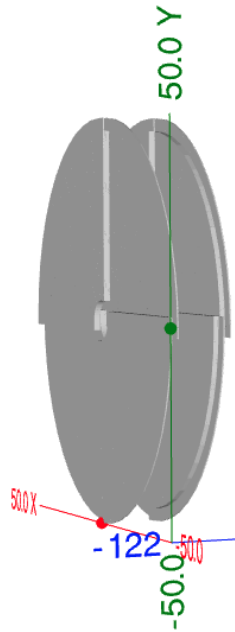
Improved inner structure of MPGD:

- Included realistic **layering**
- Implemented correct **frame** and **bulk** sizes

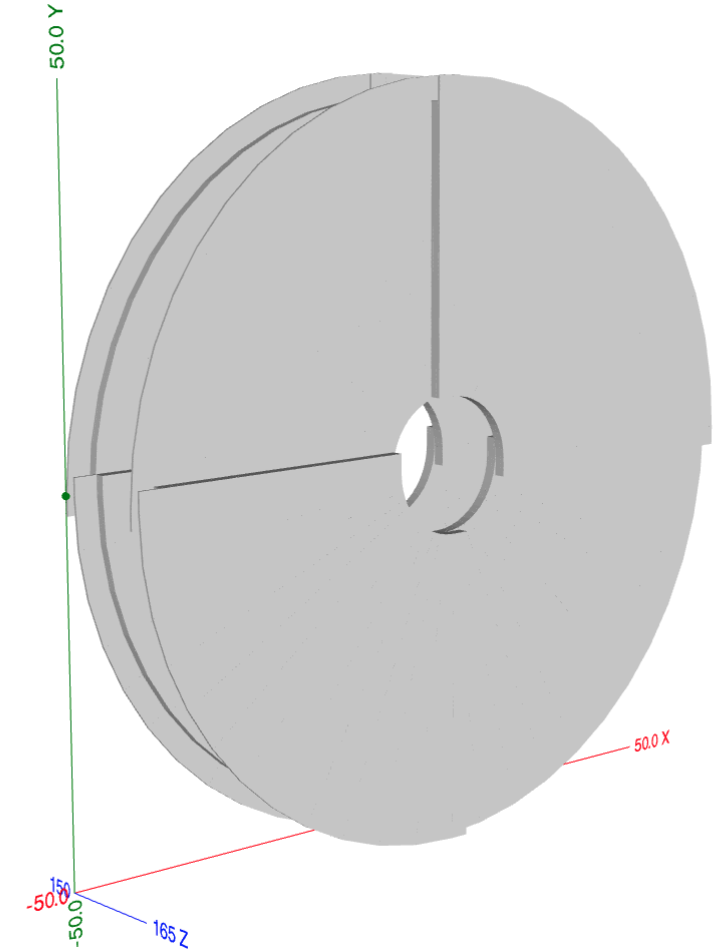
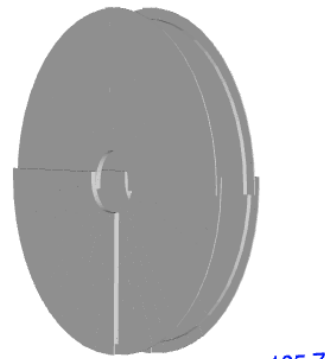
Realistic geometry soon available in official simulation framework

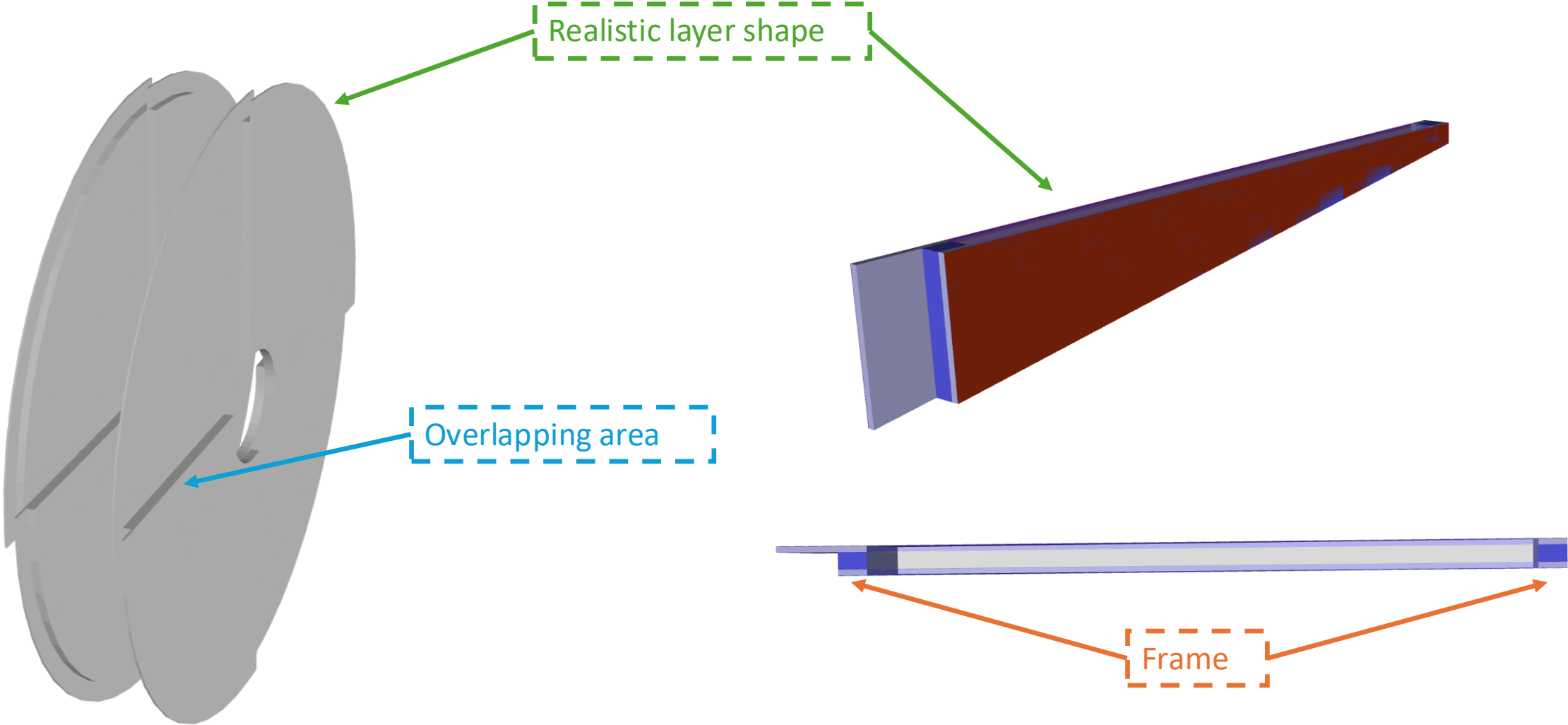
- Quadrant division
- Realistic disk structure

Backward-ECT



Forward-ECT

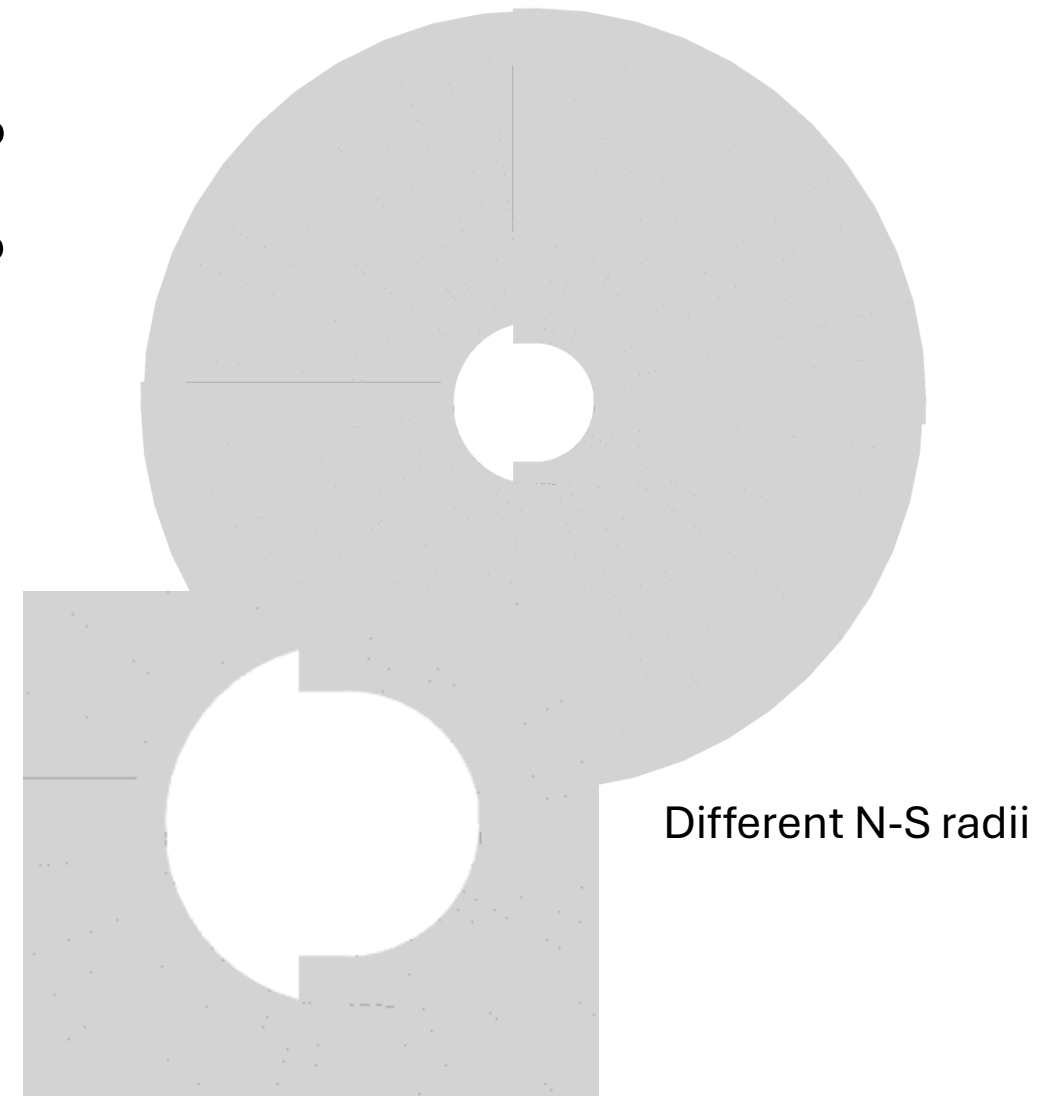




Geometry tuned on September 2025 design:

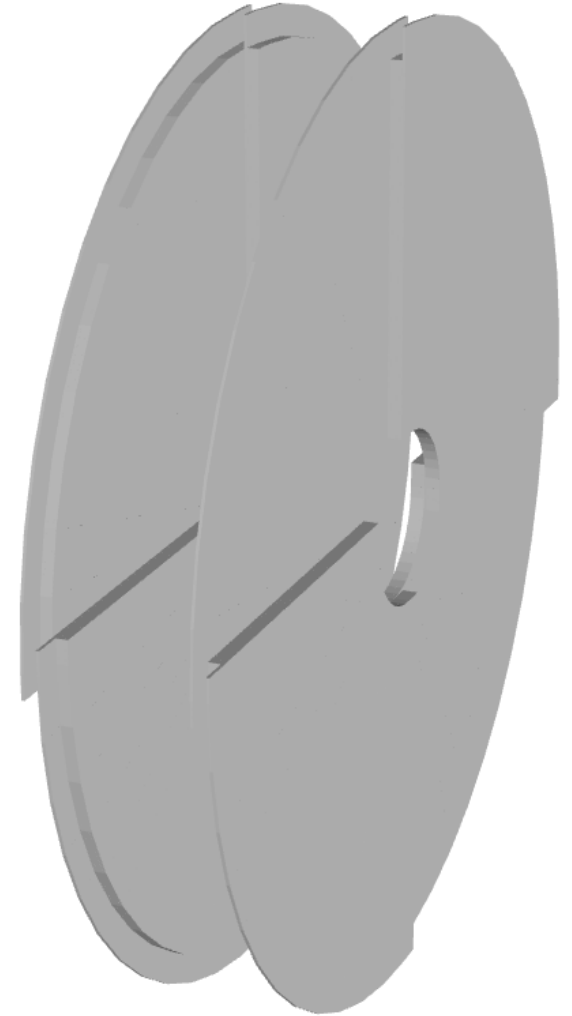
- Hadron endcap at 1500 and 1618 mm from IP
- Lepton endcap at 1075 and 1178 mm from IP
- All disk outer radius 460 mm
- Hadron ECT with inner radius 90 mm
- Lepton ECT with inner radius 50 mm

Geometry ready to be updated with newer design (e.g. different inner radii)



Tested compatibility of new geometry with simulations

- ✓ No overlap with other detectors
- ✓ Simulation safe
- ✓ Reconstruction compatible
- ! ACTS testing in progress
 - ✓ Previous version tested to be ACTS-safe
- Updated geometry **submitted** to the official repository



Geometry:

- Implement frame in “overlap” region
- Update layers based on latest design from Stefano

ACTS

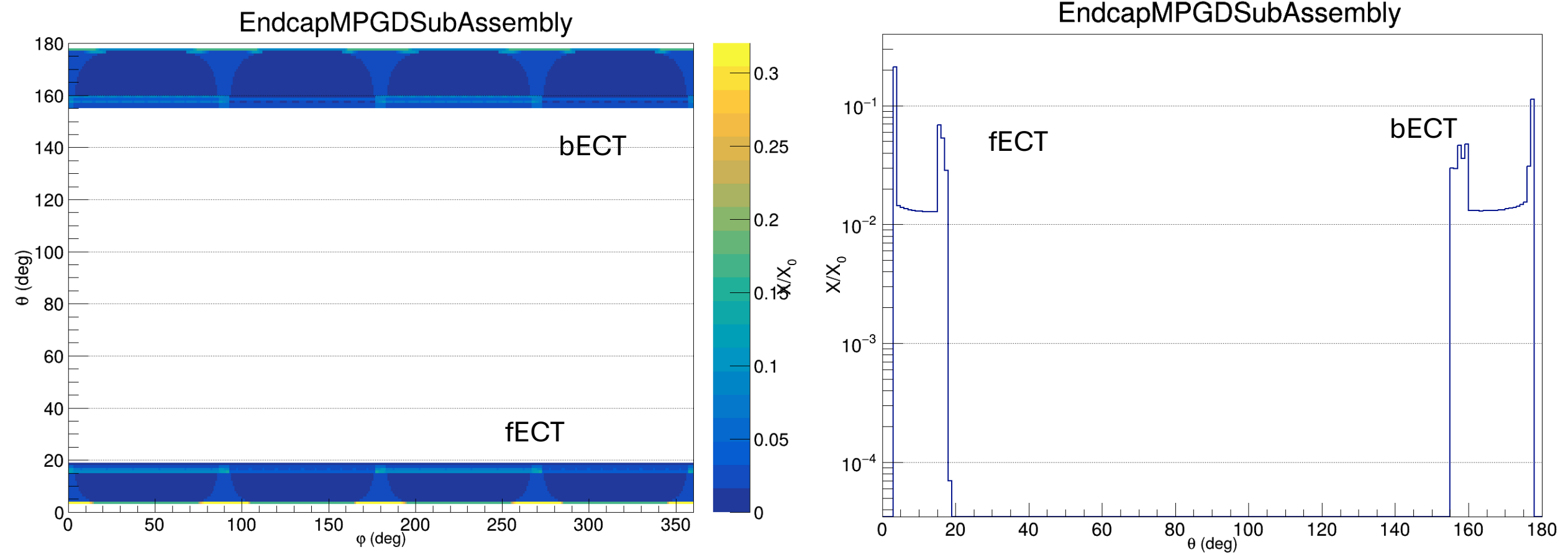
- Fix issues to make latest geometry ACTS compatible

- Updated geometry submitted for integration in the official ePIC repository
 - [PR#1185](#)

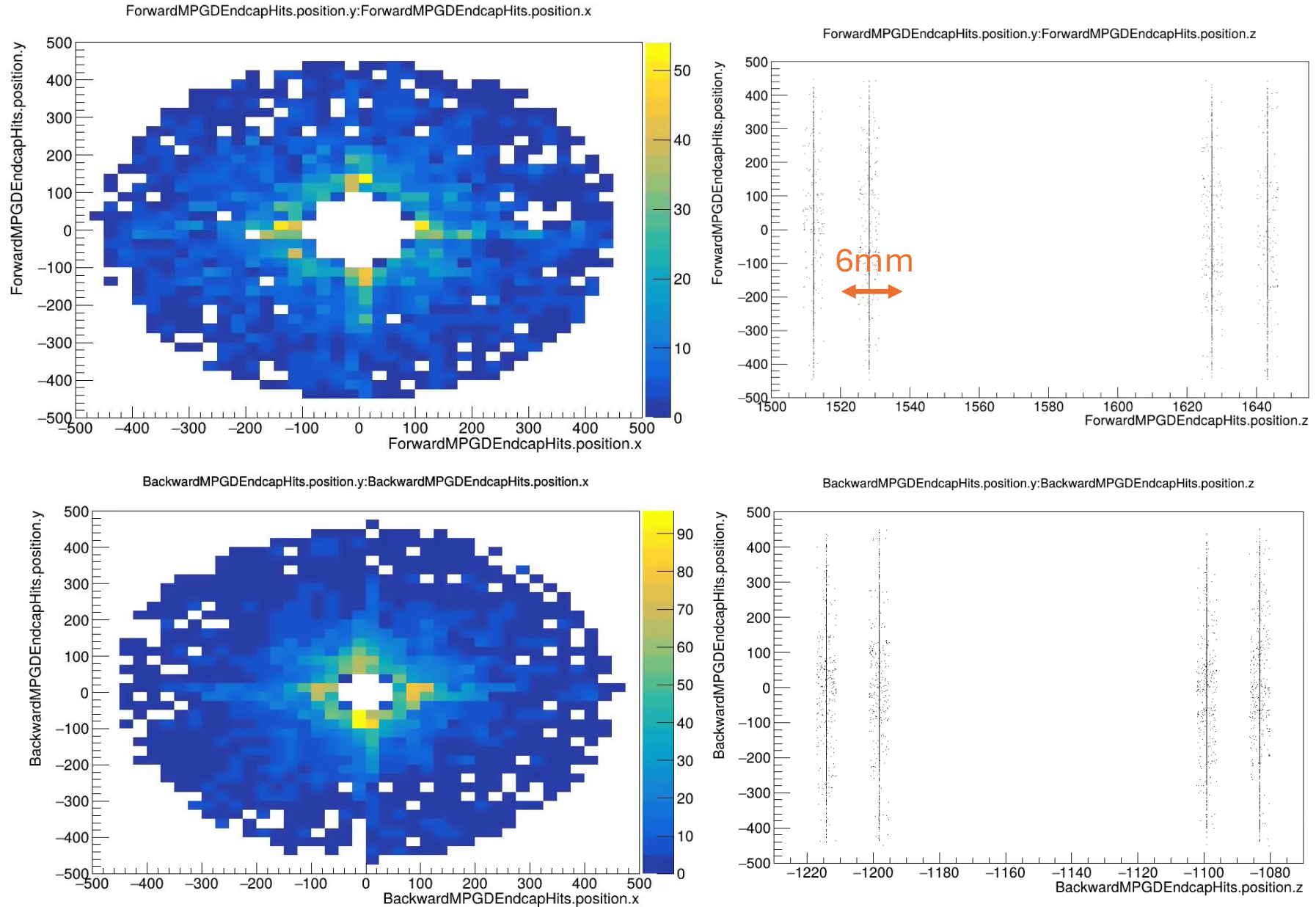
Readout

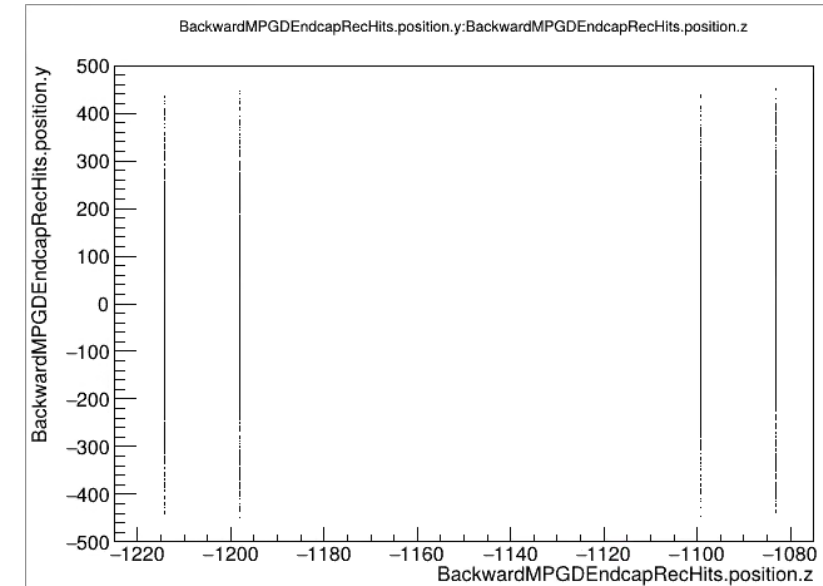
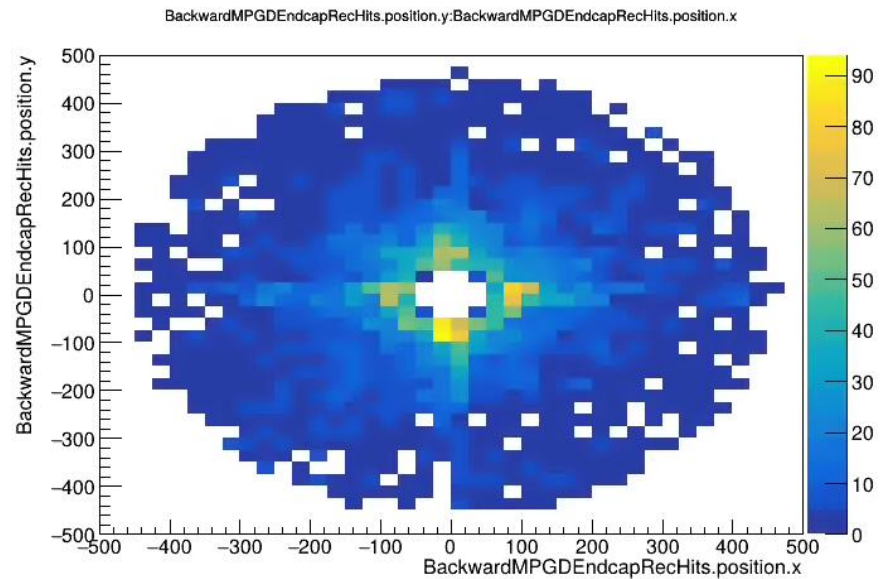
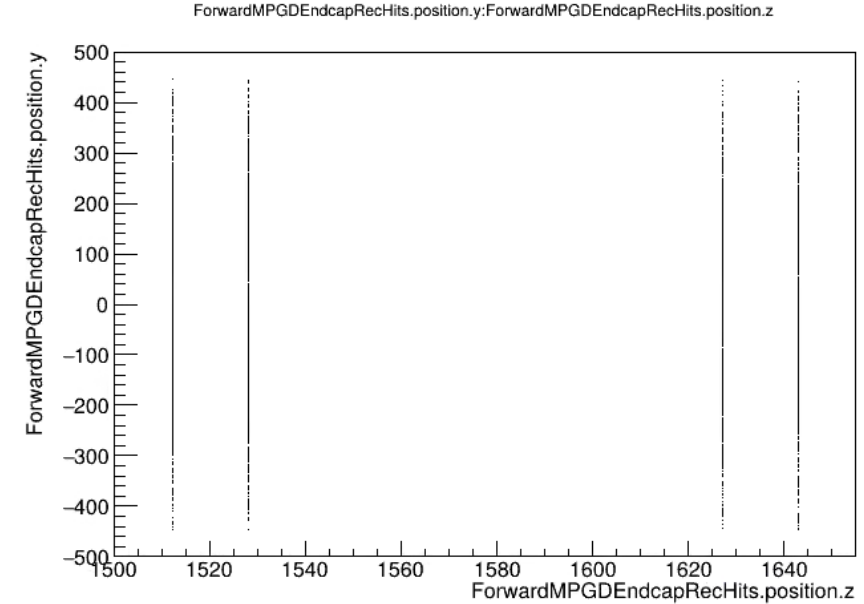
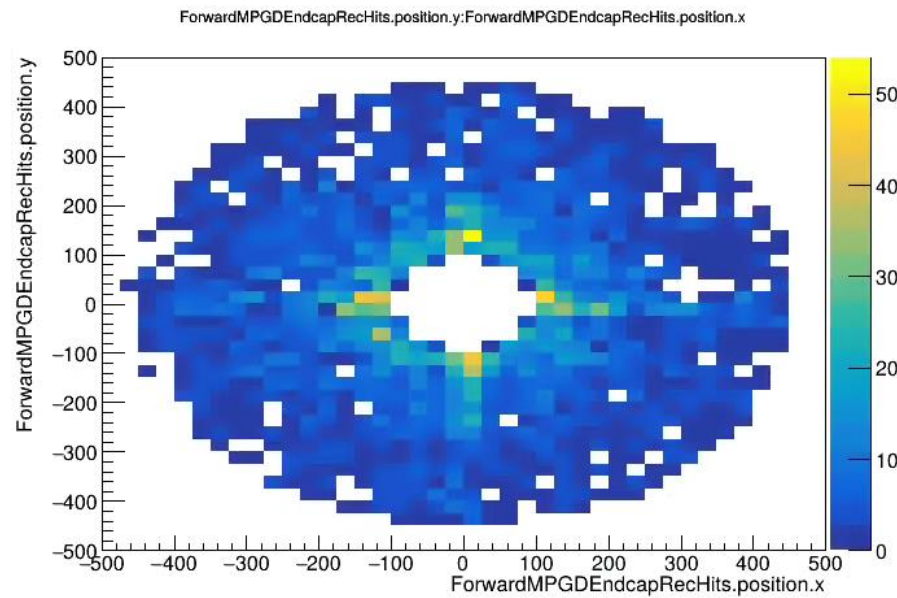
- Implement strip readout (waiting for more definitive geometry)

Backup



*Simulation studies from Matthew Posik

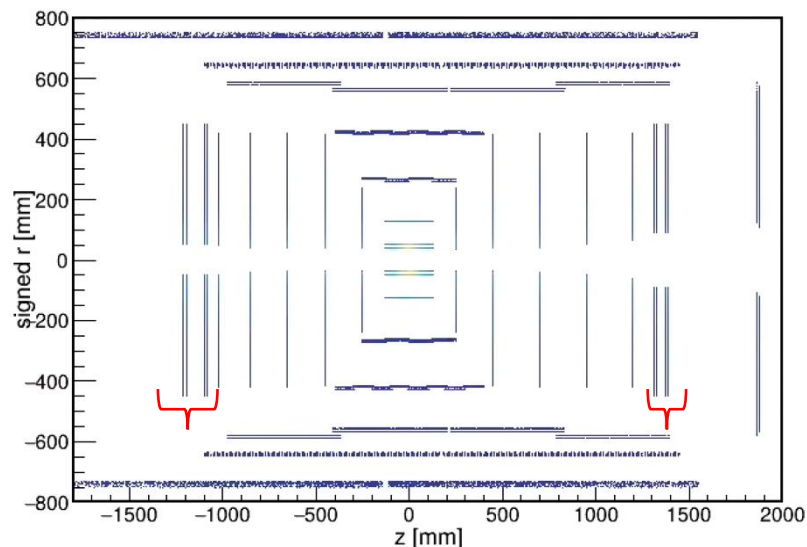




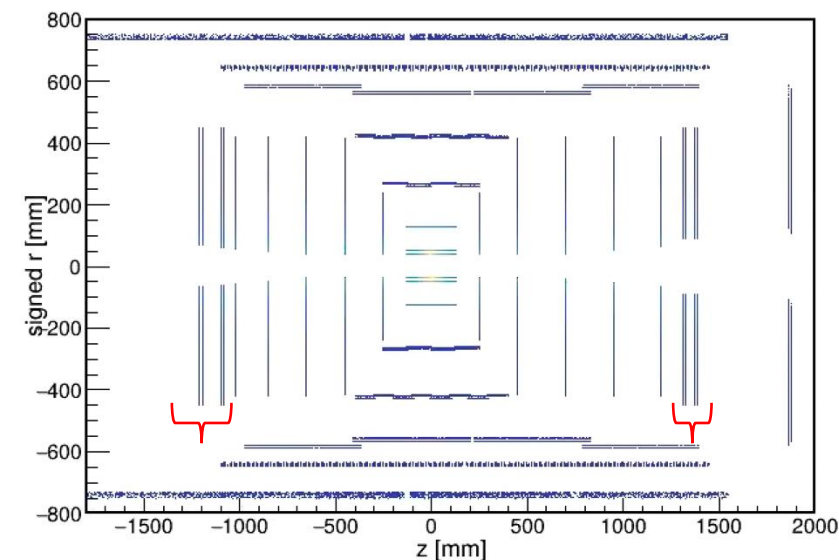
NOTE:

This work was made
with earlier version of
the geometry

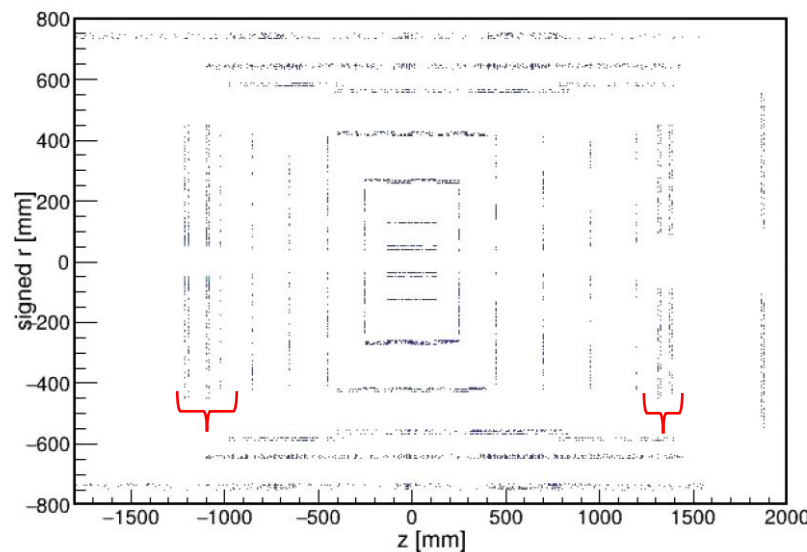
All associated digitized hits



Associated track measurement hits



Associated digitized hits missing from track



Associated track outlier hits

