SVT in (October) Simulations

Shujie Li – LBNL

(compiled and presented by ES)

TL; DR

SVT simulation geometry log

File Edit View Insert Format Data Tools Extensions Help

A14

CAD model change log

|	Detector subsystem	Design (date, source, filename)	Simplified CAD (date, source, filename)	Simulation Description (date, github PR)	Assignee	Status	Note
3	IB	2025.07	2025.07	https://github.com/eic/epic/pull/803	Shujie Li	Merged.	will be in 25.10 simulation. The cone between L0 and L2 may need more work on the cable distribution.
4	OB		2025.09	https://github.com/eic/epic/pull/933	Sam, Athanvan	Merged.	will be in 25.10 simulation.
5	Disks	LBL			Shujie	Paused. The current implementation of inner hole won't pass the latest volume overlap check.	
6	PST	Ben	2025.09	https://github.com/eic/epic/pull/961	Provakar/Shujie		The tube radius and length are updated. Waiting for some clarifications to move forward.
7	services	Ernst	calculation	https://github.com/eic/epic/pull/961	Provakar/Shujie	The total thickness in implemented as-is. Waiting for merge.	calculaton was done with r=50cm, which the previous cylinder has r=45cm, and the new PST design ahs r=54cm.
8	Cone	LBL					
9							

SVT in (October) simulations

- Past simulations used highly simplified detector descriptions, which do account for overall geometry and material,

- Paths to go directly from CAD into GEANT have been explored, but are not practical at this time,

- Concerted effort across SVT to improve the situation,
  Many thanks to all who contributed!

- Next few slides illustrate some of the improvements.

SVT Inner Barrel in ePIC simulation

Until ePIC 25.08:
- 128 box shape per layer to approximate the cylinder
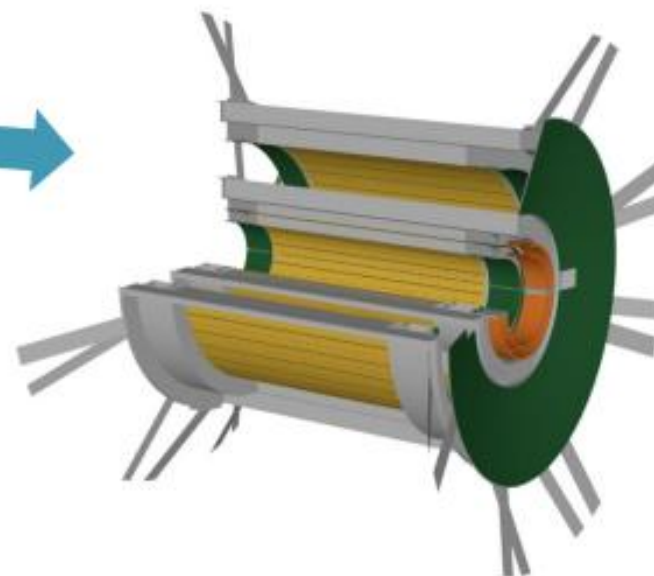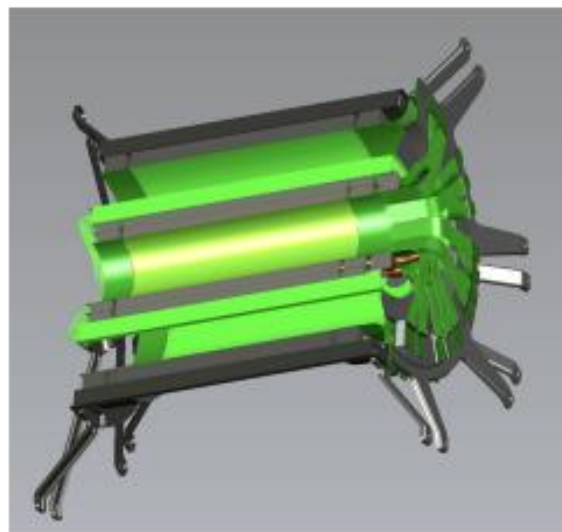- No RSU structure
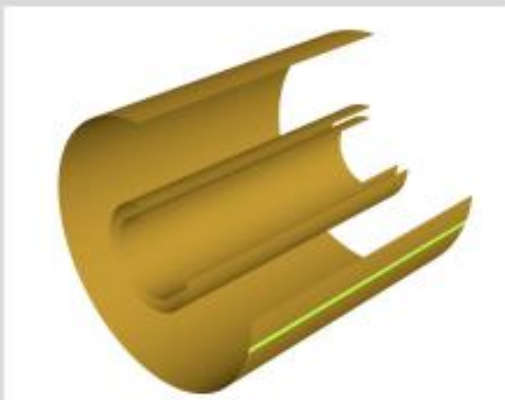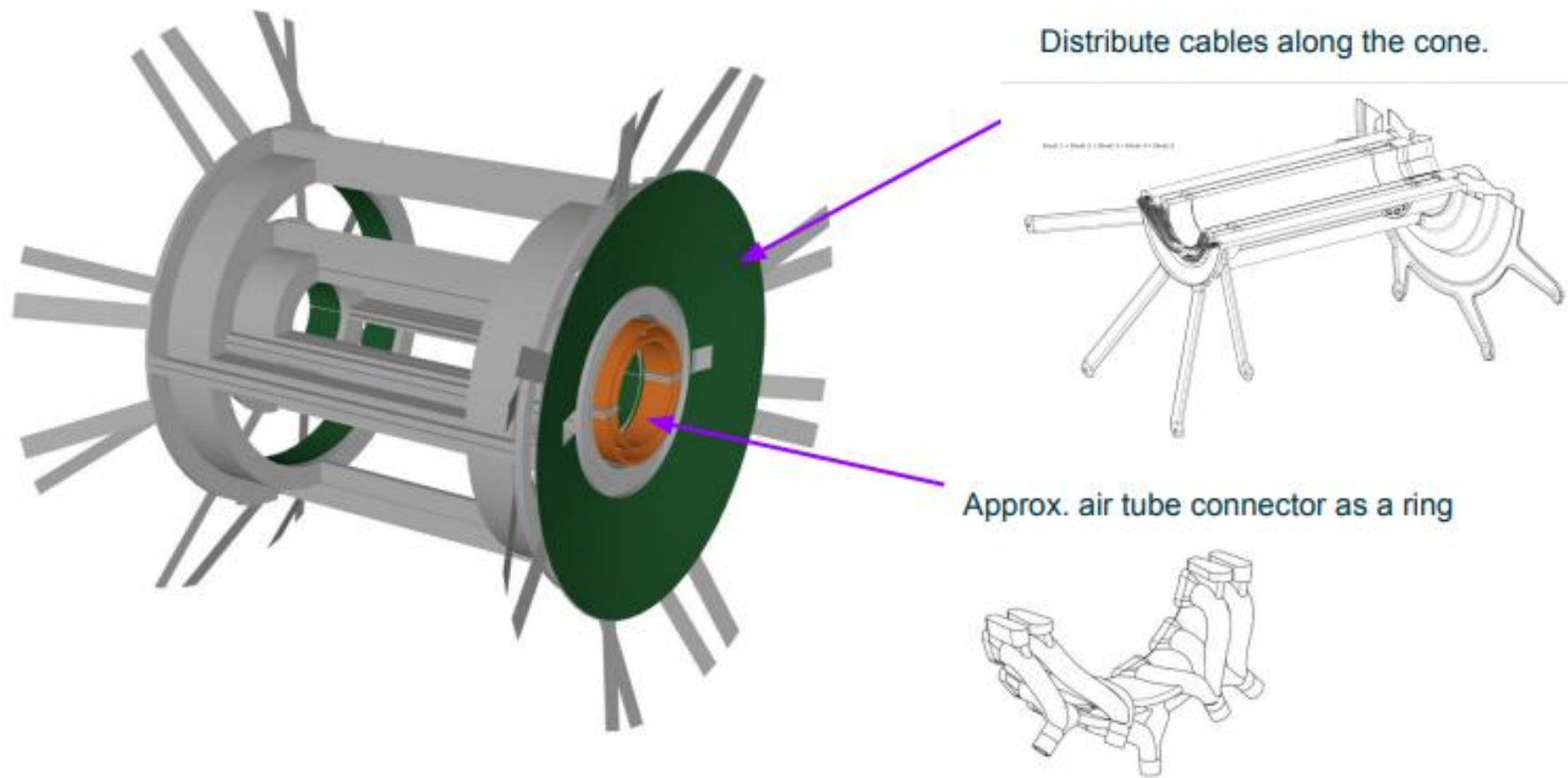

Anticipated for 25.10:
- Curved RSU sensor with inactive areas
- IB support structure and cables

Stp file of the design → simplified 2D CAD drawings → dd4hep geo description
Documents available at **PR803**

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See also: https://indico.bnl.gov/event/30061/

Rosario, Shujie

Build Mechanical structures with Simple TGeo Shapes

Distribute cables along the cone.

Approx. air tube connector as a ring

See also: https://indico.bnl.gov/event/30061/

Material Scan

- **From stp file → GDML**
  Courtesy of R.Turrisi
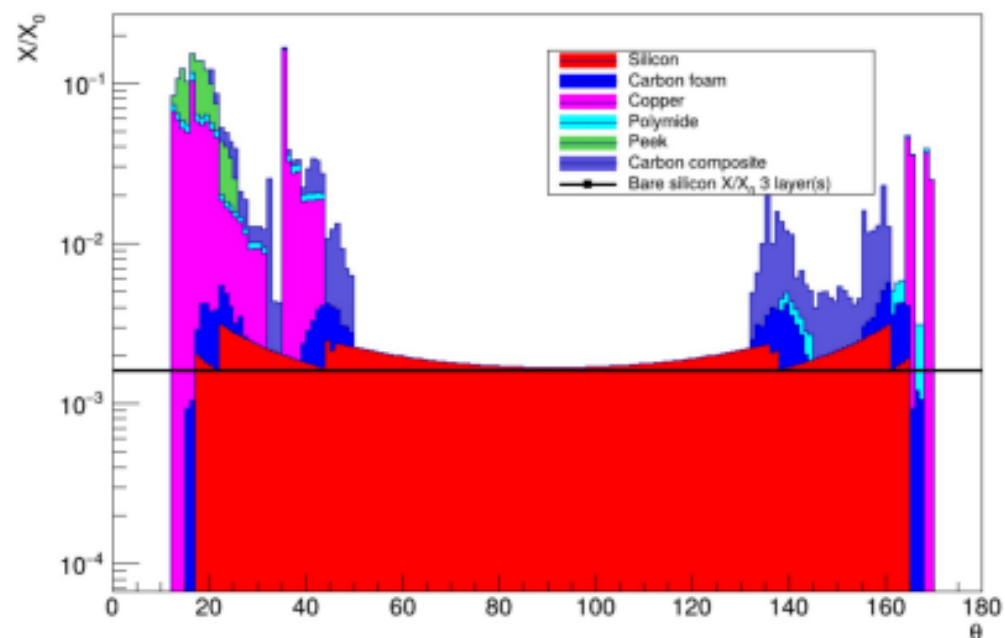
- **This simplified geometry for 28.10:**

Material budget, 10<φ<30

See also: https://indico.bnl.gov/event/30061/
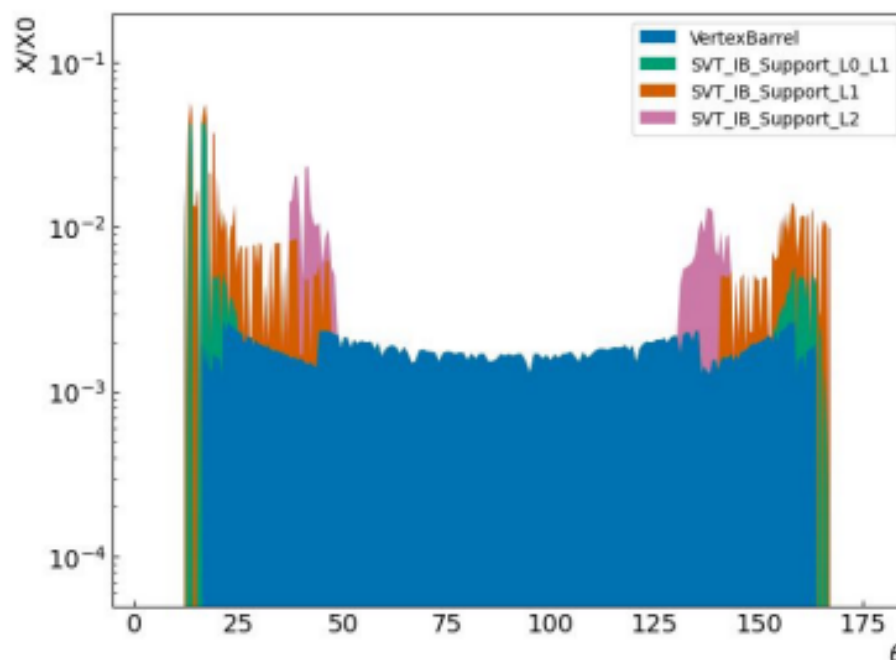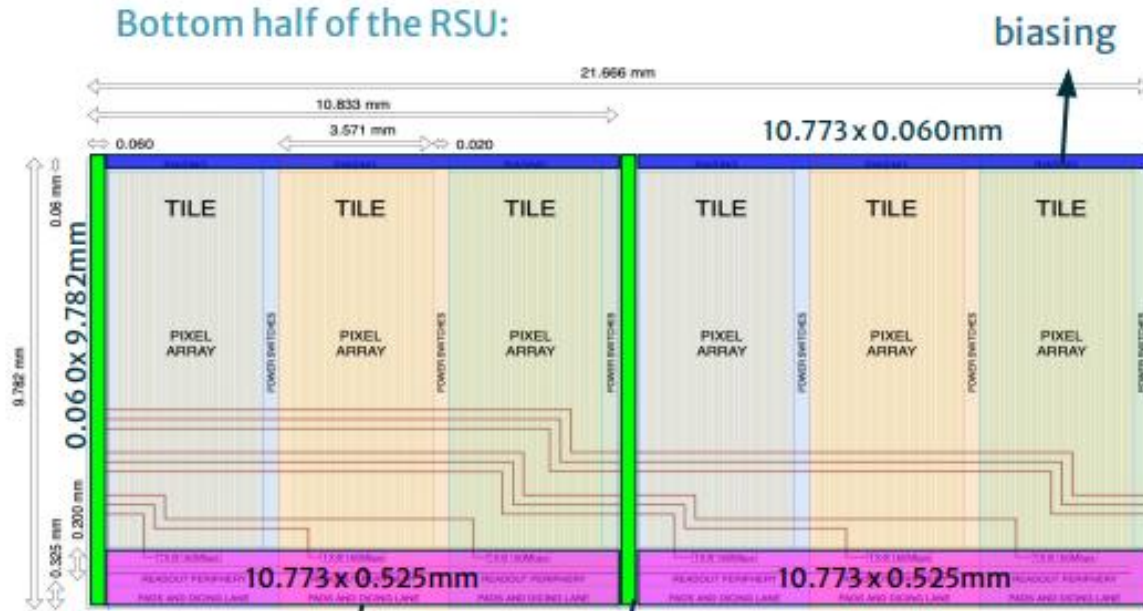
RSU in Simulation

Figure 3.37: Architecture of the bottom half sensor unit (not to scale).

Bottom half of the RSU:

biasing

readout&dicing (may shrink in the actual design)

backbone

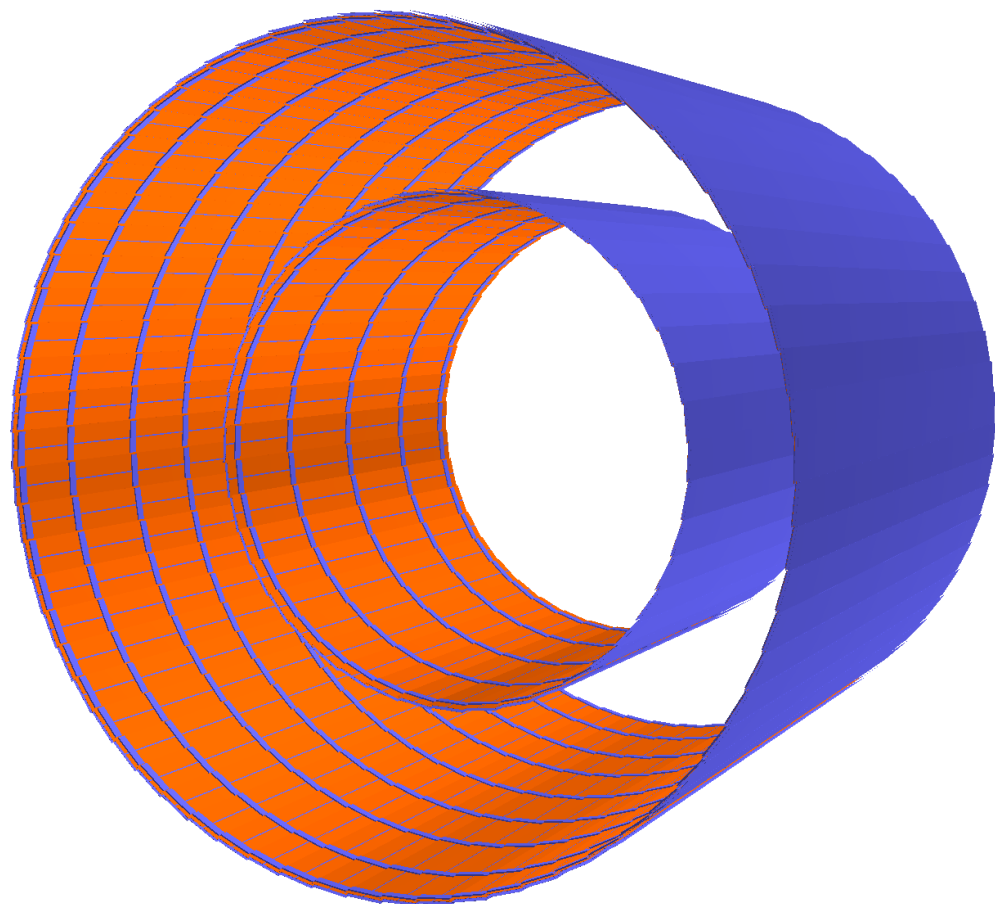**2x2 sections, 3 tiles/section:**
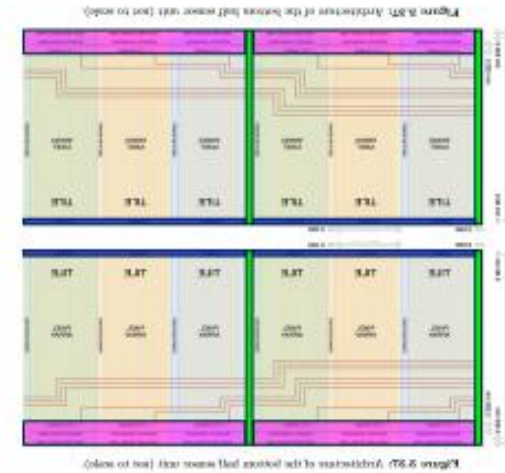
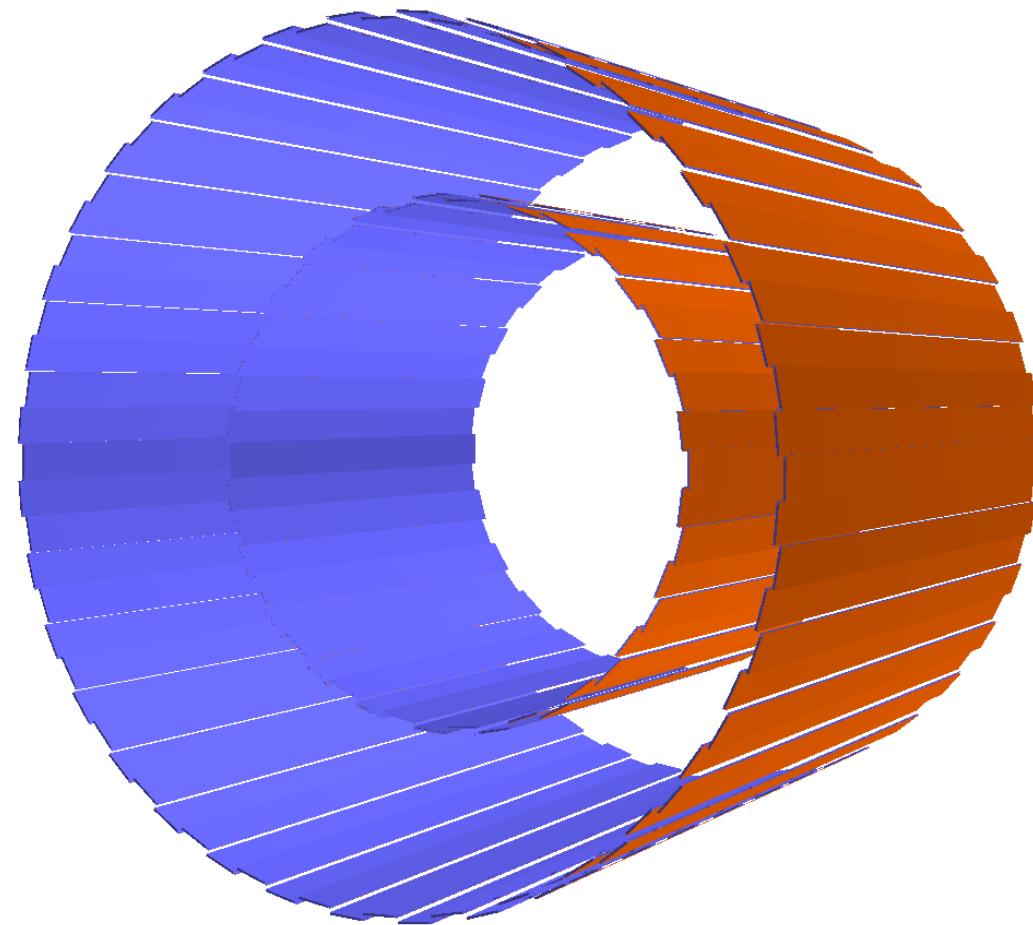**Curved RSU in simulation:**

Note: simulations now do account for insensitive sensor areas, however, they do not simulate e.g. the full readout chain,

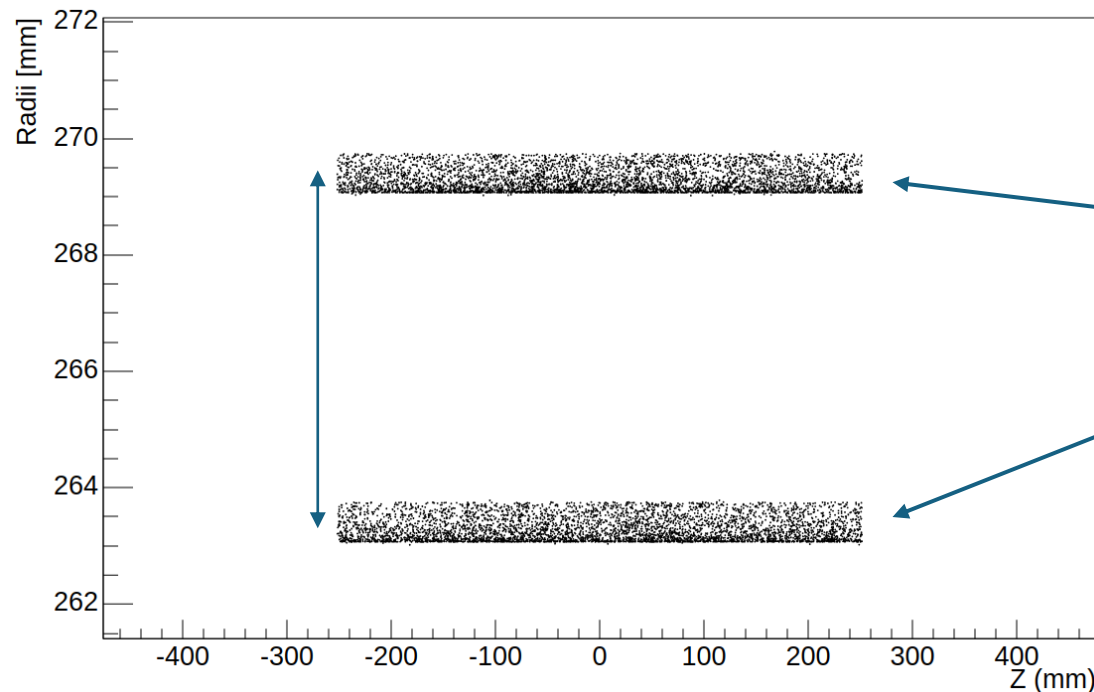Beam backgrounds are part of track finding and reconstruction studies, see e.g. https://indico.bnl.gov/event/29753/

Athavan, Sam

Comparison of flat_OB past to present

Silicon Barrel

Silicon Barrel - castellated

See also: https://indico.bnl.gov/event/30061/
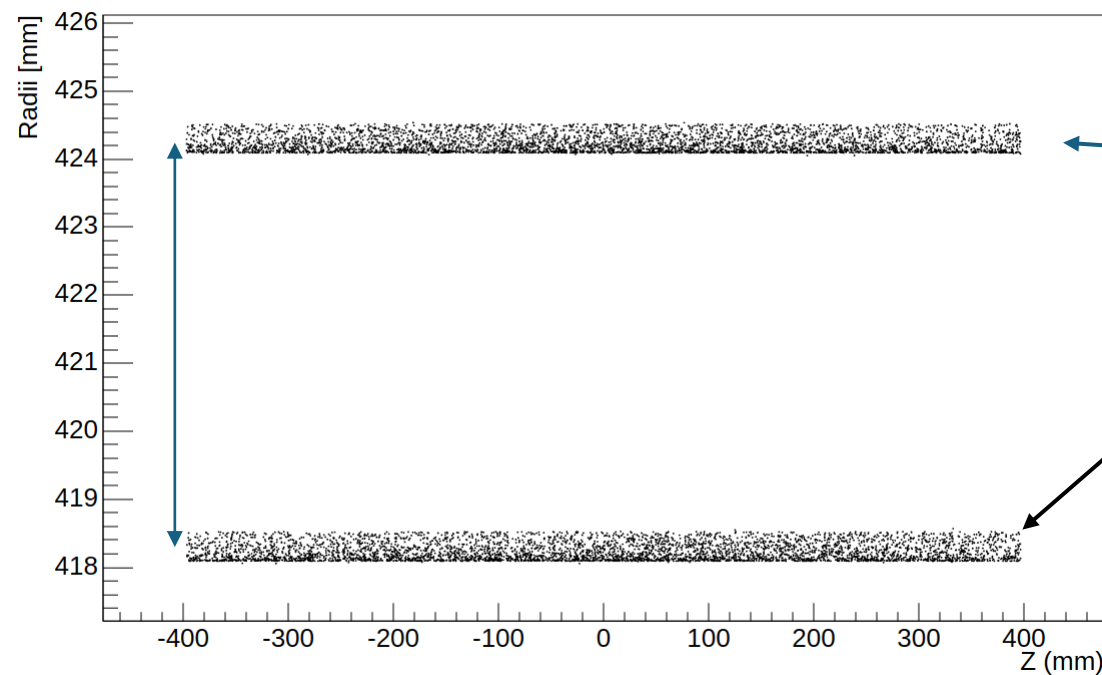
Athavan, Sam

Flat OB – L3
Top radius: ~269.1 to ~269.7mm

Bottom Radius: ~263.1 to ~263.7 mm

Difference: ~6mm

Flat OB – L4
Top radius: ~424.1to ~424.5mm

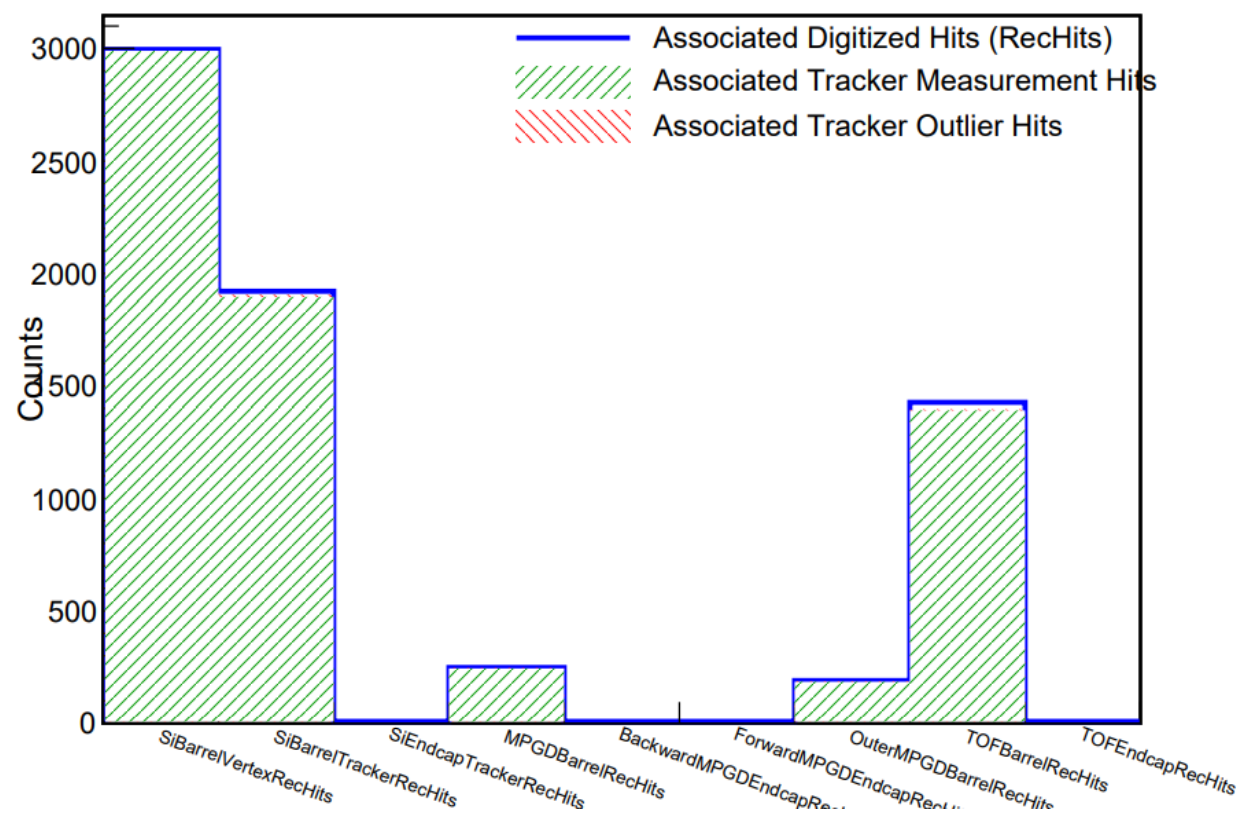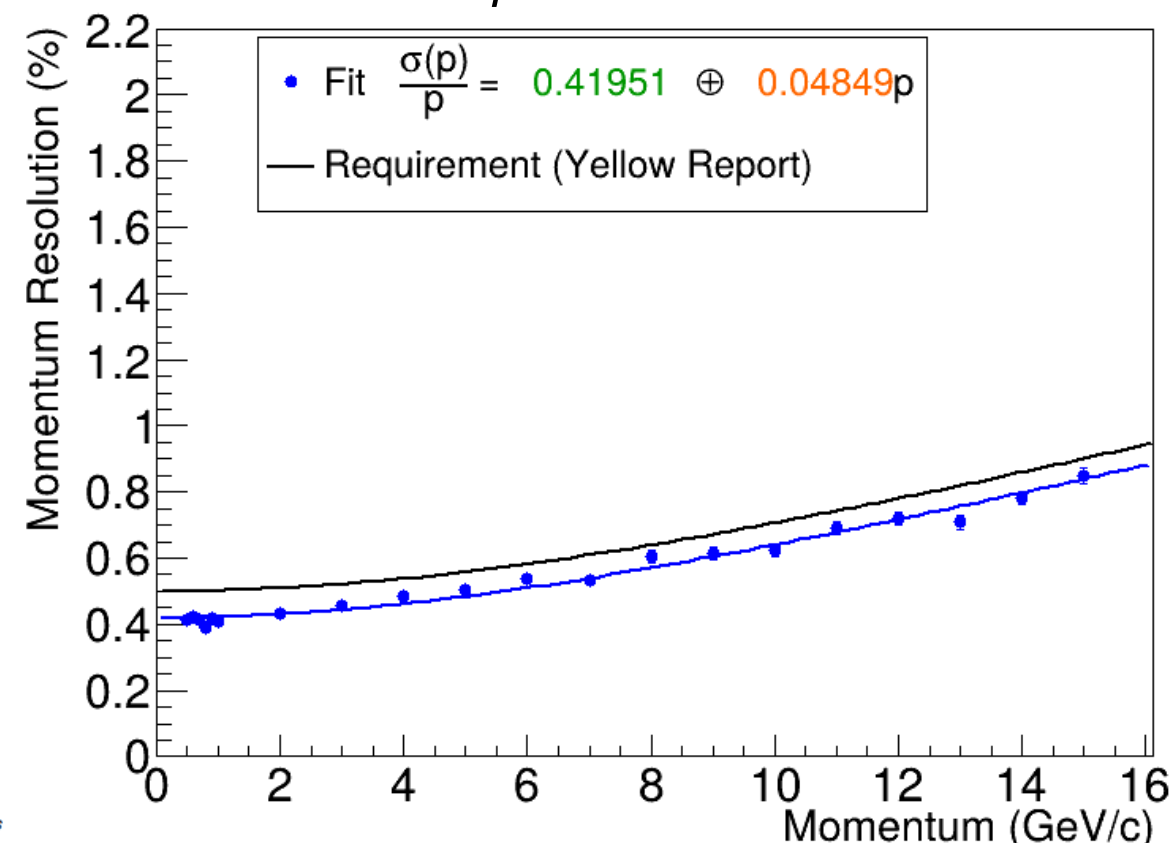Bottom Radius: ~418.1 to ~418.5 mm

Difference: ~6mm

See also: https://indico.bnl.gov/event/30061/

Athavan, Sam

Flat_OB Momentum resolution

$-0.88 \leq \eta \leq 0.88$

Distribution: η

See also: https://indico.bnl.gov/event/30061/

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SVT in (October) simulations

- Considerable progress over past simulations in terms of SVT detector description,

- Updated service estimates, as averaged material equivalents – not individual cables etc,

- Not in for October: recent changes in the length and configuration of the hadron arm – consistent across SVT, MPGD, and ToF

- Track finding and reconstruction simulations now incorporate beam backgrounds.