

ePIC SVT CAD Updates

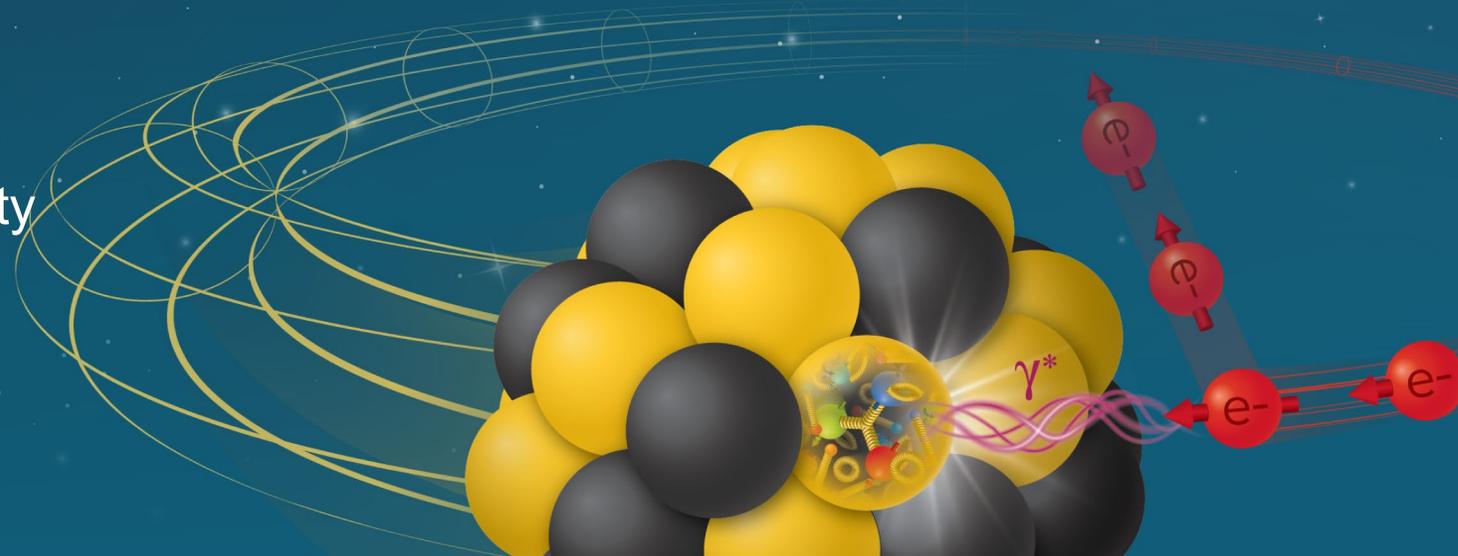
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Incremental Preliminary Design and Safety
Review of the ePIC MAPS Tracker

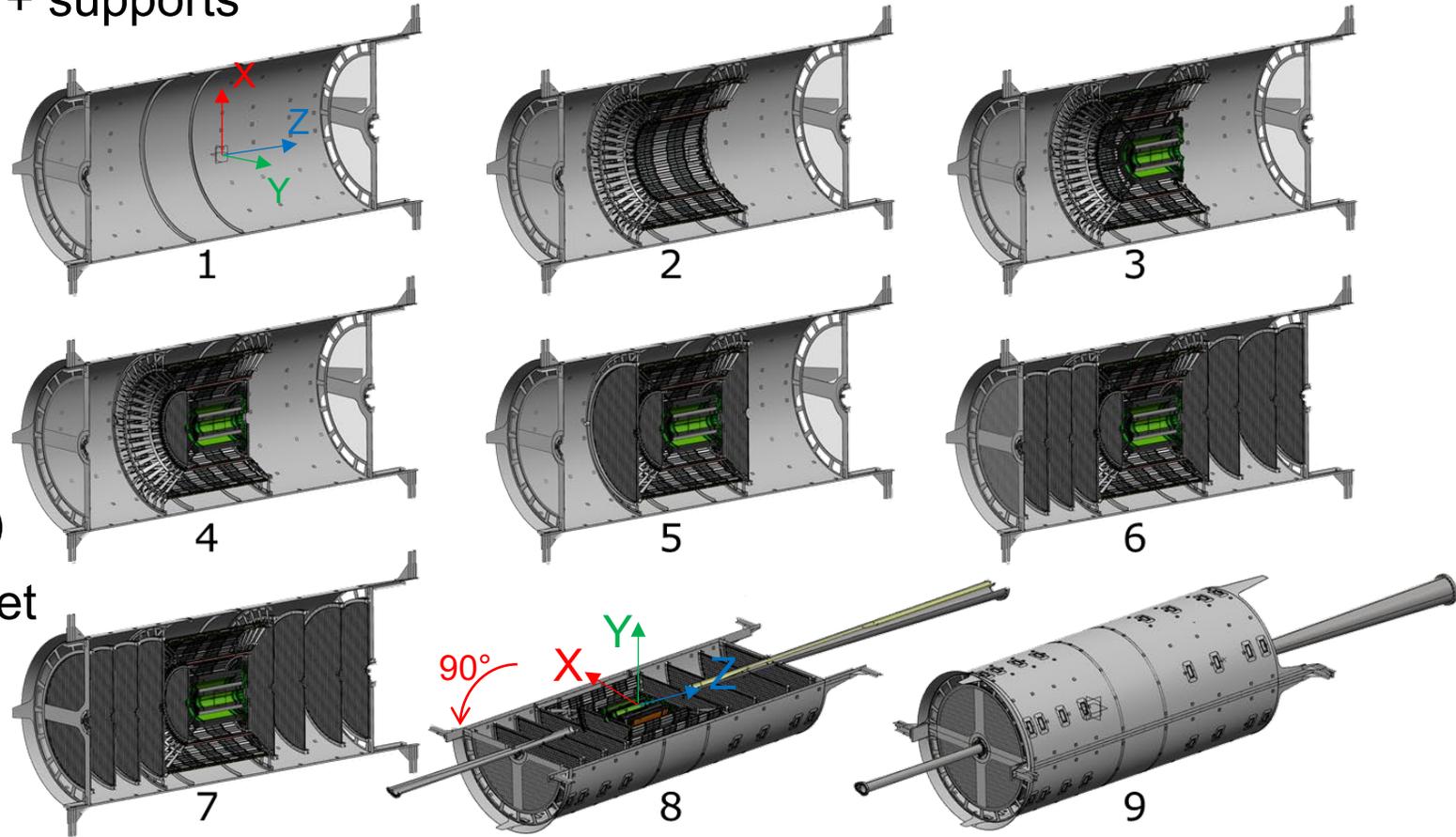
March <17>, 2026

Electron-Ion Collider



SVT Integration Sequence

1. PST Half Cylinder secured in assembly cradle, use PST external connection points to keep shape
2. Outer barrel + boards + services + supports
3. Inner barrel + b + s
4. Disk 0 (ED0 and HD0) + b + s
5. Disk 1 on each side + b + s
6. Disk 2 - 4 on each side + b + s
7. Thermal barrier at each end
8. Beampipe install and adjust (orientation could be rotated 90°)
9. Close SVT-PST package, add feet



SVT Masses and Loads

- Current estimate:
 - ~350kg of detector, services
 - ~30kg beampipe
 - ~30kg PST structure
 - ~150kg MPGD disk
- ~560kg Total Package

- Table in progress

https://docs.google.com/spreadsheets/d/1_NVPdqMuDmdeh3bQFD3ZC-UBsdtXw9STw_EMXZwGQMA/edit?usp=sharing

Subsystem	Object	Mass (kg)	Equiv Force (N)	Source
Disks	ED0	2.00	19.62	Ben estimate
Disks	ED1	3.00	29.43	Ben estimate
Disks	ED2	3.00	29.43	Ben estimate
Disks	ED3	3.00	29.43	Ben estimate
Disks	ED4	3.00	29.43	Ben estimate
Disks	HD0	2.00	19.62	Ben estimate
Disks	HD1	3.00	29.43	Ben estimate
Disks	HD2	3.00	29.43	Ben estimate
Disks	HD3	3.00	29.43	Ben estimate
Disks	HD4	3.00	29.43	Ben estimate
Inner Barrel	L0	0.43	4.26	Padova estimate
Inner Barrel	L1	0.65	6.41	"
Inner Barrel	L2	0.79	7.71	"
Outer Barrel	L3	2.50	24.53	Adam notes
Outer Barrel	L4	4.00	39.24	Adam notes
DETECTOR STRUCTURES TOTAL		36.37	356.82	
Inner Barrel	Services in PST	20.00	196.20	Ben estimate
Outer Barrel	Services in PST	90.00	882.90	Ben estimate
Disks	Services in PST	180.00	1,765.80	Ben estimate
Inner Barrel	RDO, Cards	5.00	49.05	Ben estimate
Outer Barrel	RDO, Cards	5.00	49.05	Ben estimate
Disks	RDO, Cards	10.00	98.10	Ben estimate
SERVICES TOTAL		310.00	3,041.10	
Air Inlets		5.00	49.05	Ben estimate
Air Outlets		5.00	49.05	Ben estimate
Beampipe		center only	30.00	294.30CAD with SS 304 and beryllium
PST	Cylinder	24.06	236.00	CAD based on area
PST	Feet (x4)	4.60	45.13	CAD based on area
PST	End plates/supports	2.14	21.99	CAD based on area
PST	joint plates	1.07	10.49	CAD based on area
PST TOTAL		31.86	312.59	
MPGD Disk	MPGD disk E	75.00	735.75	verbal, Rosario
MPGD Disk	MPGD disk H	75.00	735.75	verbal, Rosario
SVT Total		418.24	932.63	
SVT +MPGD Total		568.24	5,574.41	

Sub-Assembly Design Status

Inner Barrel

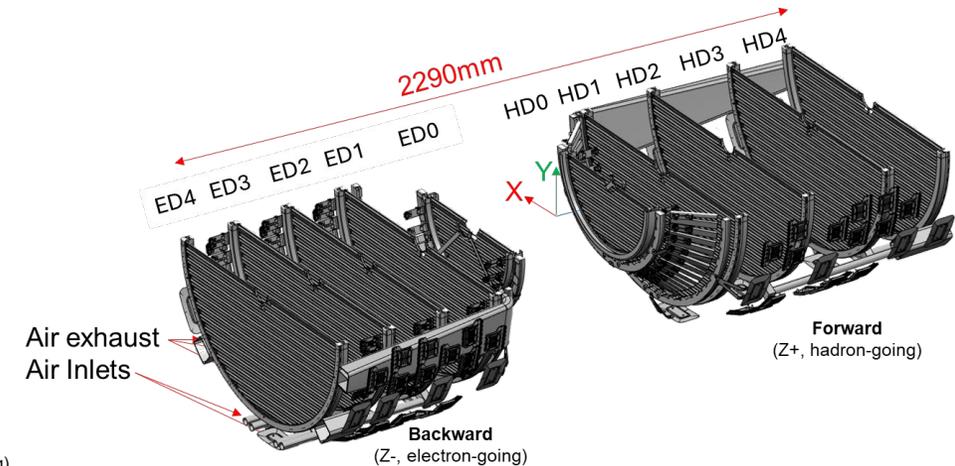
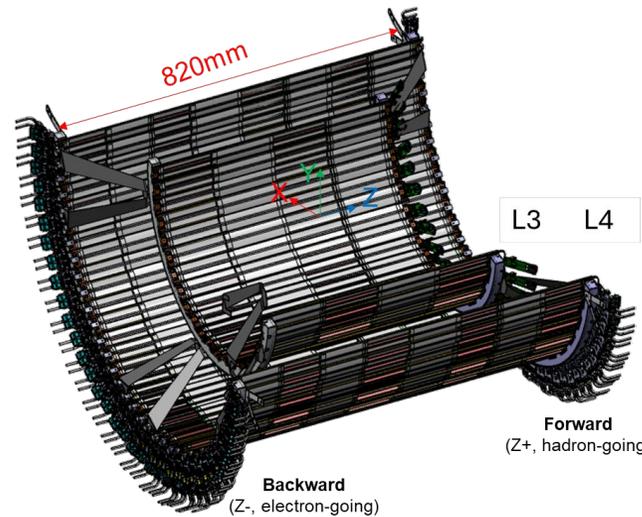
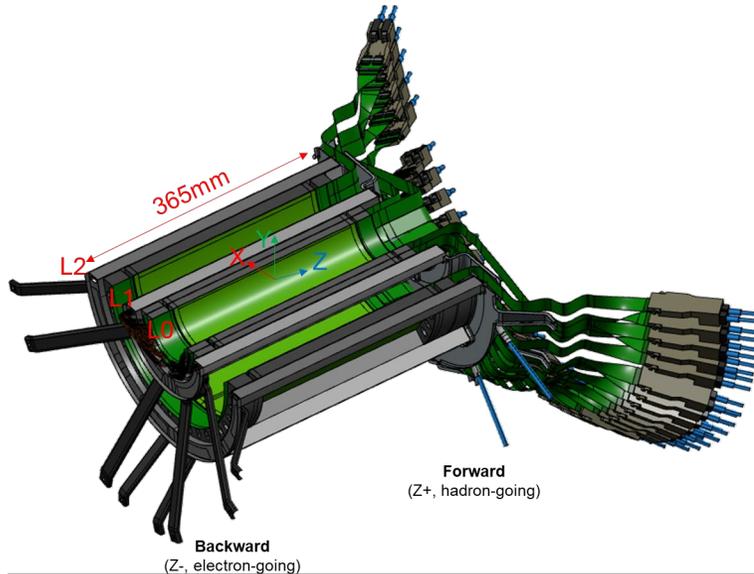
- Points of Contact
 - INFN - Rosario Turisi, Domenico Colella, Domenico Elia
- Mass Estimate ~2kg (no services)
- Model from Mar 2026

Outer Barrel

- Points of Contact
 - UK (detector, services, controls) – Georg Viehhauser, Adam Huddart, James Glover
 - LBL (support cones) – Joe Silber, Elaine Buron
- Mass Estimate ~7kg (no services)
- Model from Jan 2026

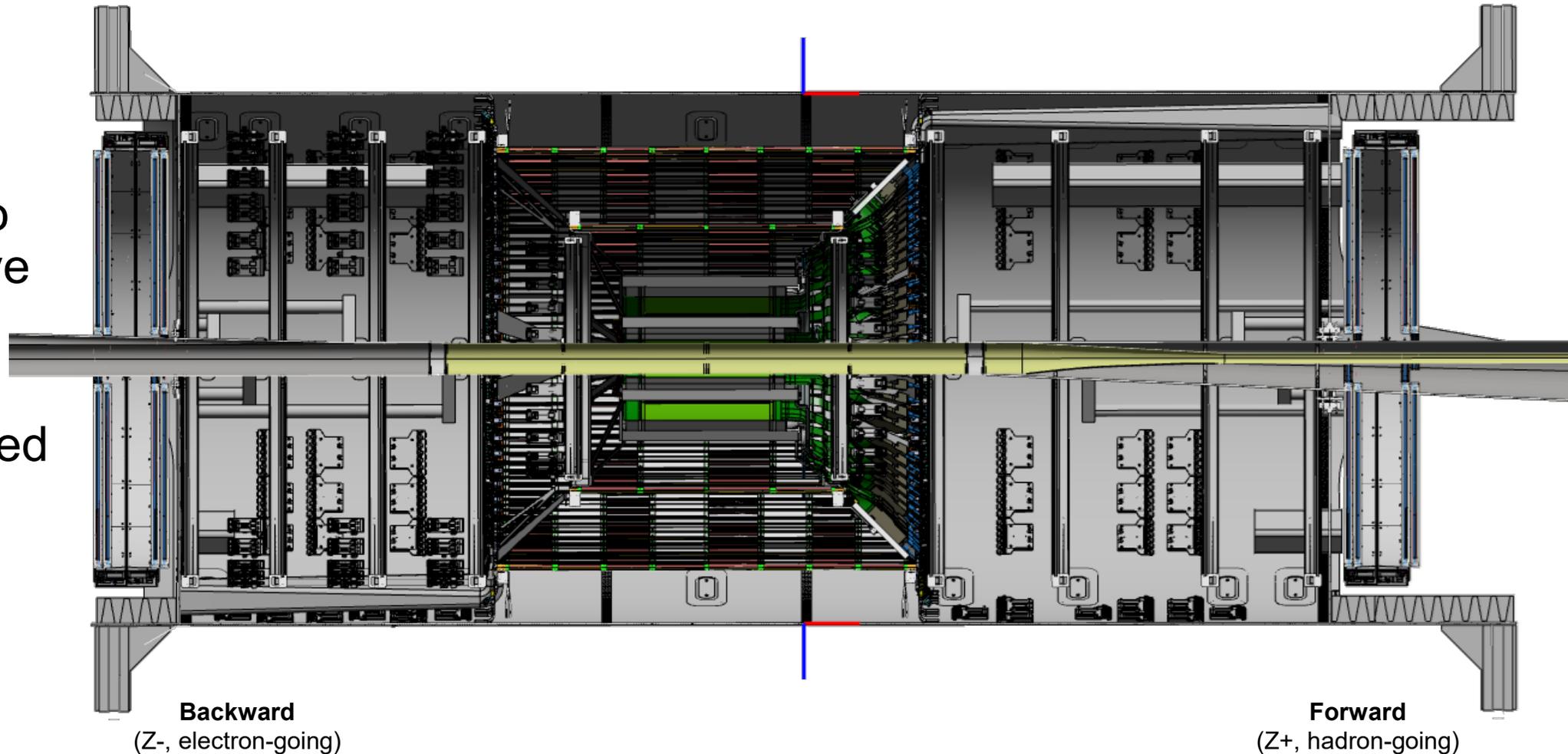
Disks

- Points of Contact
 - LBL - Nicole Apadula, Joe Silber, Elaine Buron
- Mass Estimate ~28kg (no services)
- Model from Dec 2025



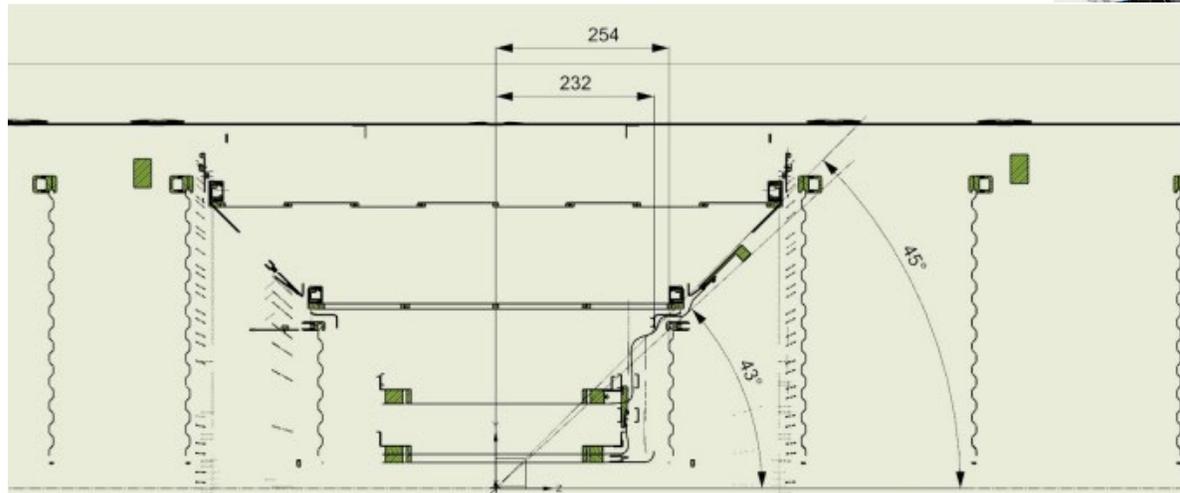
Latest Assembly X-Z Plane View

- Inner Barrel has most complete model
- Uploaded to Google Drive for WP4/6 group
- Just uploaded to vault



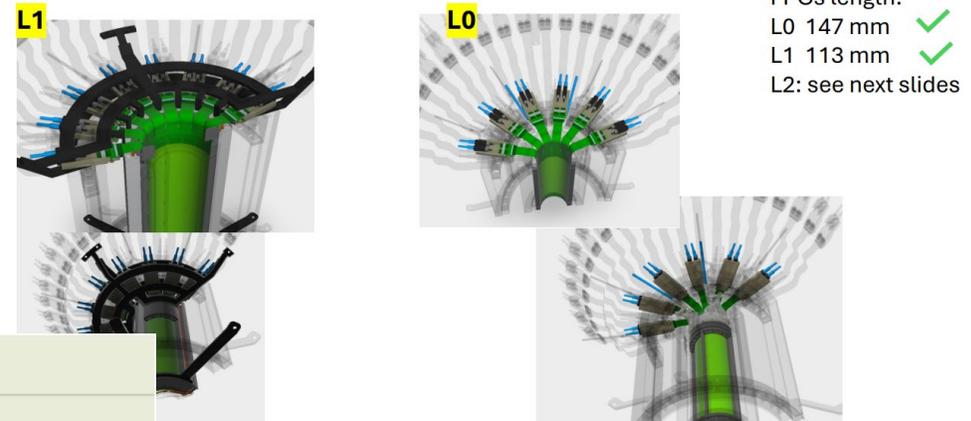
Inner Barrel Services and Electronics

- INFN actively working on FPC and board placement
 - Minimize shadow on detector
 - Keep FPC length $\leq 250\text{mm}$ until demonstrated otherwise
- Ongoing discussion in WP4/6 group

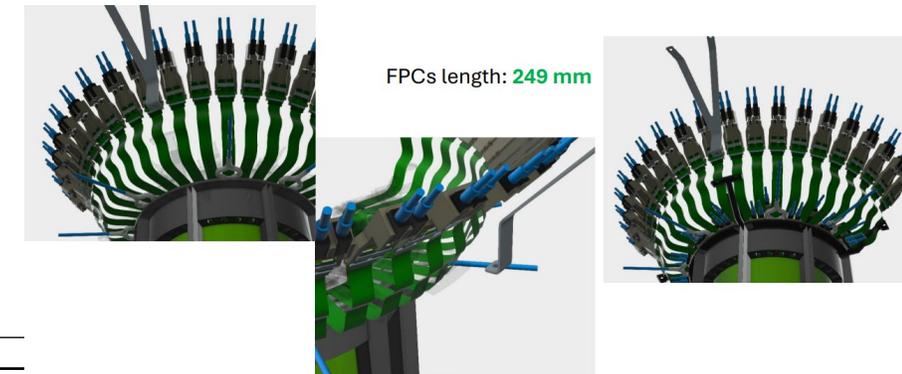


- Preliminary images from Rosario Turisi
 - <https://indico.bnl.gov/event/31233/contributions/118764/attachments/68506/117686/IB-design-update-Feb25-2026.pdf>

New layout of SIB boards

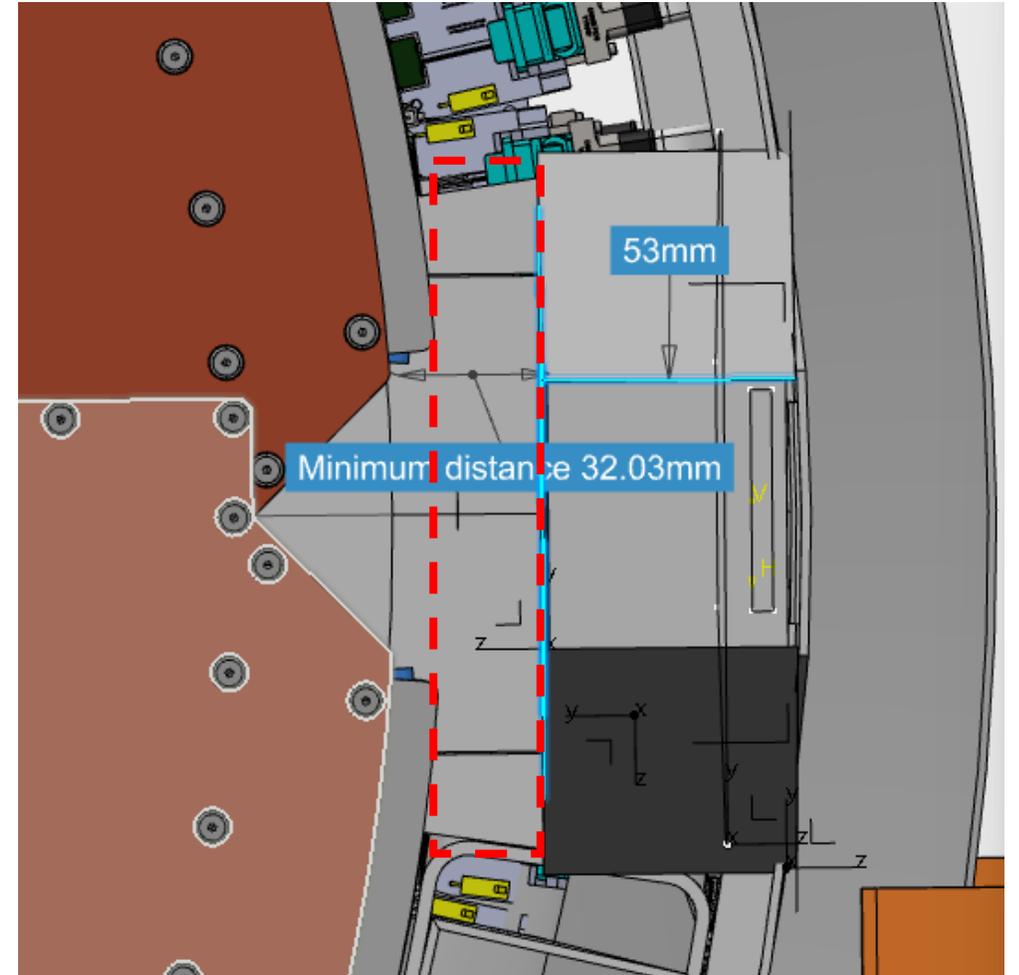


New positions for L2 SIBs – take 3



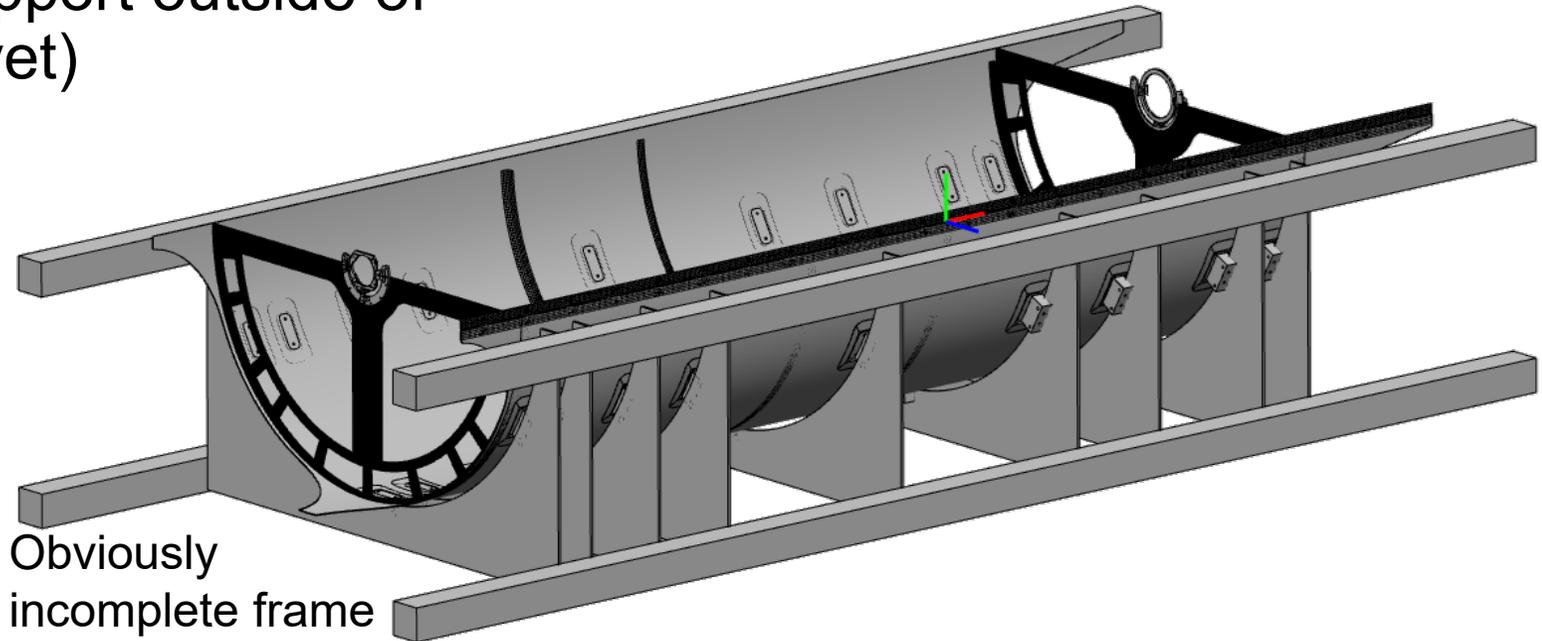
MPGD Disk Services Exit

- Communications with Stefano Gramigna to discuss space for MPGD disk services exit
- Their services “join” SVT services outward to and along GST



Preliminary Integration Support Cradle

- Provide rigid support on outside of PST
- Connect at or near disk mounting points
 - Even positioning them during bonding to PST shell
- Allow joining of two halves
- Allow additional services support outside of PST volume (not sketched yet)



Next Steps (before CD2)

Design Updates

- PST, refine:
 - Detector attachments to PST
 - End PST “fingers” to minimize twist/sag
 - Connection to GST, motion and adjustment
 - Beampipe support/alignment mechanism
- Services, create:
 - More detailed layout of services and boards
 - Support trays from PST to GST and out
 - Attachment points to PST and guides
- Assembly / integration cradle design
 - Ultra rigid, extruded aluminum (or similar) with CNC critical interface features
 - Support PST half cylinders outside, near designed mounting points
 - Extensions to support beampipe ends

Finite Element Analysis

- Examine feet stresses in more detail
- Simulate feet with hinge about Z and slide in X
- Simulate half cylinder assemblies in new cradle during
 - Installation of detectors and services
 - Rotation and assembly of two halves

Information Refinement Continues

- Services and paths for each detector
- Boards (CB, FIB, SCB) for each detector
- Mass estimates for each component