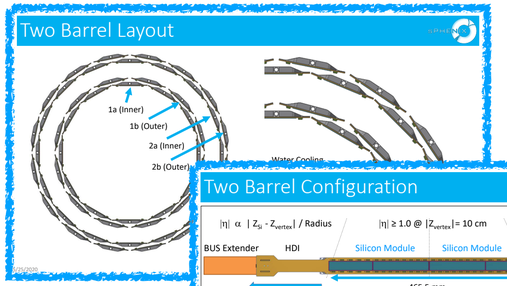
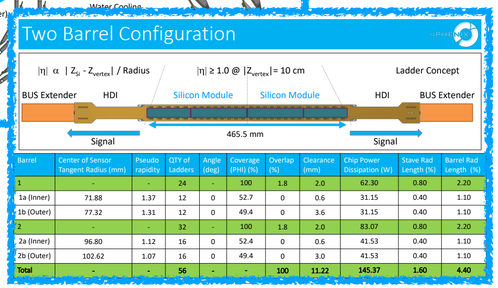
Updated Description of INTT in Geant4

Genki Nukazuka (RBRC), INTT Bi-weekly meeting, 17/June/2020

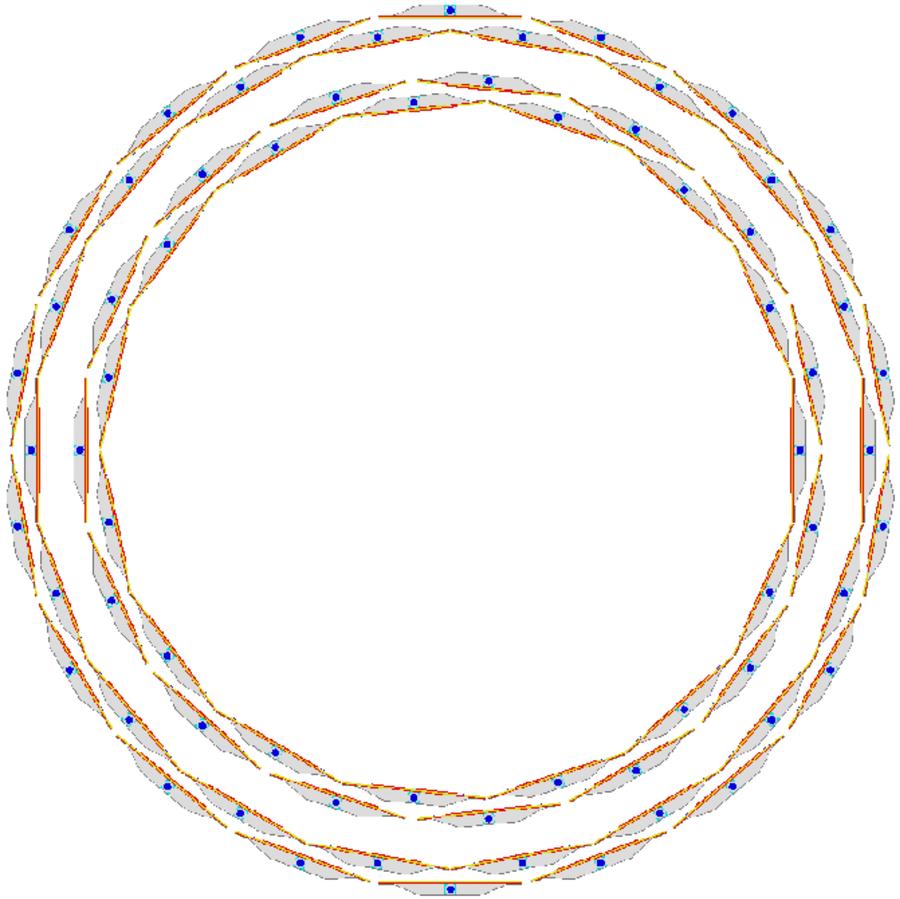
Layout updated

Dan provided the information!→

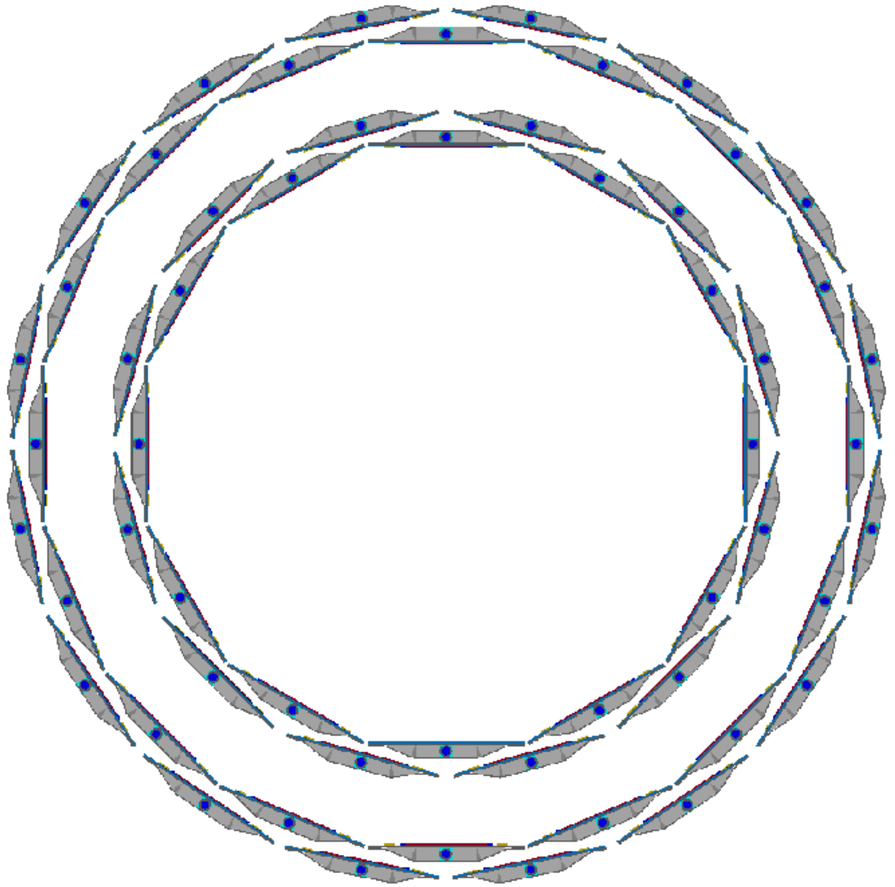




Barrel	Center of Sensor Tangent Radius (mm)	Pseudo rapidity	QTY of Ladders	Angle (deg)	Coverage (PHI) (%)	Overlap (%)	Clearance (mm)	Chip Power Dissipation (W)	Stave Rad Length (%)	Barrel Rad Length (%)
1			24	-	100	1.8	2.0	62.30	0.80	2.20
1a (Inner)	71.88	1.37	12	0	52.7	0	0.6	31.15	0.40	1.10
1b (Outer)	77.32	1.31	12	0	49.4	0	3.6	31.15	0.40	1.10
2	-	-	32	-	100	1.8	2.0	83.07	0.80	2.20
2a (Inner)	96.80	1.12	16	0	52.4	0	0.6	41.53	0.40	1.10
2b (Outer)	102.62	1.07	16	0	49.4	0	3.0	41.53	0.40	1.10
Total	-	-	**56**	-	-	**100**	**11.22**	**145.37**	**1.60**	**4.40**



Model in the current repository



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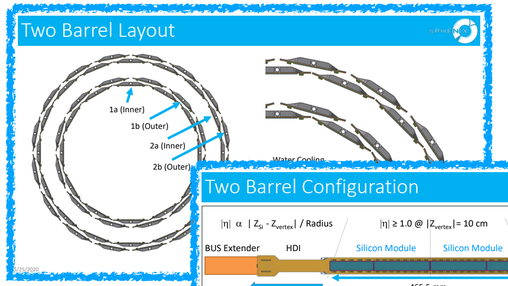

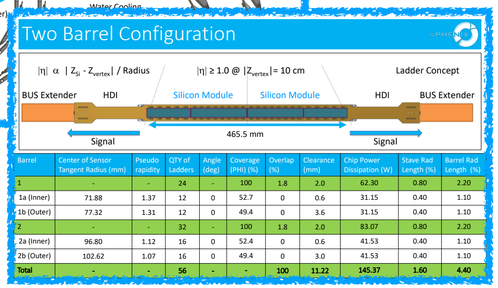

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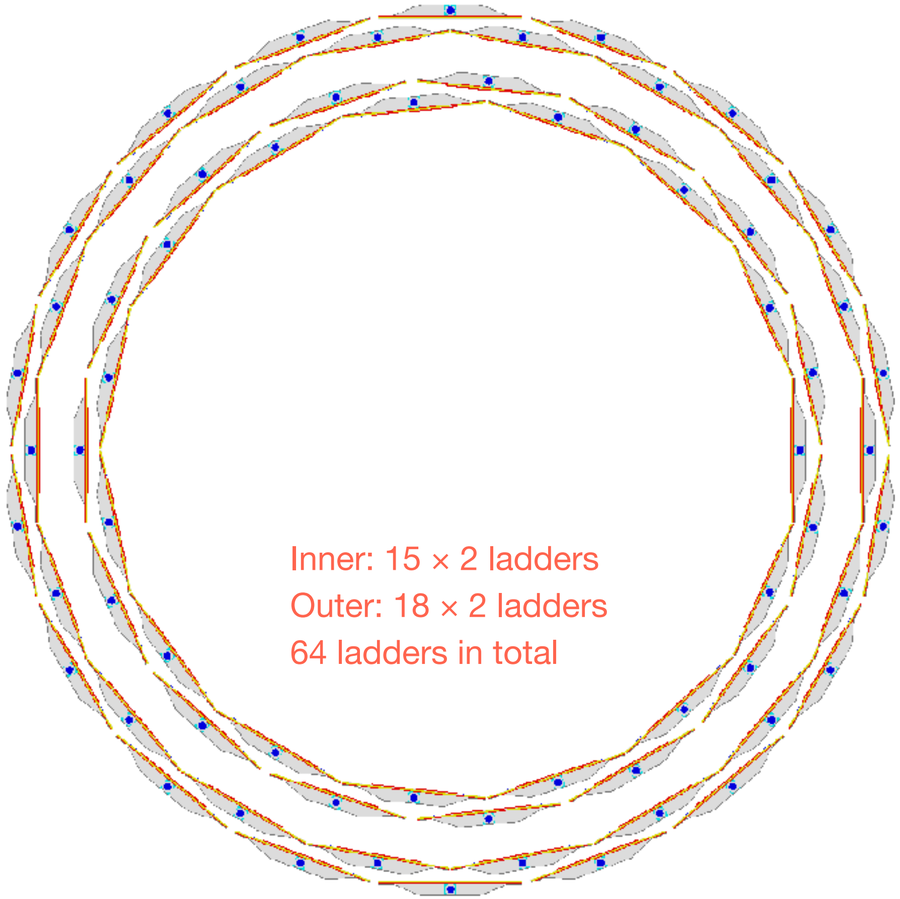

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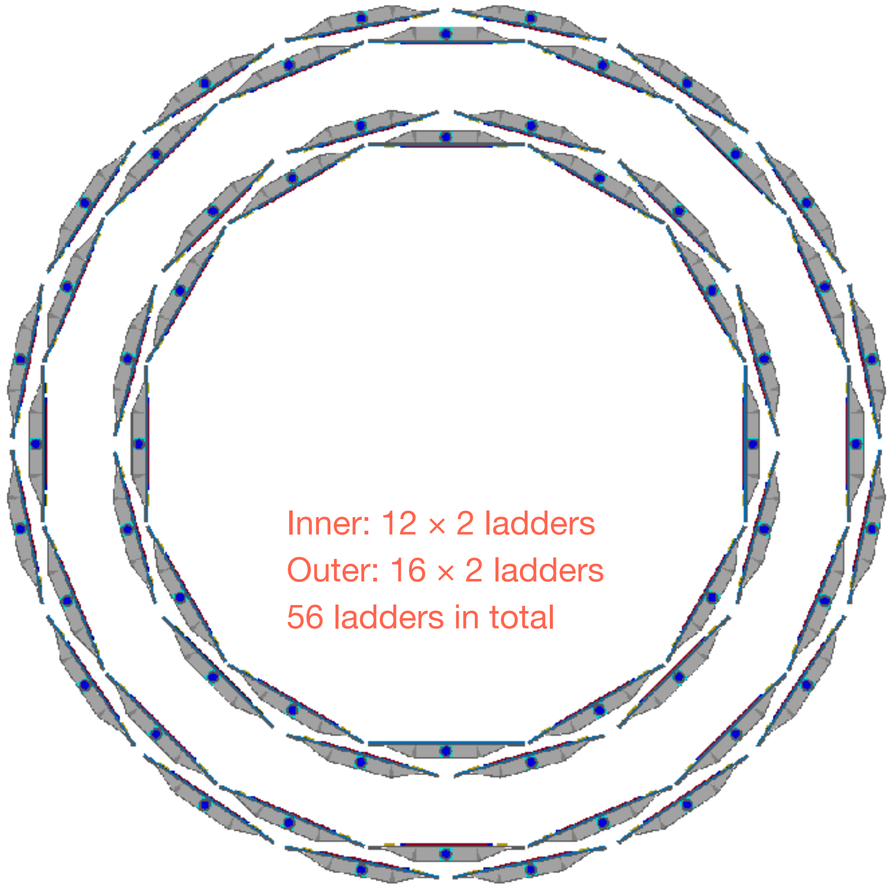

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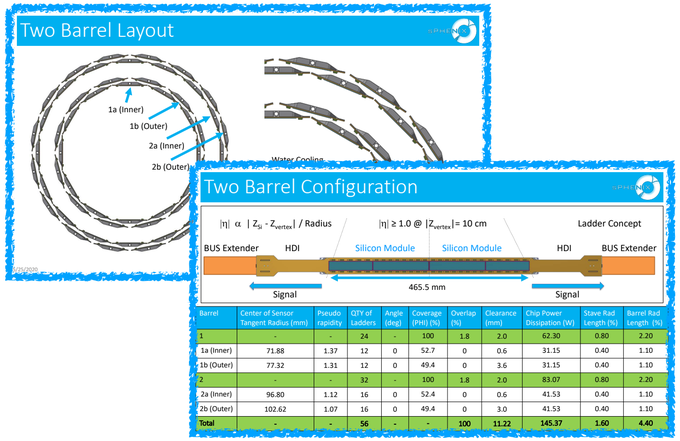

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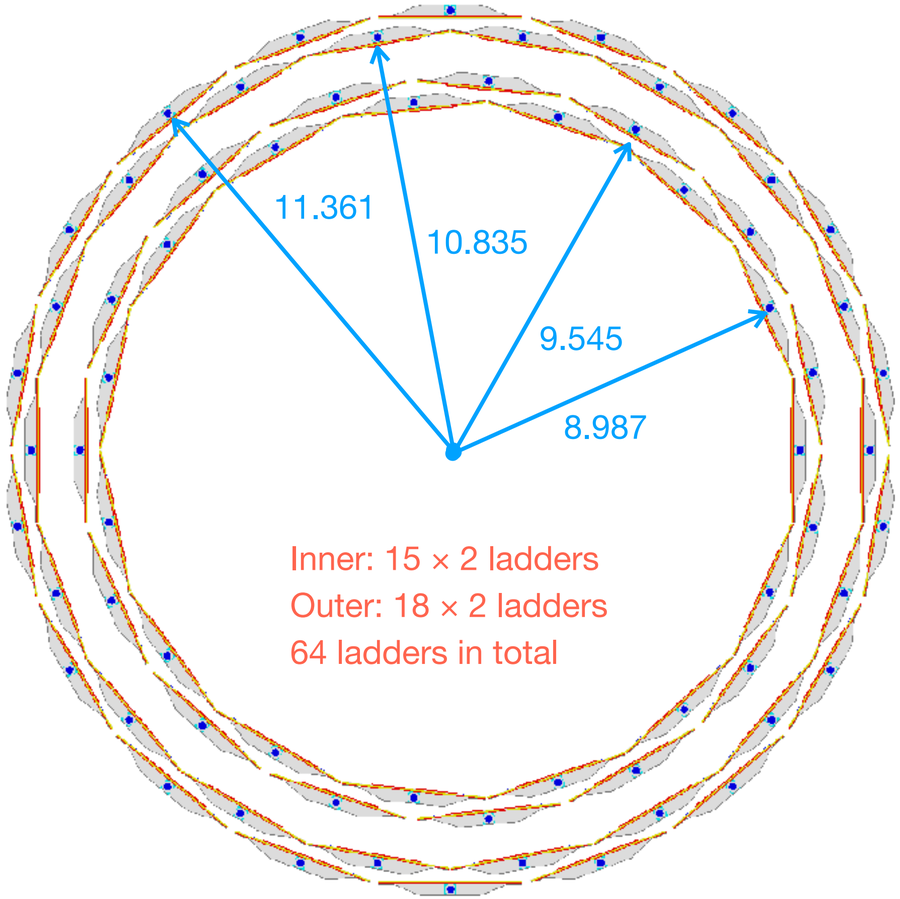
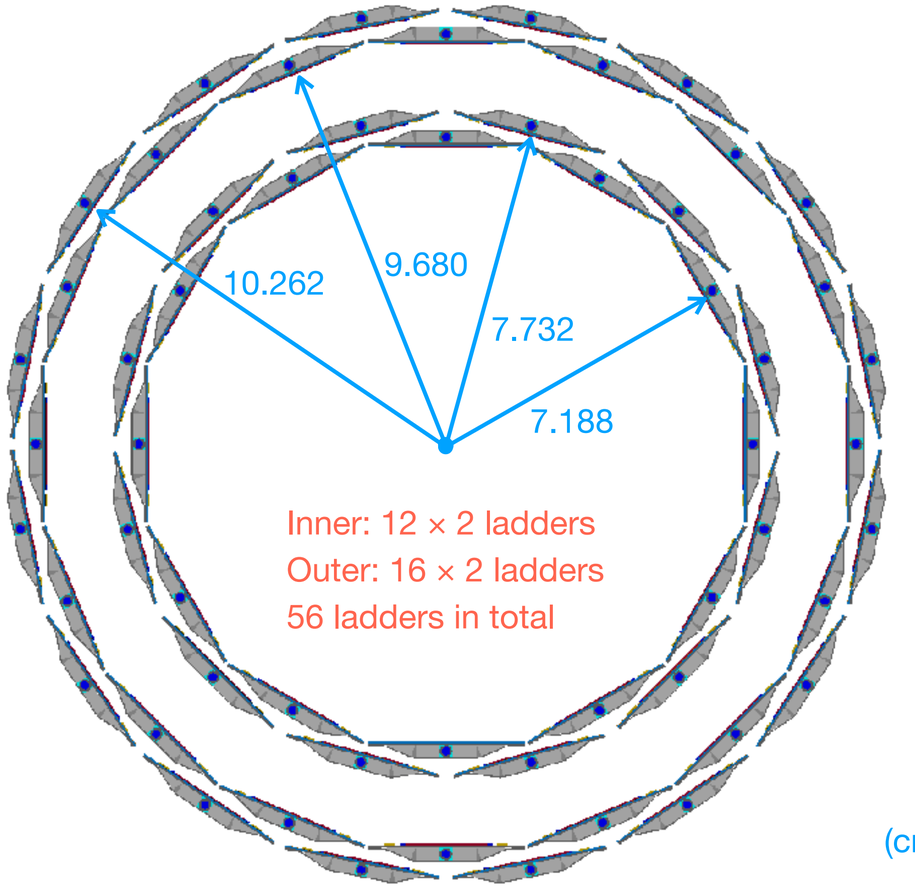


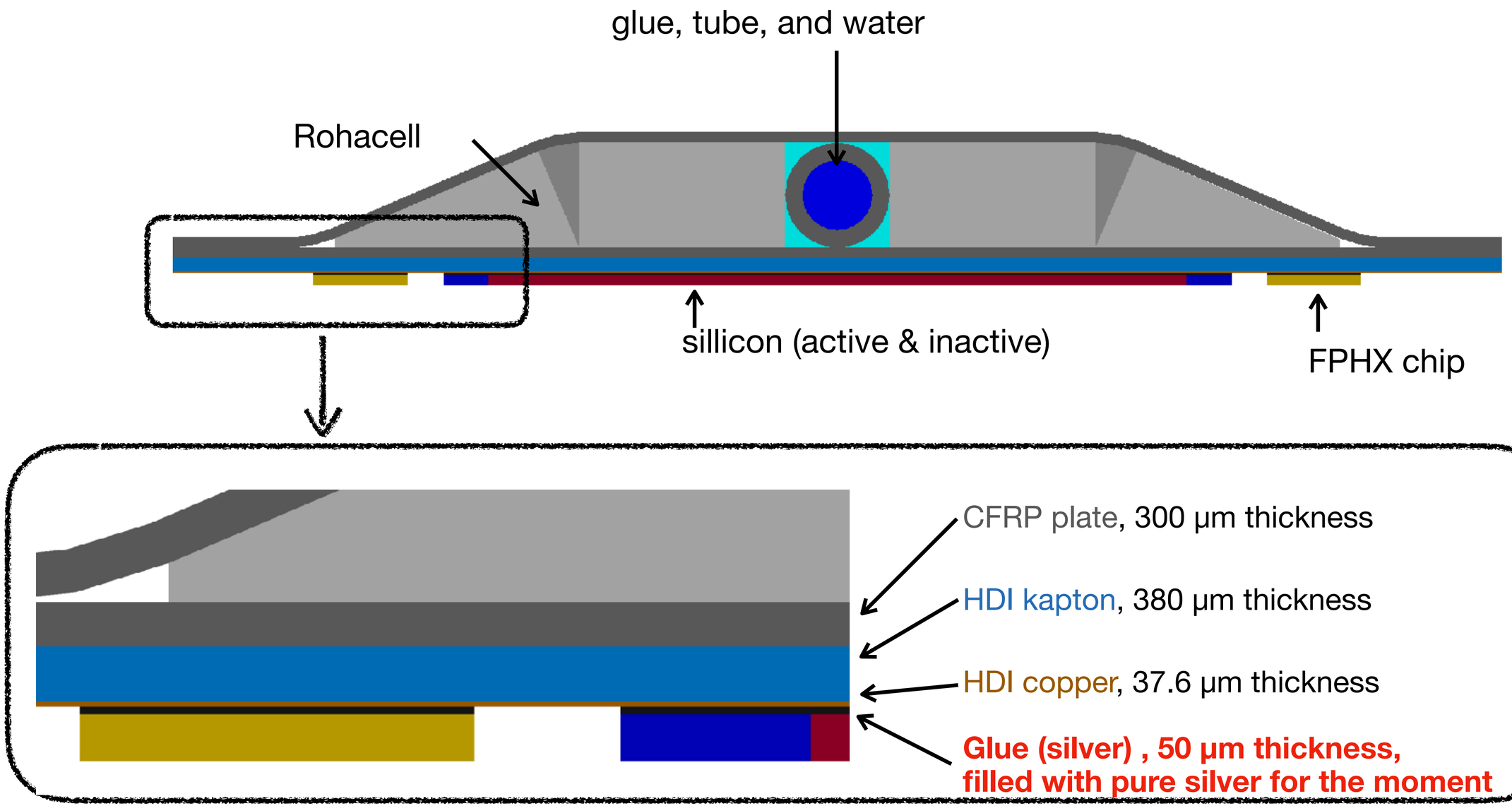


(cm)

Model in the current repository

Updated model

Geometry of a ladder



The silver epoxy glue

if composition was written…

LOCTITE®

Technical Data Sheet

LOCTITE ABLESTIK 2902

October 2014

PRODUCT DESCRIPTION

LOCTITE ABLESTIK 2902 provides the following product characteristics:

Technology	Epoxy
Appearance	Silver
Filler Type	Silver
Cure	Room Temperature or Heat Cure
Components	Two component - requires mixing
Product Benefits	• Electrically conductive • Thermally conductive • Solvent-free • High adhesion • Two component • Room temperature cure • Good adhesion to a variety of substrates
Mix Ratio, by weight - Resin : Hardener	100 : 6
Typical Assembly Applications	Electrical modules, Printed circuitry, Wave guides, Flat cables, High frequency shields and Cold solder
Operating Temperature	-60 to 110 °C
Application	Bonding, Sealing or Repair
Surfaces	Ceramics, Many metals, Glass and Plastic laminates

LOCTITE ABLESTIK 2902 is designed for electronic bonding and sealing applications that require a combination of good mechanical and electrical properties.

LOCTITE ABLESTIK 2902 passes NASA outgassing standards.

ISO-10993-5

LOCTITE ABLESTIK 2902 was tested to and passed the requirements of ISO 10993-5 for Cytotoxicity.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Mixed Viscosity, mPa·s (cP) :	
cp #52, 10 rpm	20,000
Specific Gravity, mixed	3.2
Pot life , minutes	60
Flash Point - See SDS	

TYPICAL CURING PERFORMANCE

Cure Schedule

24 hours @ 25°C or
1 to 4 hours @ 65°C

The above cure profile is a guideline recommendation. Cure conditions (time and temperature) may vary based on customers' experience and their application requirements, as well as customer curing equipment, oven loading and actual oven temperatures.

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties

Coefficient of Thermal Expansion, cm/cm/ºC	4.9×10^{-05}
Glass Transition Temperature (Tg), °C	52
Thermal Conductivity , W/(m-K)	2.99×10^{00}
Hardness, Shore D	80

Electrical Properties

Volume Resistivity, ohms-cm:	
1 hour @ 110°C	0.0006
15 minutes @ 150ºC	0.0005
2 hours @ 65ºC	0.0009
24 hours @ 25ºC	0.001
5 minutes @ 160ºC	0.0003

Outgassing Properties

Total Mass Loss, %	0.64
Collected Volatile Condensable Material, %	0.05

TYPICAL PERFORMANCE OF CURED MATERIAL

Shear Strength

Lap Shear Strength :

Aluminum:

Cured @ 110 °C for 1 hour	N/mm² (psi)	11 (1,600)
Cured @ 150 °C for 15 minutes	N/mm² (psi)	11 (1,600)
Cured @ 65 °C for 2 hours	N/mm² (psi)	7 (1,000)
Cured @ 25 °C for 24 hours	N/mm² (psi)	5 (700)

GENERAL INFORMATION

For safe handling information on this product, consult the Material Safety Data Sheet, (MSDS).

DIRECTIONS FOR USE

1. Carefully clean and dry all surfaces to be bonded.
2. Remove clamp and thoroughly mix the LOCTITE ABLESTIK 2902 epoxy adhesive system components in the handy BIPAX mixing-dispenser package until color is uniform throughout.
3. Apply this completely mixed adhesive to the prepared surfaces, and gently press these surfaces together. Contact pressure is adequate for strong, reliable bonds; however, maintain contact until adhesive is completely cured.
4. Some separation of components is common during shipping and storage. For this reason, it is recommended that the contents of the shipping container be thoroughly mixed prior to use.
5. Some ingredients in this formulation provided in BIPAX, TRA-PAX and bulk packaging may crystallize when subjected to low temperature storage. A gentle warming cycle of 52ºC for 30 minutes prior to mixing components may be necessary. Crystallized epoxy components do not react as well as liquid components and should be redissolved prior to use for best results.

Henkel

Not for product specifications
The technical data contained herein are intended as reference only. Please contact your local quality department for assistance and recommendations on specifications for this product.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

Optimal Storage : 27 °C

Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
N x 0.225 = lb
N/mm x 5.71 = lb/in
psi x 145 = N/mm²
MPa = N/mm²
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

Disclaimer

Note:
The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.
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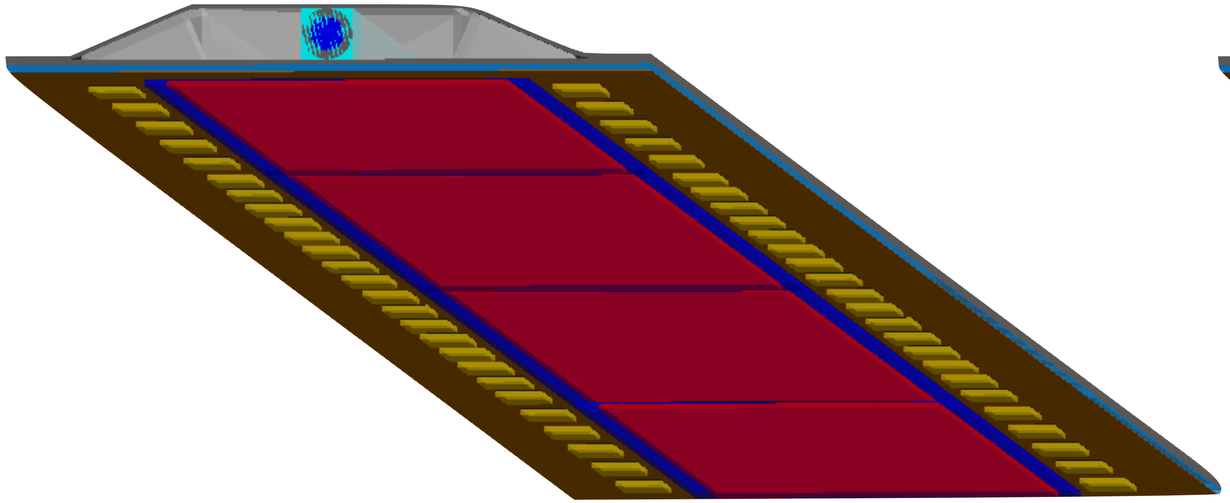
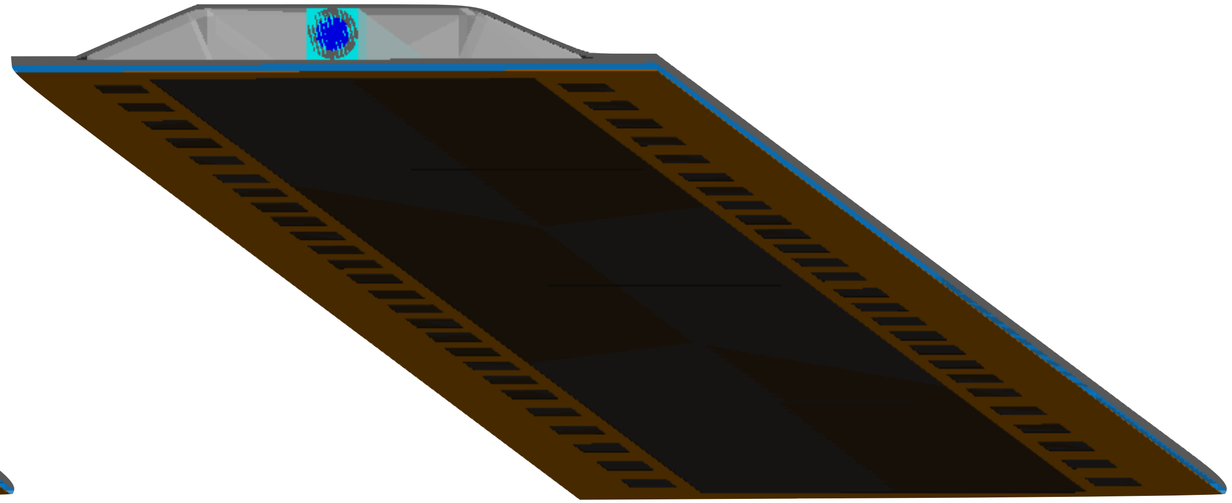
Geometry of a ladder



View from bottom



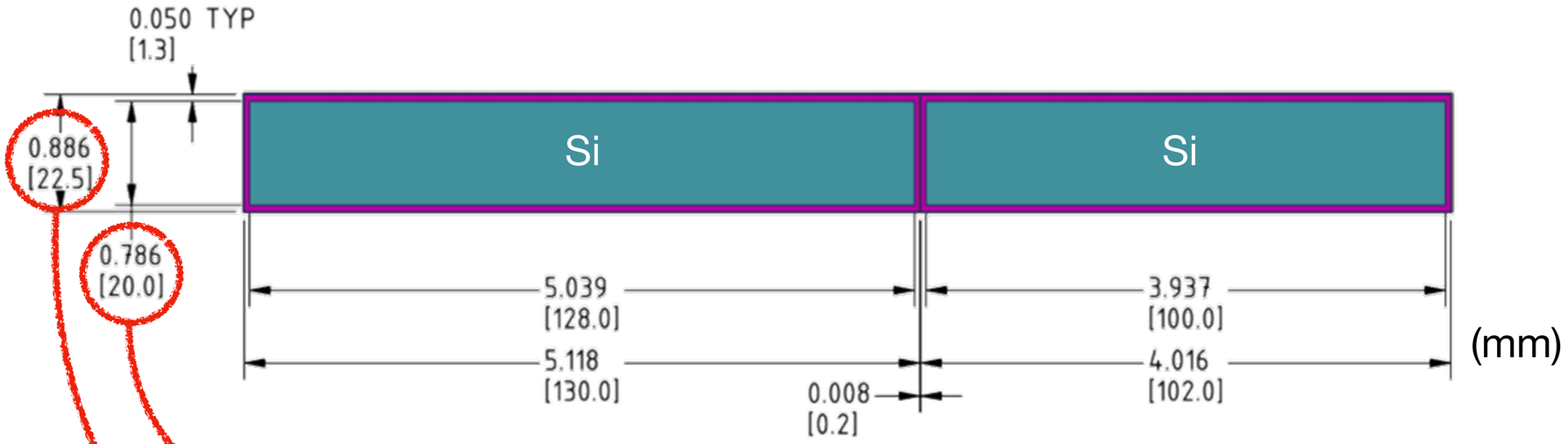
Sillicon sensors and
FPHX chips removed

Size of glue is exactly the same as sillicon’s and chips’.

Geometry of a ladder, dimension

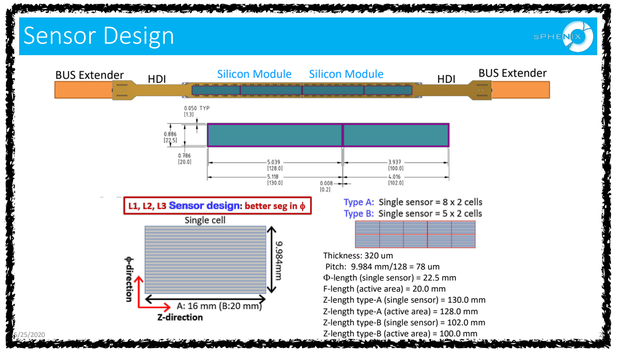
No major discrepancy was found in the Geant4 codes for the moment although I need to take more time to understand Dan's drawing.

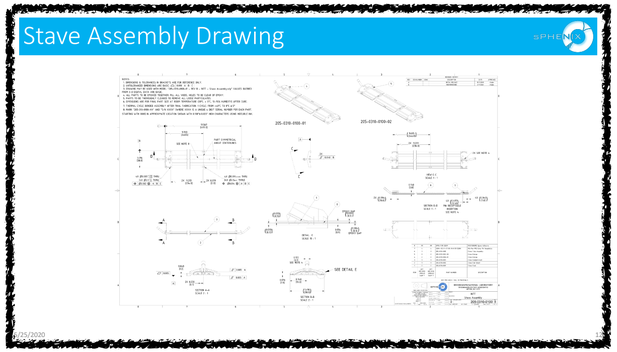
Minor difference I found:



Width of the silicone sensor in Geant: 0.0078 × 256 = 1.9968 cm

Width of the silicone in Geant: 1.9968 + 2 × 0.13 = 2.2568 cm





Dan provided the information!

Implementation

There are 2 choices to change the geometry:

- changing parameters at source level
- changing parameters at macro level

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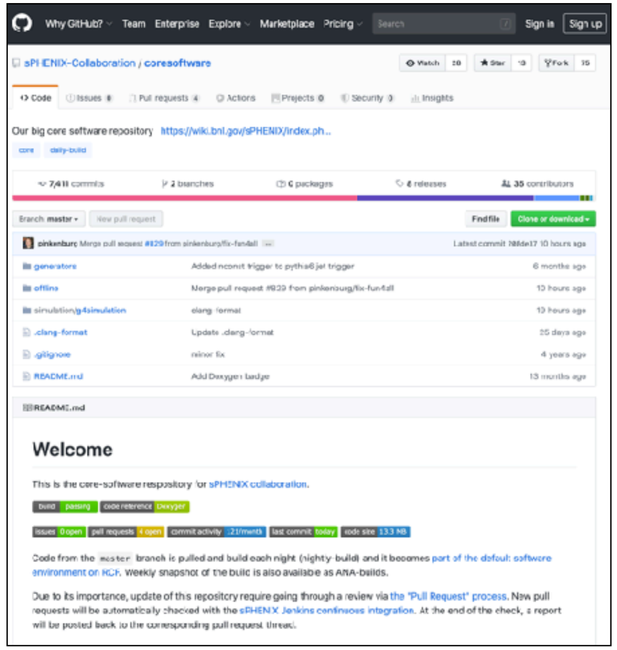
Steps to run the simulation

1. Coresoftware repository
   making a shared library (libg4intt.so) etc.
2. Macro repository
   running Fun4All_sPHENIX.C
   - Fun4All_sPHENIX.C uses G4_Tracking.C to construct INTT.




```
coresoftware repository
├── generators
├── offline
└── simulation
    └── g4simulation
        ├── g4detectors
        ├── g4dst
        ├── g4eval
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        ├── g4histos
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        ├── . . .
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building shared lib. etc.

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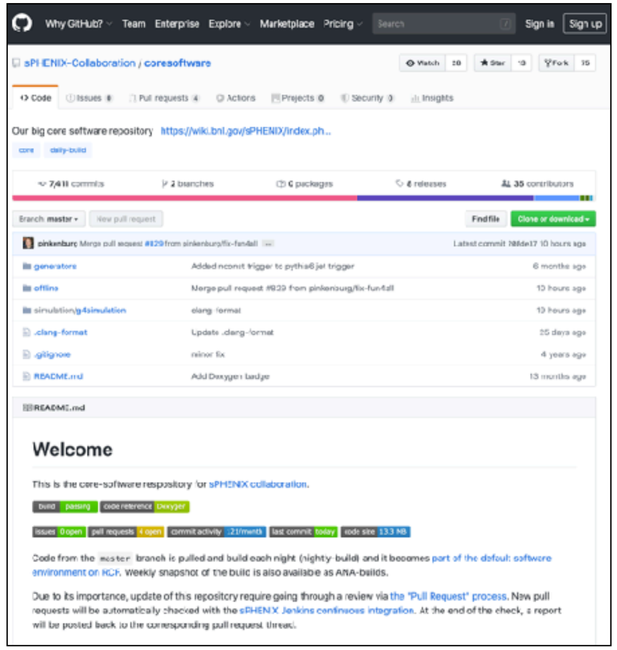

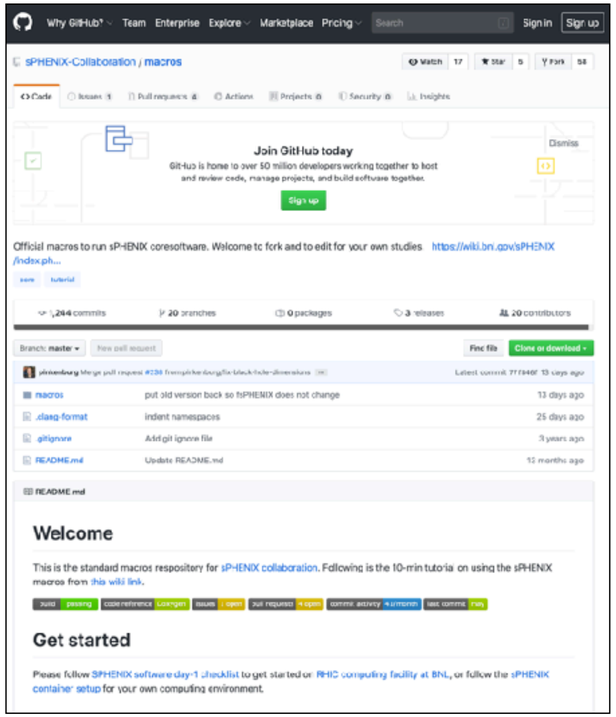


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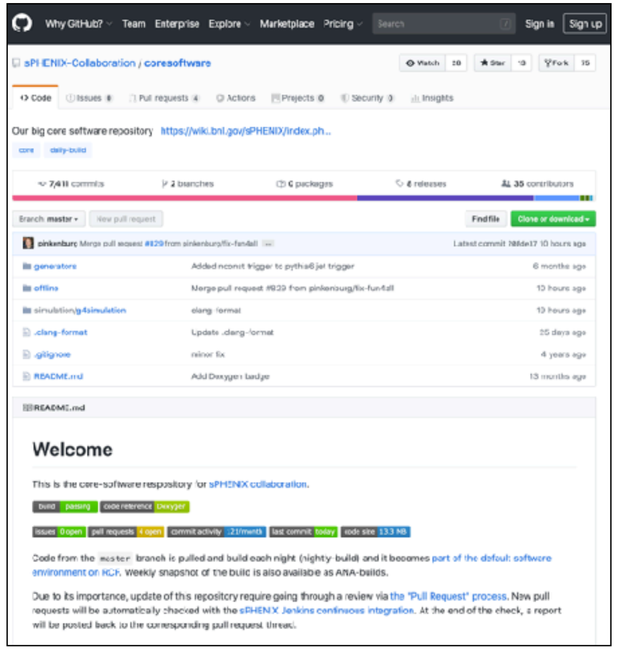
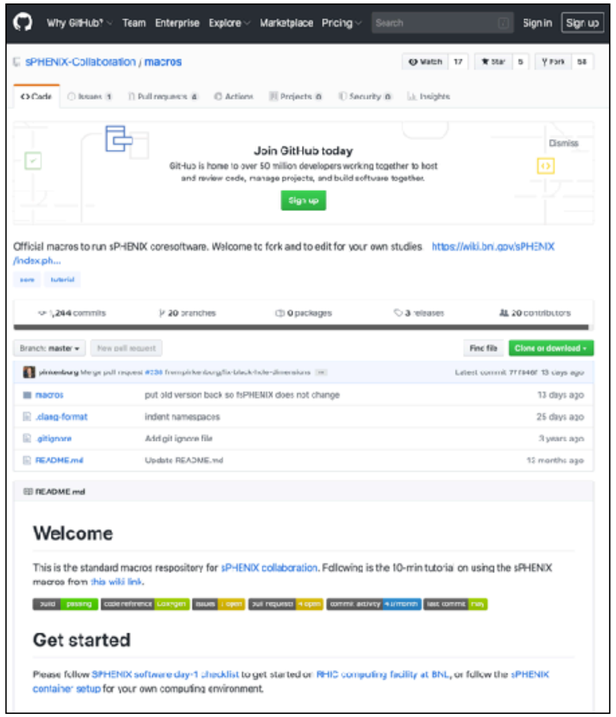
Parameters in the source are hard corded.

Users can change parameters in the macro,
so it's useful but danger.



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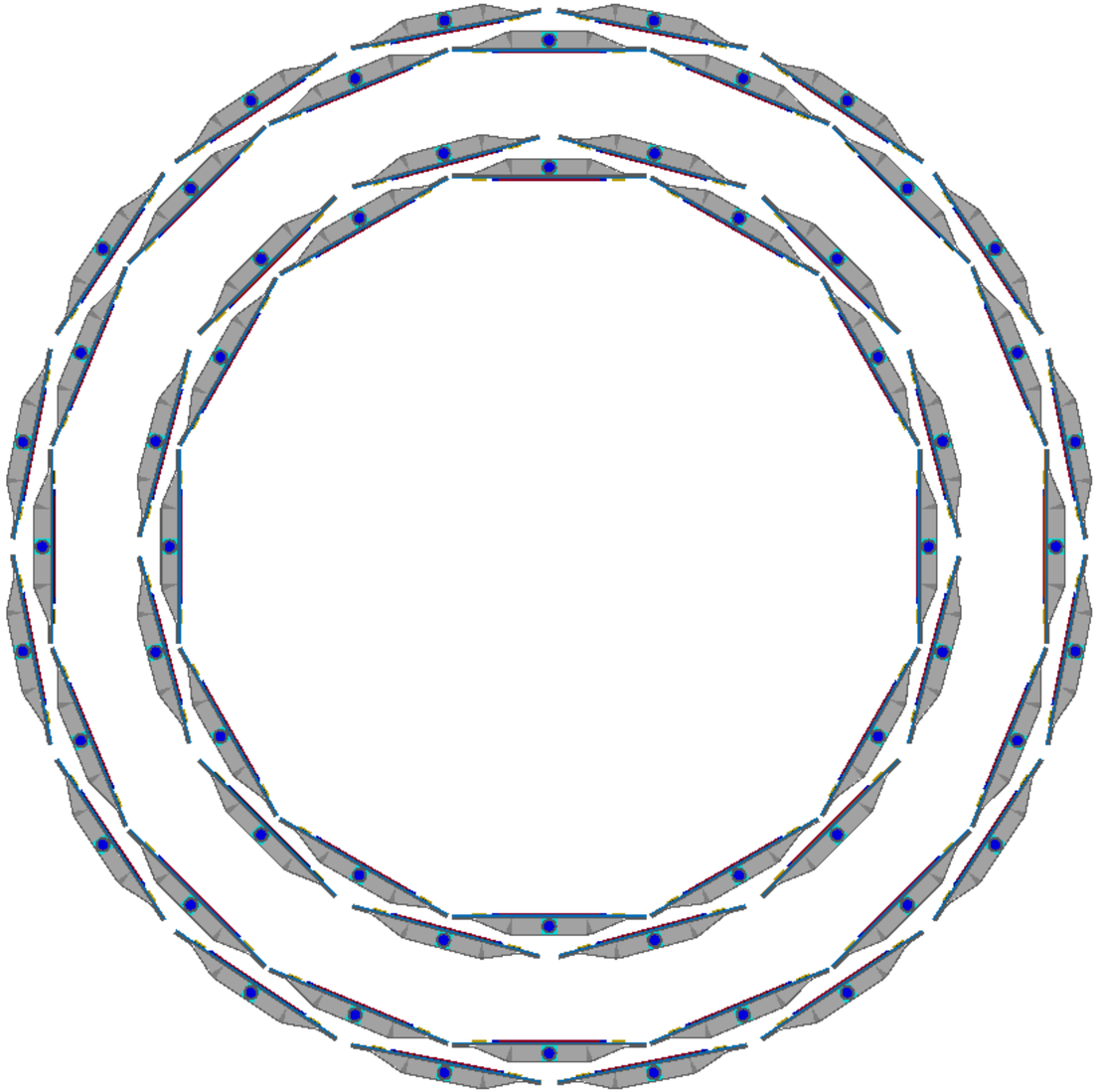
libg4intt.so etc.

feeding shared lib. etc.

backup

Gallery of the updated model



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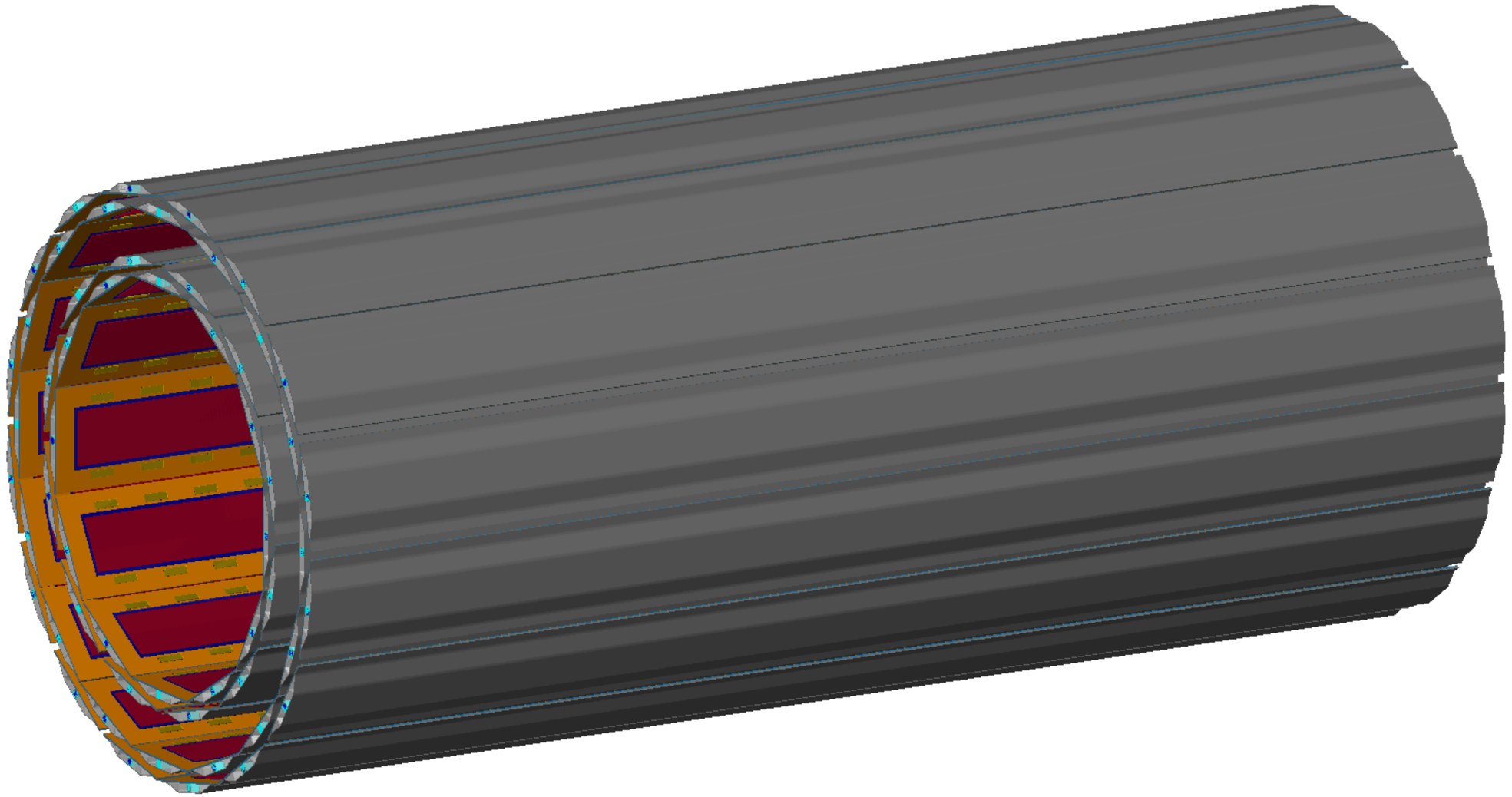

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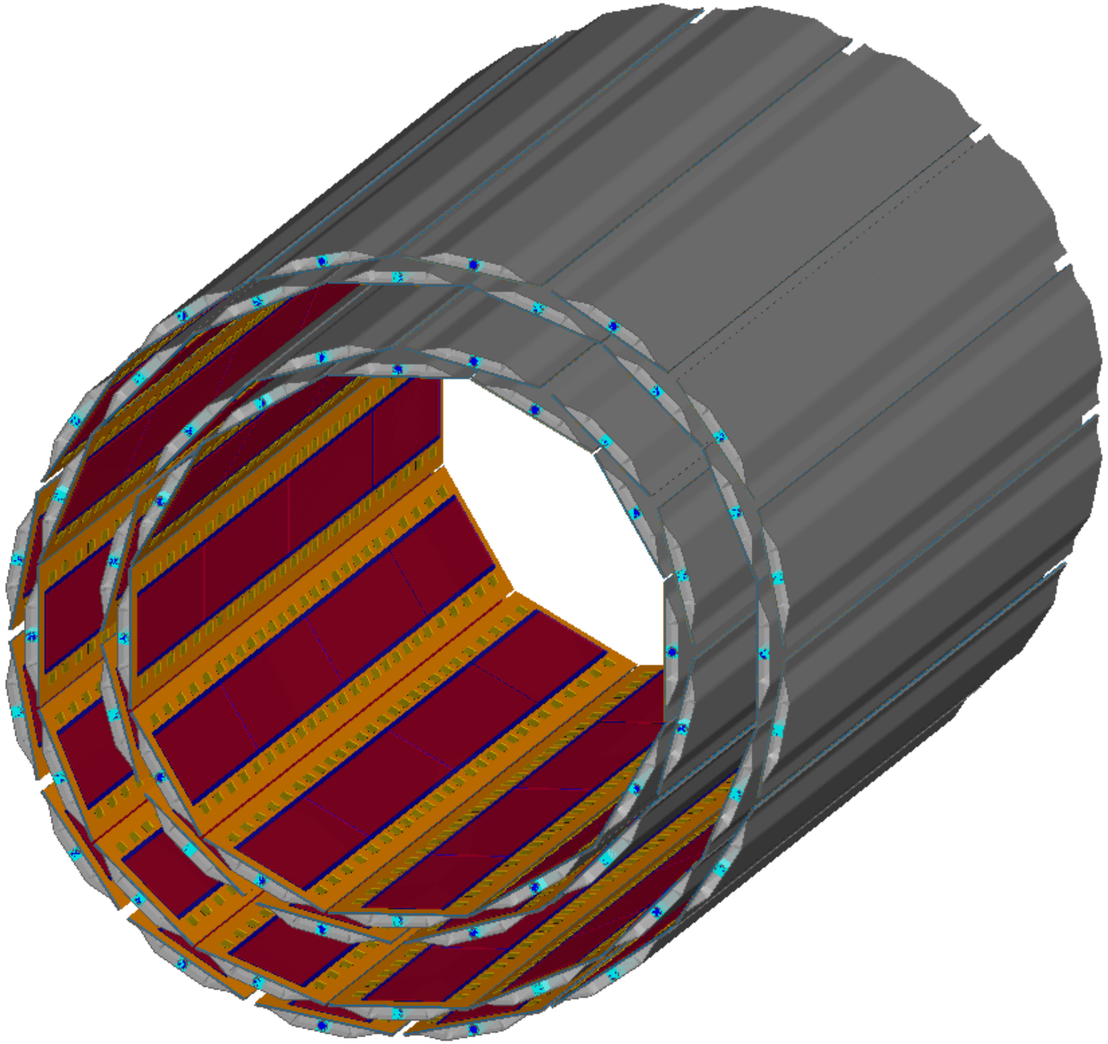

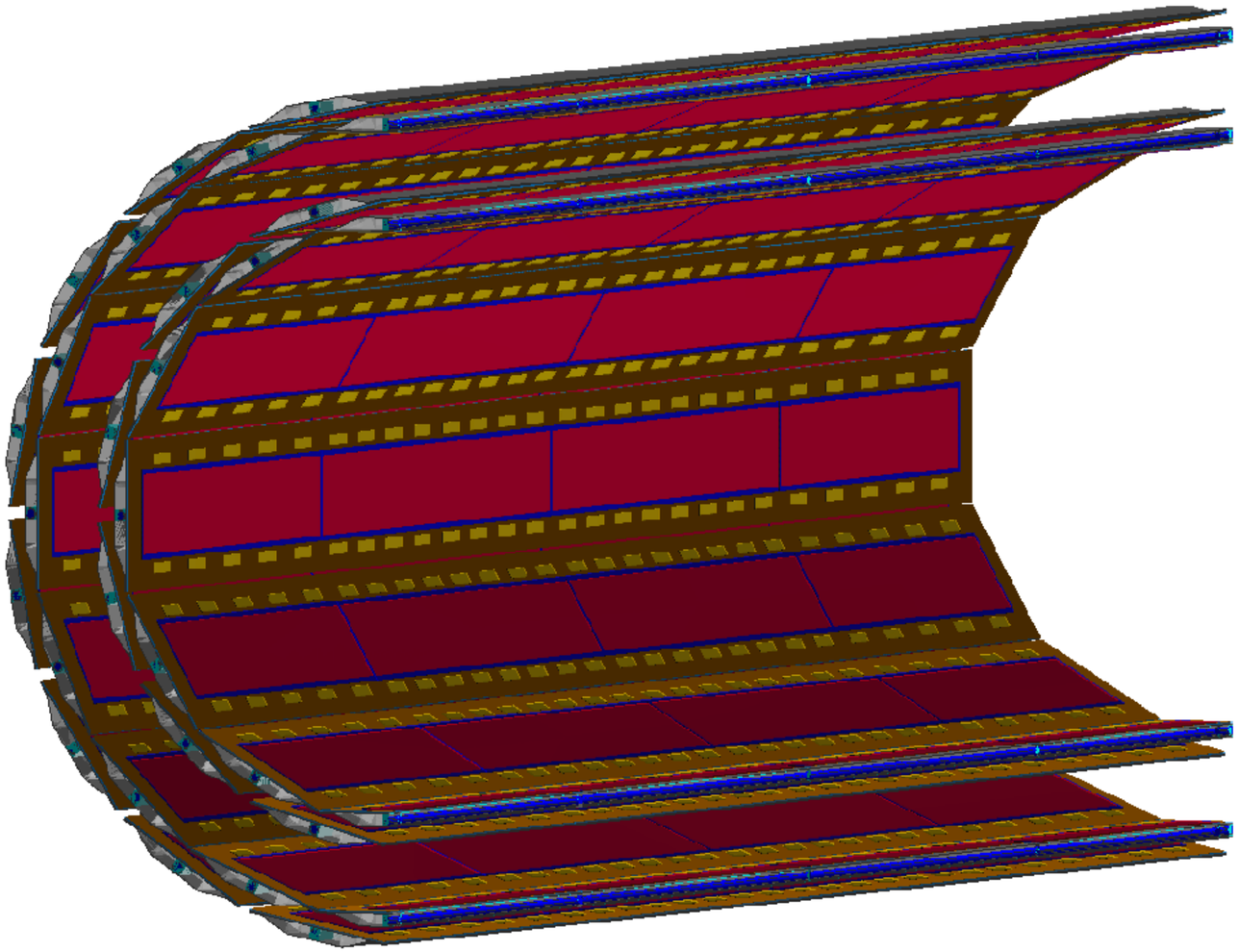

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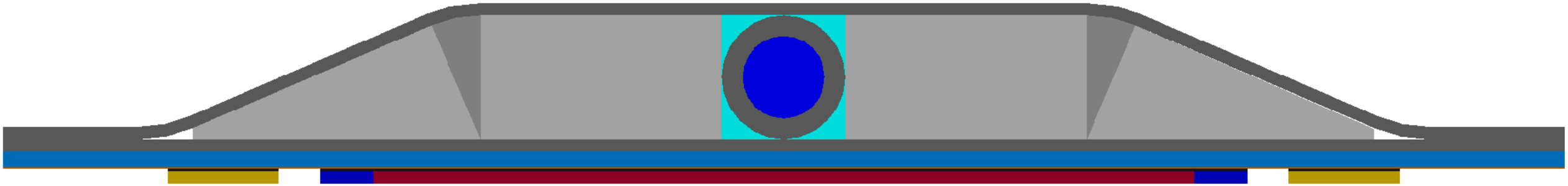
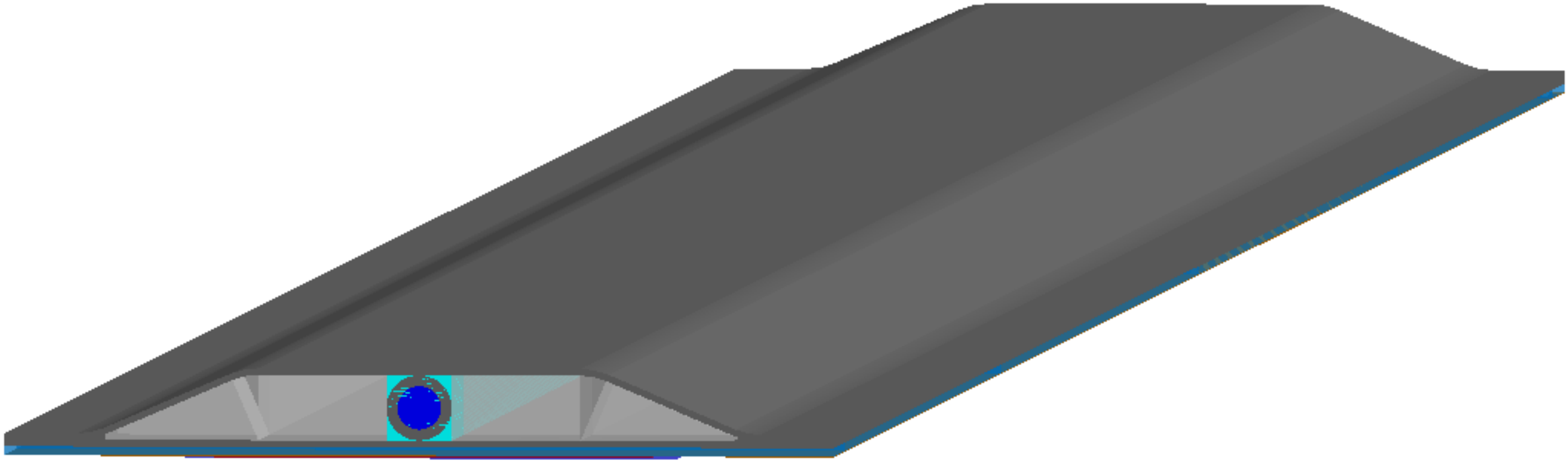
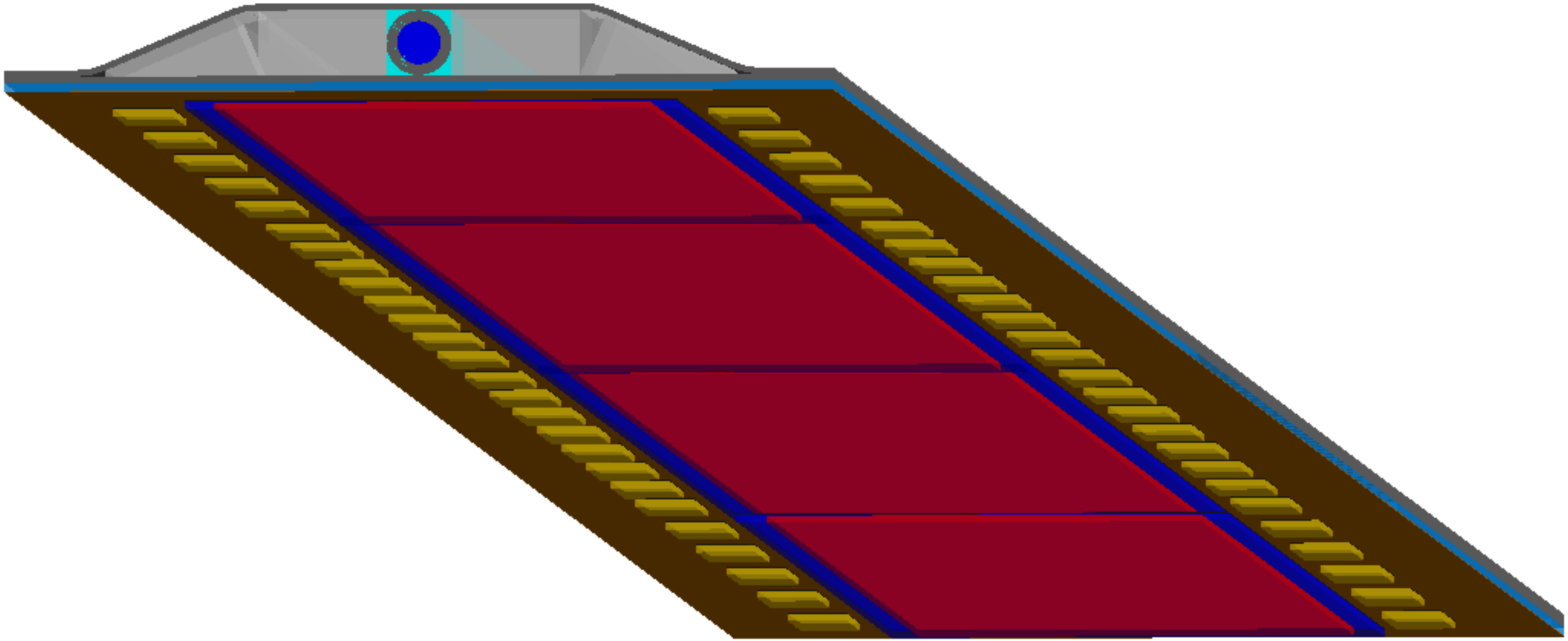


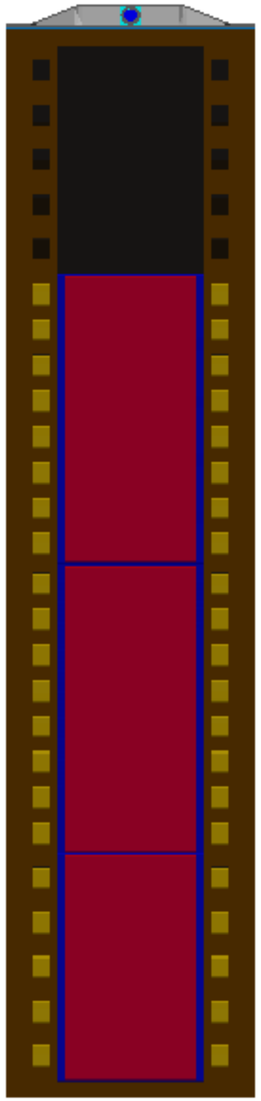
Gallery of the updated model



Gallery of the updated model



Gallery of the updated model



Gallery of the updated model