Detector Simulation at SUT

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Objective of the simulations

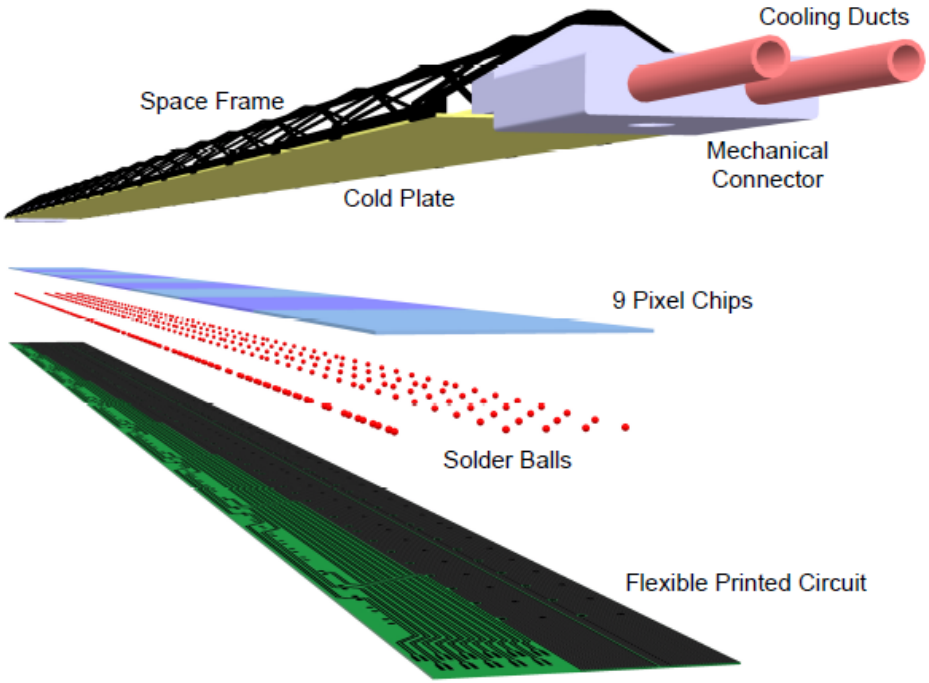
- To investigate the mean material budget of the inner barrels
- To answer the question

"Is it possible to reduce material budget: X/X0 /layer of the inner barrels to approximately 0.3% ? "

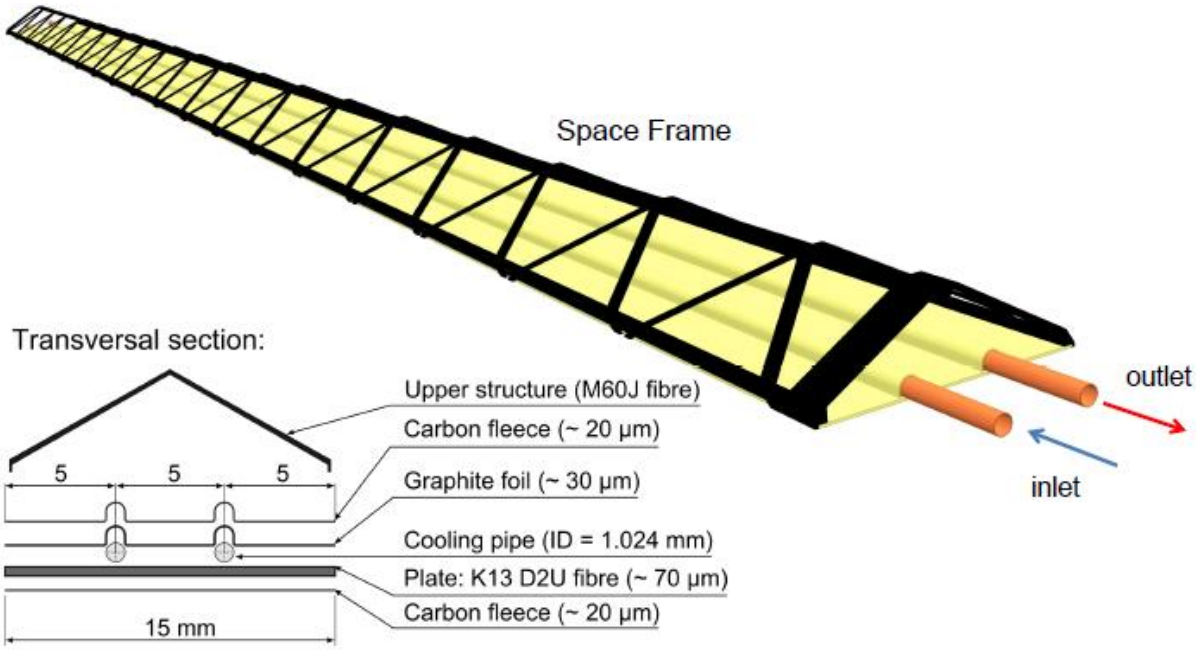
The structure of inner barrels

1. Detector stave
2. Detector barrel and service barrel

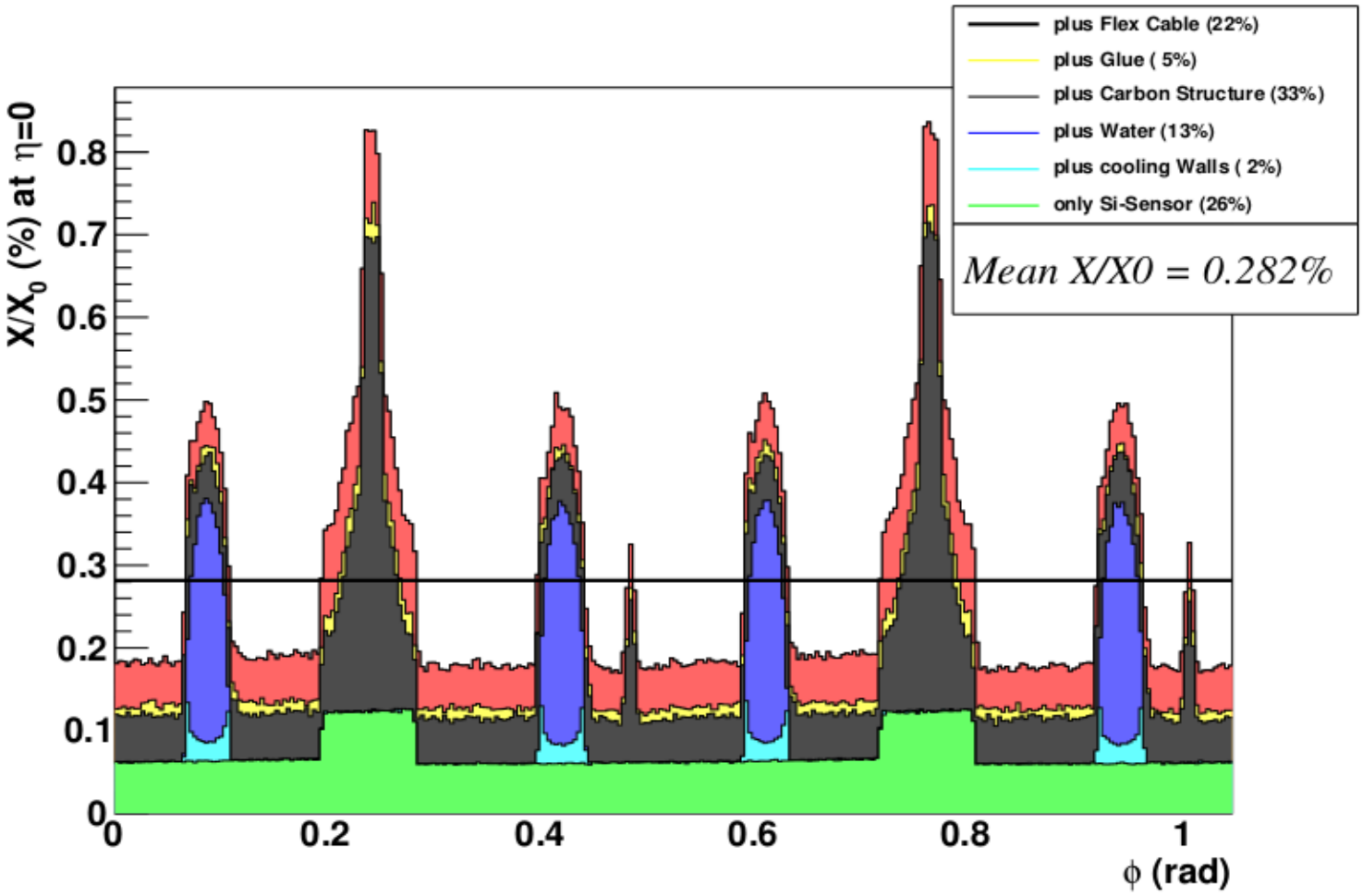
1. Detector stave



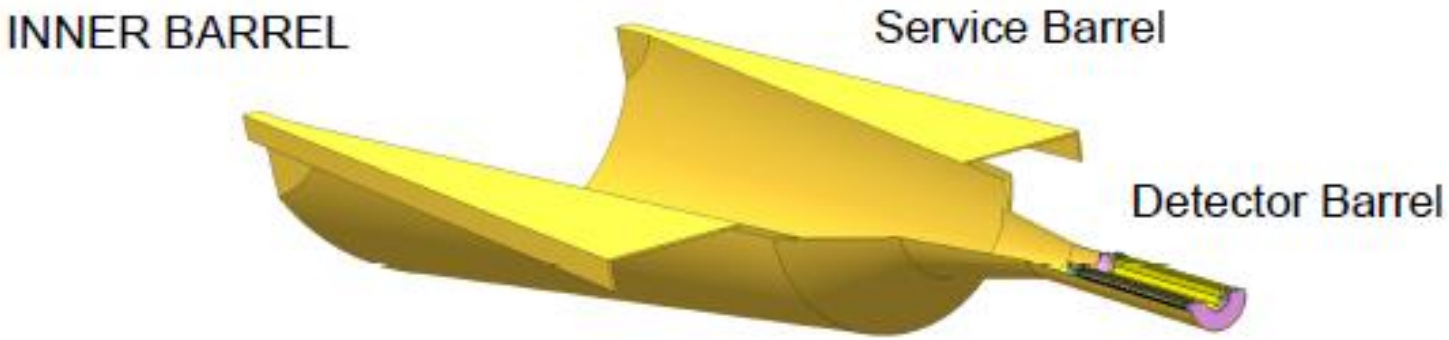
Space frame or supporting structure



Stave element	Component	Material	Thickness (μm)
HIC	FPC Metal layers	Aluminium	50
	FPC Insulating layers	Polyimide	100
	Pixel Chip	Silicon	50
Cold Plate		Carbon fleece	40
		Carbon paper	30
	Cooling tube wall	Polyimide	25
	Cooling fluid	Water	
	Carbon plate	Carbon fibre	70
	Glue	Eccobond 45	100
Space Frame		Carbon rowing	

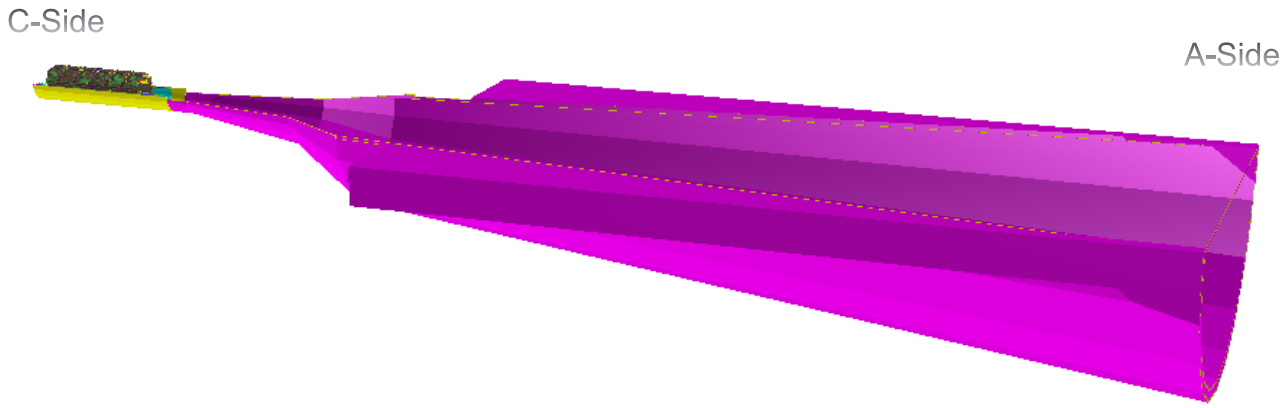

plus Flex Cable (22%)
plus Glue (5%)
plus Carbon Structure (33%)
plus Water (13%)
plus cooling Walls (2%)
only Si-Sensor (26%)
Mean X/X0 = 0.282%
X/X0 (%) at η=0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
0.2
0.4
0.6
0.8
1
ϕ (rad)

2. Detector barrel and service barrel



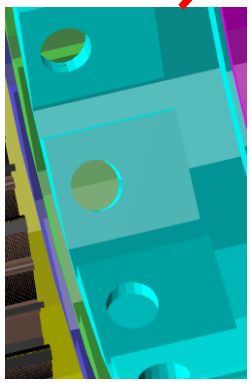
Current results

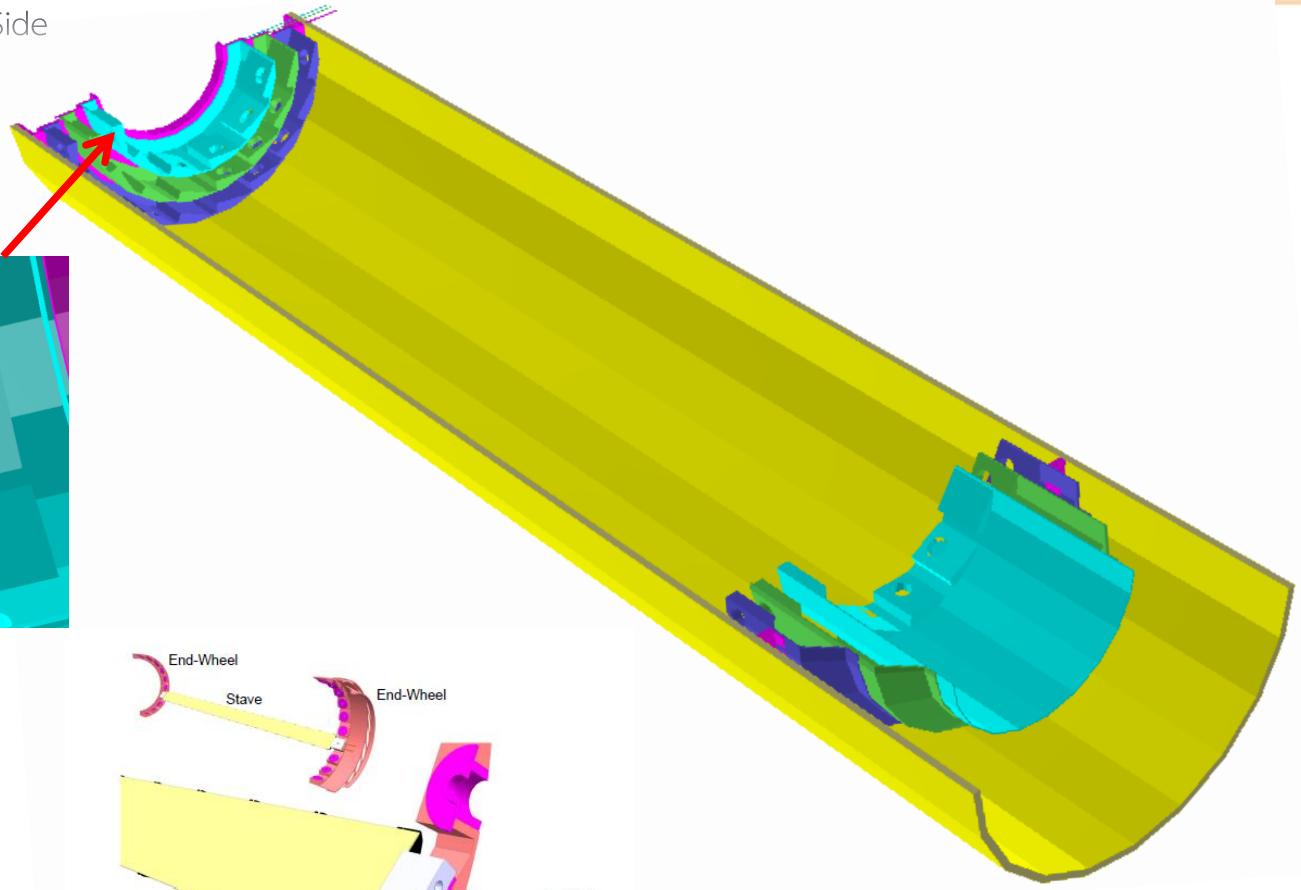
2.1 Geometry shapes (working in progress)

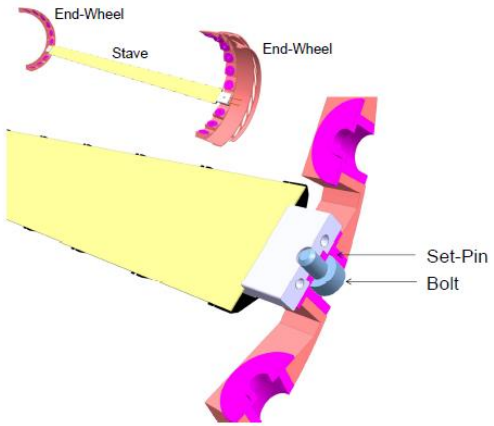


Coded in : AliITSUv1Layer.{cxx, h}
AliITSUv1.{cxx, h}

C-Side



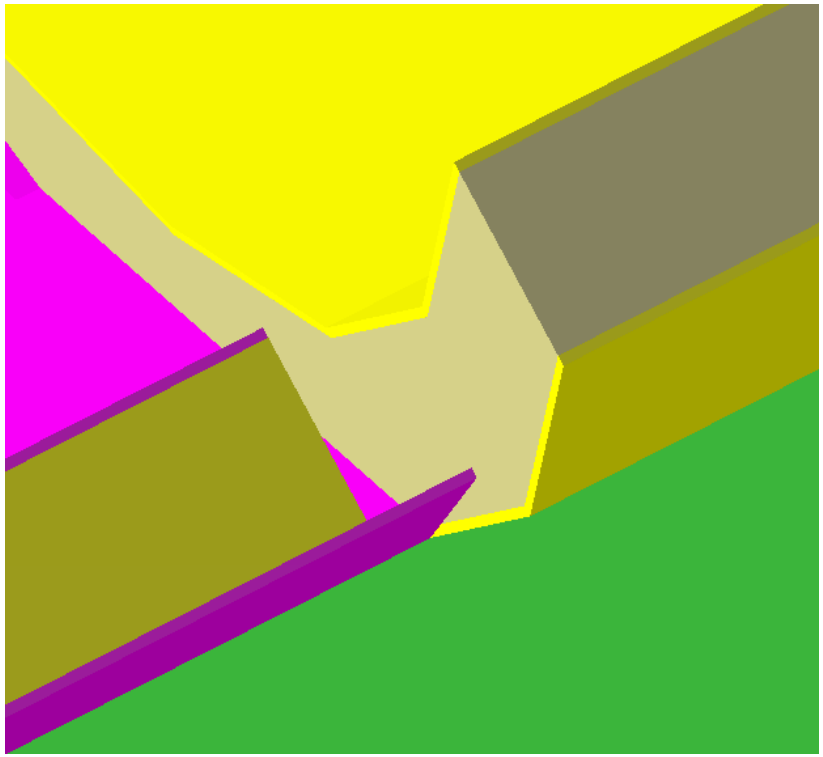




A-Side

Overlap Problems

Object next to together



Prospect to the updated codes

- Use different private methods
- Remove hardcoded numbers
- Transform composite shapes into real volumes
- Solve overlap problems
- Make the code to comply with the Coding Conventions of Aliroot

2.2 Material budget calculation

- With the help of Mario, now the codes to calculate material budget is in Aliroot repository under

  " ITS/UPGRADES/testITSuv1"

- Configuration files are in the Config.C and CreateITSUv1.C
- Use the script runMatBud.sh to produce geometry.root
- Use MakeMatBudPlots.C to draw the plots

Outlook

- Once the geometry files are completed we will be able to calculate the mean material budget used in the sensitive area of the inner barrels
- Outer barrels now are being investigated by Mario.

Thank you