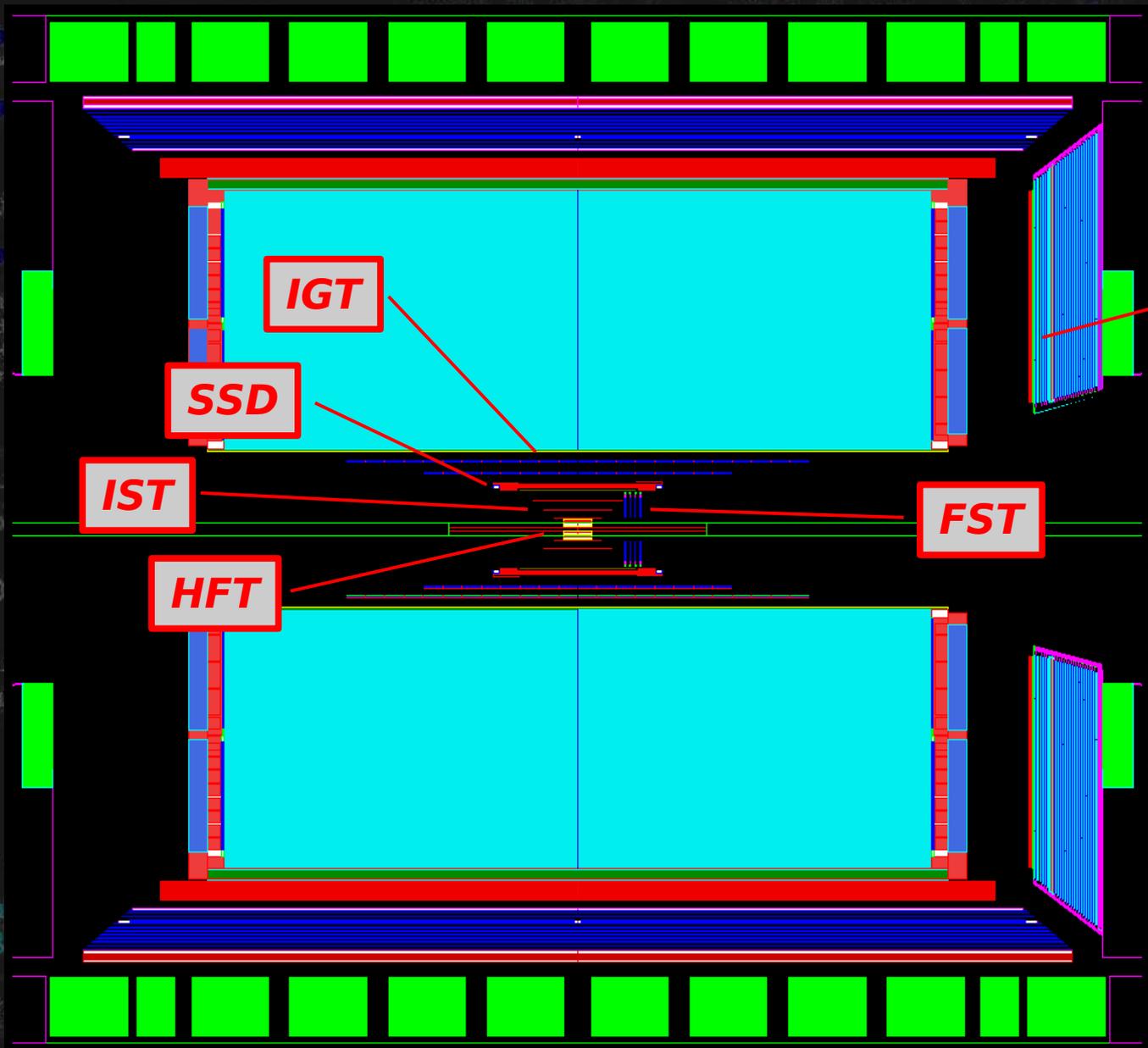


Tracking Upgrade StarSim & Engineering Design

Gerrit van Nieuwenhuizen
STAR Upgrades Workshop
BNL, Dec. 1, 2005

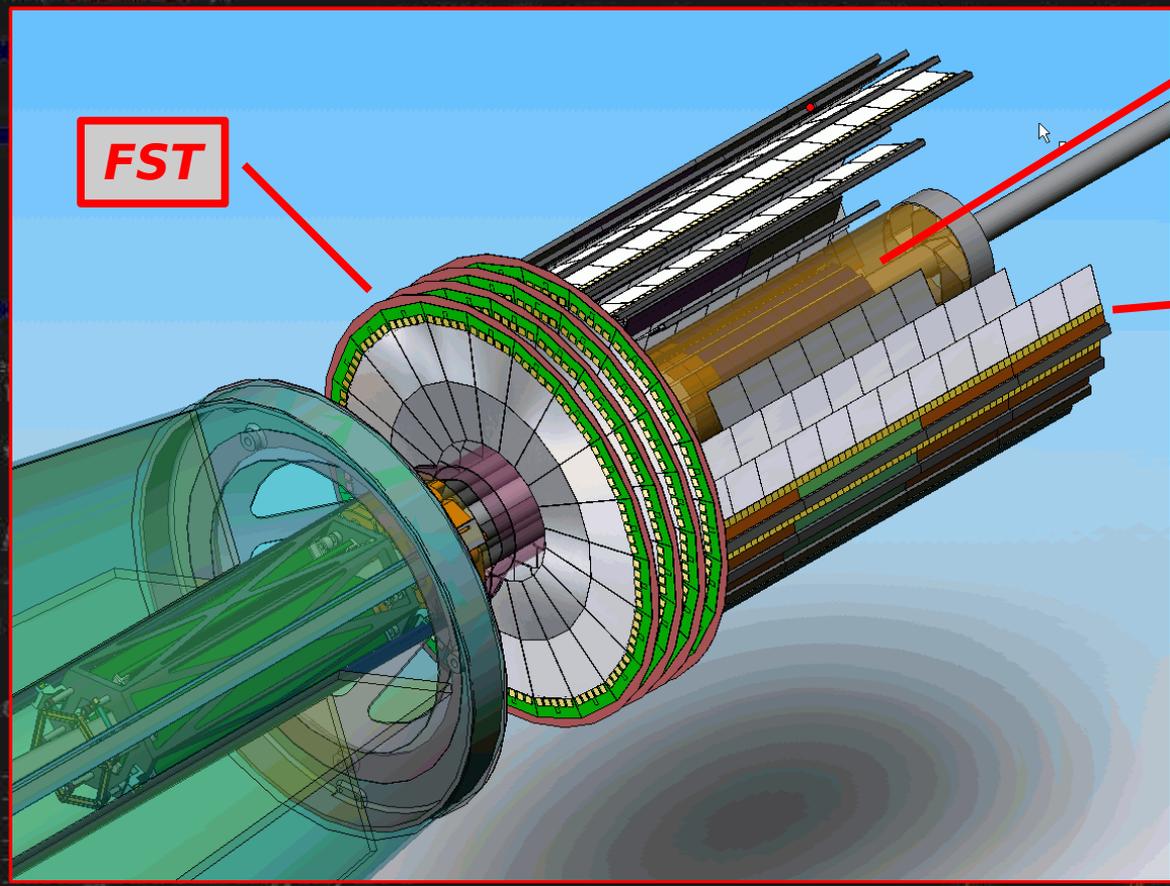


Upgrade overview



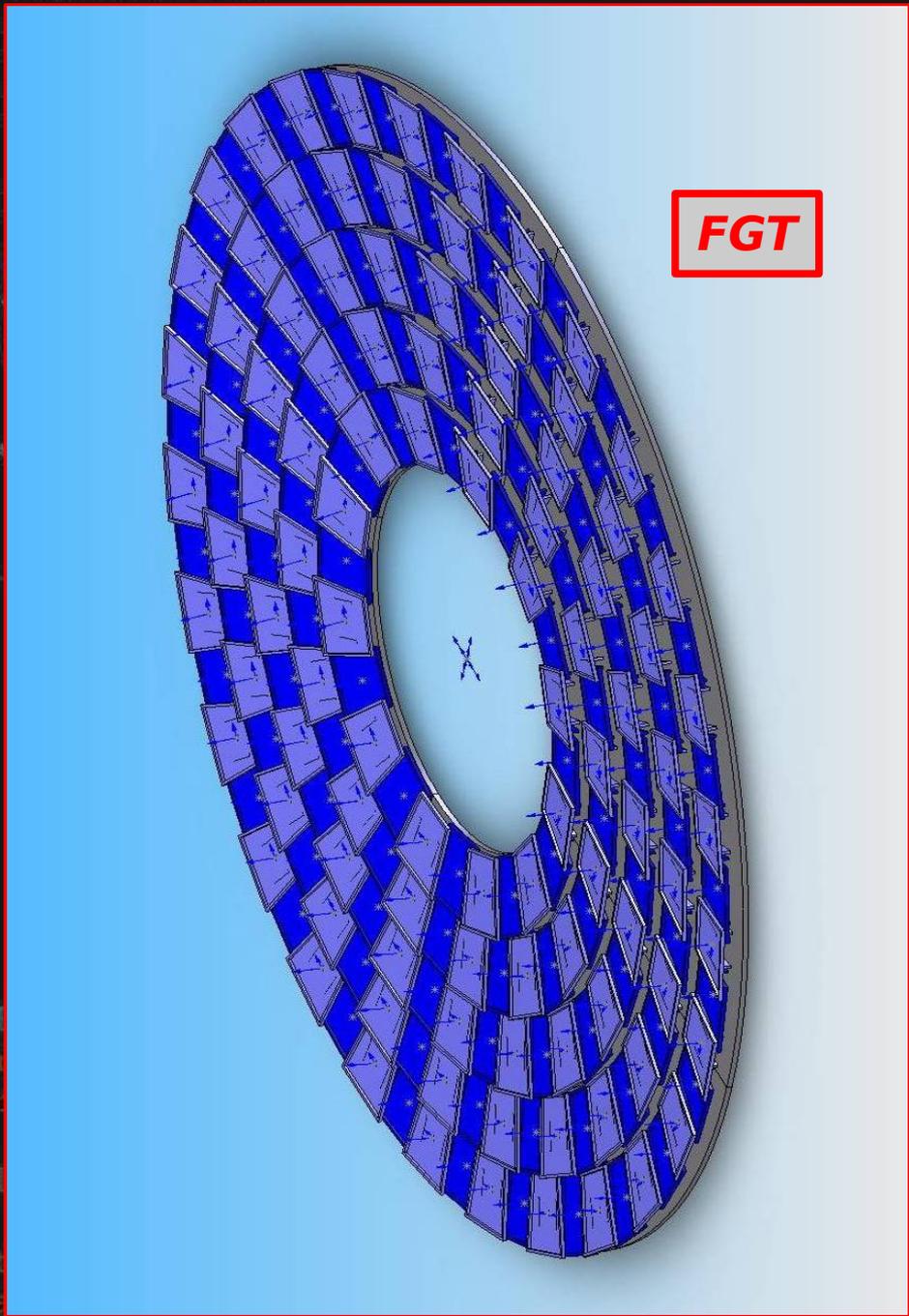
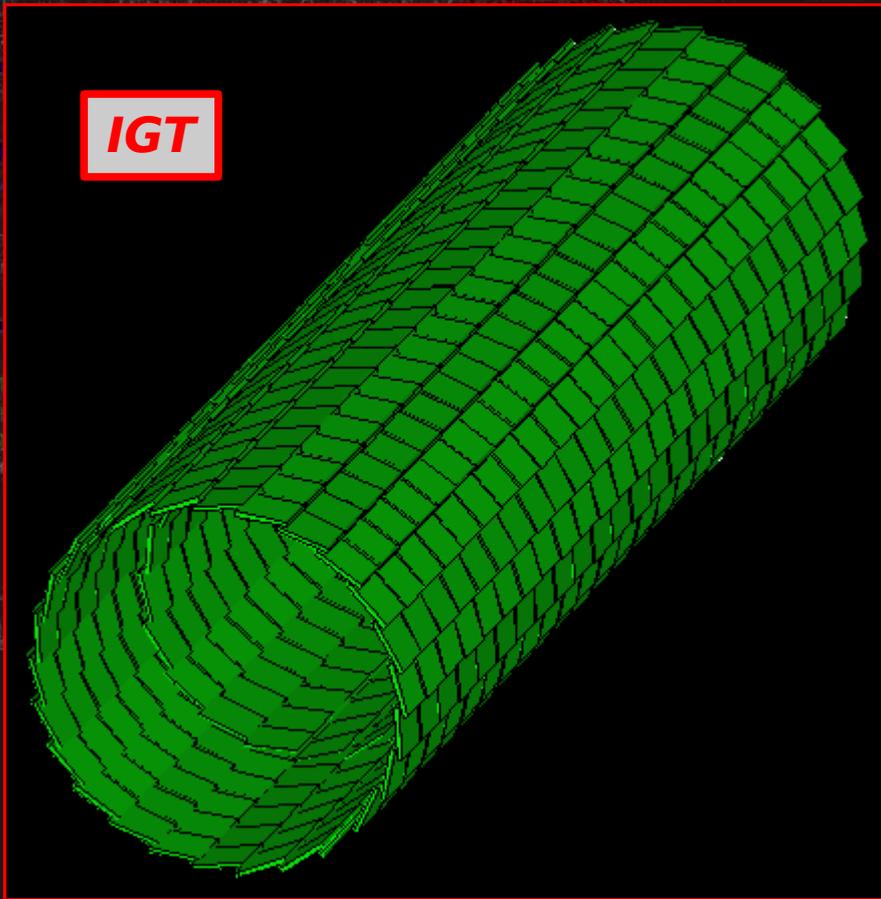
GvN Offset perpendicular to the length of the module/ladder; this to move the midpoint of the sensors back on the requi:

Upgrade engineering



Jim Kelsey from the MIT-Bates R&E facility is currently reworking the designs Also a SolidWorks repository is in the making

The two GEM options



IGT not yet in Solidworks
FGT fully implemented

Hot engineering issues

Turn the current, bulky designs into state of the art SolidWorks designs

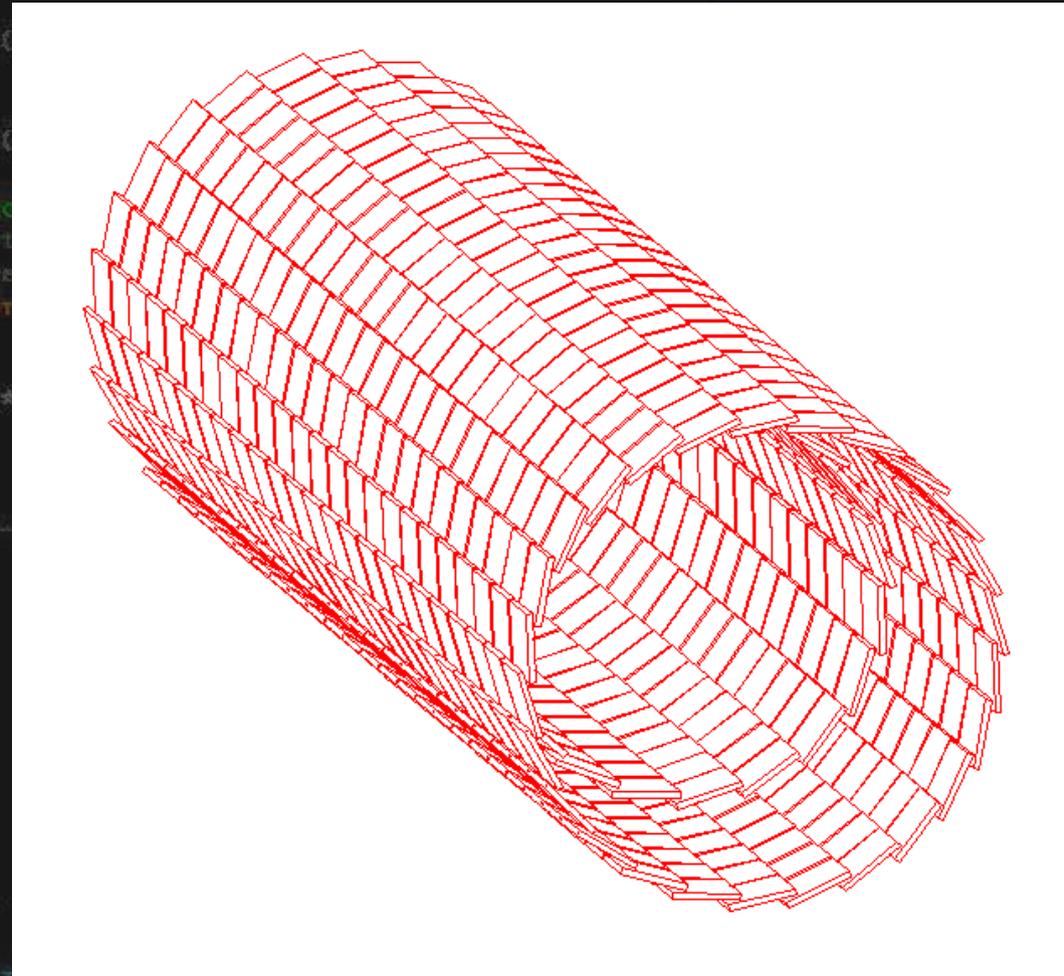
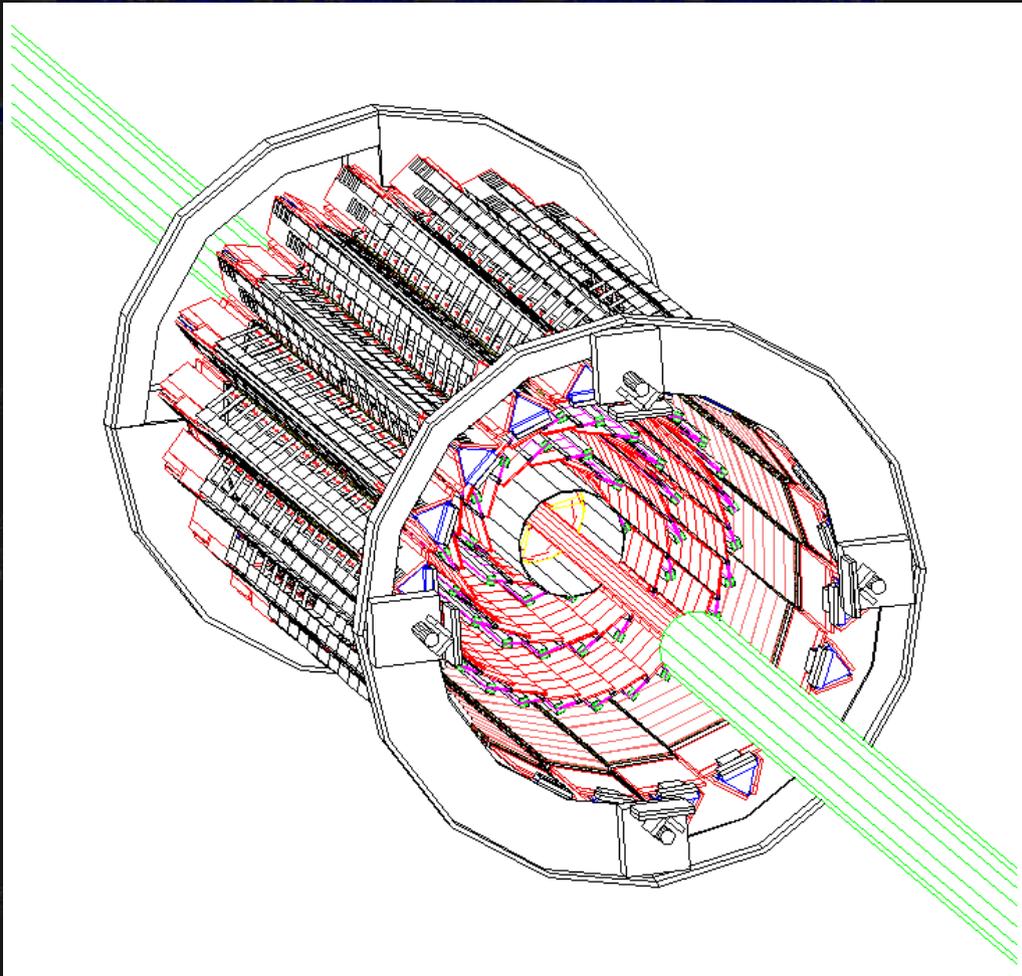
Implement IGT and SSD and the most current HFT

Make an integrated tracker design

Decide how to support everything, nose-cone vs rails, etc.

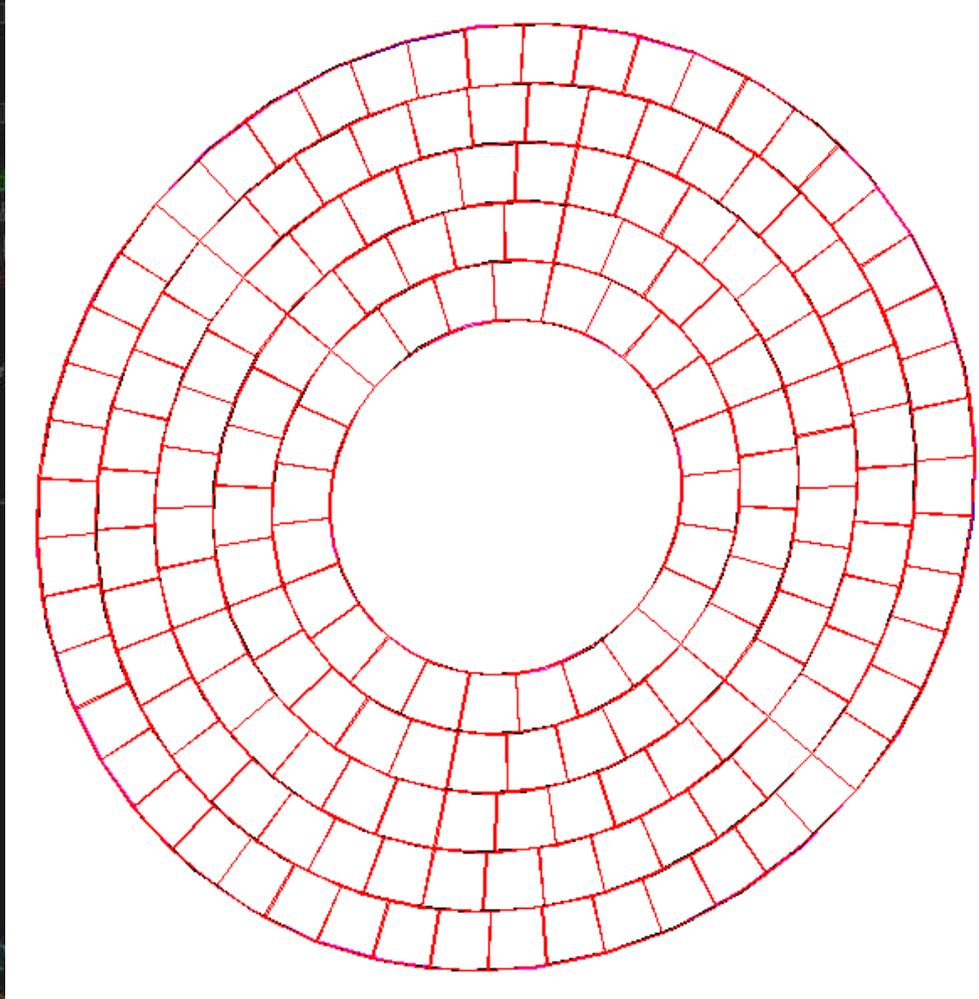
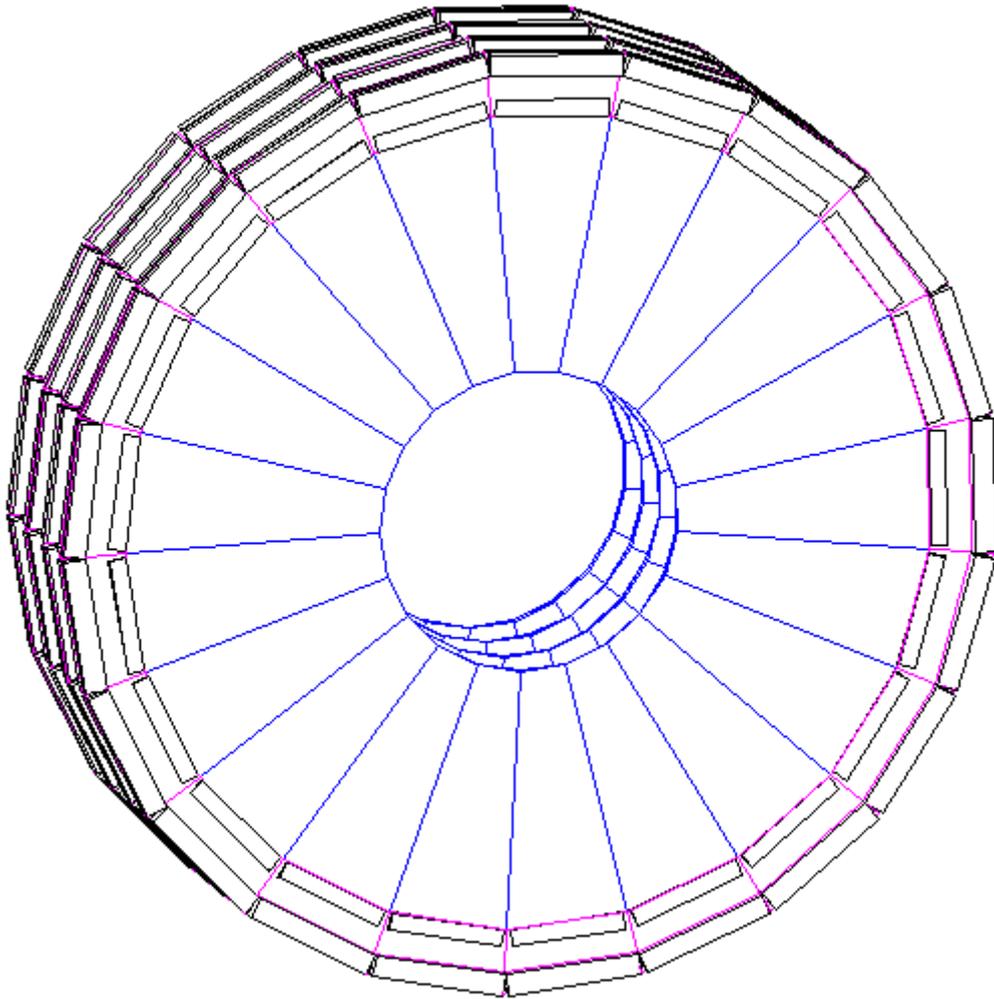
Make a SolidWorks repository server

Inner tracking upgrade geometry



```
USE ISBG Layer=lv | length and other parameters specific  
do nl=1, ISBG_nLadder | inner loop over ladders (which consist of  
angle = (360.0/ISBG_nLadder)*nl | Base tilt, to be further  
GvN Offset perpendicular to the length of the module/ladder  
this to move the midpoint of the sensors back on the required
```

Forward tracking upgrade geometry



do nl=1,ISBG_nLadder | inner loop over ladders (which consist

angle = (360.0/ISBG_nLadder)*nl | Base tilt, to be further

GvN Offset perpendicular to the length of the module/ladder
this to move the midpoint of the sensors back on the requi

MC status so far

Starting point for single particle and W simulations
=====

1. Single particle:

a. electrons: 10k samples with

- $-1 < \eta < 2$
- pT: 1, 2, 5, 10, 15, 20, 25, 30, 35, 40 GeV/c
- delta eta: 0.2 (15 eta ranges)

Total: 10 X 15 X 10k samples

b. pions: 10k samples with

- $-1 < \eta < 2$
- pT: 1, 2, 5, 10, 15, 20 GeV/c
- delta eta: 0.2 (15 eta ranges)

Total: 6 X 15 X 10k

2. W simulations:

Total cross-section X BR(W+/->e+/e- final state):

W+: 135pb⁻¹

W-: 42pb⁻¹

For $1 < \eta < 2$:

W+: 14pb⁻¹

W-: 8pb⁻¹

Simulation request: 100K samples (e+/e- in final state!)

a. $1 < \eta < 2$

b. $-1 < \eta < 1$

Status pions:

Done, starsim MC and BFC conversion finished.

Results (.geant.root files) can be found on:

mit2.star.bnl.gov/data/nieuwhzn/MCTUP/PIONS

Status electrons:

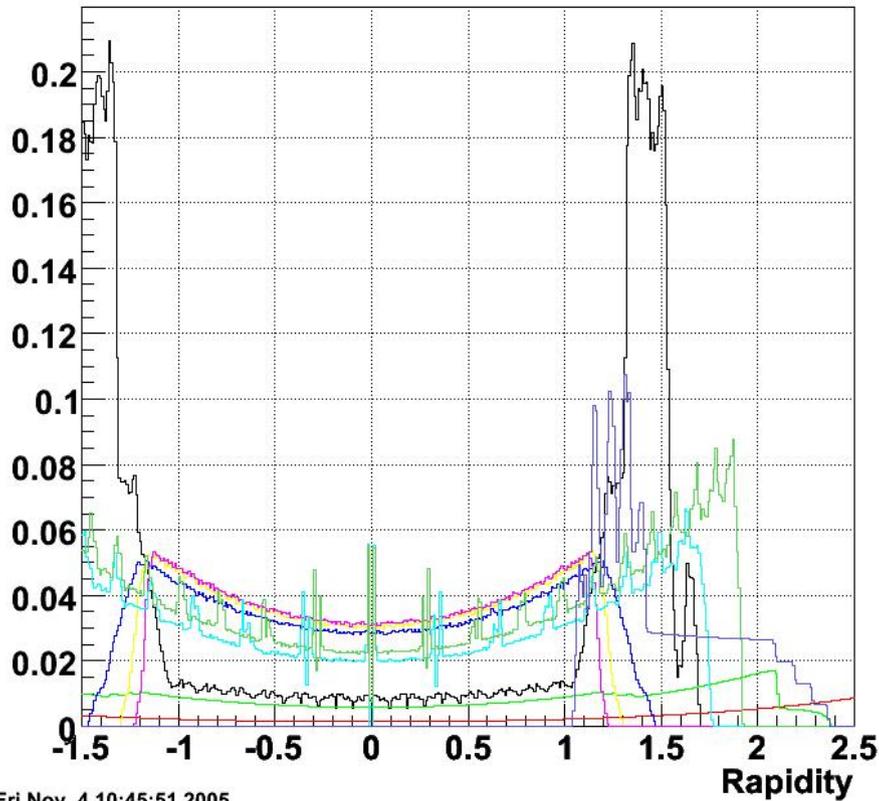
starsim MC production

ptRap	-1.0	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X				
10	X	X	X	X	X	X	X	X	X	X					
15		X	X	X	X	X	X								
20															
25															
30															
35															
40															

IST layer', by
parameters specific
ders (which consis
tilt, to be further

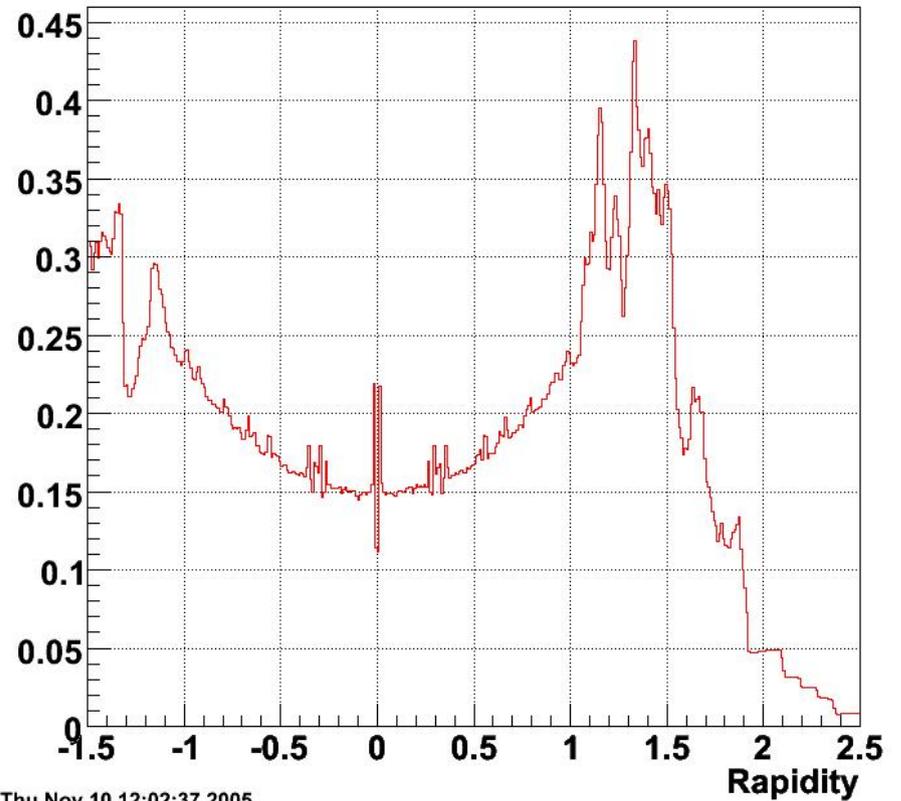
Material budget

Total material budget tracker

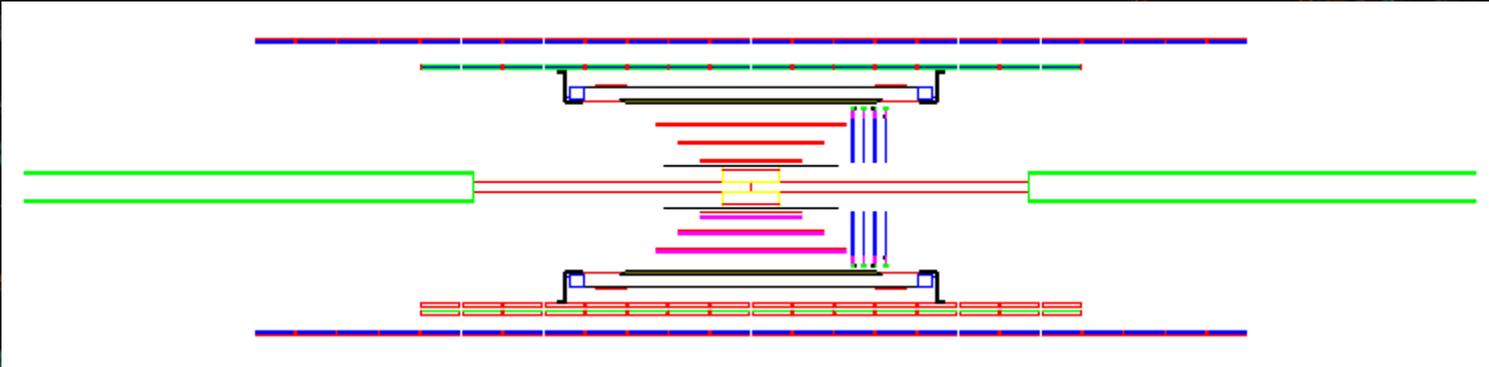


Fri Nov 4 10:45:51 2005

Total Material Budget Tracking Upgrade

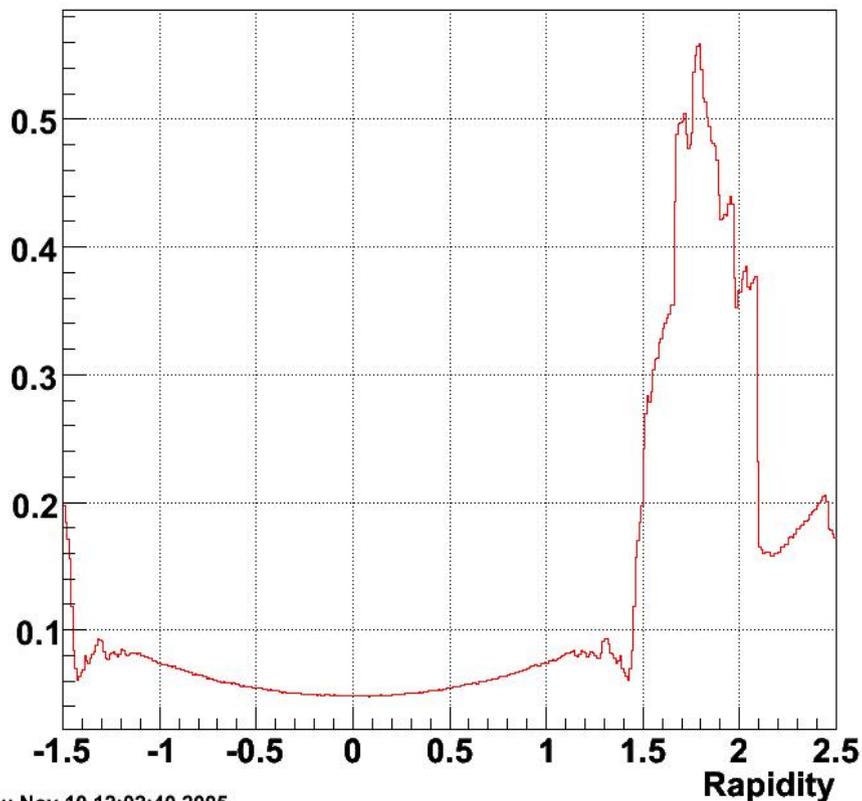


Thu Nov 10 12:02:37 2005



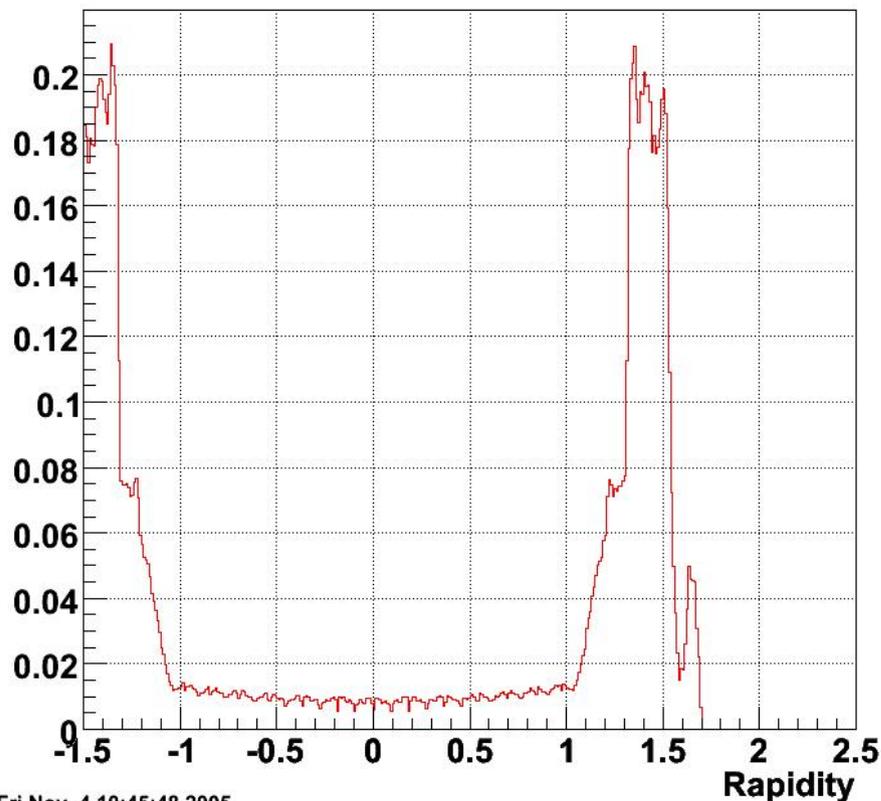
Existing SVT, SSD and Nose-Cone

Material Budget SVT

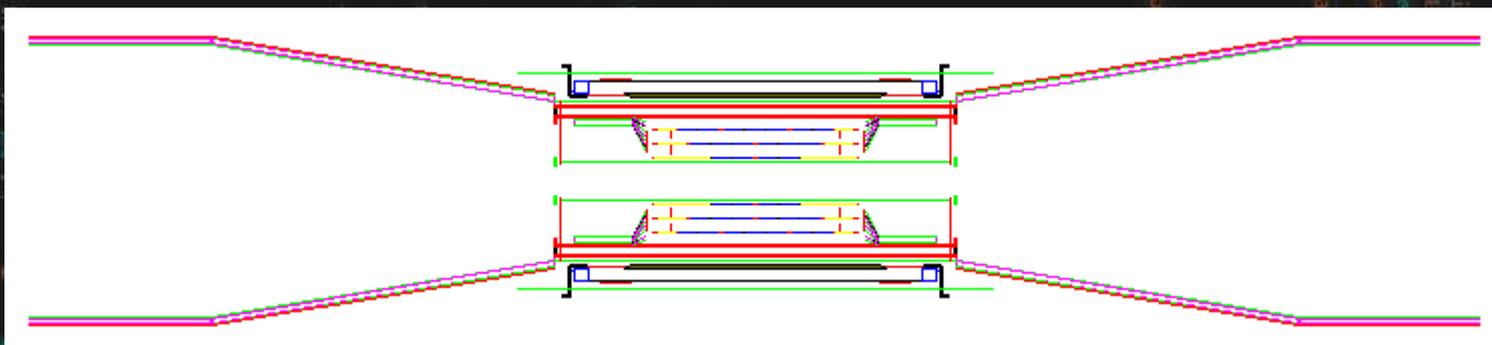


Thu Nov 10 12:02:40 2005

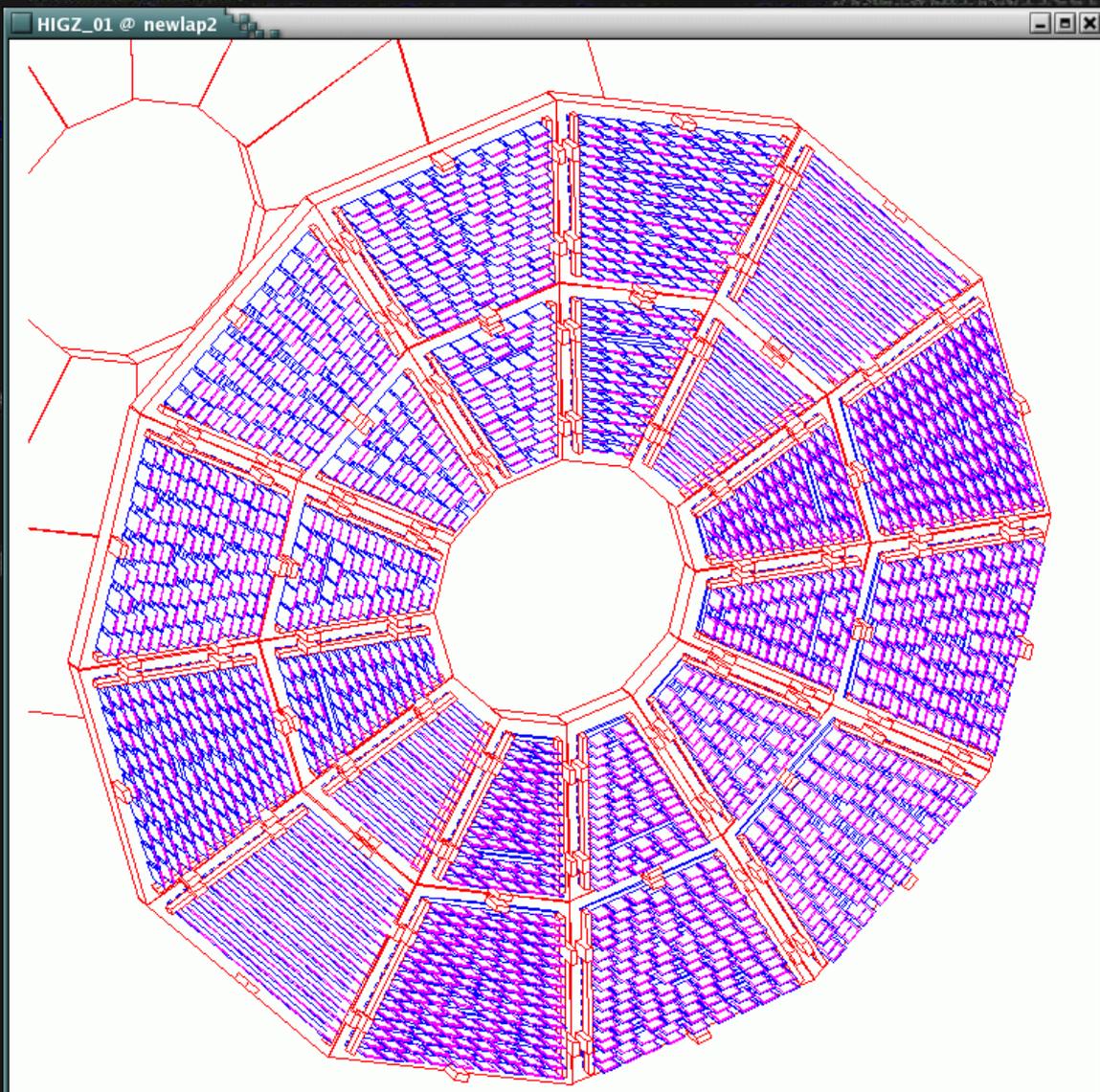
Material Budget SSD



Fri Nov 4 10:45:48 2005



TPC endcap



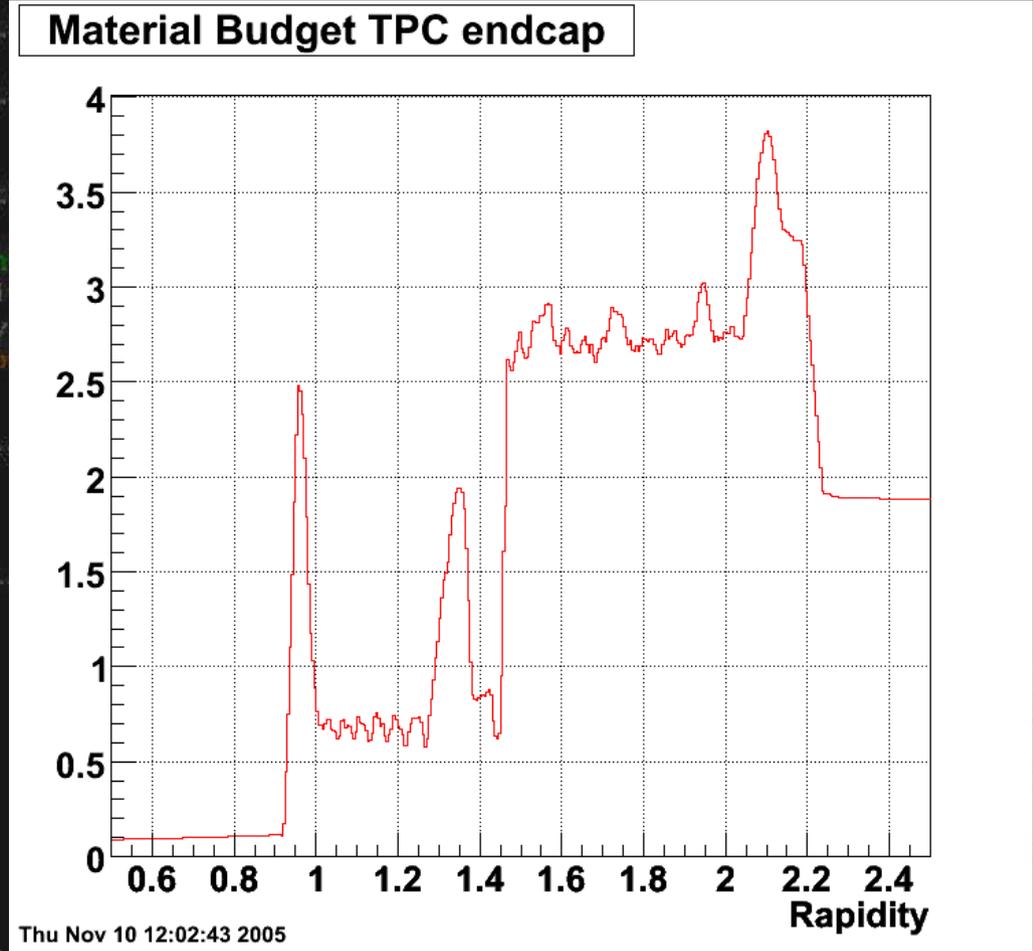
Includes Dave Underwood's observations

Needs to be realistic to study effect on FGT in front of calorimeter

`angle = (360.0/ISBG_nLadder) * nl` | Base tilt, to be further

`GvN Offset` perpendicular to the length of the module/ladder; this to move the midpoint of the sensors back on the requi

Material budget TPC endcap



Support beams clearly visible
Much more material in inner padrows?
Need to investigate.....

IST Strip Simulator

Afterburner to simulate silicon strip response

Internal strip geometry implemented

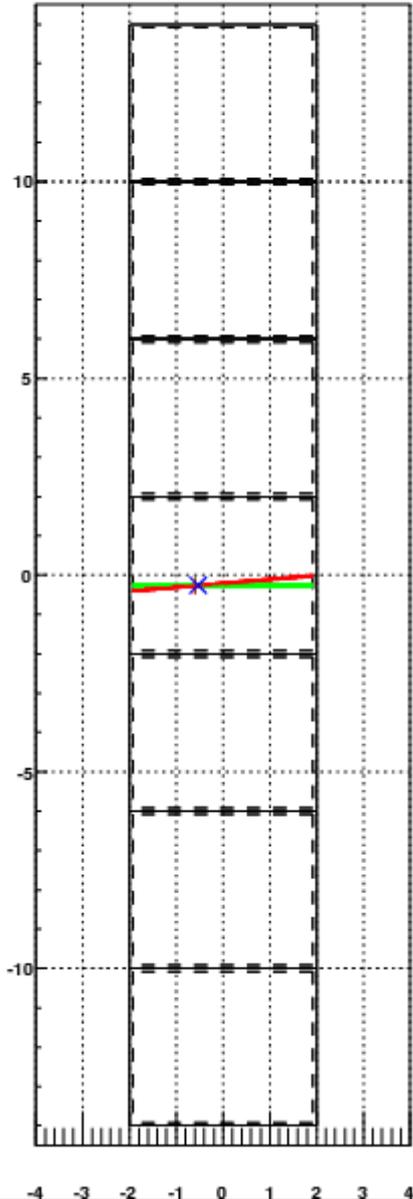
Find hits, reconstructs hits from hit strips

Proper clustering is being worked on

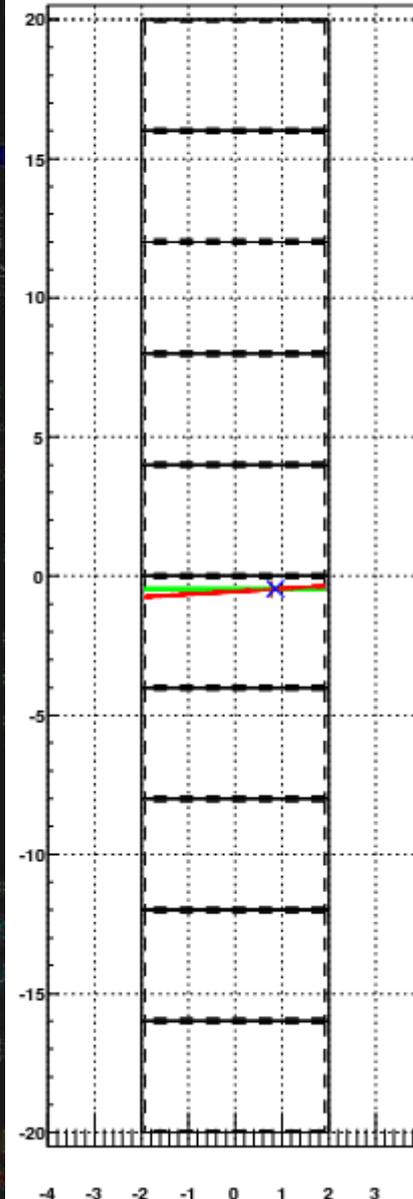
Need ITTF tracking!

See Mike Miller's talk

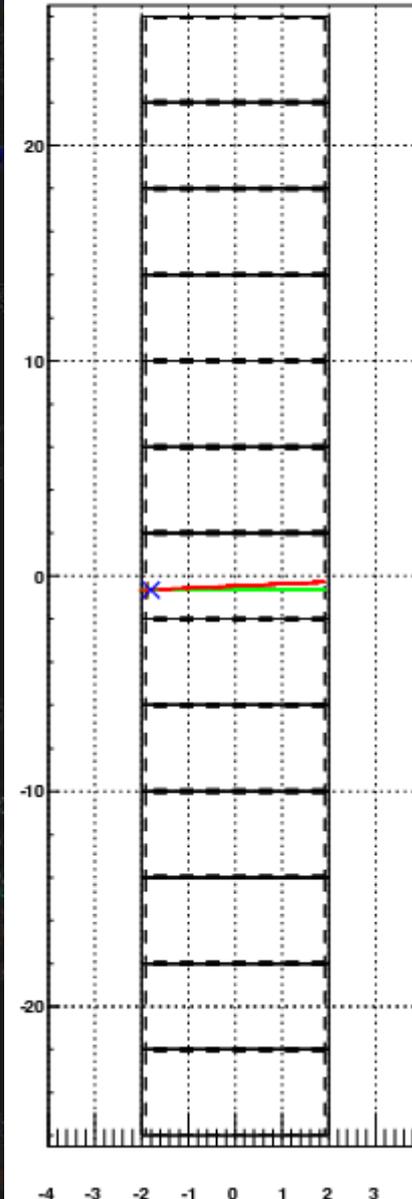
layer 1 and 2, ladder 9



layer 3 and 4, ladder 16



layer 5 and 6, ladder 22



Summary

Engineering effort is well underway (Jim Kelsey @ Bates)

All upgrade geometries have been implemented in StarSim

Monte Carlo studies have started

Initially will focus on occupancy in IST

Then will look at pointing resolution toward HFT

Desperately need of proper tracking (ITTF)

Studying material budget