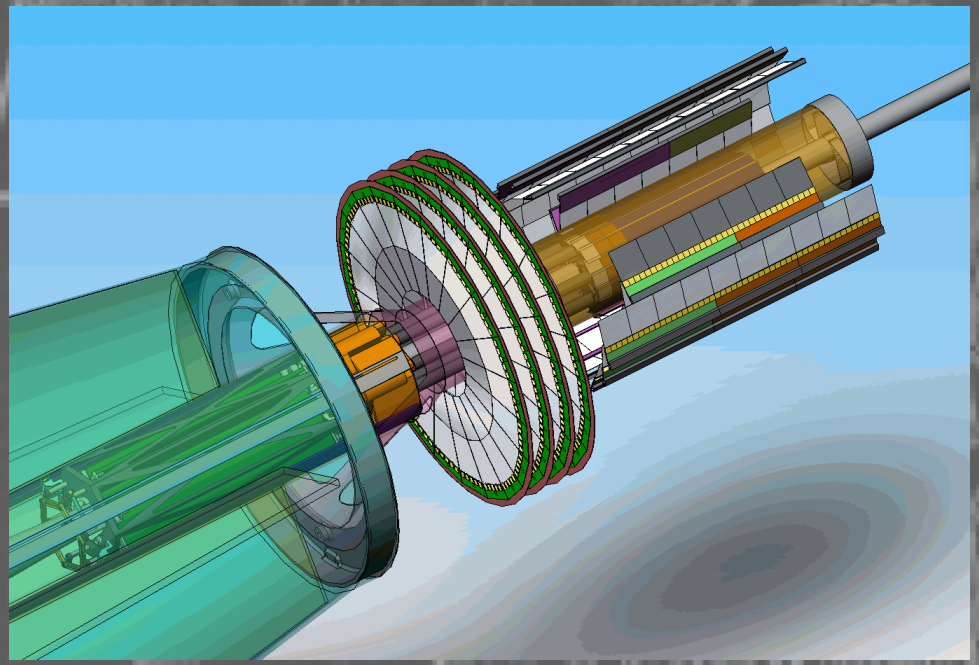
Inner and Forward Tracking Upgrade



Towards a CD0

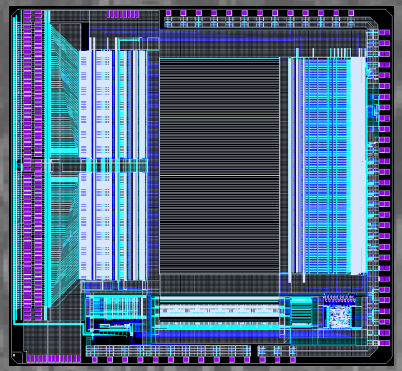
Gerrit van Nieuwenhuizen

TUP workshop

BNL, 28 February 2006

IST physics

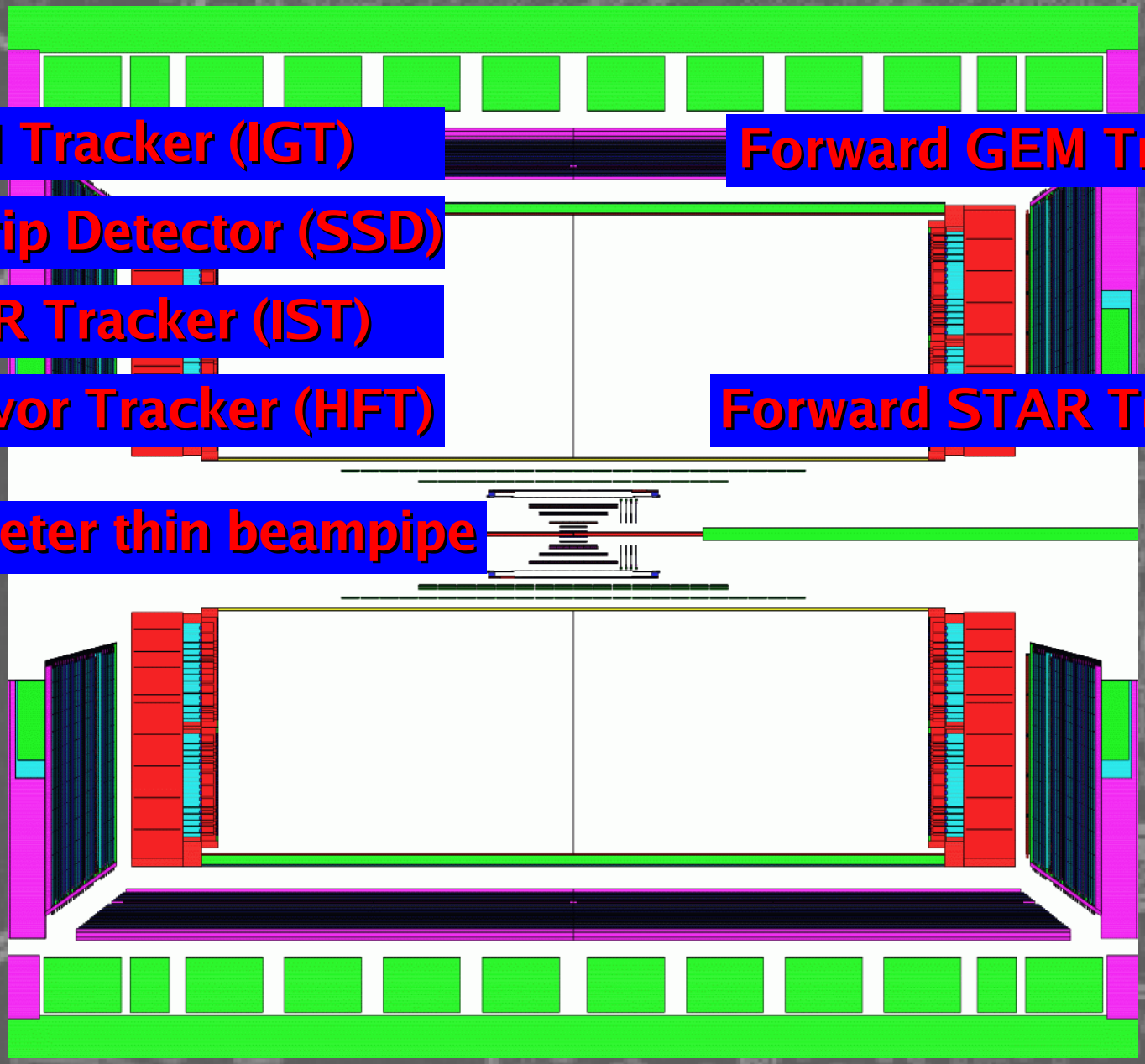
(c,b) R_AA as function of centrality
(c,b) Flow as function of centrality
Reference/Baseline systems (p+p, d+A, light A+A),
lower energies



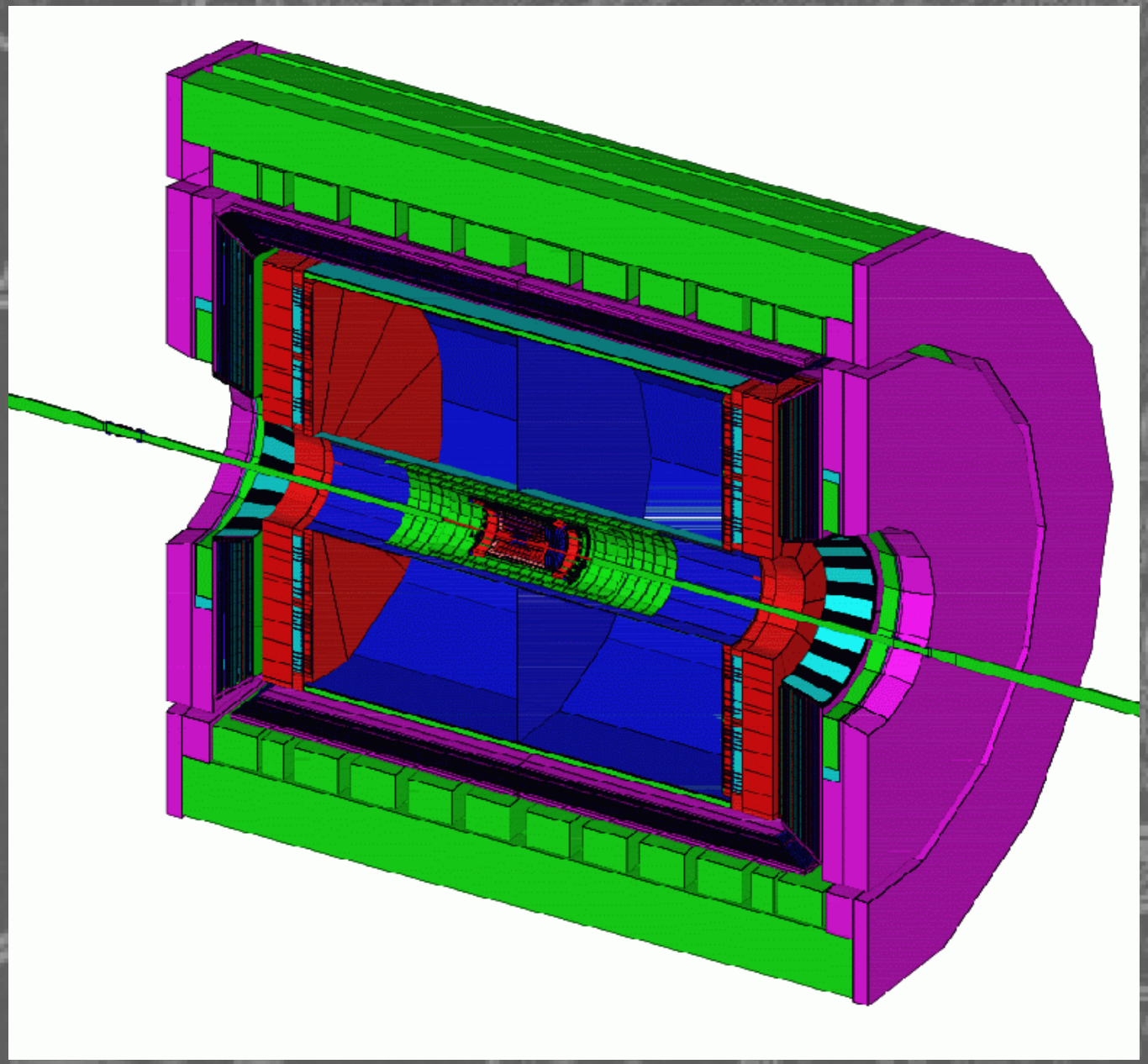
APV25S1 readout chip

Fast detector (no problems with overlapping events)
Able to work at low multiplicities
Good pointing resolution to hook up to HFT
Reasonable DCA resolution to do (c,b)

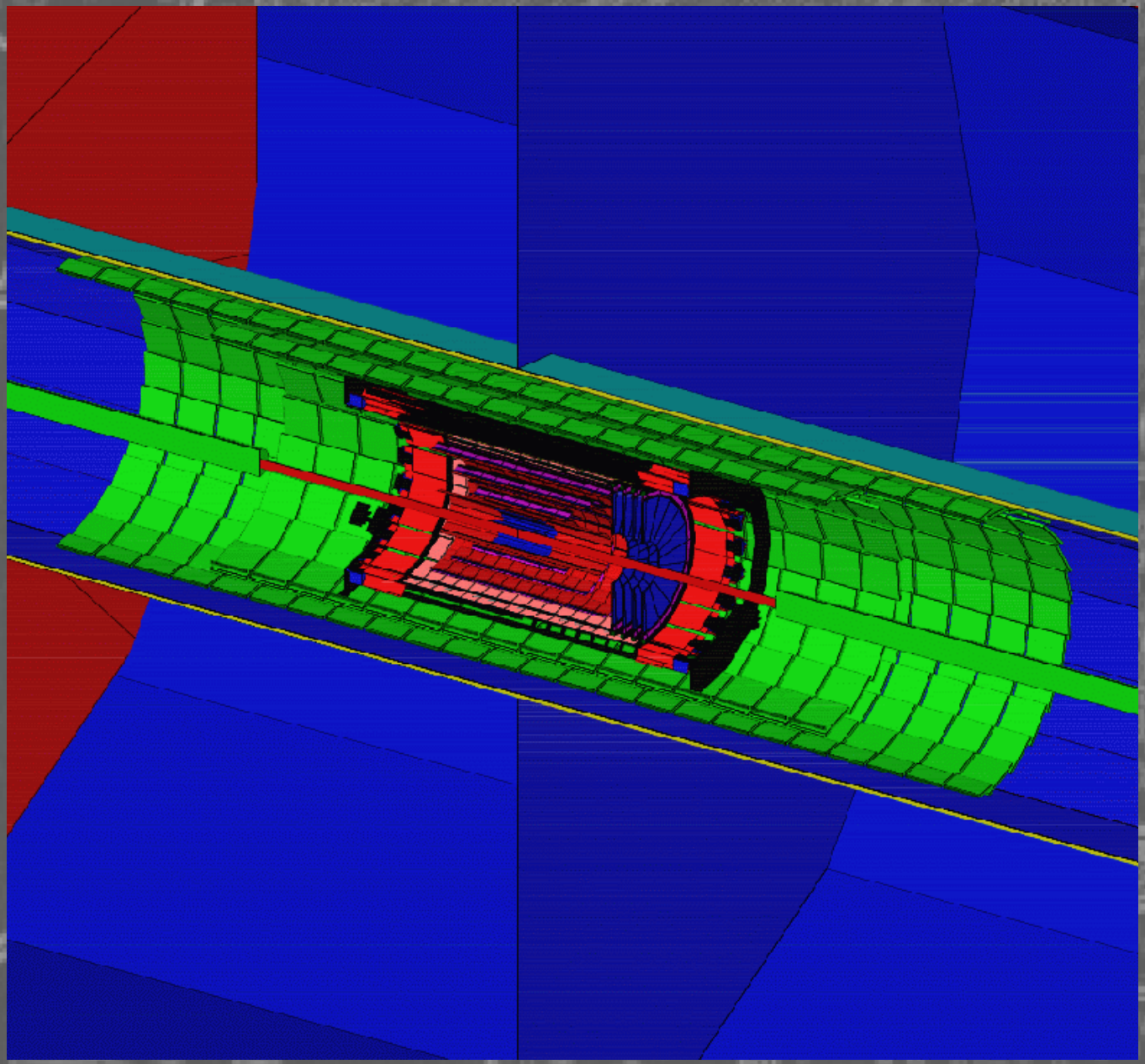
Tracking Upgrade in STAR



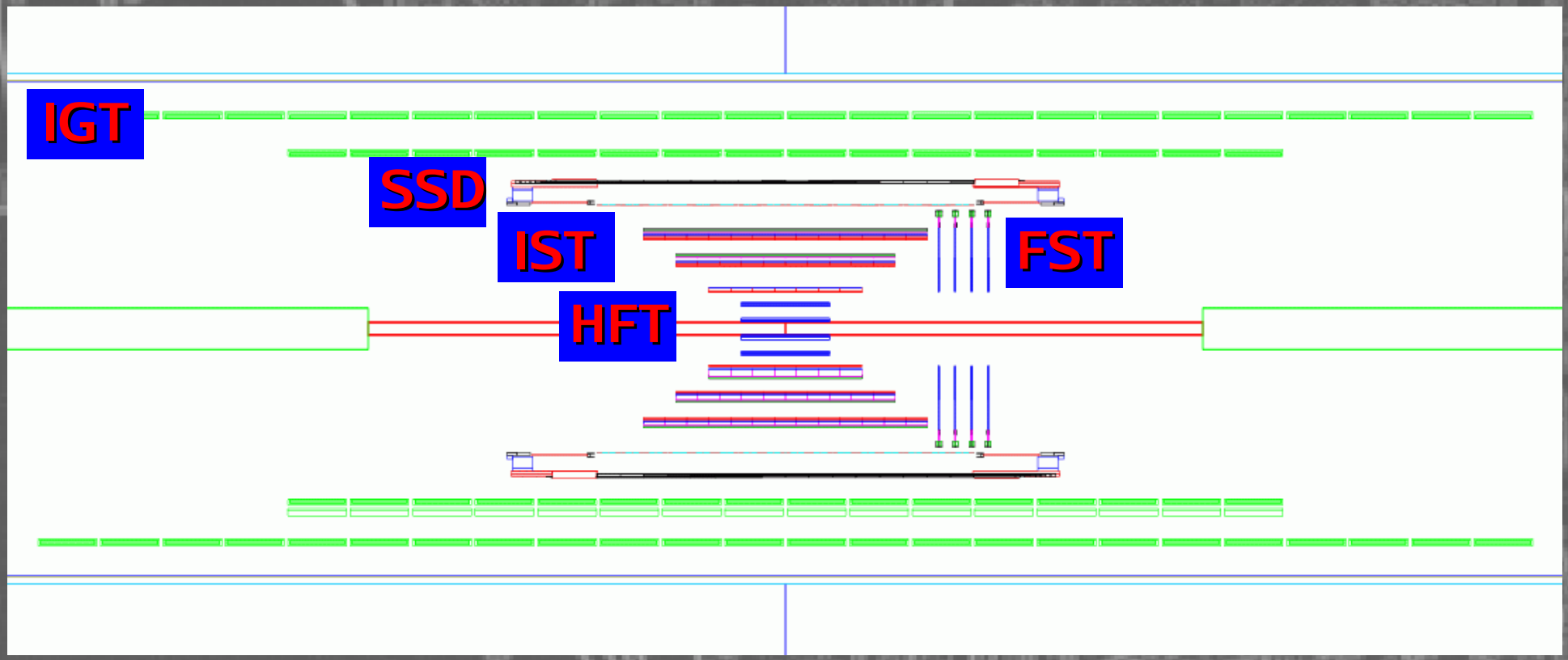
Tracking Upgrade in STAR



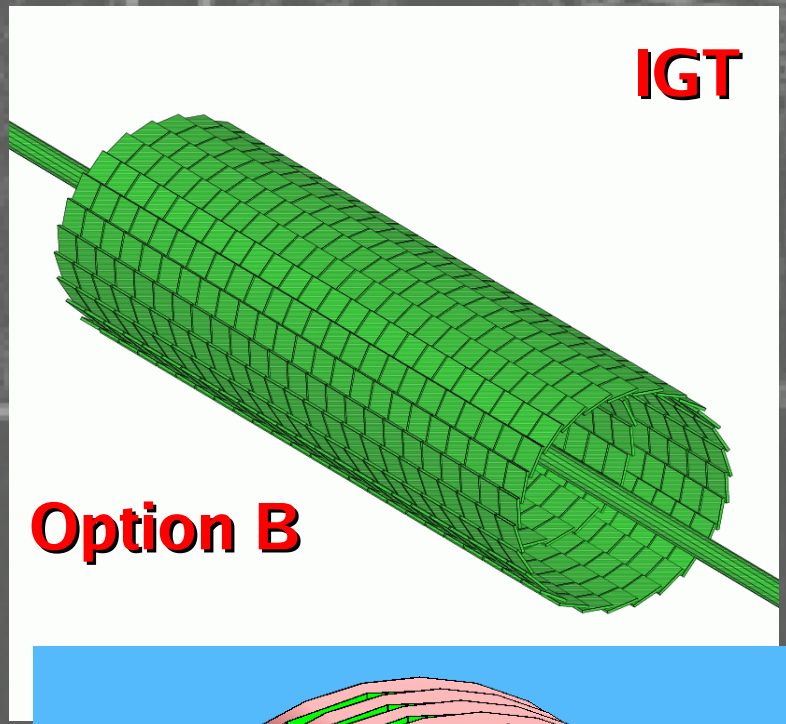
Tracking Upgrade inside TPC

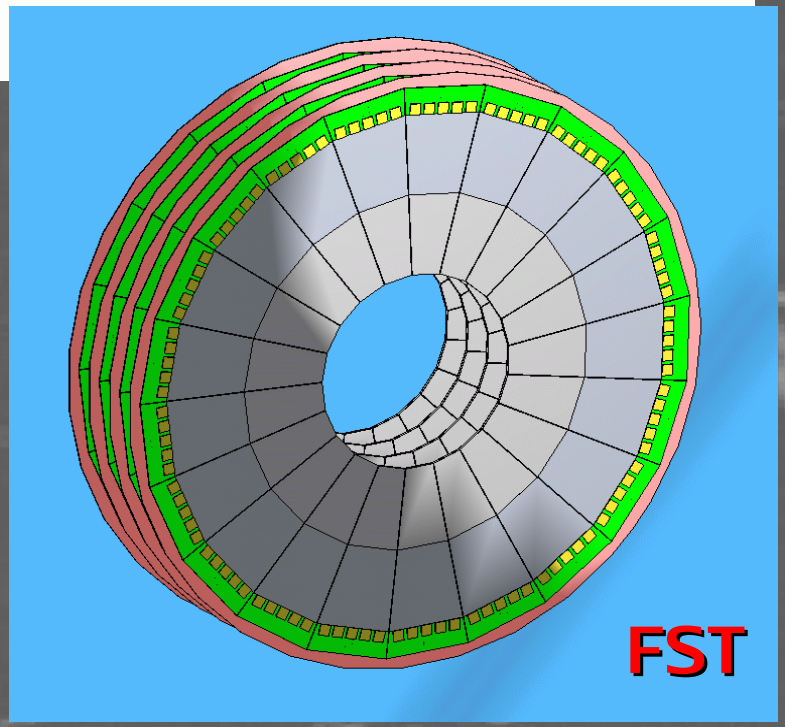


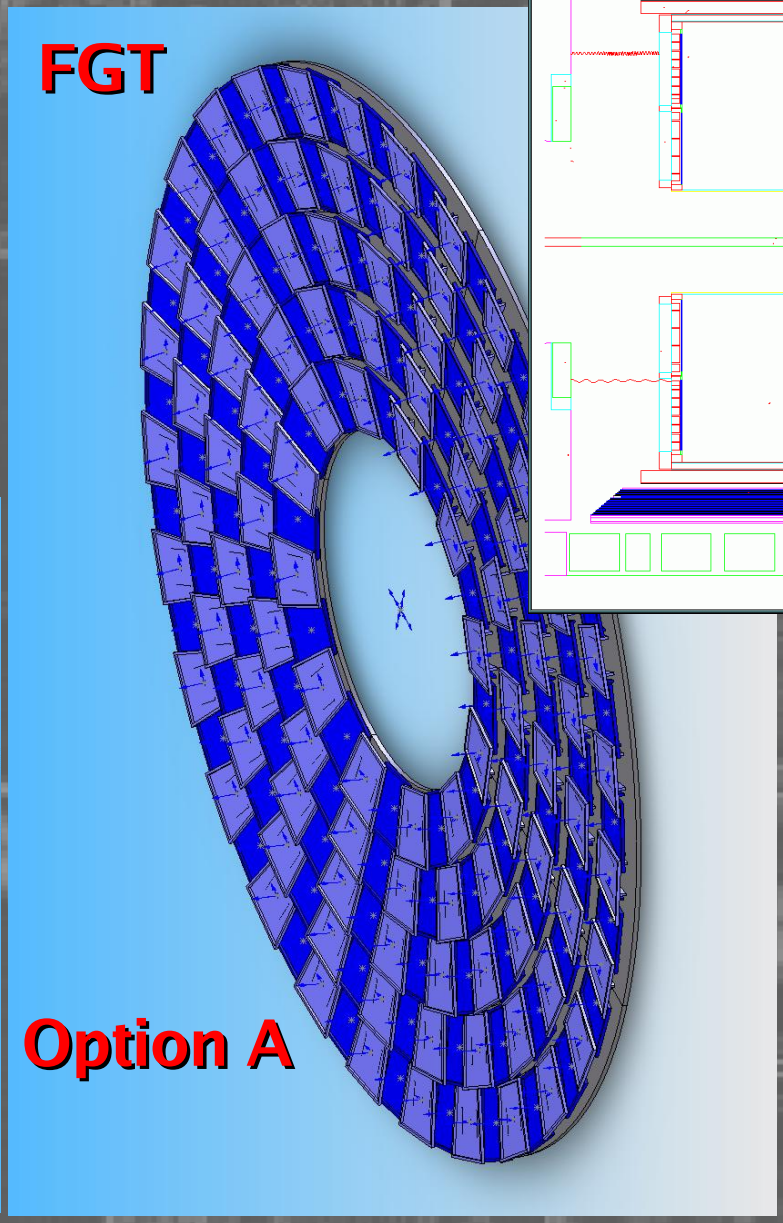
Tracking Upgrade inside TPC

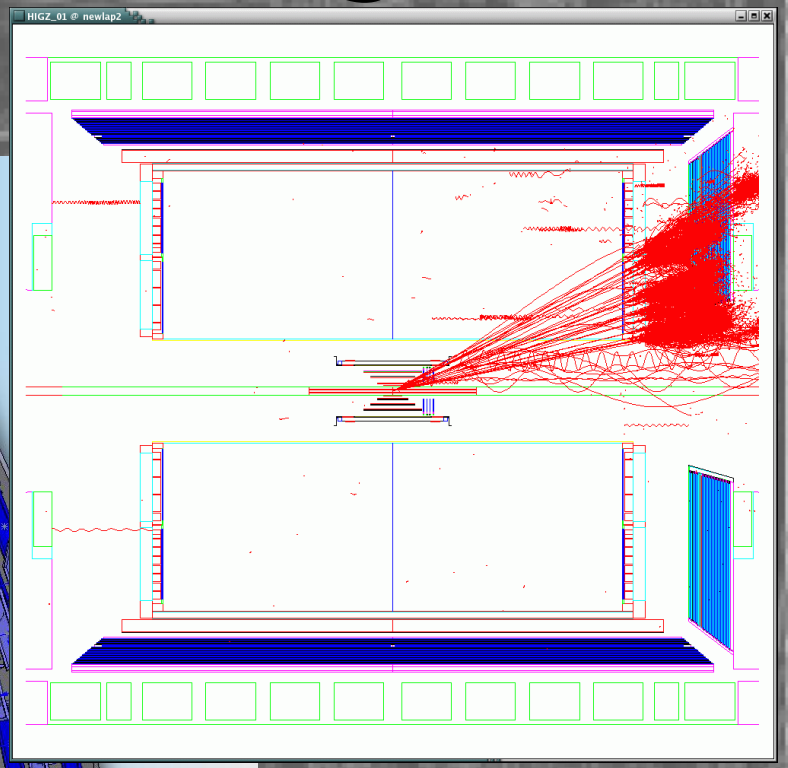


Forward STAR Tracking

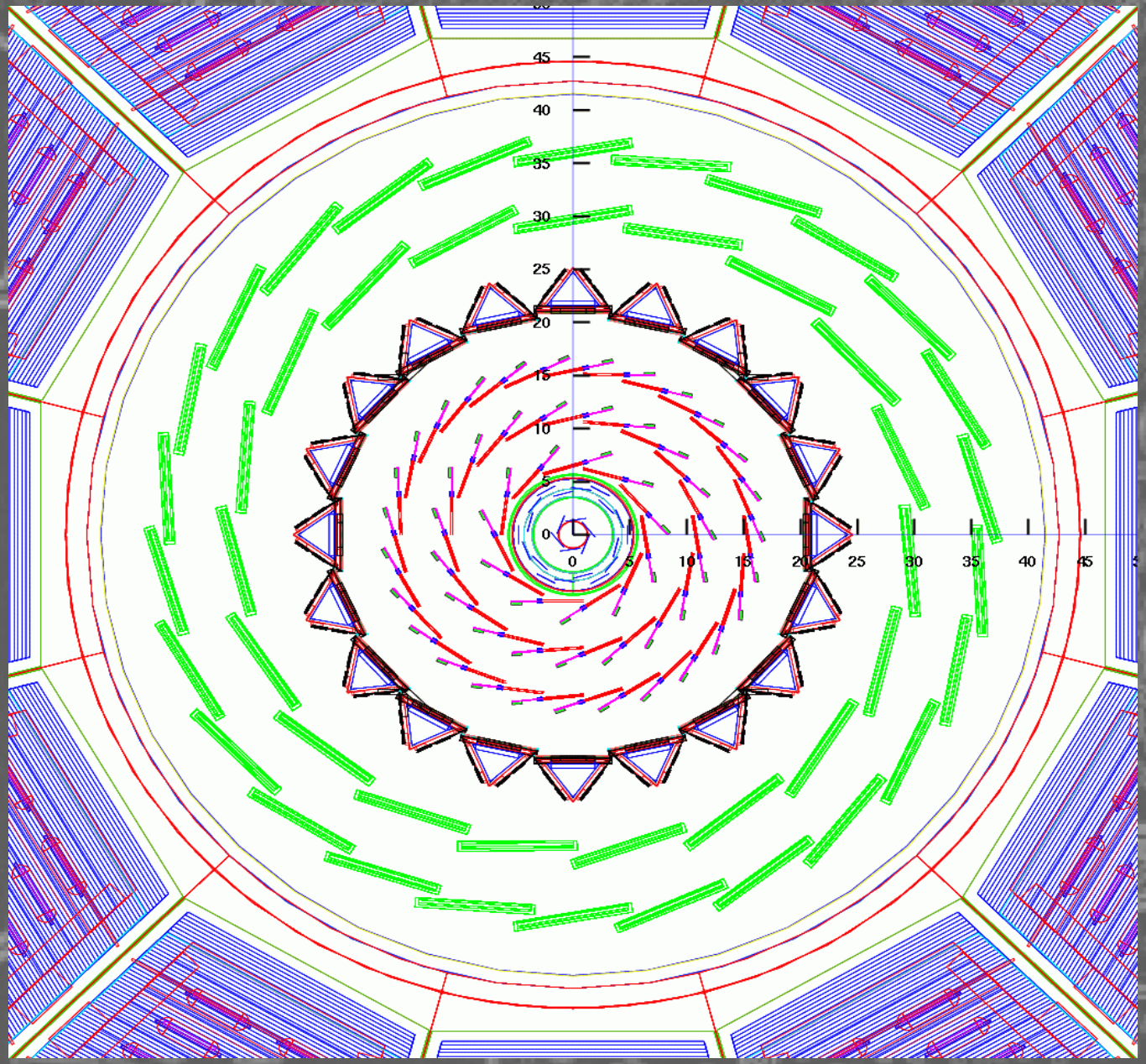




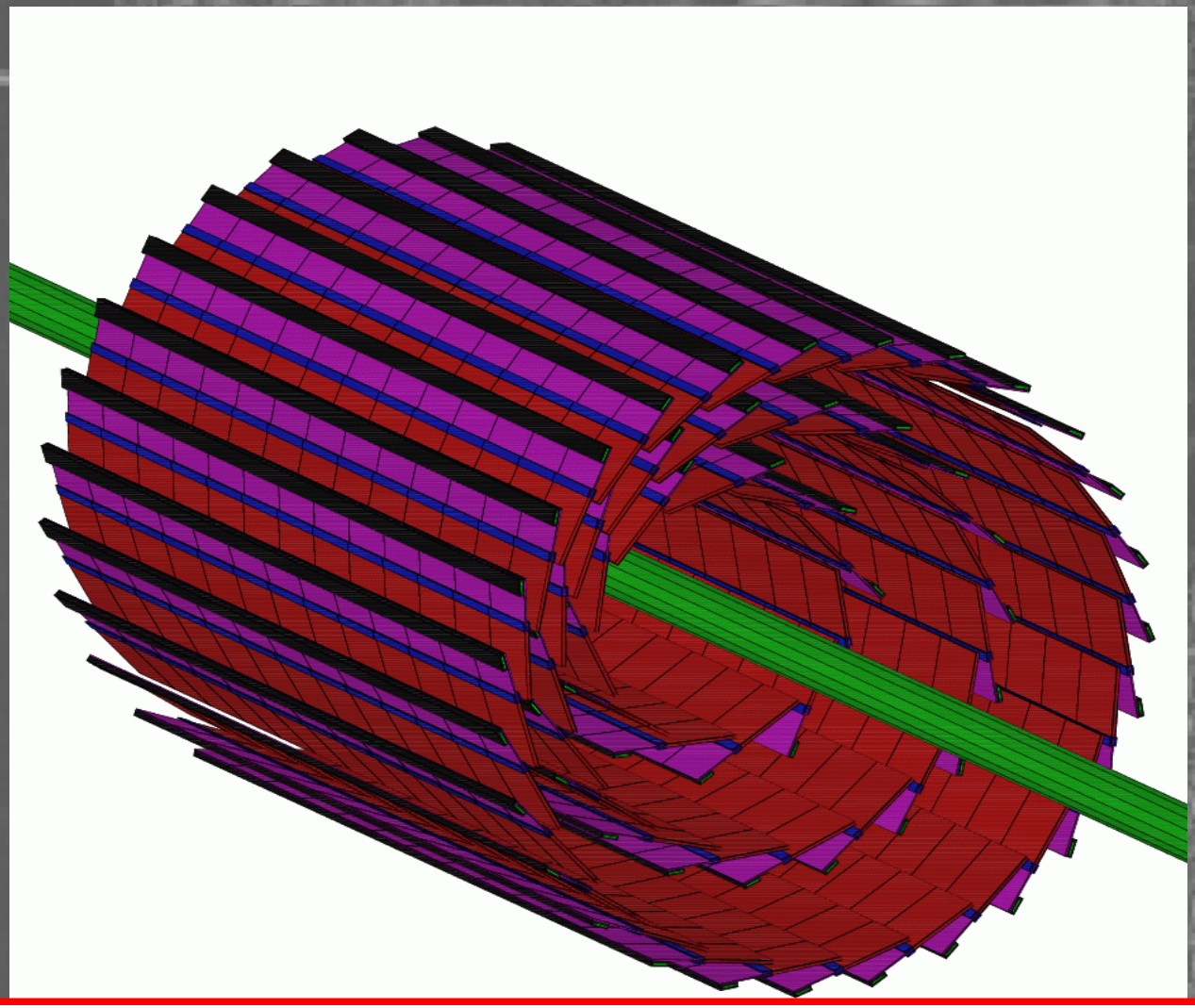




Tracking Upgrade inside TPC



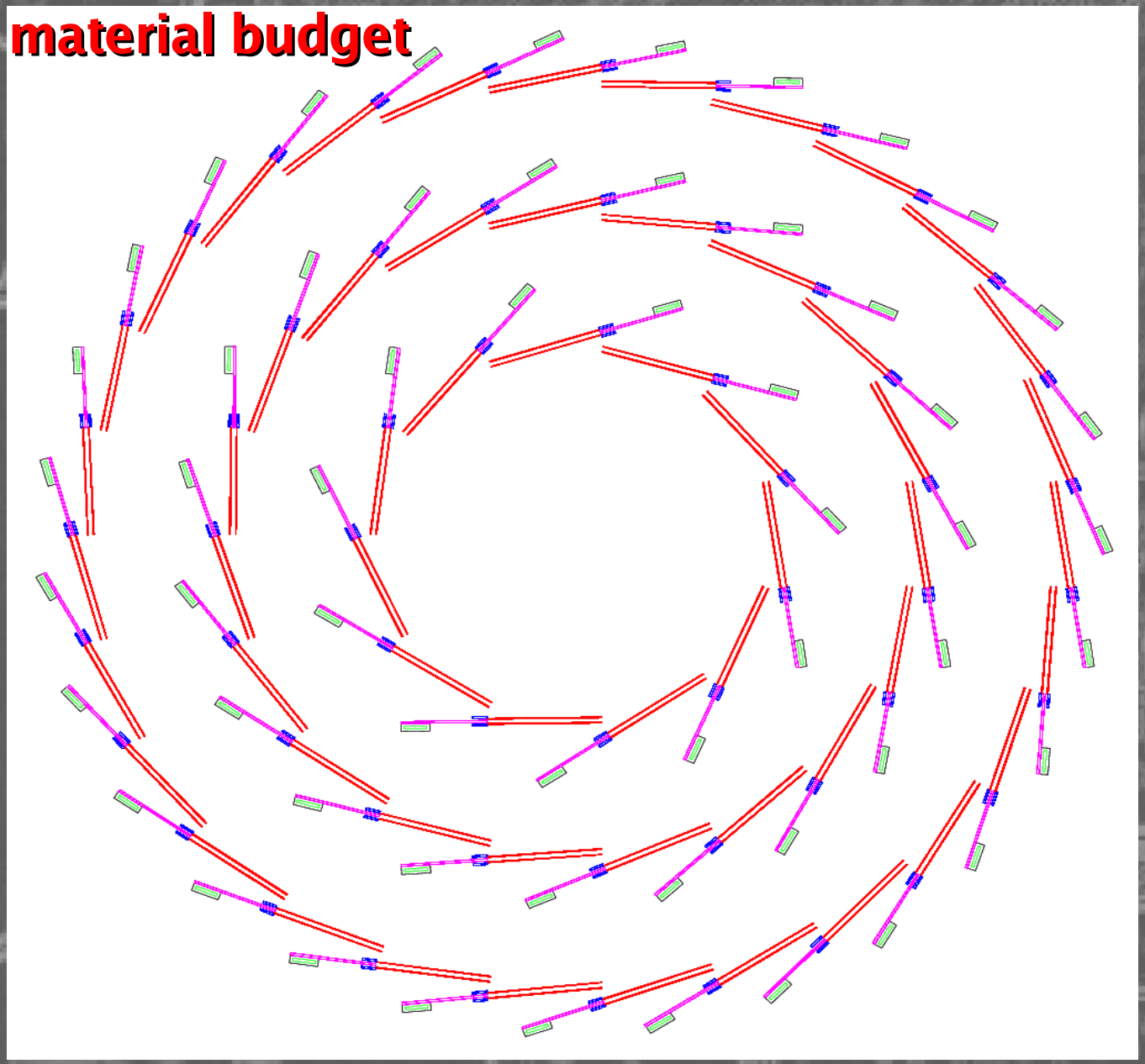
Inner STAR Tracker (IST)



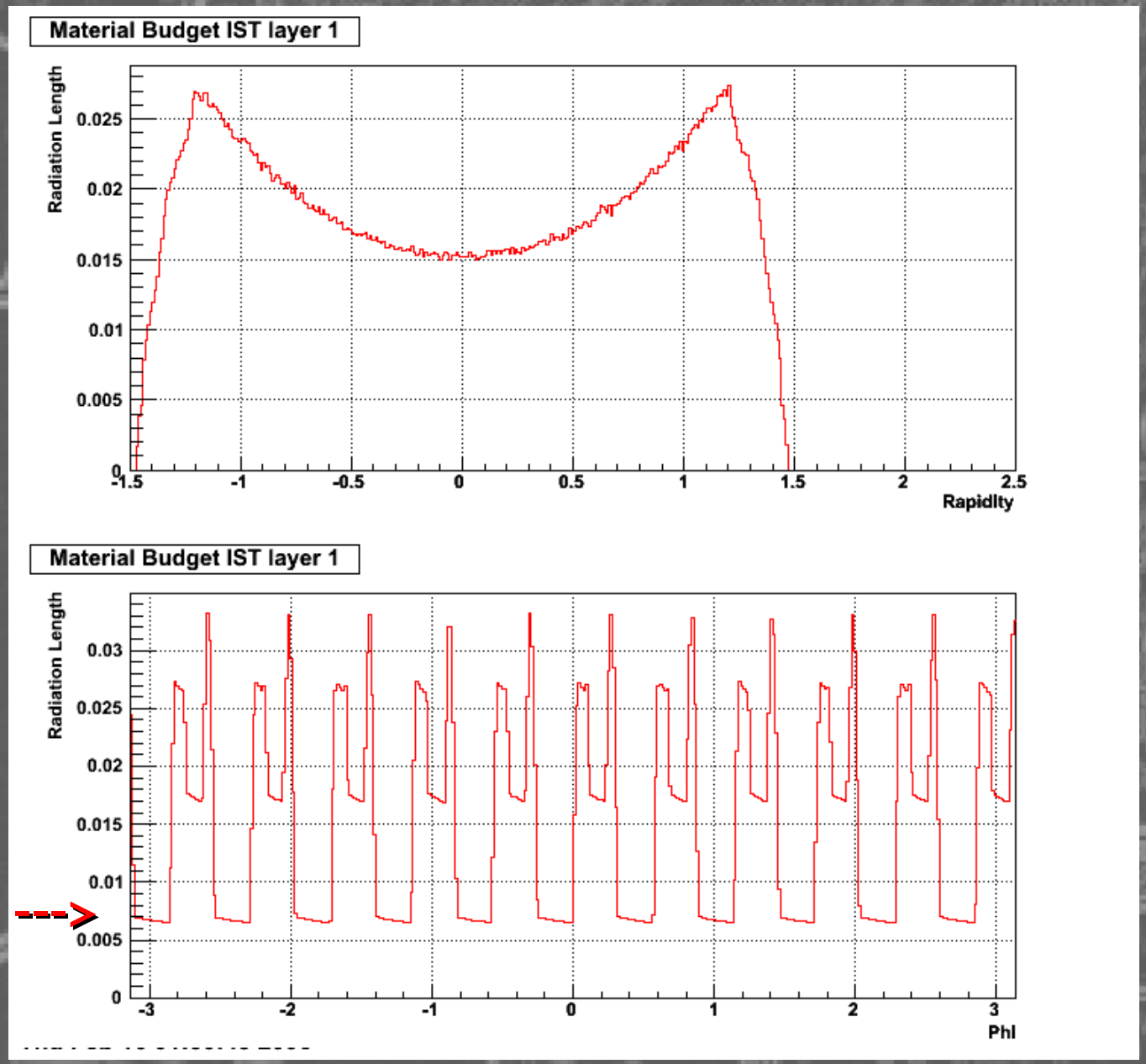
	Layer 1	Layer 2	Layer 3
Radius [mm]	70	120	170
No. Sensor per ladder	14	20	26
No. Ladders per layer	11	19	27

Inner STAR Tracker (IST)

Minimized material budget

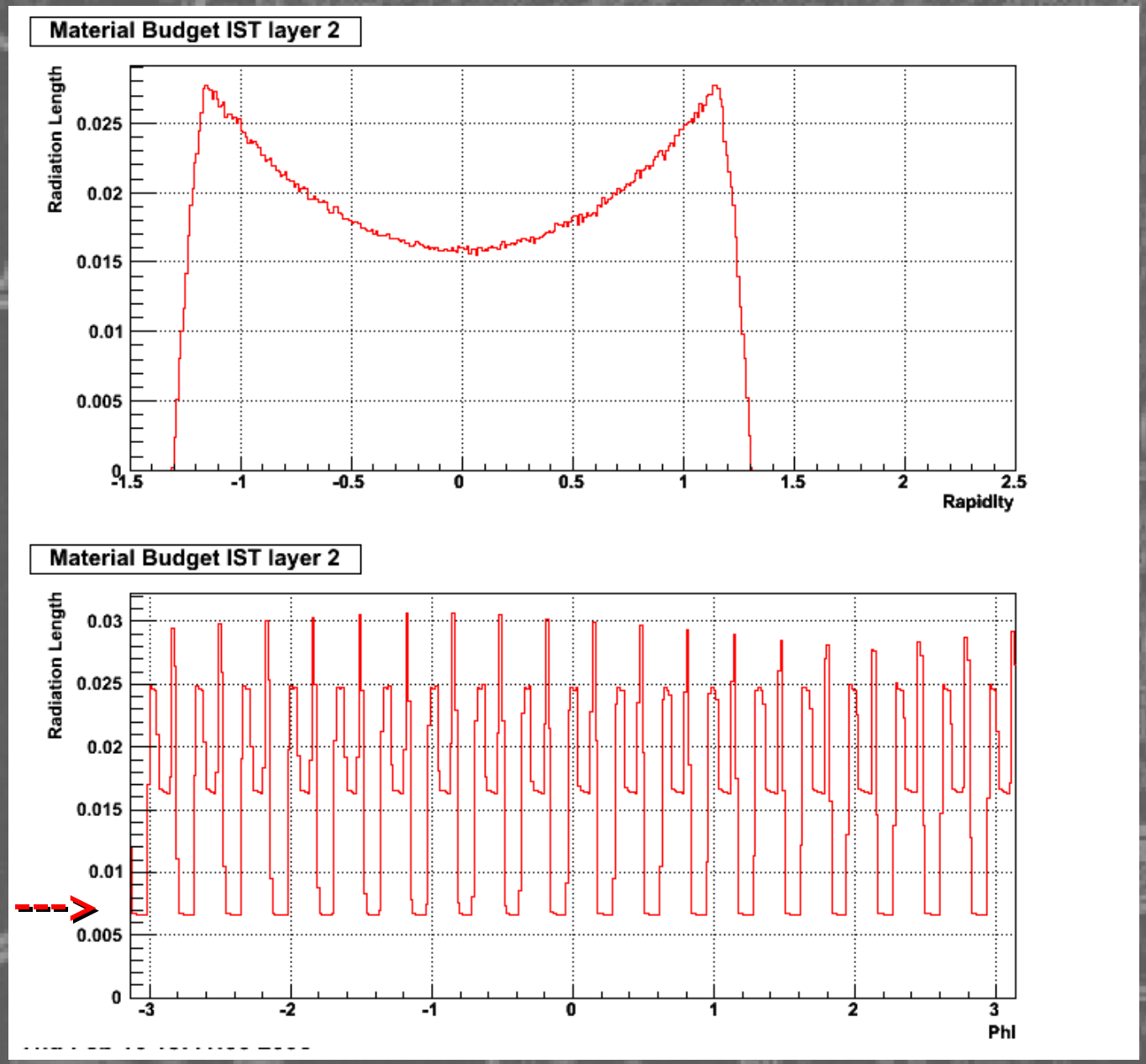


Material Budget IST Layer 1



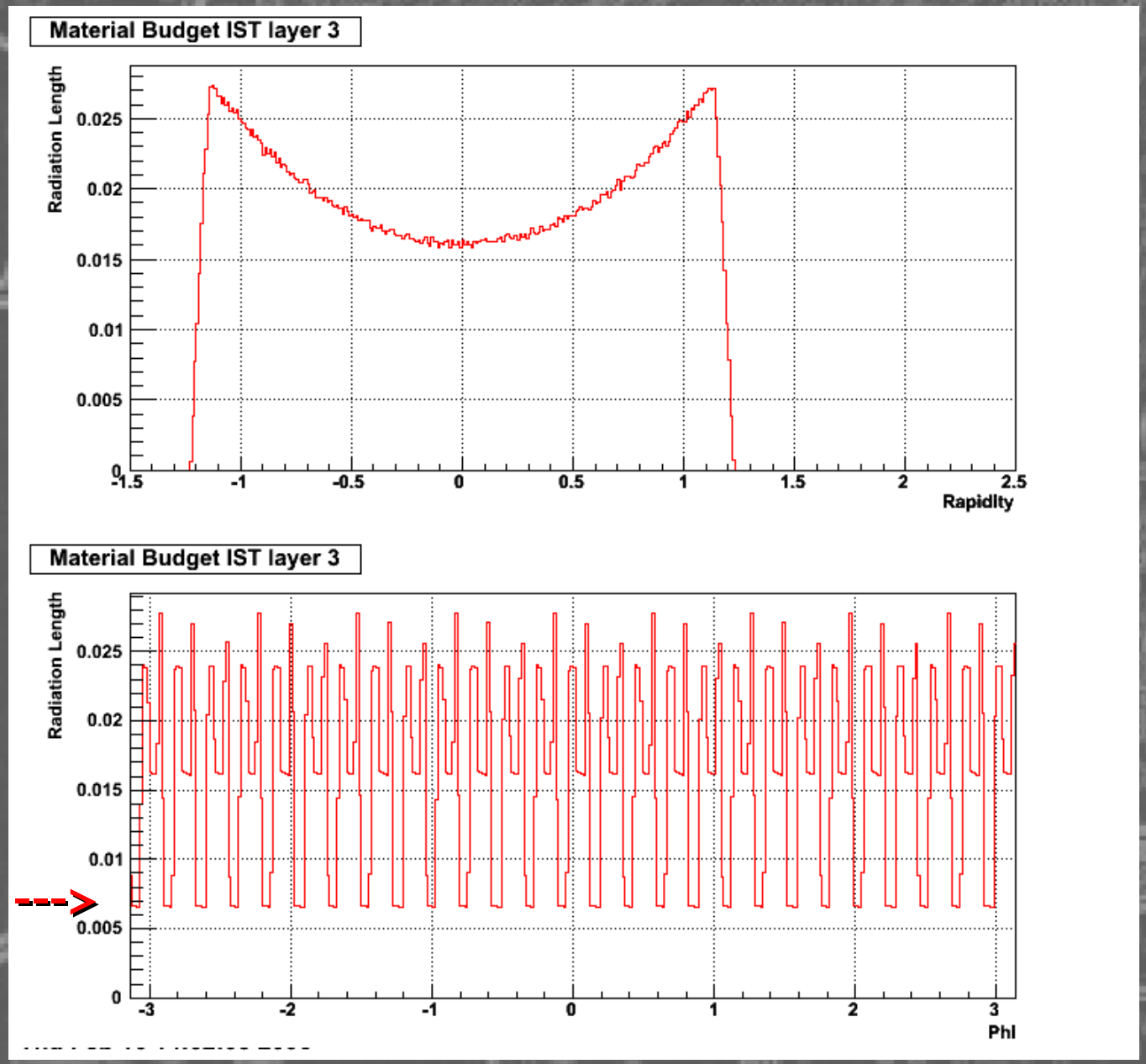
2 sensors --->

Material Budget IST Layer 2



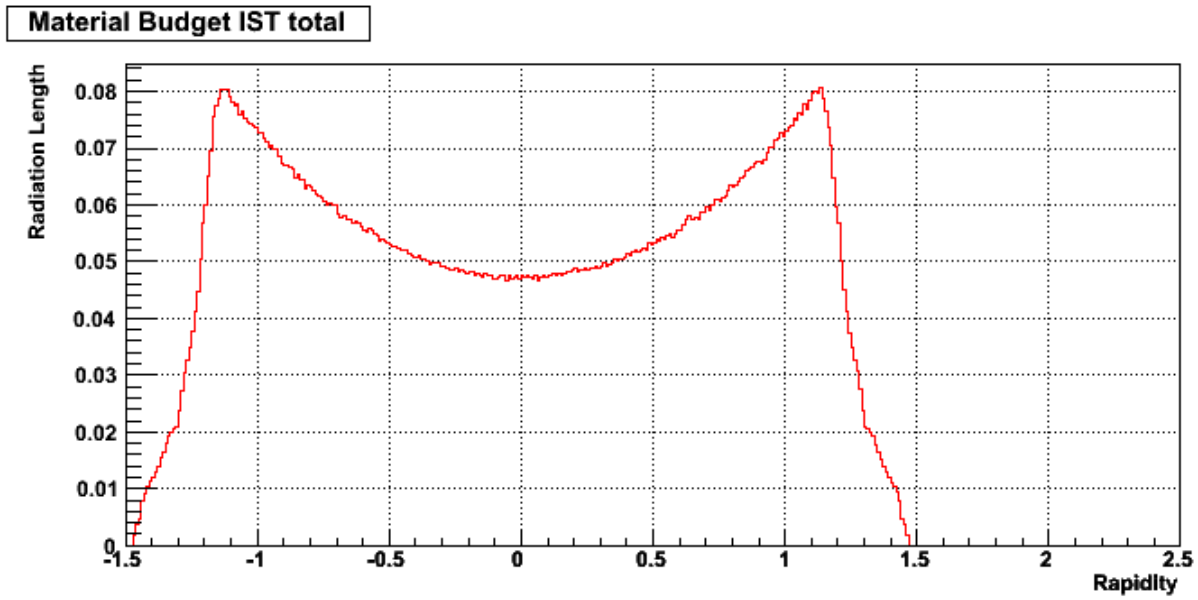
2 sensors --->

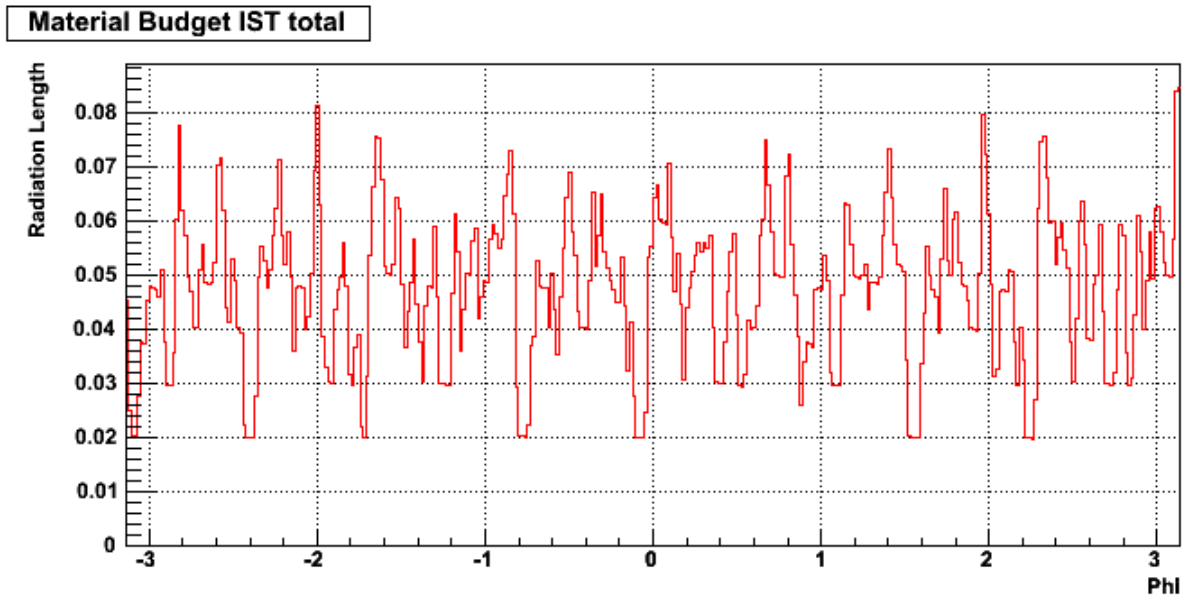
Material Budget IST Layer 3



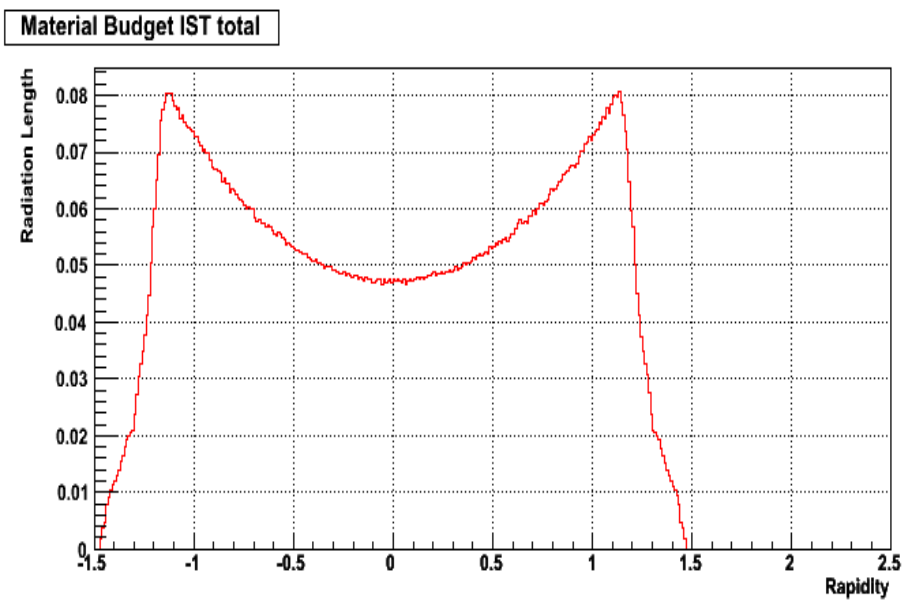
2 sensors --->

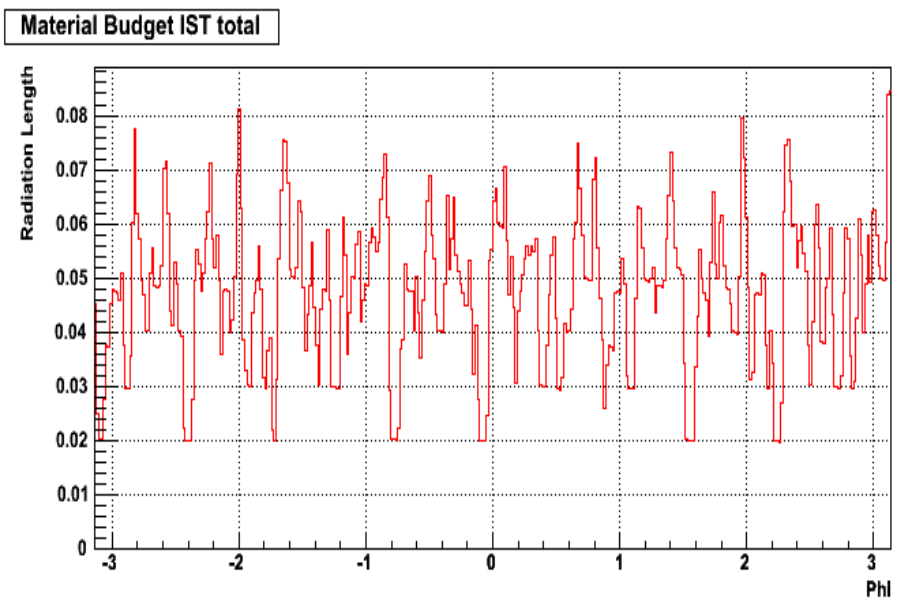
Total Material Budget IST

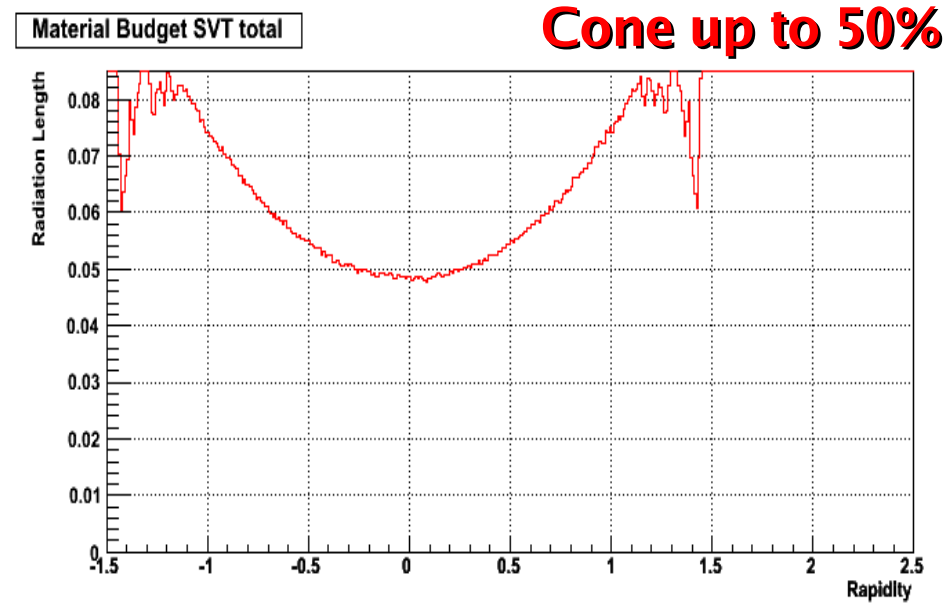




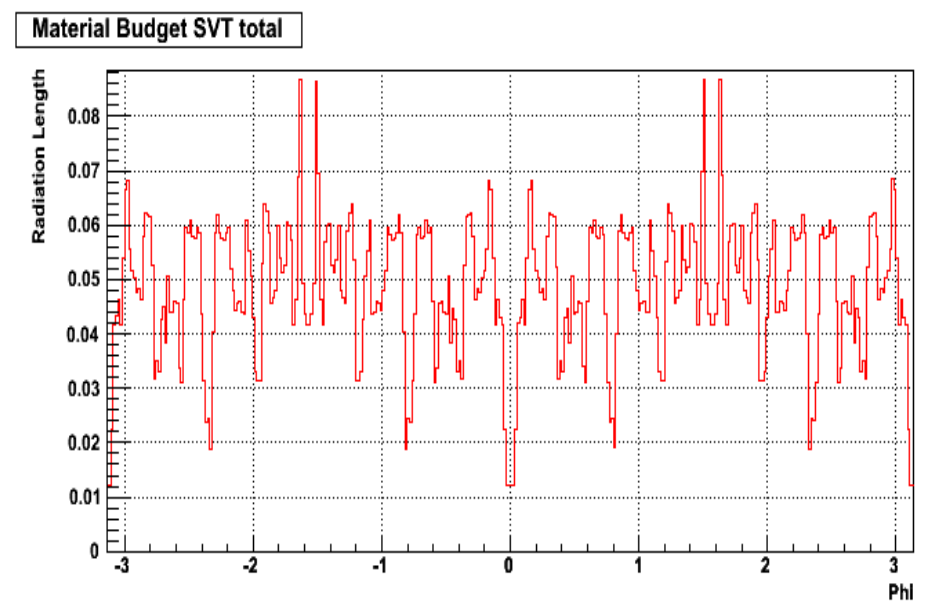
Material Budget IST and SVT



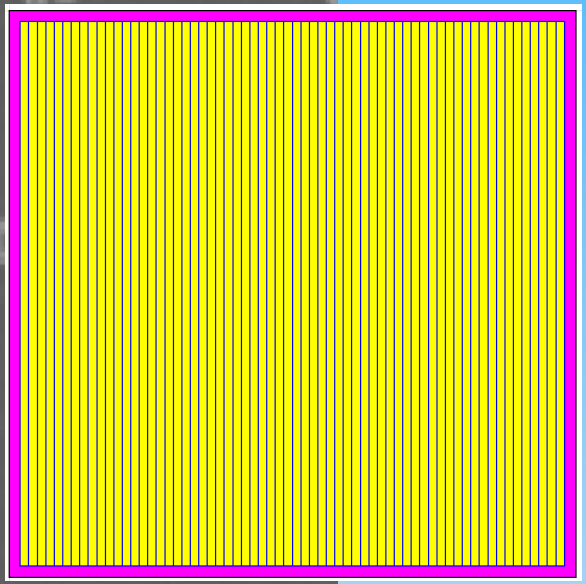


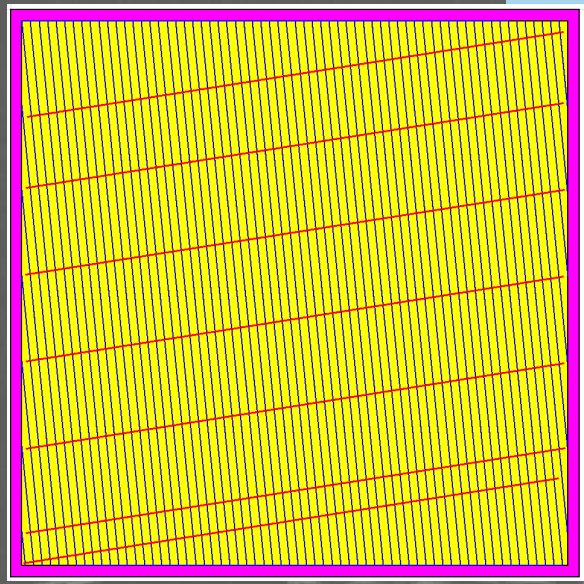


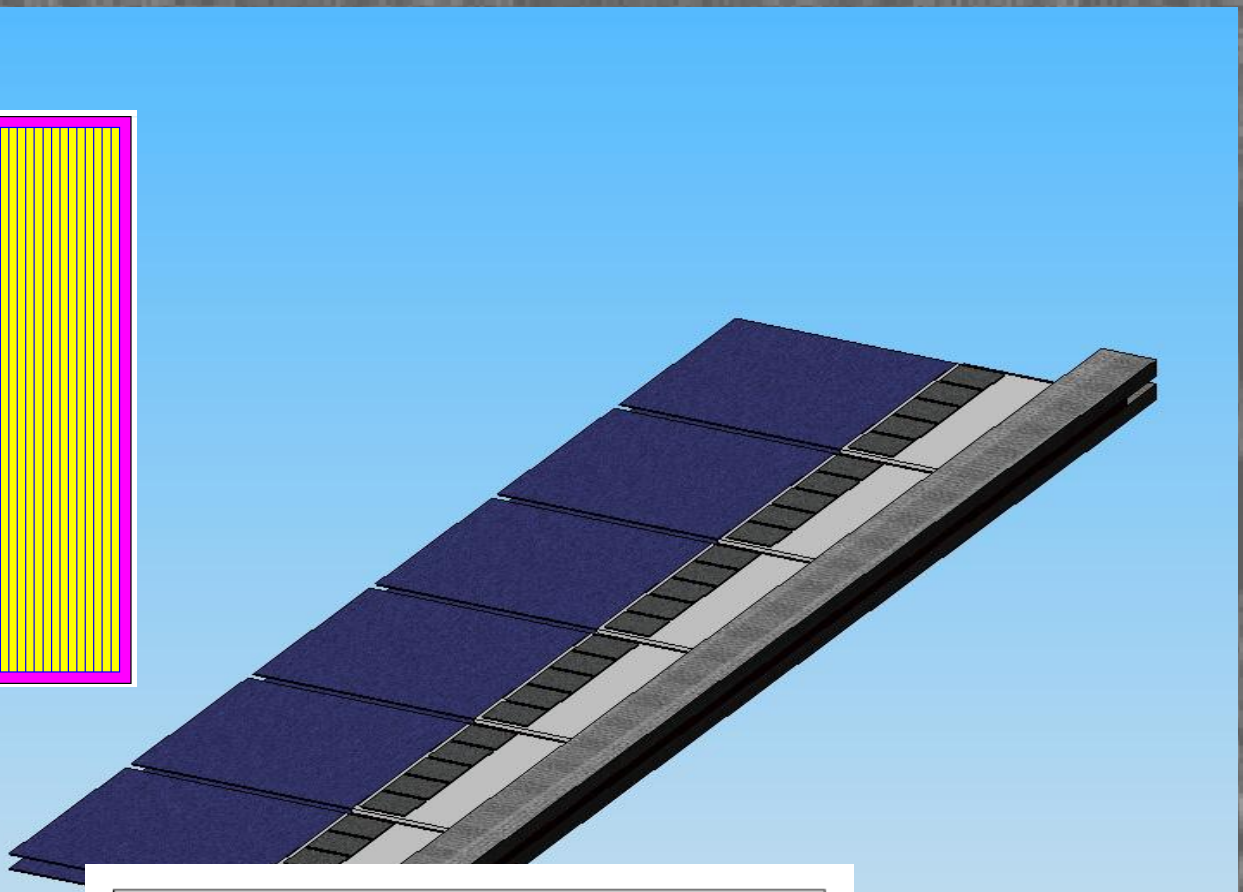
Cone up to 50% Xo

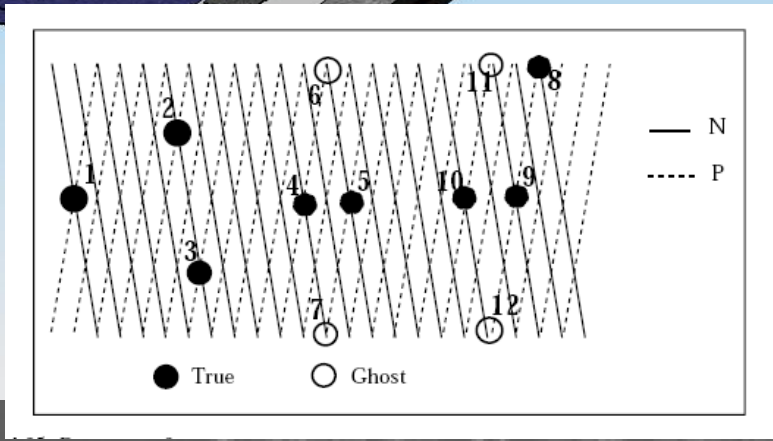


IST Ladder

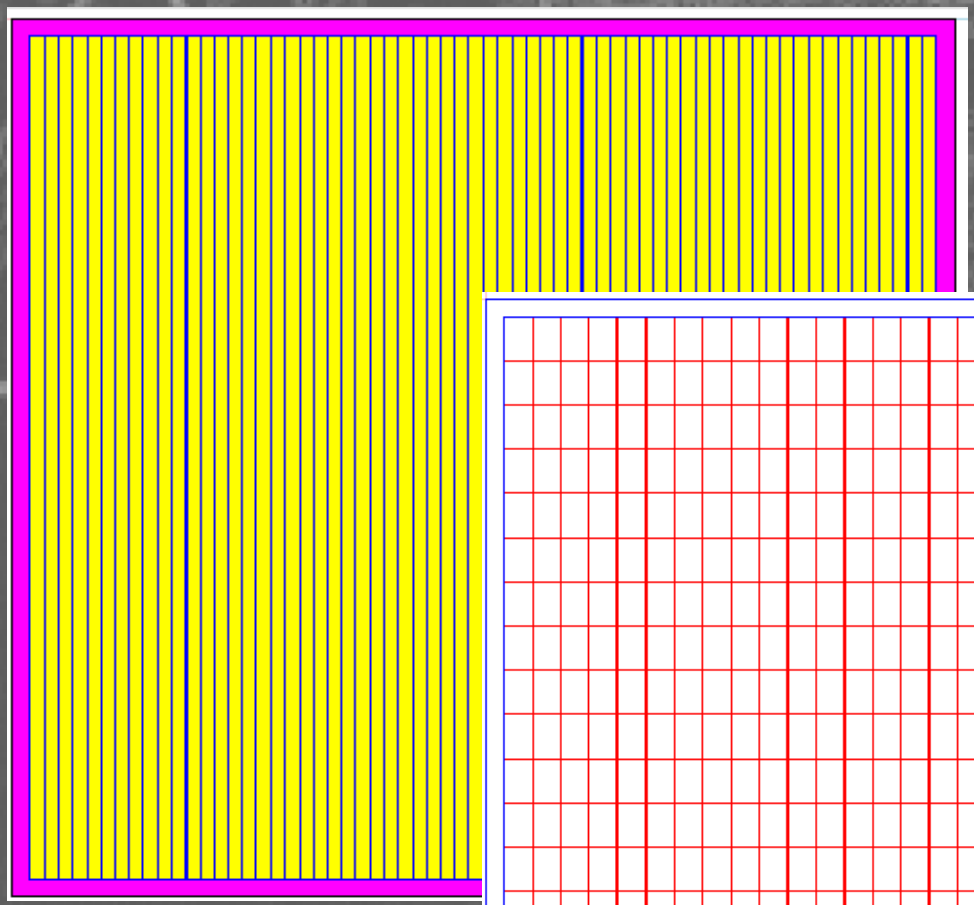




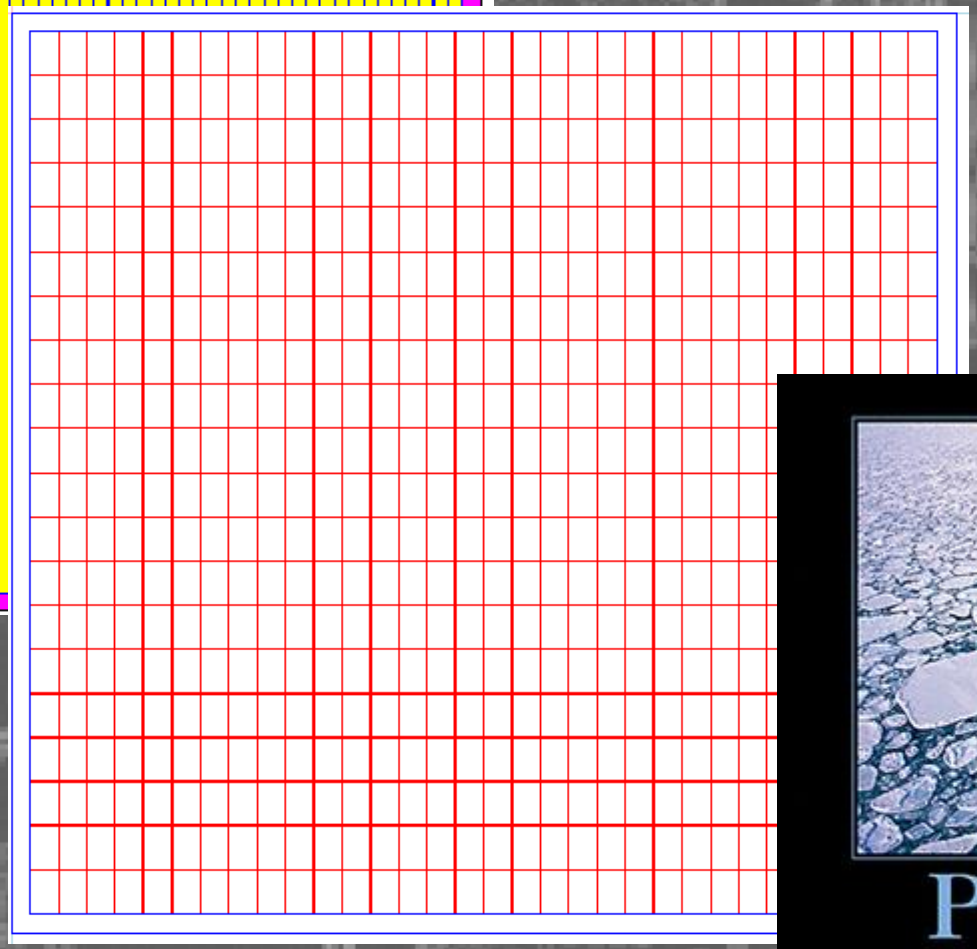




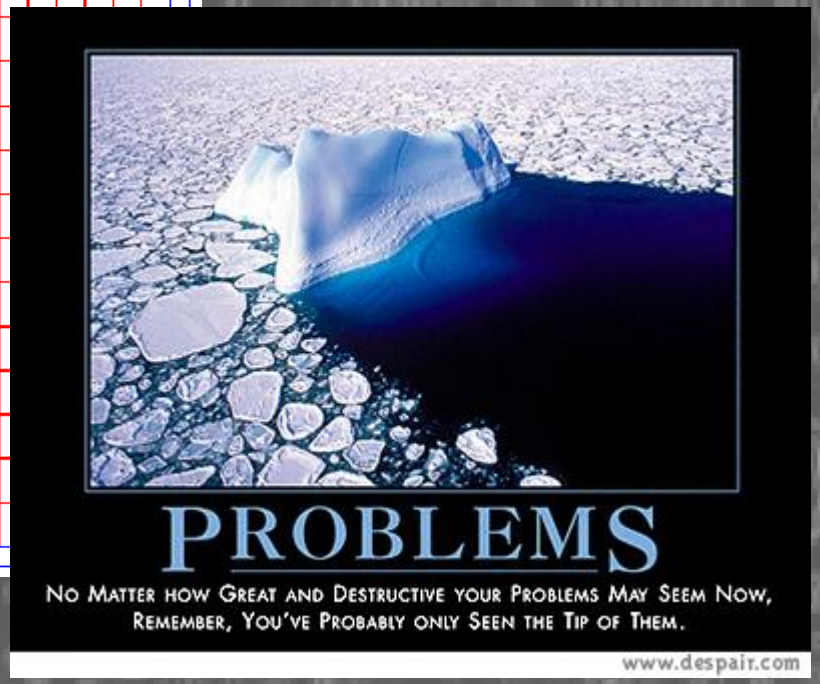
IST sensors



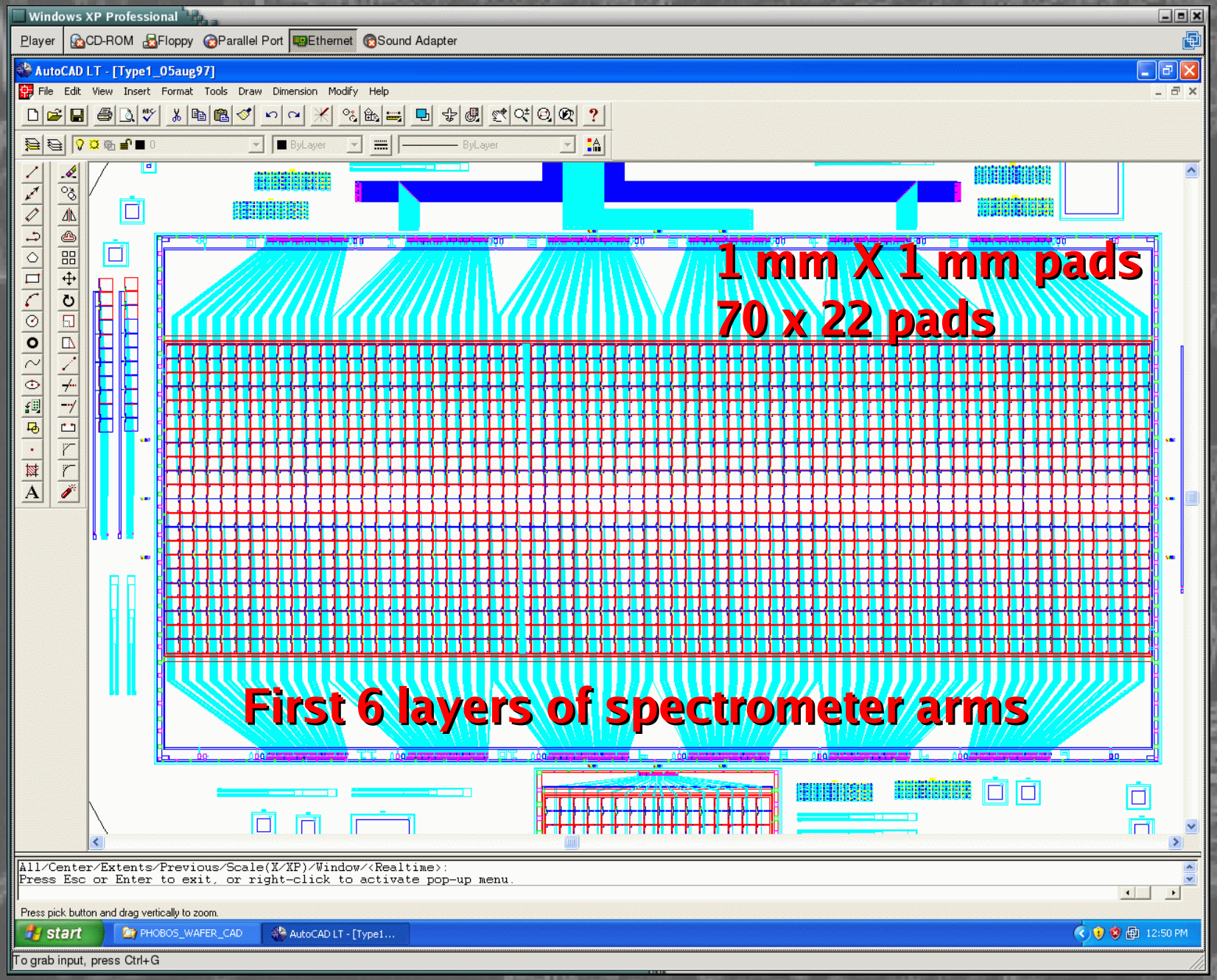
4 cm X 4 cm
640 strips
60 um pitch



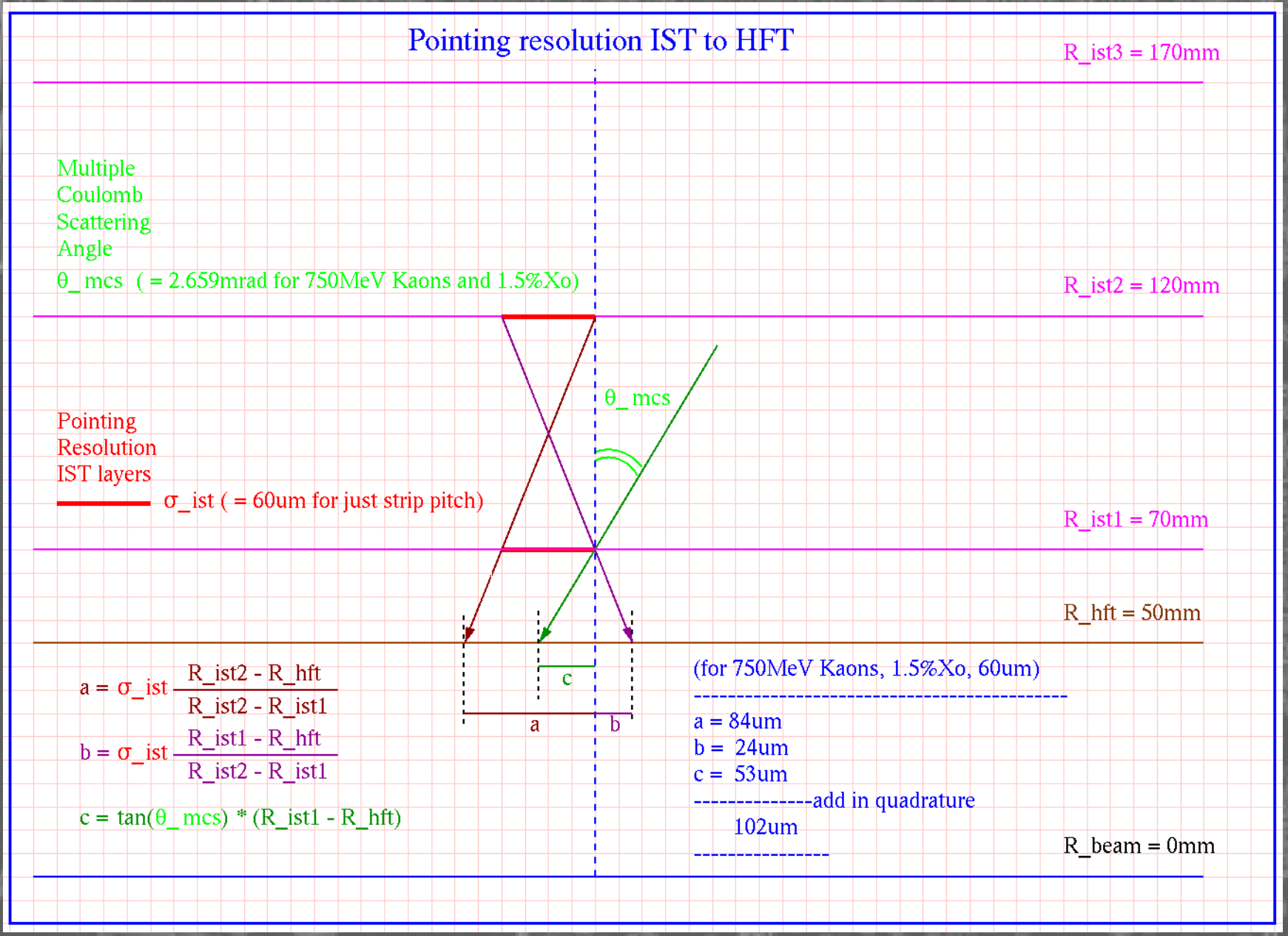
4 cm X 4 cm
30 X 21 pads
1.3 mm x 1.8 mm



PHOBOS Silicon Pad Sensors



Pointing Resolution Strips to HFT



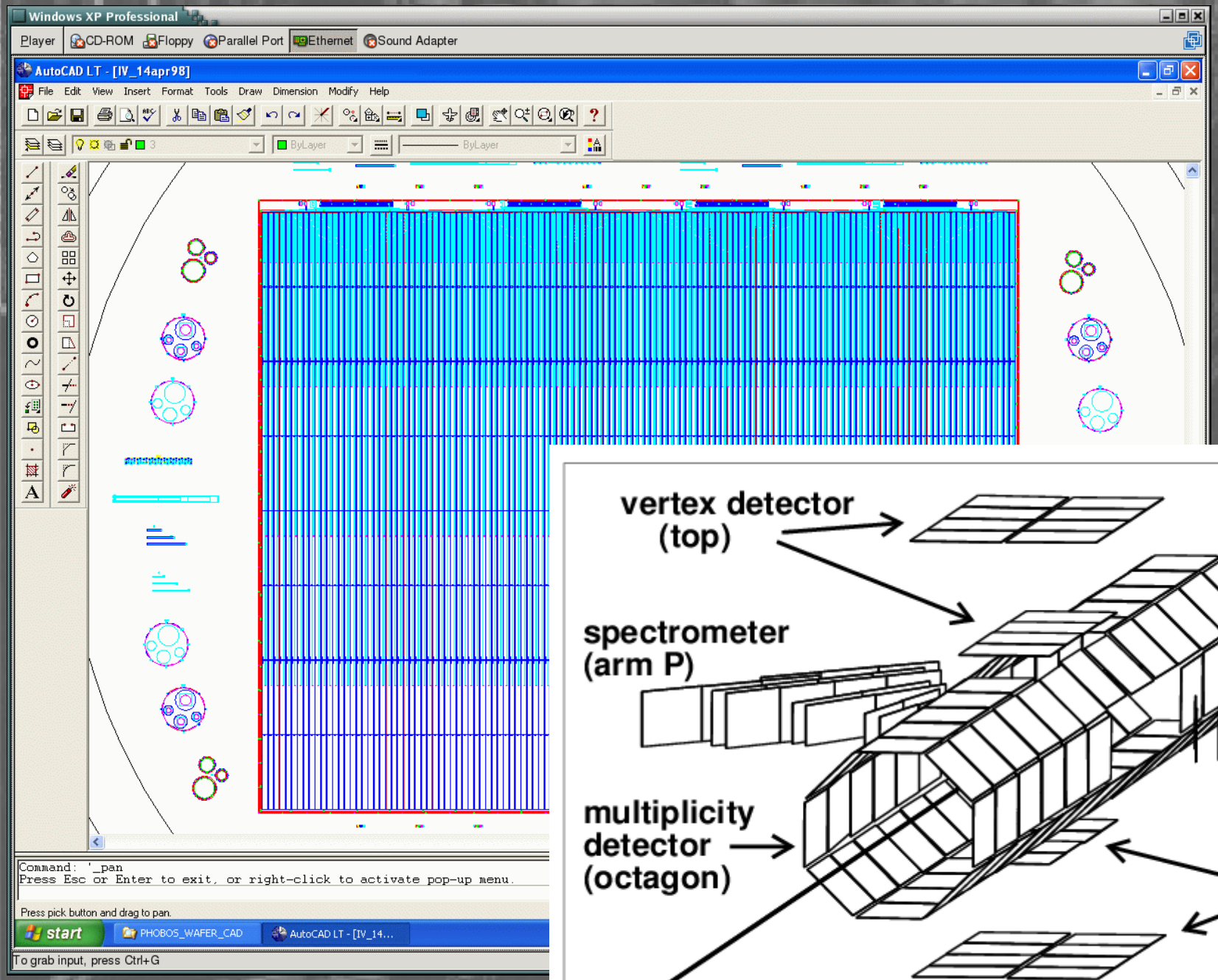
DCA Resolution

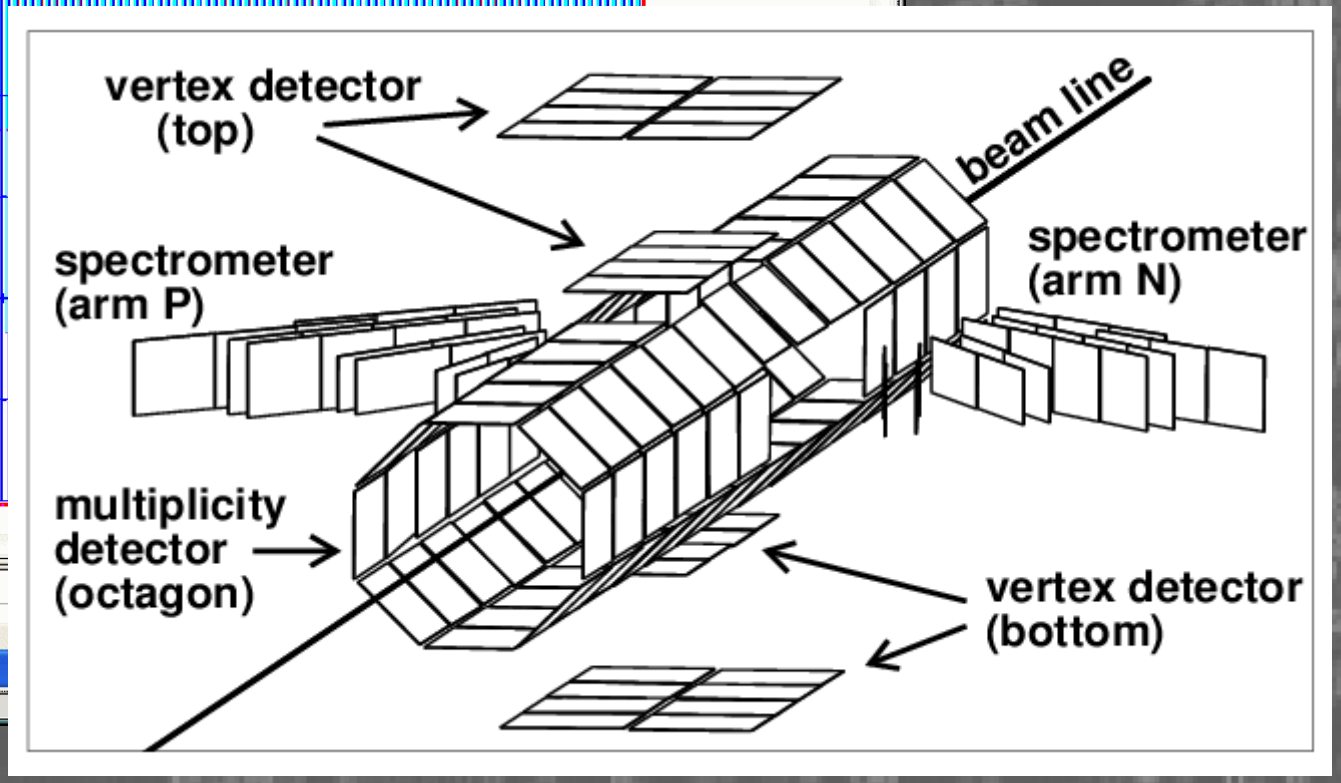
```
root [0] .x Pointing1.C
-----------------------------------------------------
theta = 90.002657
beta  = 0.835121
MCS angle = 0.002659
---------------HFT-----------------------------------
PosZ     Res at HFT = 87.361319
PosPhiZ Res at HFT = 1456.021978
MCS      Res at HFT = 53.186802
Total    Z pointing resolution at HFT = 102.278229
Total Phi pointing resolution at HFT = 1456.993042
---------------DCA-----------------------------------
PosZ     Res     DCA = 166.709328
PosPhiZ Res     DCA = 2778.488798
MCS      Res     DCA = 186.153813
Total    Z pointing resolution     DCA = 249.890457
Total Phi pointing resolution     DCA = 2784.717773
-----------------------------------------------------
```

```
[0] .x Pointing1.C
-----------------------------------------------------
 = 90.002657
 = 0.835121
ngle = 0.002659
----------HFT----------------------------------------
   Res at HFT = 43.680659
Res at HFT = 1456.021978
Res at HFT = 53.186802
 pointing resolution at HFT = 68.824677
 pointing resolution at HFT = 1456.993042
------DCA----------------------------------------
Res     DCA = 83.354664
Res     DCA = 2778.488798
Res     DCA = 186.153813
 pointing resolution     DCA = 203.963821
 pointing resolution     DCA = 2784.717773
-----------------------------------------------------
```

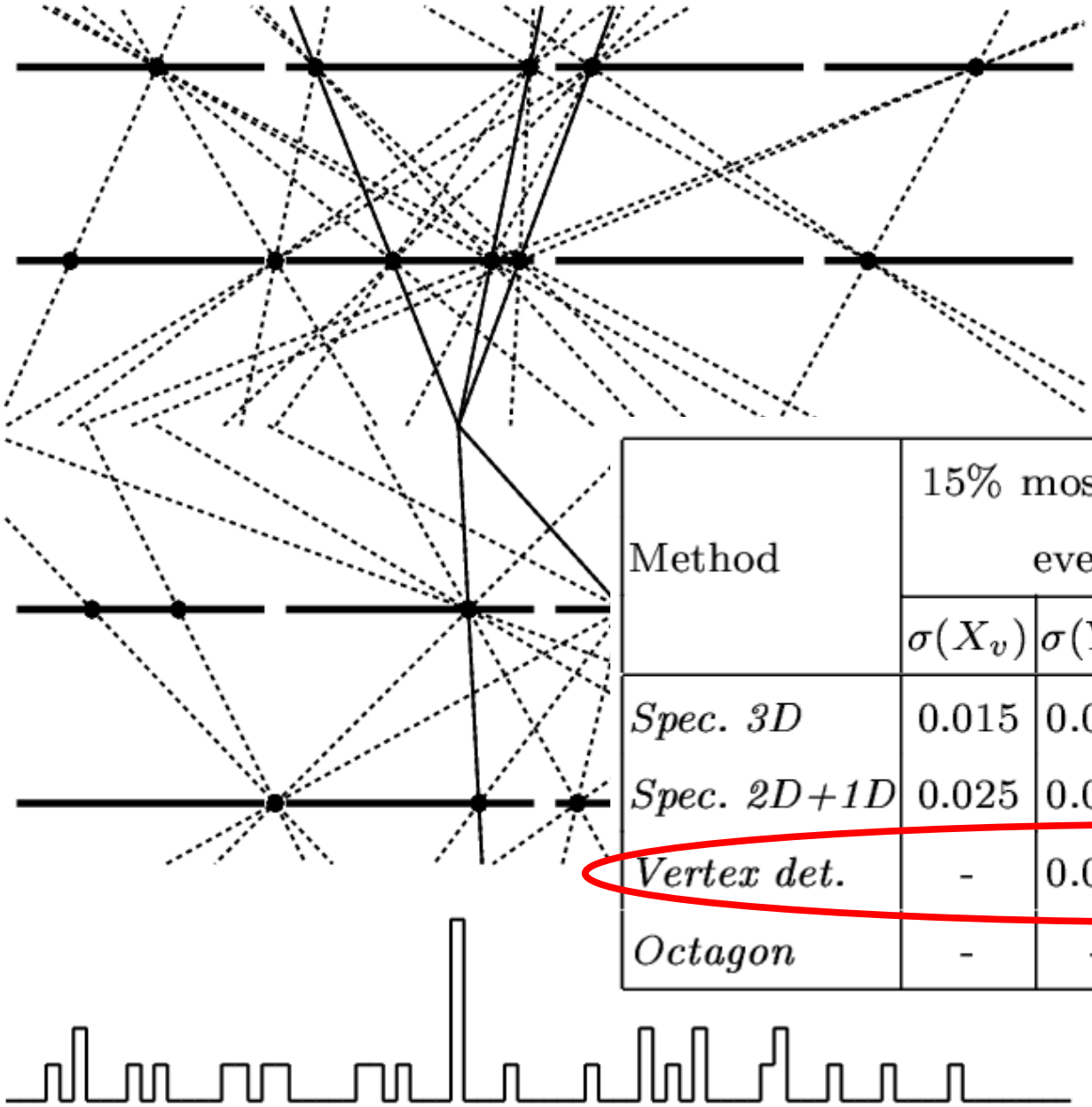
particle	daughters	cτ (μm)	Mass (GeV)
D^0	$K^-\pi^+$ (3.8%)	123	1.8646
$D^\pm$	$K^-\pi^+\pi^+$ (9.2%)	312	1.8694
D_s	$K^+K^-\pi^+$ (4.4%) $\pi^+\pi^+\pi^-$ (1.0%)	147	1.9683
Λ_c	$p\,K^-\pi^+$ (5.0%)	59.9	2.2849
B^0		460	5.2794
$B^\pm$		501	5.2790

PHOBOS Vertex Sensors



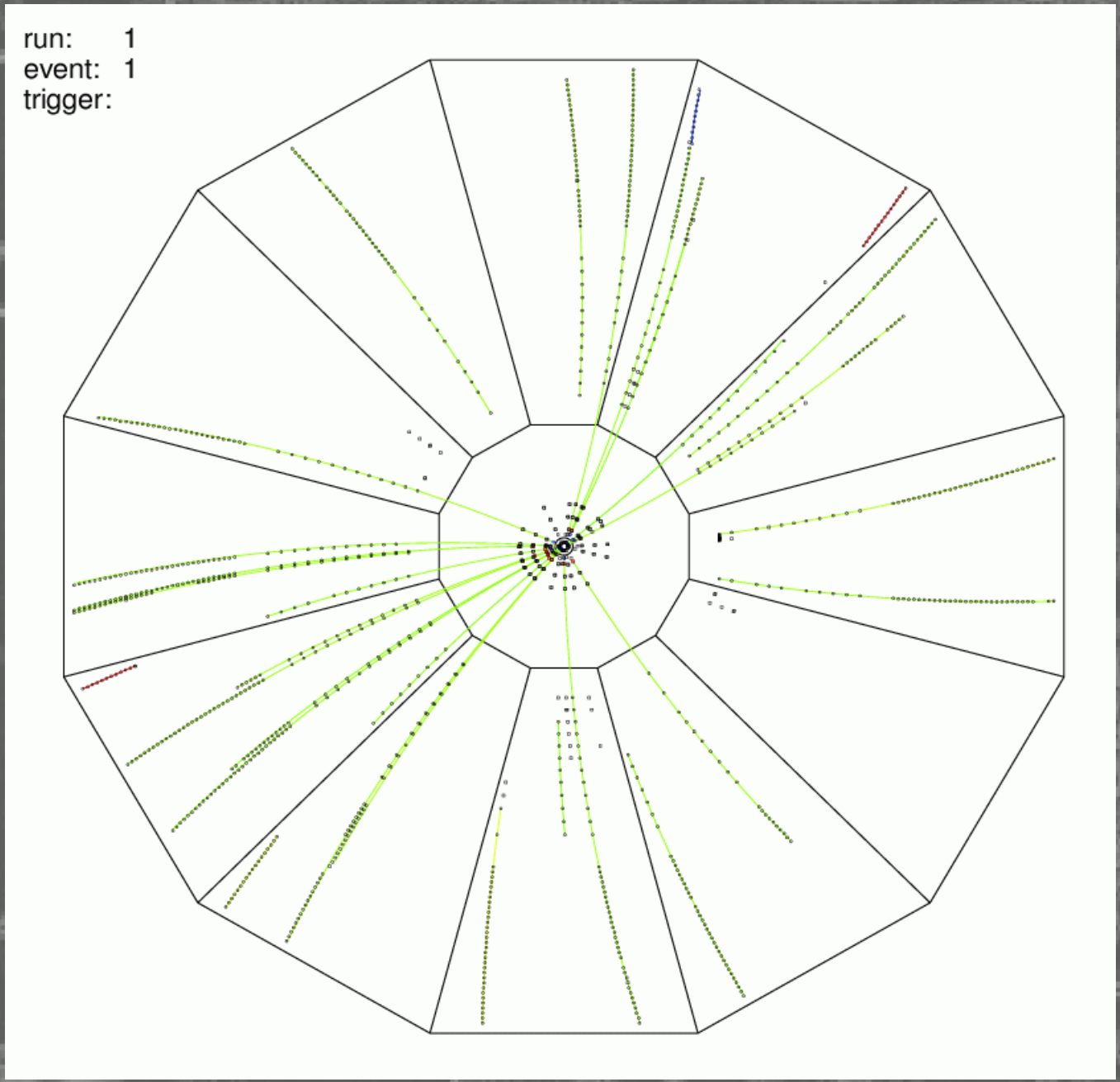


PHOBOS Vertexing

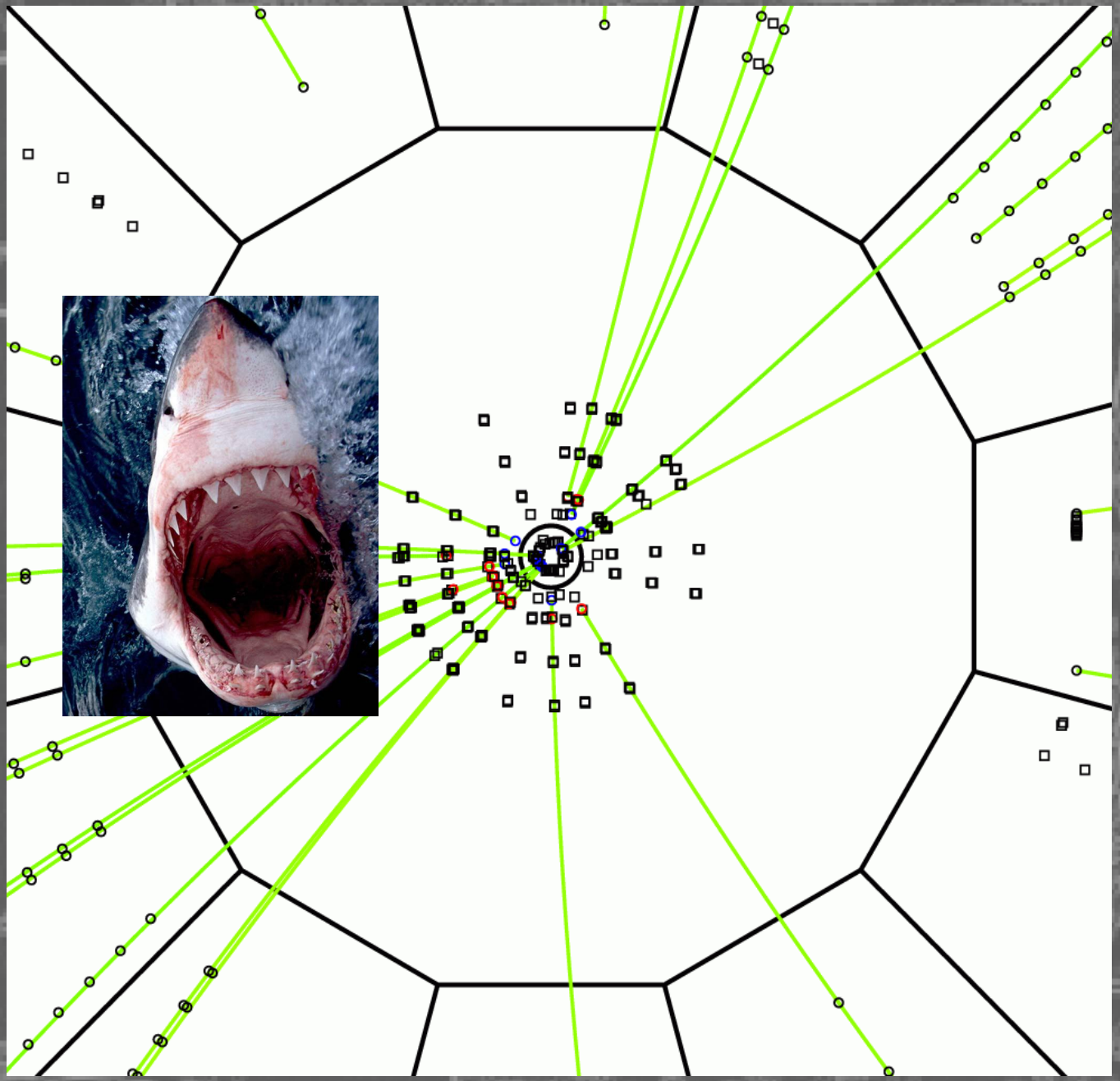


Method	15% most central events			30% most peripheral events			
	$\sigma(X_v)$	$\sigma(Y_v)$	$\sigma(Z_v)$	$\sigma(X_v)$	$\sigma(Y_v)$	$\sigma(Z_v)$	eff.
Spec. 3D	0.015	0.022	0.020	0.350	0.100	0.300	4%
Spec. 2D+1D	0.025	0.022	0.030	0.150	0.150	0.250	7%
Vertex det.	-	0.015	0.006	-	0.030	0.023	28%
Octagon	-	-	0.500	-	-	1.100	85%

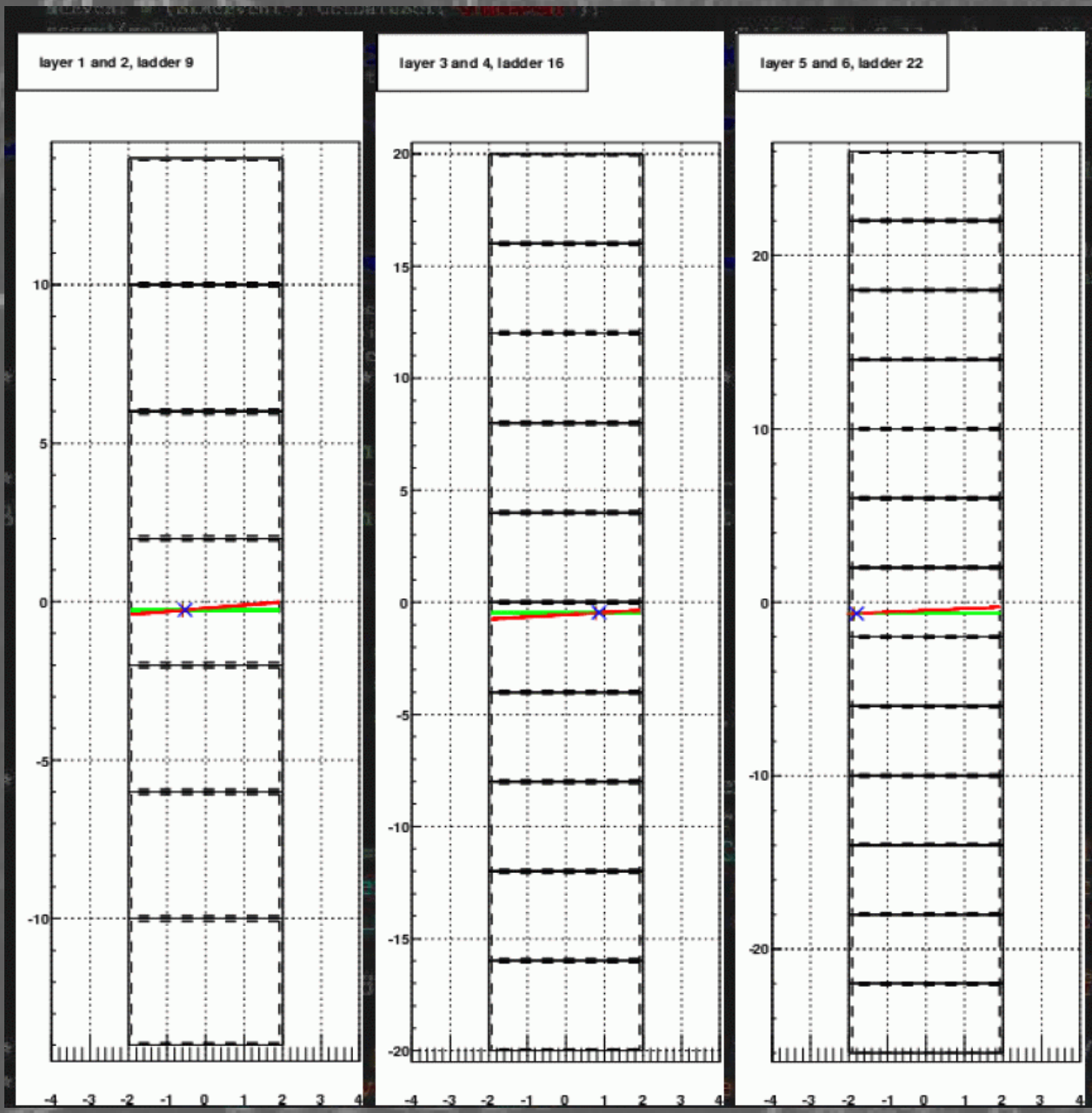
ITTF is coming online for TUP



ITTF needs a bit of tuning



Strip Simulator



Afterburner to simulate silicon strip response

Internal strip geometry implemented

Finds hits, reconstructs hits from hit strips

Proper strip clustering is being worked on

New pad geometry easy to implement

CD0 Status

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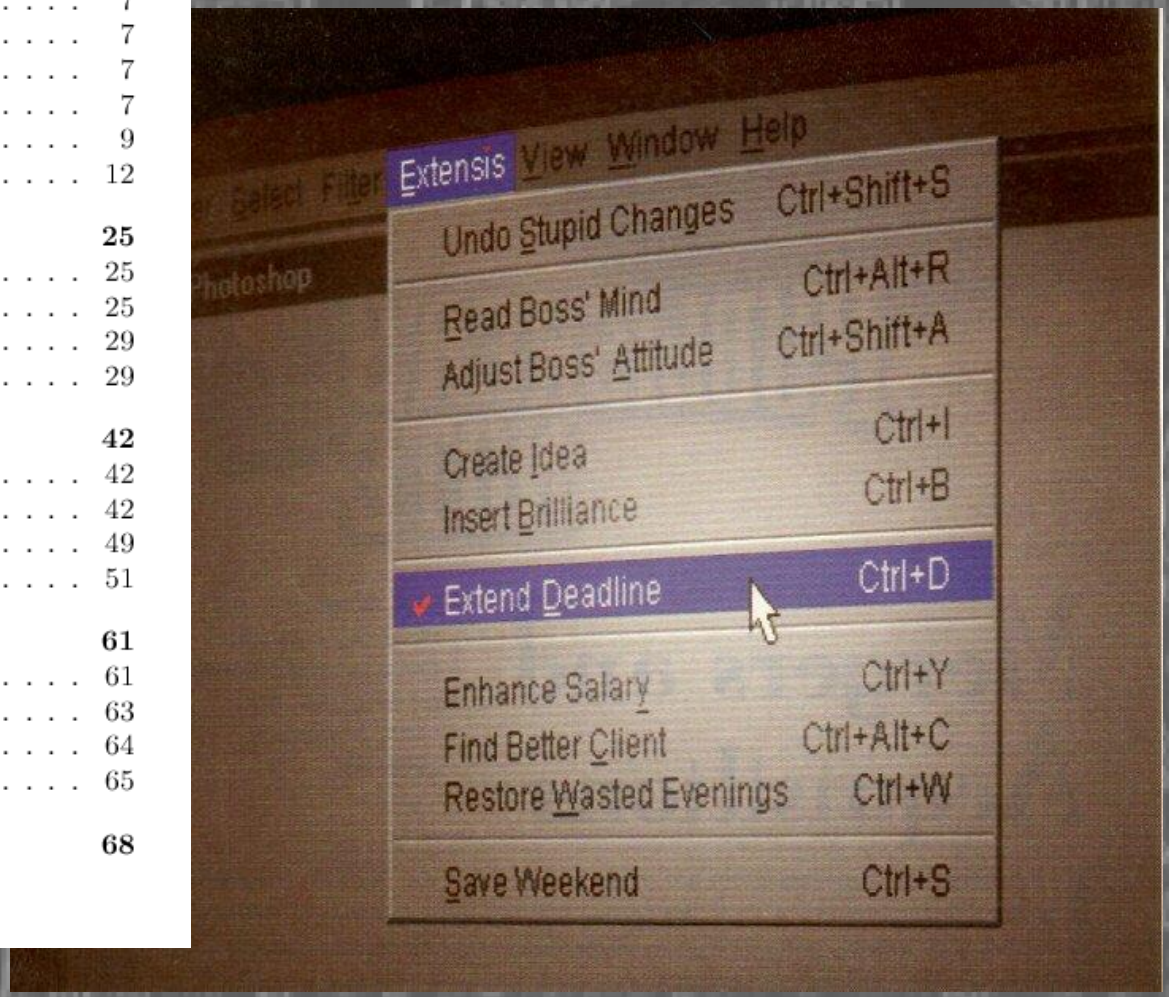
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