Radiation Length Distribution

Aug 8, 2008

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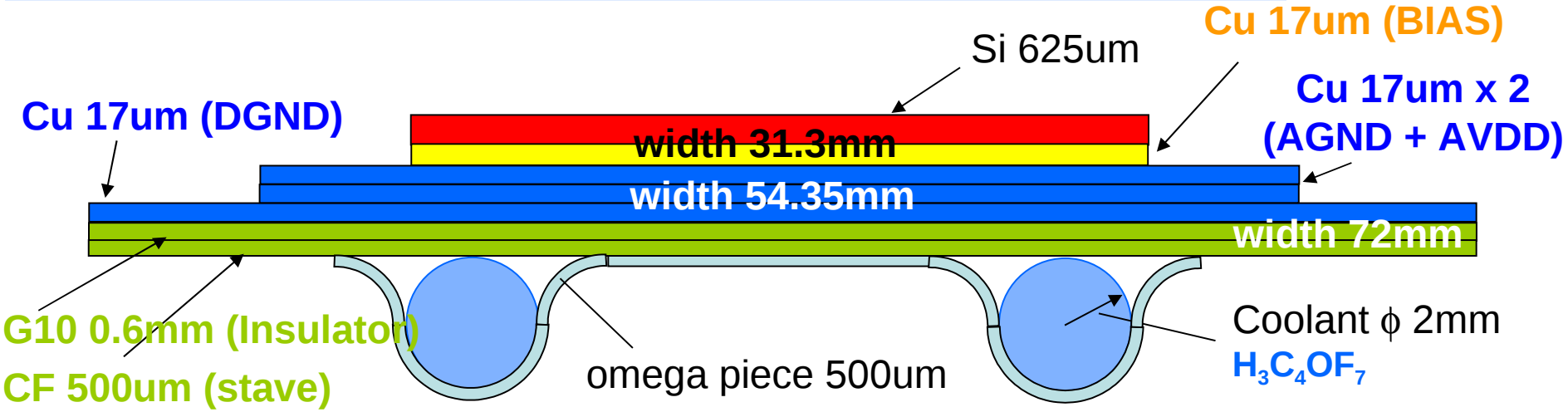
RIKEN

Modified Medium for Strip Layer (ROC3 ½ oz)

Implementation of the realistic coolant material "NOVEC7000($H_3C_4OF_7$)"

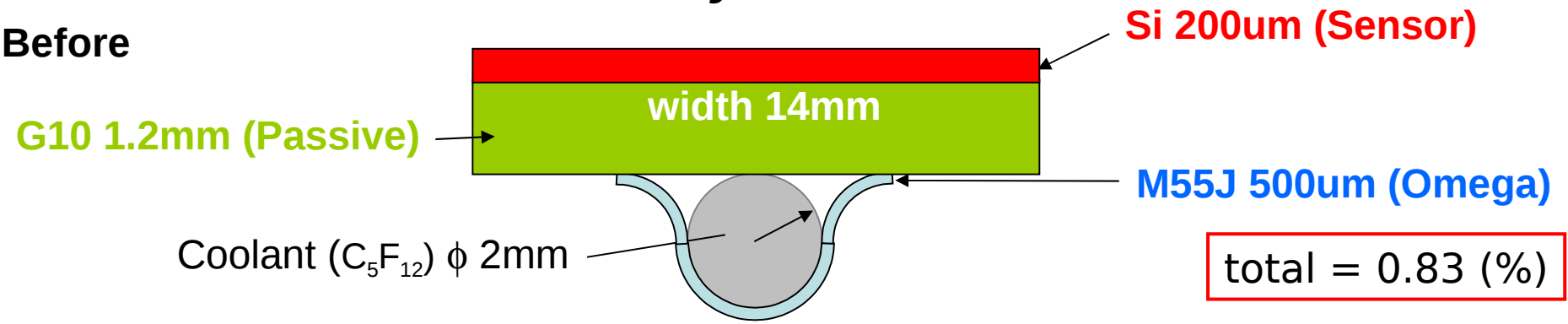


Material (radl(cm))	Radiation Length (%)
Si (radl:9.36)	0.67 (625um)
Cu (radl:1.43)	0.48 (68um)
G10 (radl:19.4)	0.31 (1.2mm → 0.5mm)
CC (~~radl:18.8~~ → 23.9) → **CF (radl:26.6)**	**0.19 (500um)**
C_5F_{12} (radl:21.58) → **$H_3C_4OF_7$(radl:30.84)**	**average 0.11 (350um)**
M55J (radl:25.86)	0.19 (500um)
Sum	**1.95**

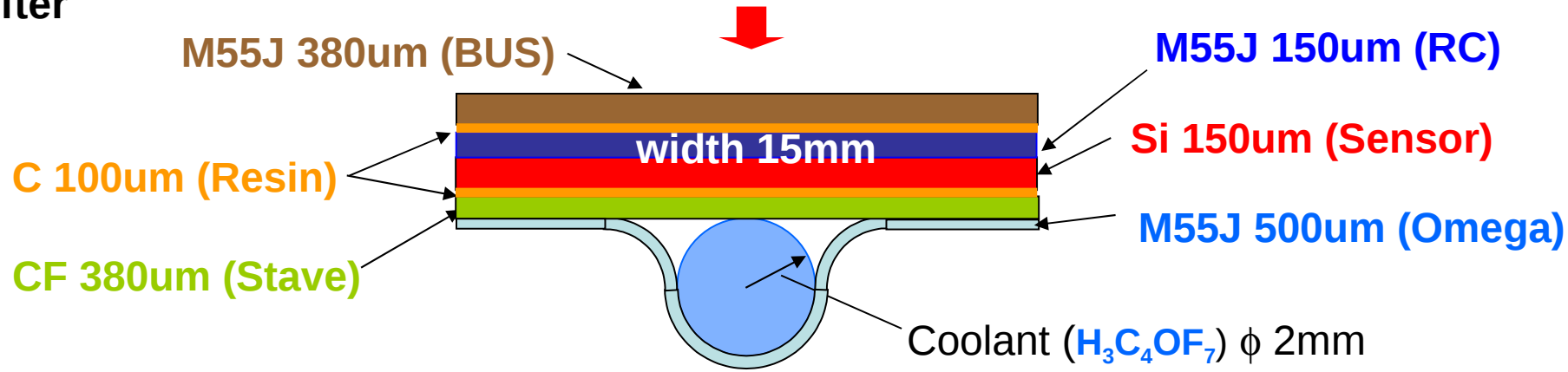
total = 1.95 + 1.25*1.3 ~ **3.6 (%)**

Modified Medium for Pixel Layer

Before



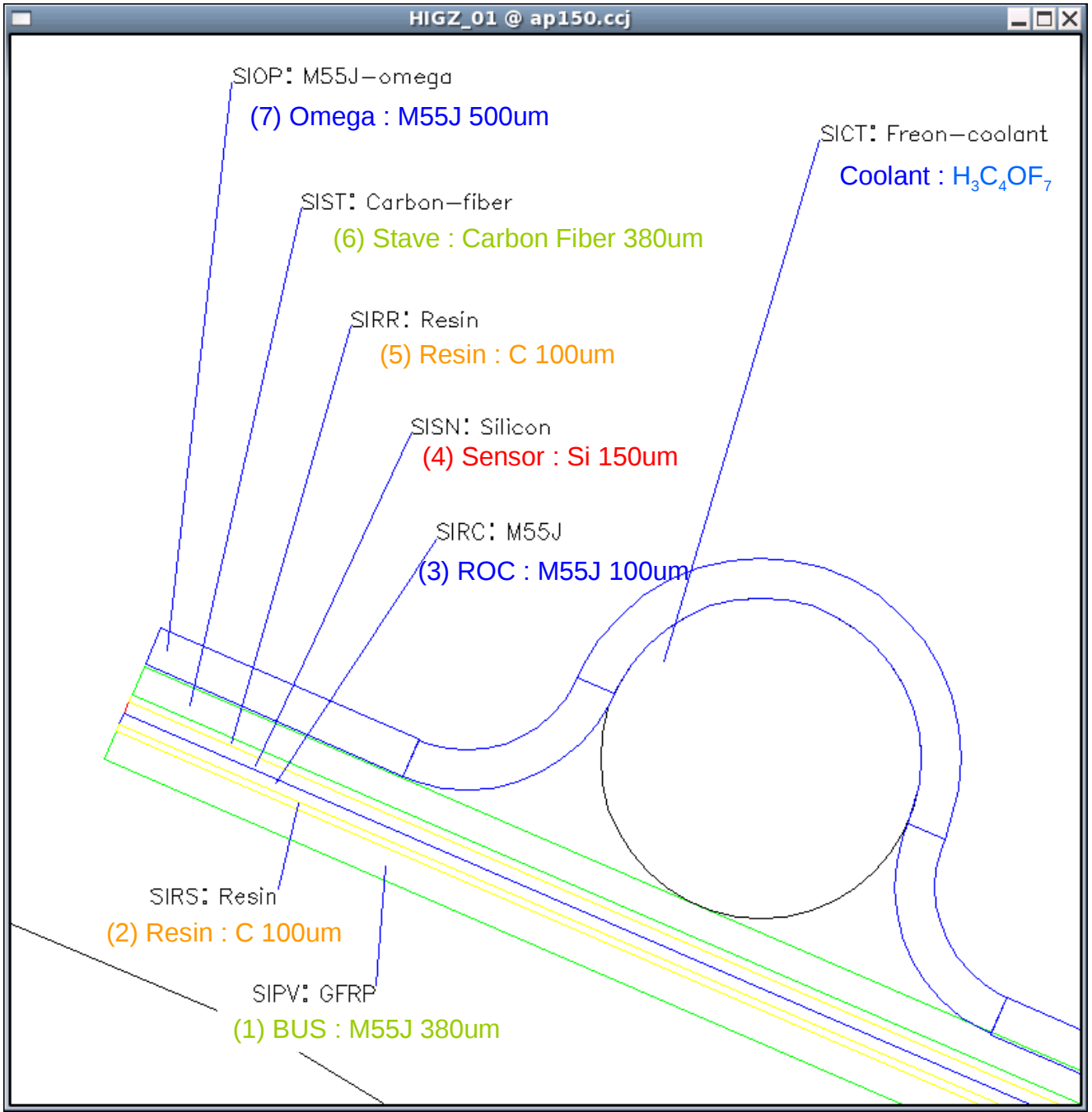
After



Material (radl(cm))	Radiation Length (%)
M55J (radl:25.86)	0.40 (380+150+500um)
Resin (radl:35.5)	0.06 (100+100um)
Si (radl:9.36)	0.16 (150um)
Carbon Fiber (radl:26.6)	0.14 (380um)
C_5F_{12} (radl:21.58) → $H_3C_4OF_7$(radl:30.84)	average 0.27 (840um)
Sum	1.03

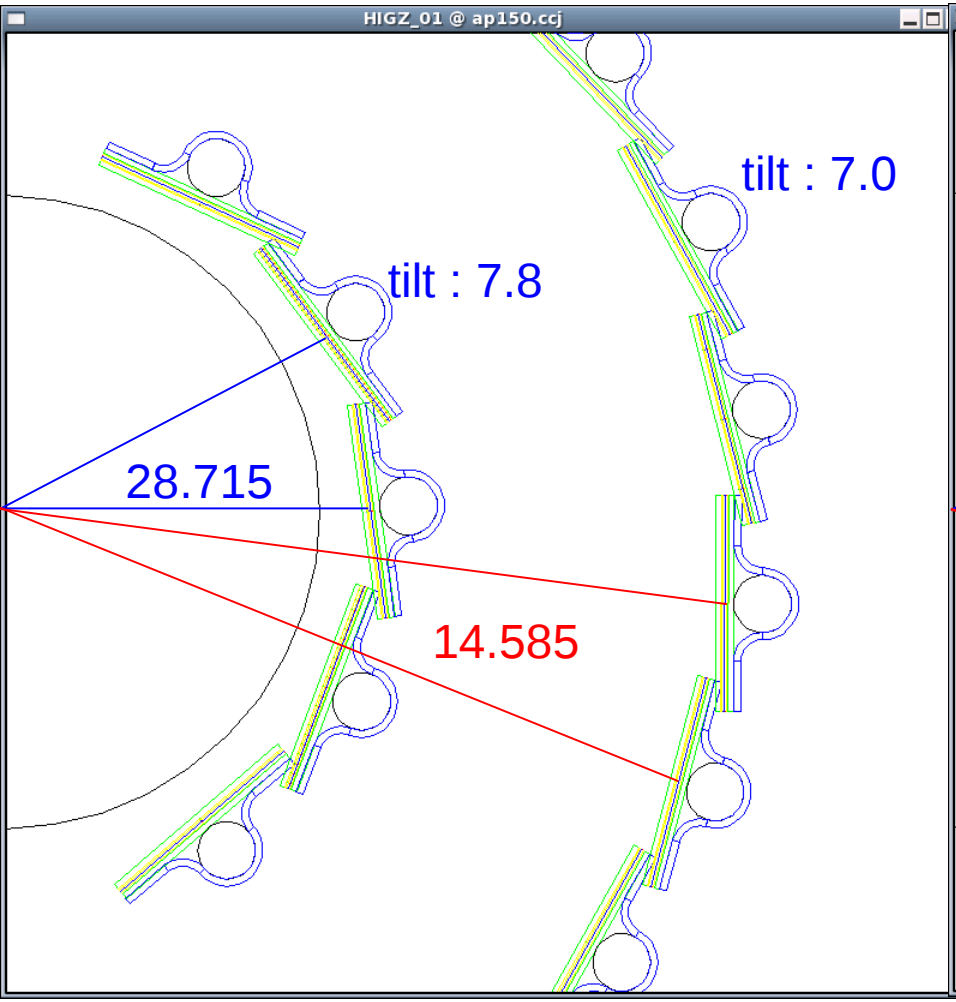
total = 1.03 (%)

Present Material of Pixel Layer

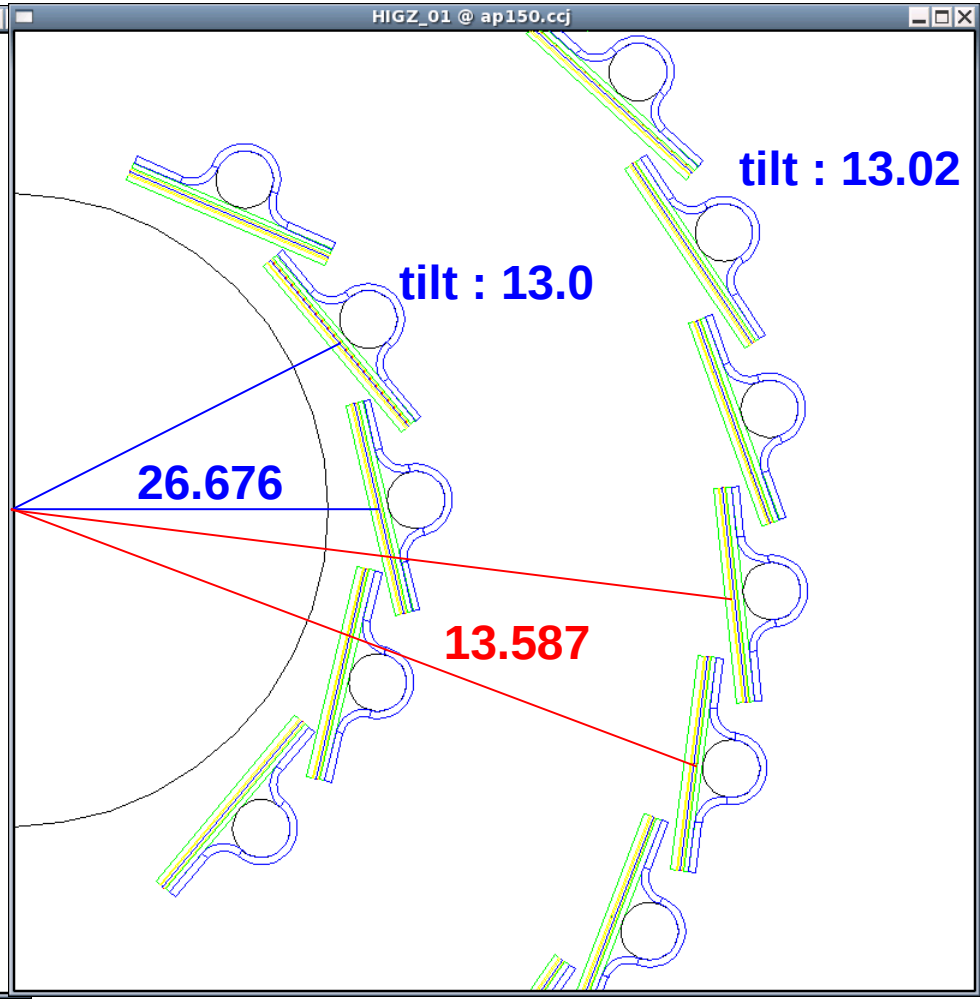


Tilt Angle of Pixel Layer

Previous

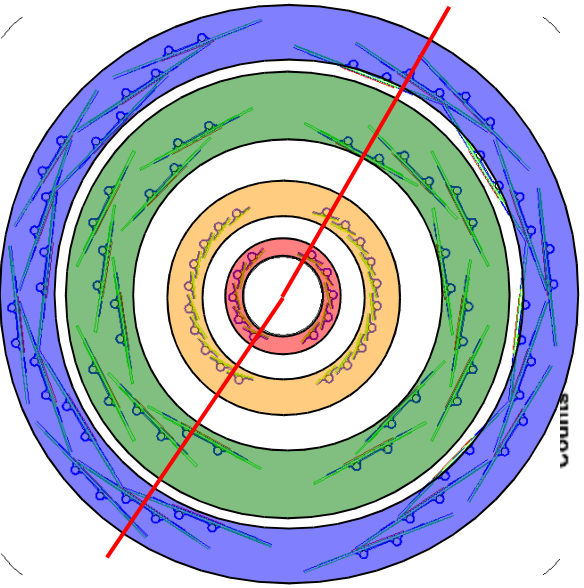


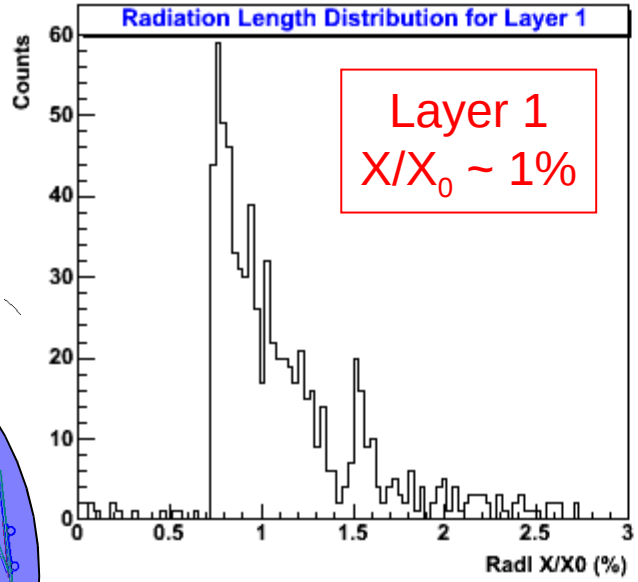
Present

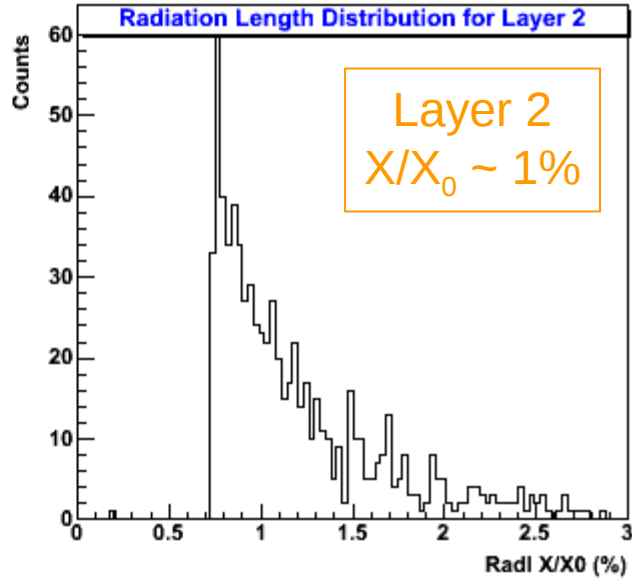


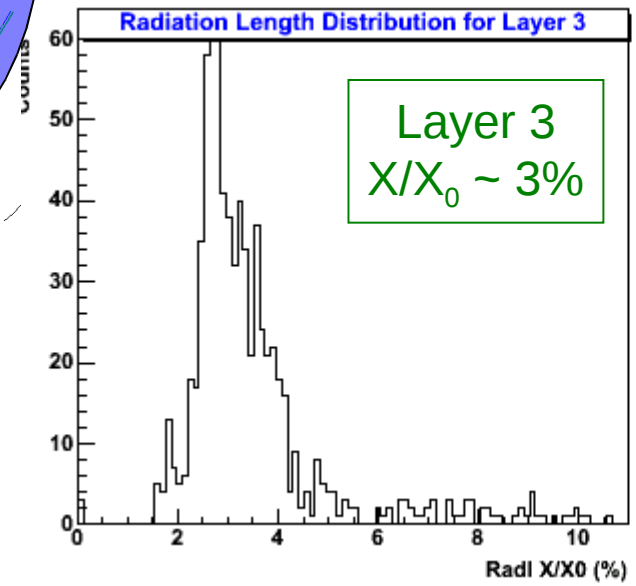
UNIT : degree

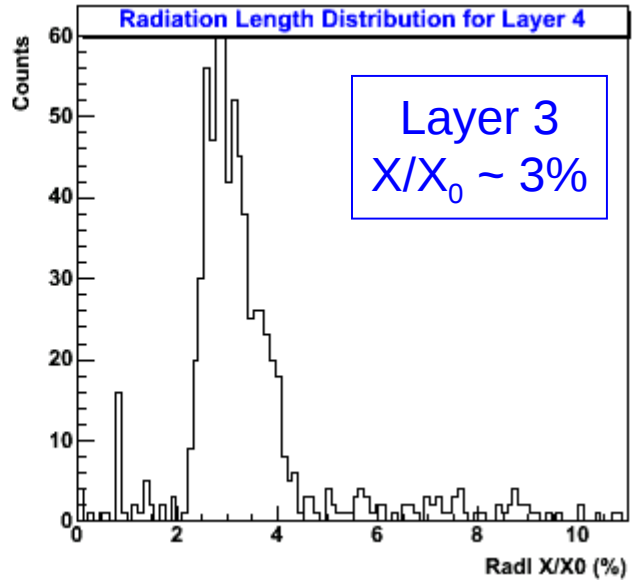
Radiation Length Distribution









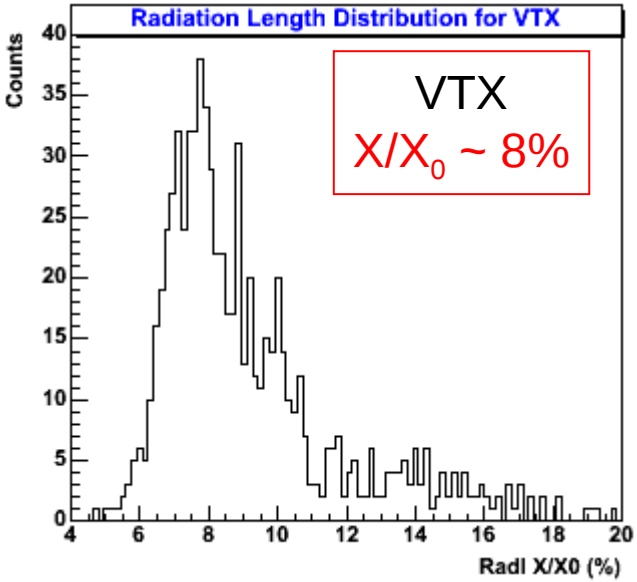


CONDITION

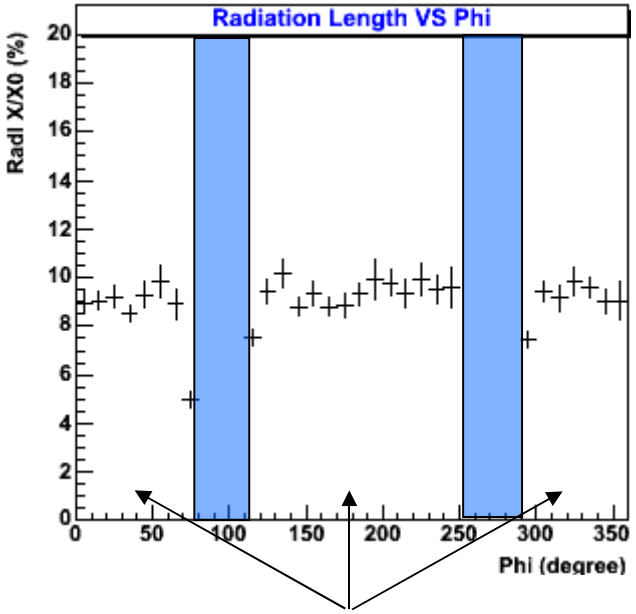
- **-1.2 < η < 1.2 (FLAT)**
- **0.0 < ϕ(degree) < 360 (FLAT)**

Radiation Length Distribution (ROC3 ½ oz)

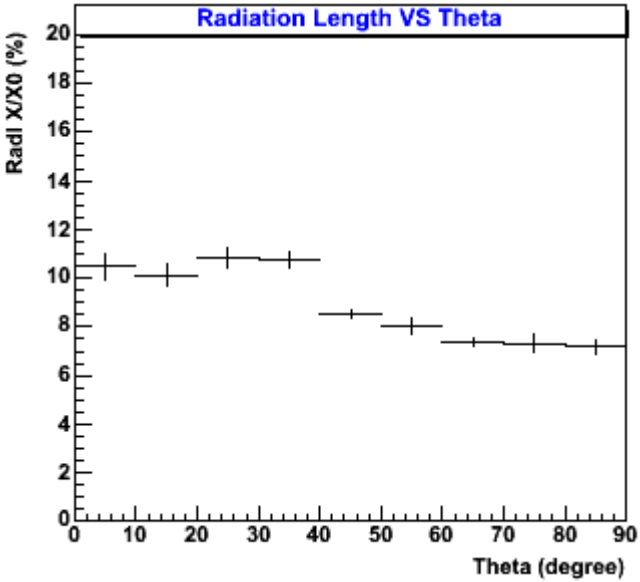
Radiation Length for VTX



Radiation Length v.s. ϕ



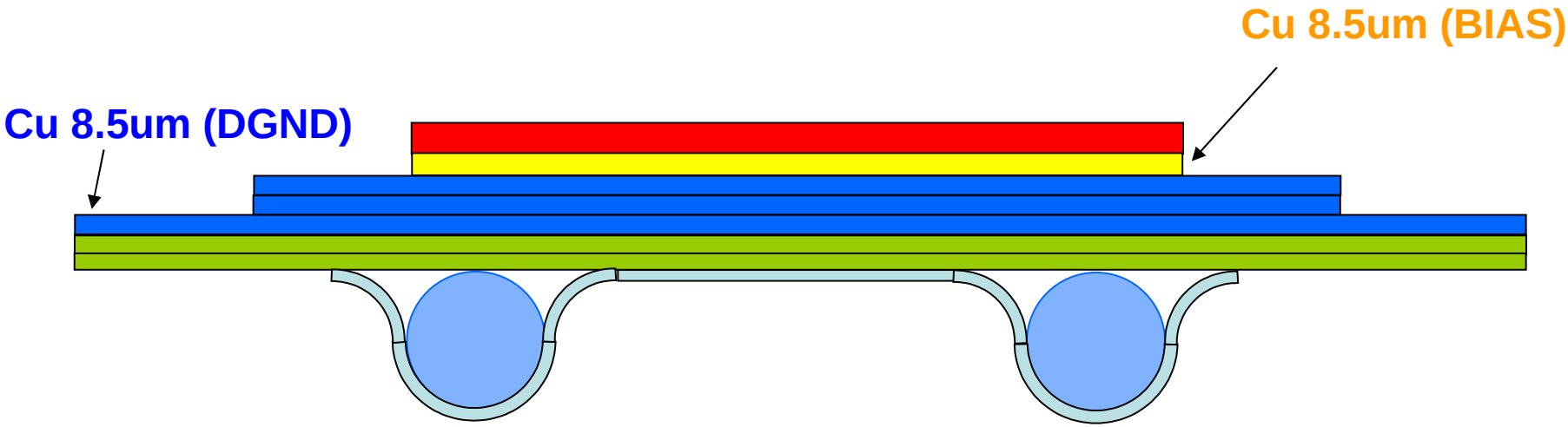
Radiation Length v.s. θ



SVX Acceptance

Radiation length of VTX was estimated to be 8%.

Modified Medium for Strip Layer (ROC3 ¼ oz)

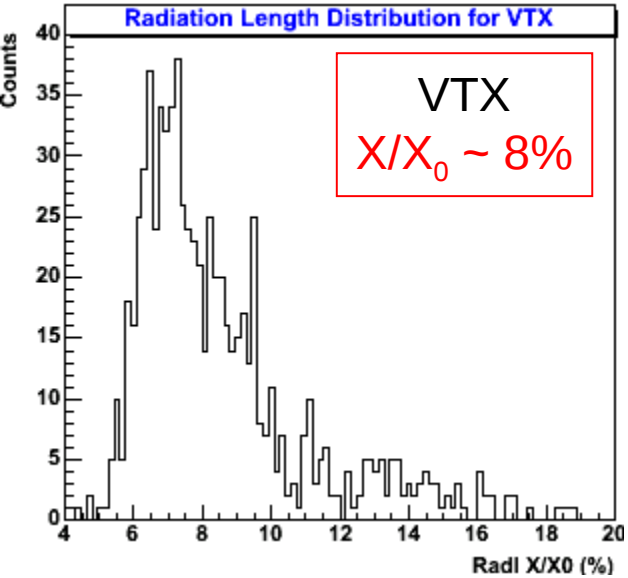


Material (radl(cm))	Radiation Length (%)
Si (radl:9.36)	0.67 (625um)
Cu (radl:1.43)	**0.48 → 0.36 (68um → 51um)**
G10 (radl:19.4)	0.31 (0.5mm)
CF (radl:26.6)	0.19 (500um)
$H_3C_4OF_7$(radl:30.84)	average 0.11 (350um)
M55J (radl:25.86)	0.19 (500um)
Sum	**1.83**

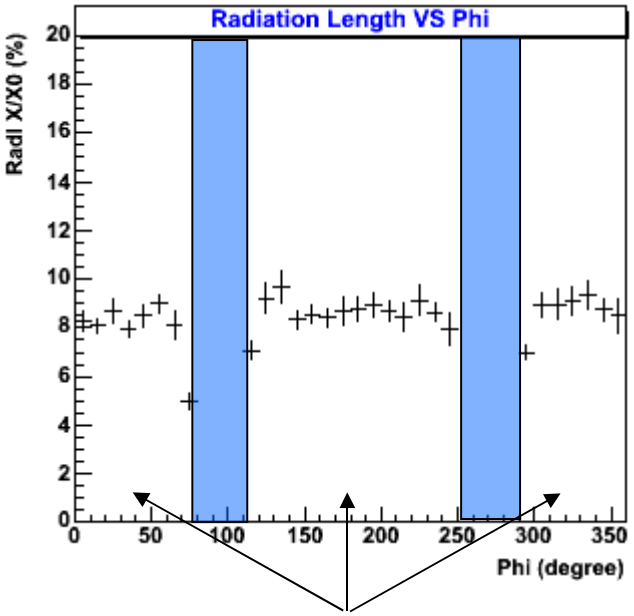
total = 1.83 + 1.25*1.3 ~ **3.5 (%)**

Radiation Length Distribution (ROC3 ¼ oz)

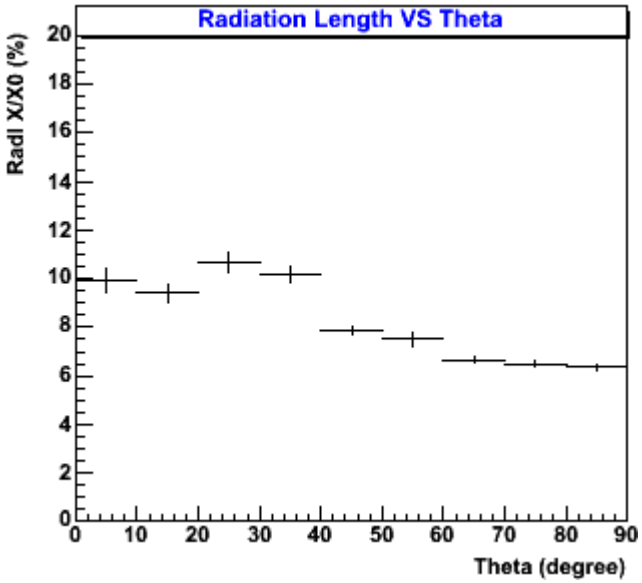
Radiation Length for VTX



Radiation Length v.s. ϕ



Radiation Length v.s. θ



SVX Acceptance

Radiation length of VTX was estimated to be 8%.

Summary

- Change the radiation length of a thermal plate (23.9 → 26.6 cm).
- Implement a realistic cooling medium (C_5F_{12} → **$H_3C_4OF_7$**)
- Implement the realistic material of a pixel layer.
- Modify tilt angle and an angular difference between adjacent ladders.
- Radiation length of VTX was estimated to be 8%.