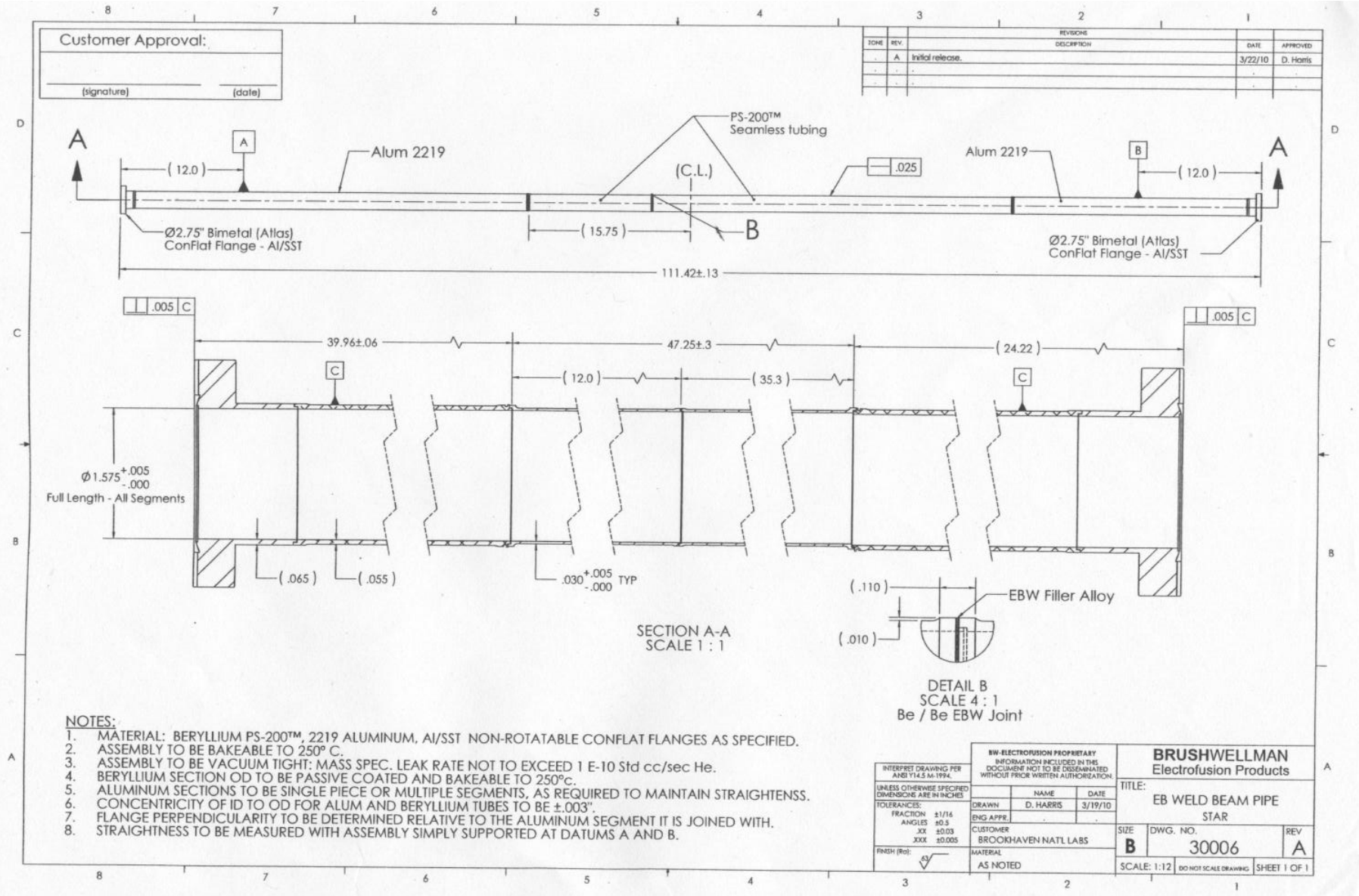


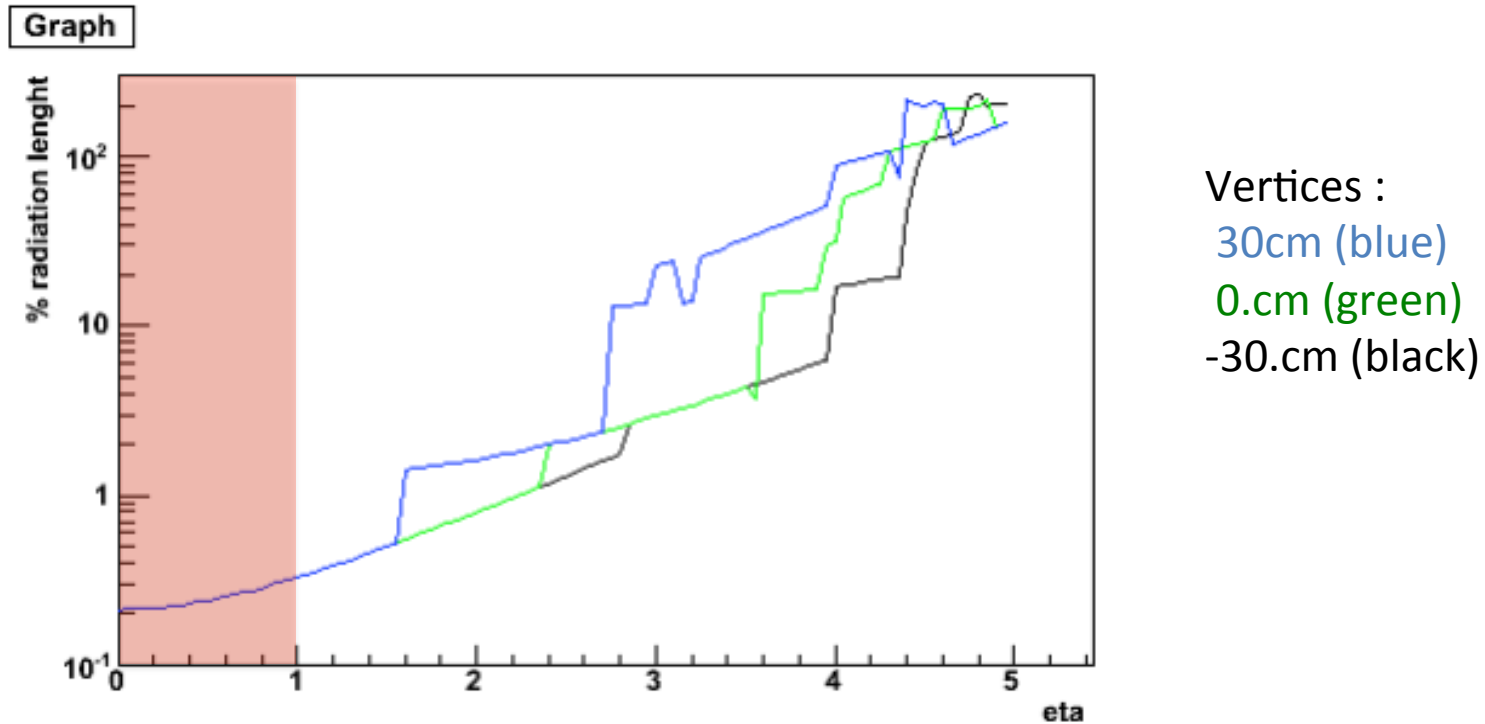
DETAILS OF THE NEW BEAM PIPE FOR DEV13 GEOMETRY

- dimensions
- Radiation length

Input : Dimensions from Brushwellman drawing



Input : radiation length vs. pseudo-rapidity $\eta(^*)$



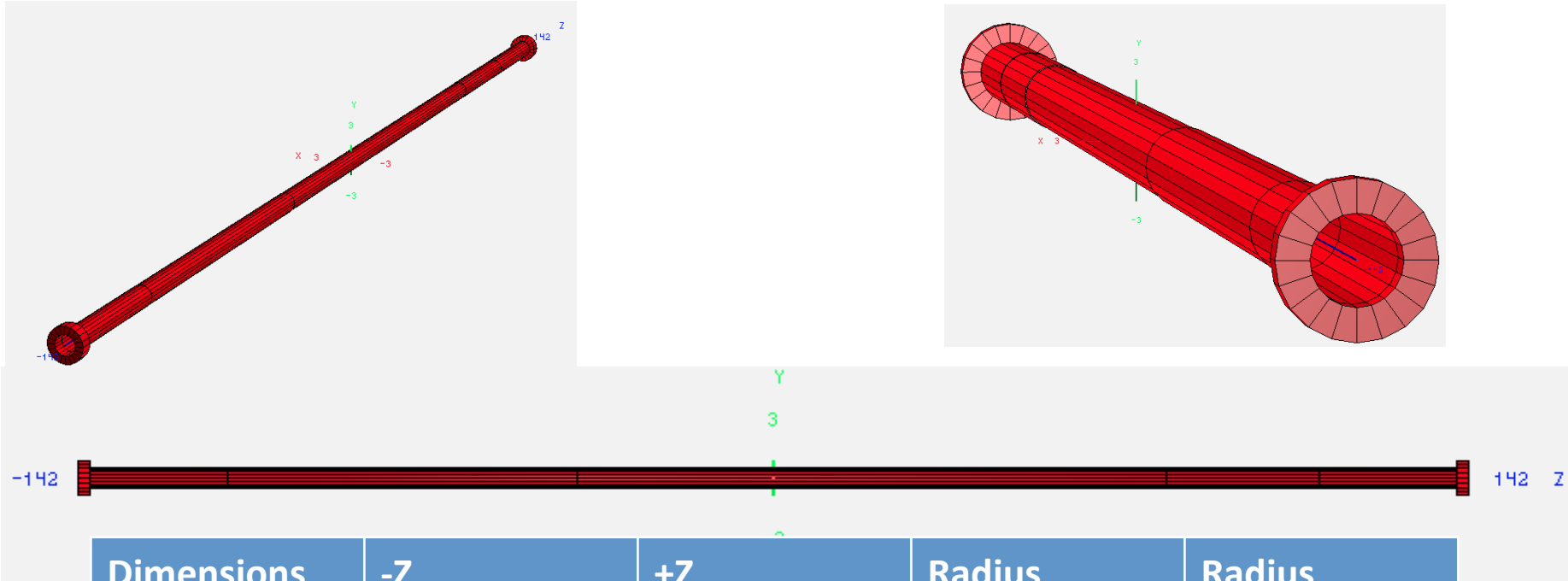
- for $|\eta| < 1$, the estimated radiation length is $\sim 0.2 - 0.3 \% X_0$

*: plot taken from Effective Thickness of the HFT Beam Pipe, D. Beavis, August 26, 2009

Implementation in GEANT

- The new beam pipe has been implemented by Amilkar
- Done within the new framework AgML
- Available for DEV13 geometry (year > 2012 including the PXL detector)

Details from GEANT



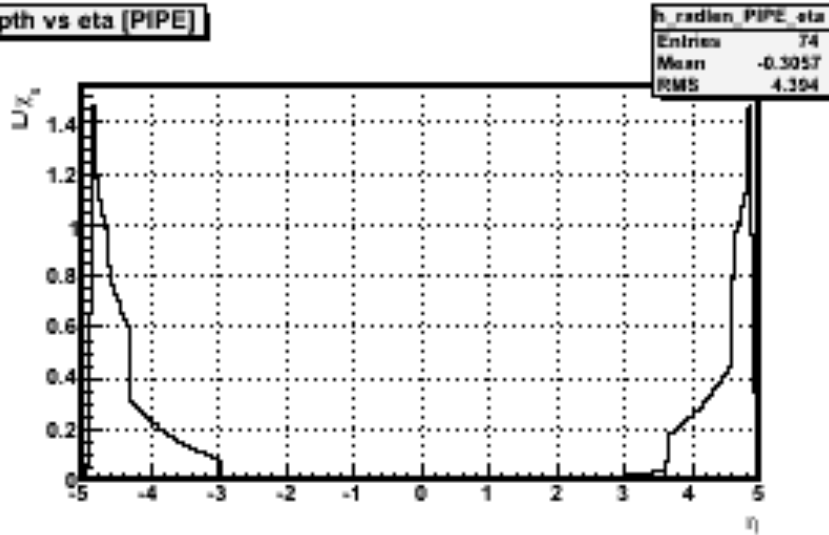
Dimensions (*)	-Z	+Z	Radius (min)	Radius (max)
inch	55.71	55.71	0.7875	0.7875+0.03 (Beryllium layer**)
cm	141.50	141.50	2.00025	2.07645

* : taken from PipeGeo1.xml

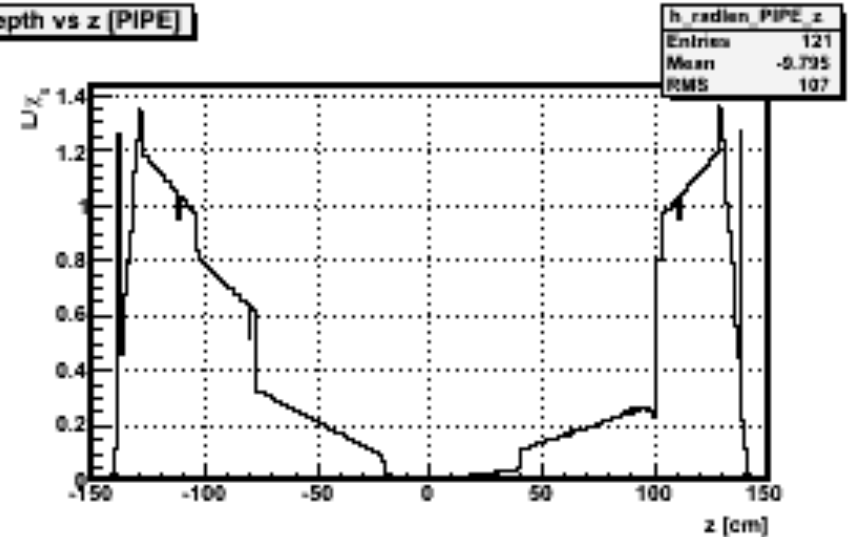
** : the beryllium section is at $|z| < 60$ cm , the rest of the beam pipe is surrounded by an Aluminum layer

Checks : radiation length & dimension

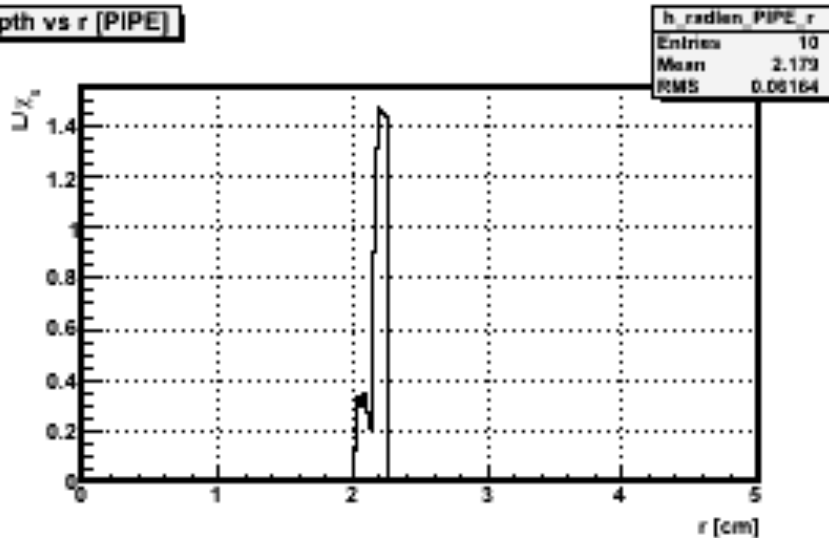
Depth vs eta [PIPE]



Depth vs z [PIPE]



Depth vs r [PIPE]

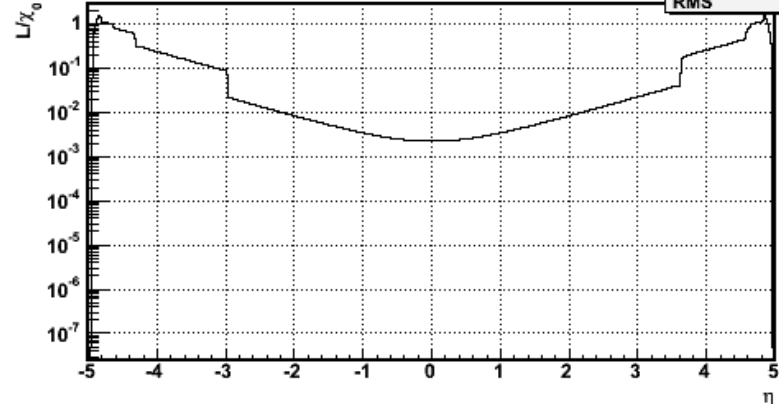


- Simulation : used Geantios thrown at $z=0$
- top left : radiation length vs eta
- Top right : radiation length vs Z
- Bottom left : radiation length vs radius
- Radius looks OK
- next slide for log scale

Checks : radiation length & dimension (log)

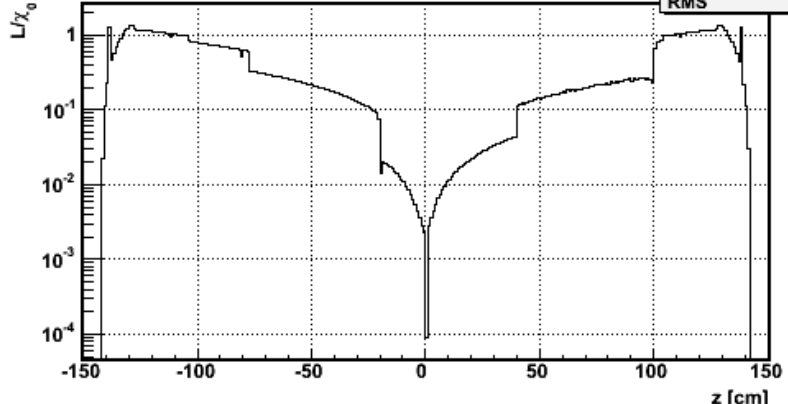
Depth vs eta [PIPE]

h_radlen_PIPE_eta
Entries 74
Mean -0.3057
RMS 4.394



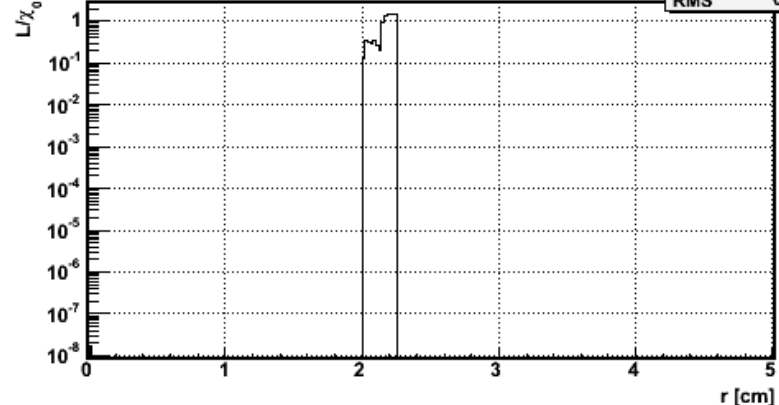
Depth vs z [PIPE]

h_radlen_PIPE_z
Entries 121
Mean -9.795
RMS 107



Depth vs r [PIPE]

h_radlen_PIPE_r
Entries 10
Mean 2.179
RMS 0.06164



Graph

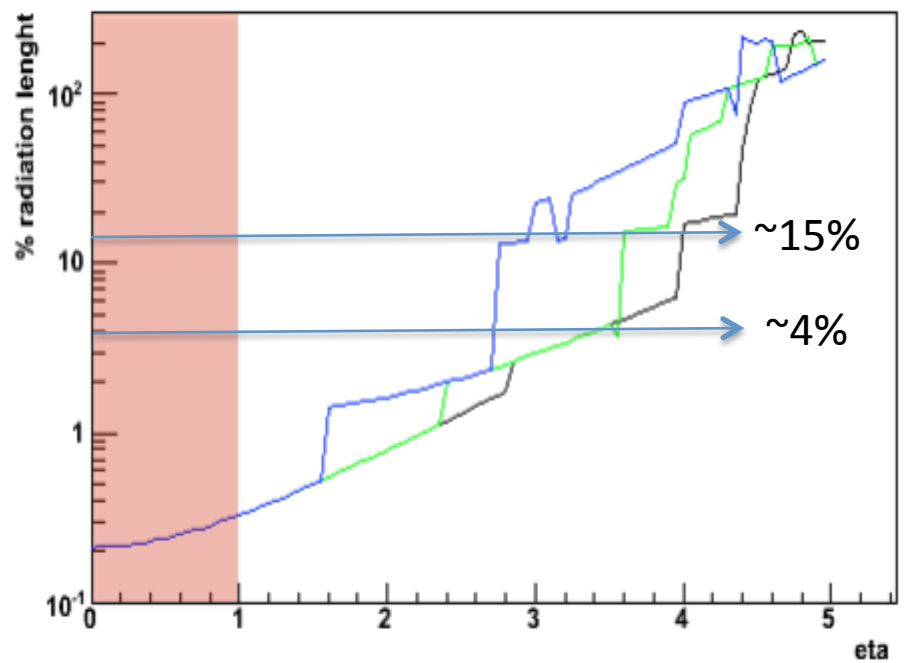
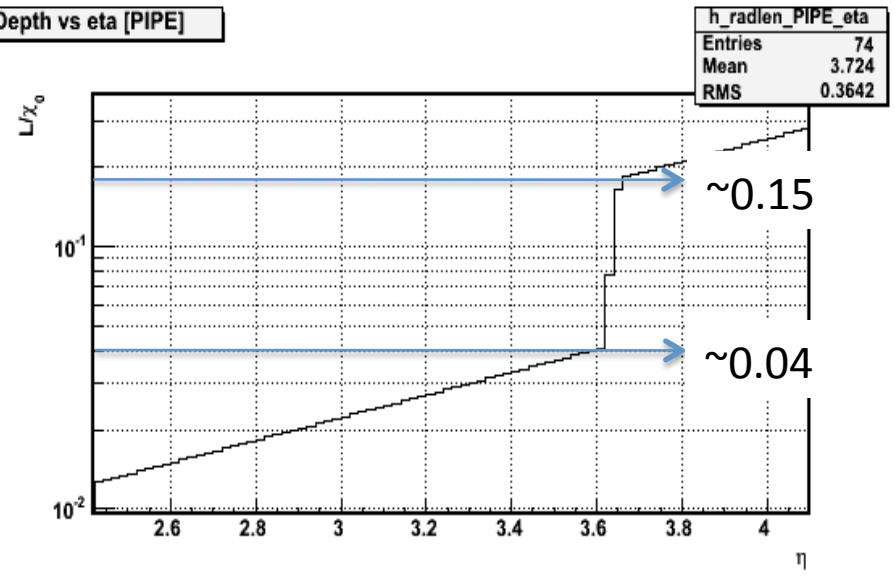


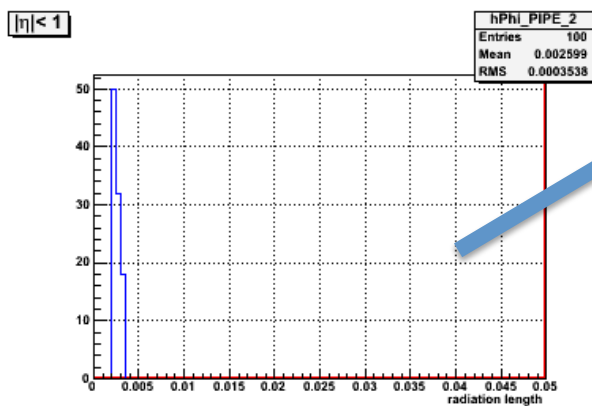
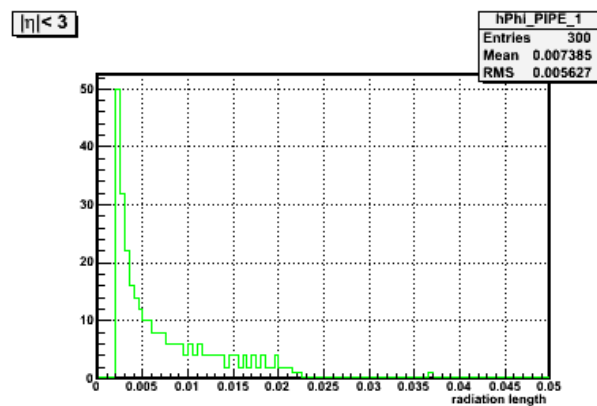
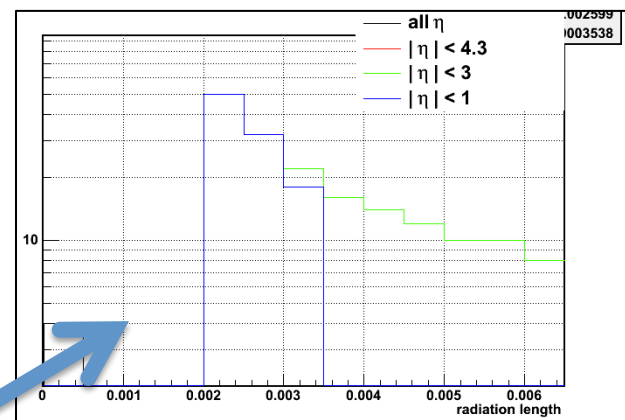
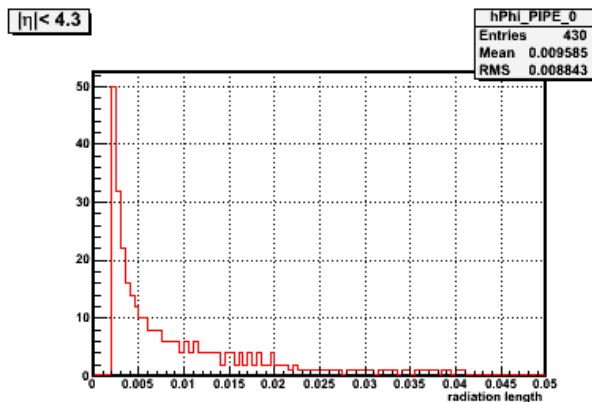
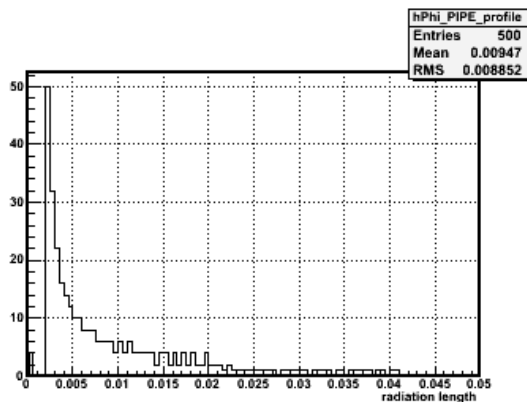
Figure 3. Preliminary new beam pipe.

Depth vs eta [PIPE]



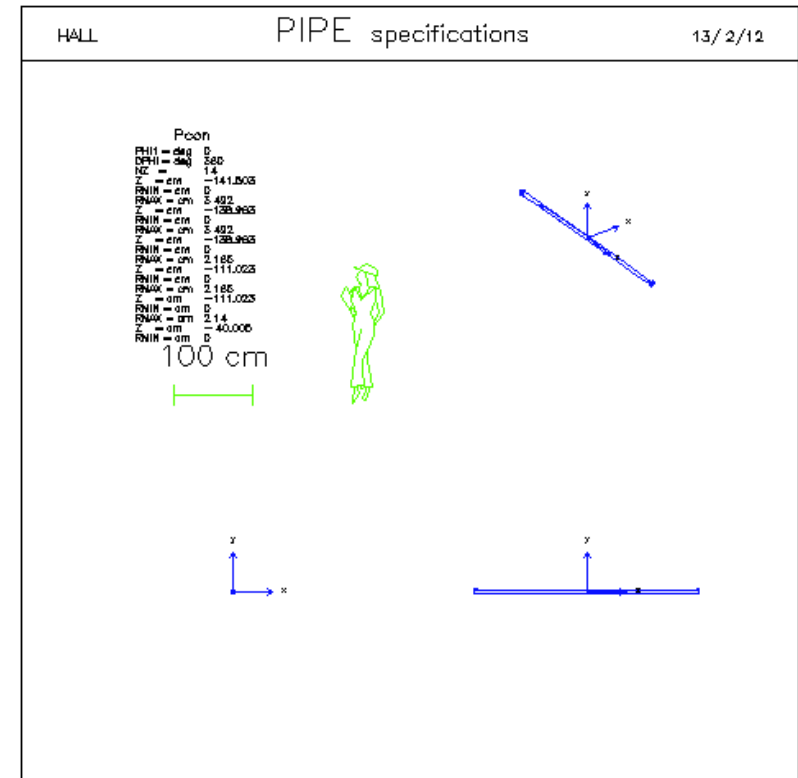
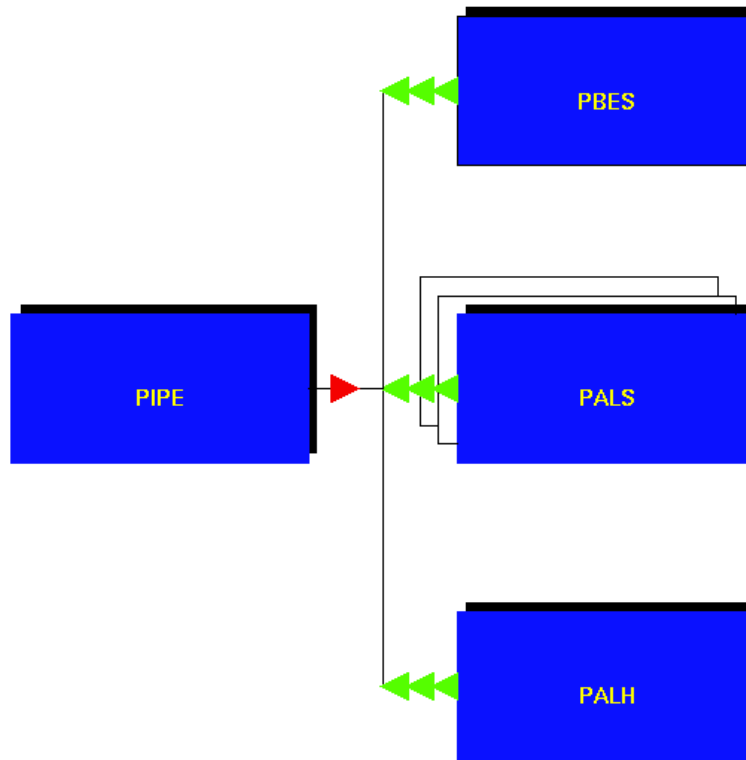
- green line is for vertices at $z = 0$
- We see the same jump at $\eta \sim 3.6$ in both plots with same values in radiation length
- ✓ Nice agreement between design and GEANT

Radiation length vs pseudo-rapidity η



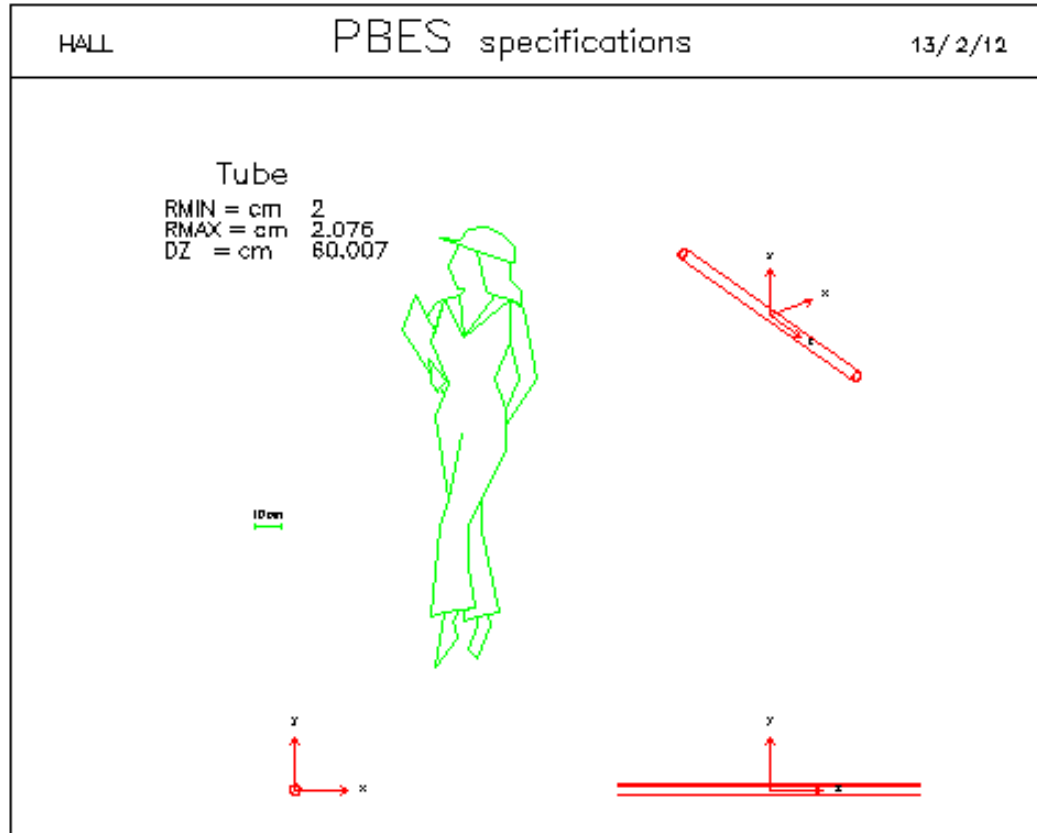
- We see that for $|\eta| < 1$, the radiation length is peaked at ~ 0.0026 (= 0.26% of X_0)
✓ Agree with slide 3

BeamPipe in GEANT



- The beam Pipe is made of 3 volumes :
- PBES
- PALS
- PALH

Beryllium part : PBES



Z range

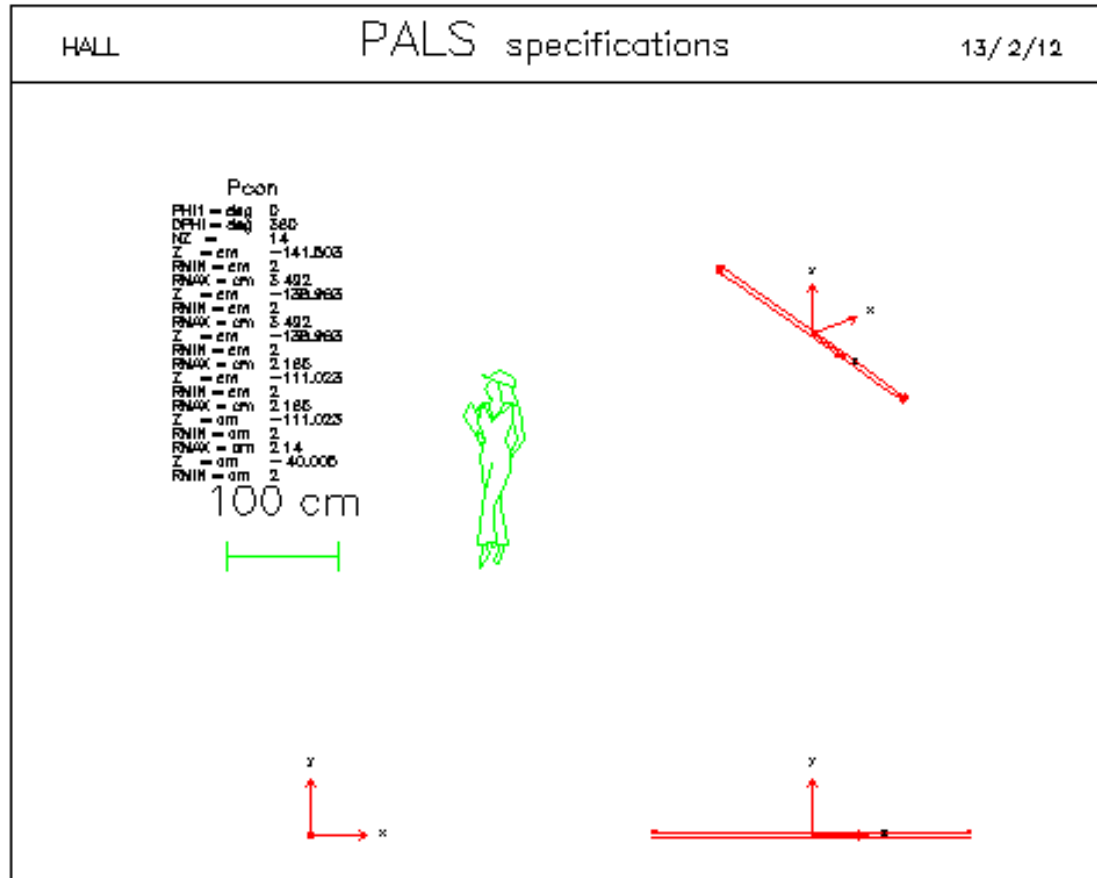
-100 ; 20

Rmin ; Rmax

2 ; 2.076

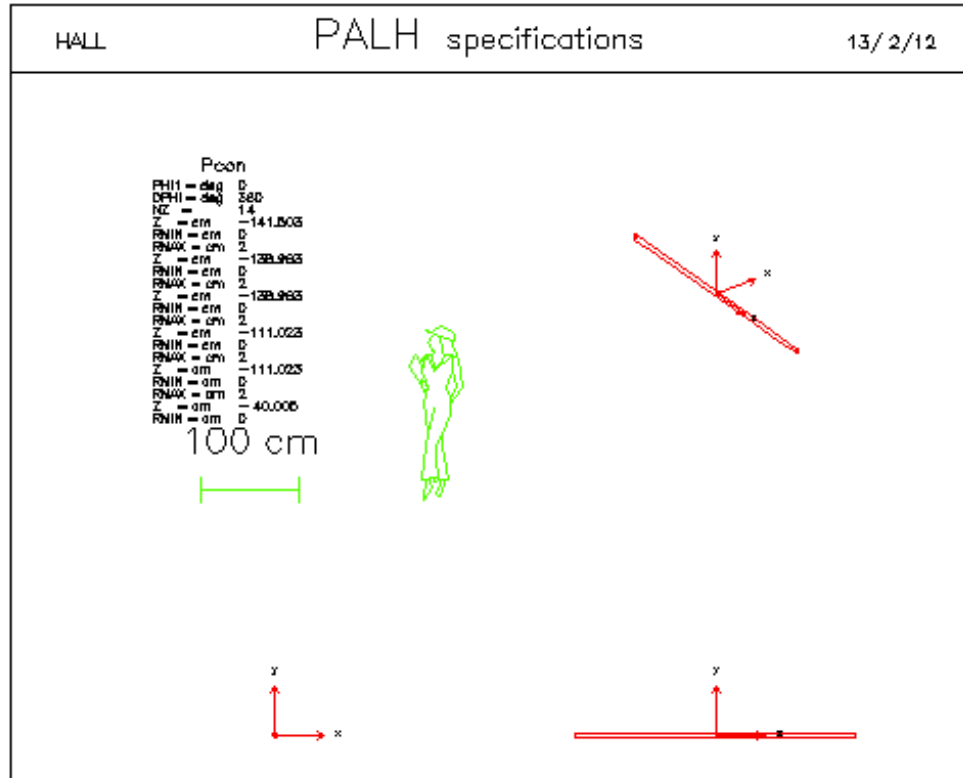
Note : the Be part is centred at $z = -15.75\text{inch}$ (= - 40 cm)

Aluminium part : PALS



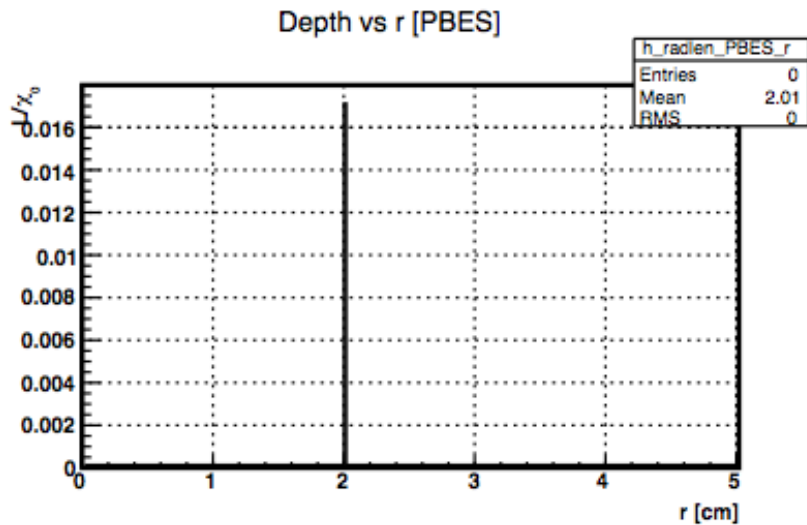
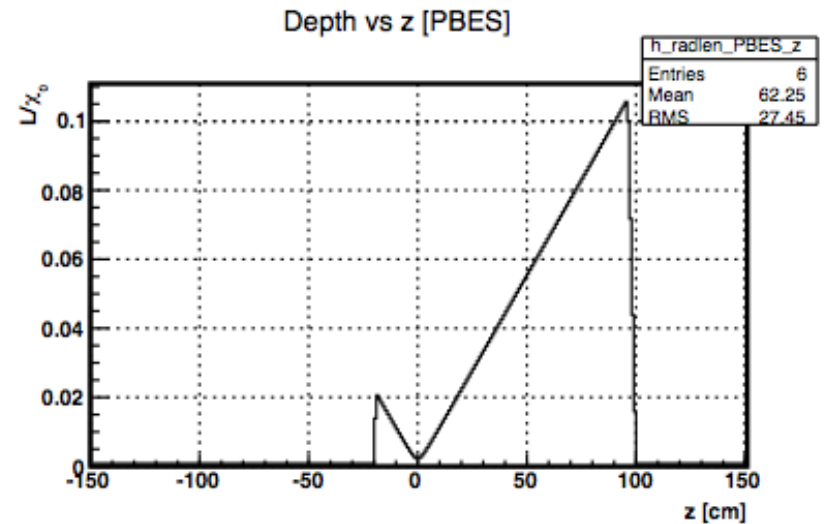
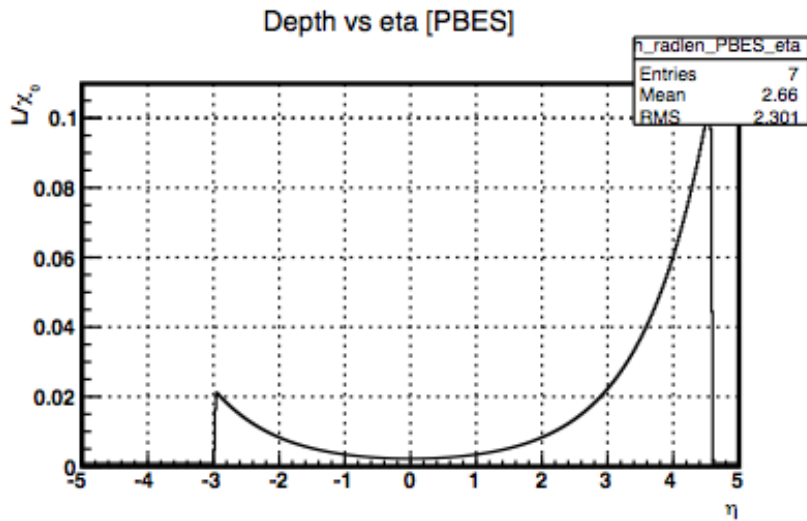
Z range	-141.50 ; -138.9	-138.9 ; -111.04	-111.04 ; -40	-40; 80	80; 111.04	111.04; 138.9	138.09; 141.50
Rmin ; Rmax	2 ; 3.492	2 ; 2.185	2 ; 2.14				

PALH (AIR)



Volume = air ; not supposed to have radiation length

Check : Beryllium part

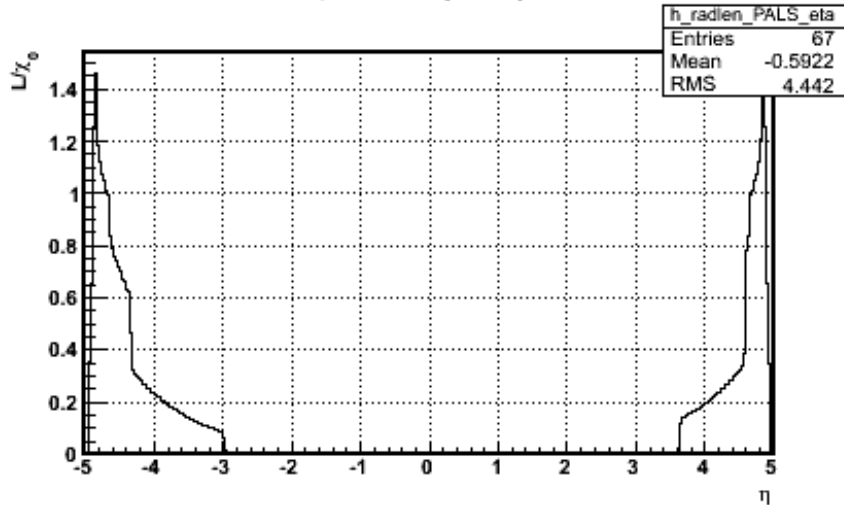


The agreement is very good :

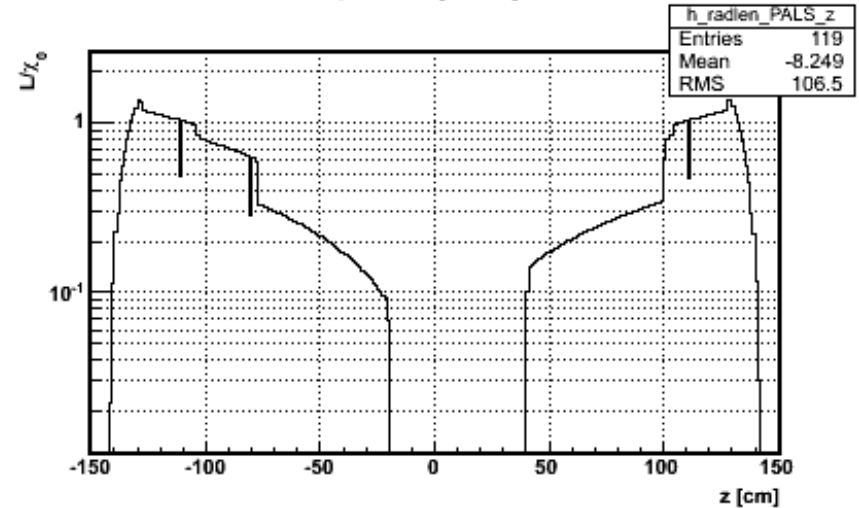
- radius is agree with the AgML model
- Z range too

Check : Aluminium part

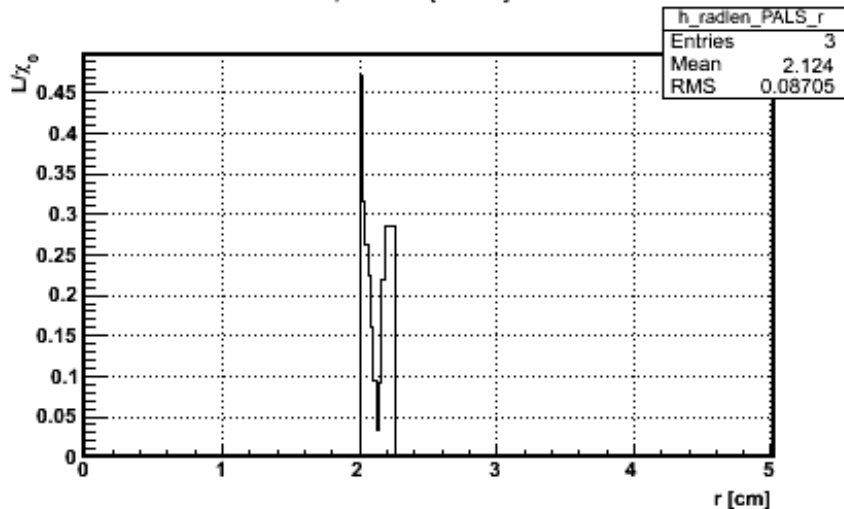
Depth vs eta [PALS]



Depth vs z [PALS]



Depth vs r [PALS]



- The radius looks OK : we see the larger values for the extremities
 - But there is something wrong with the central part : it is supposed to have a volume (slide 12) but it looks empty
- ➔ Overlap between volumes ? Option kOnly vs. kMany ?