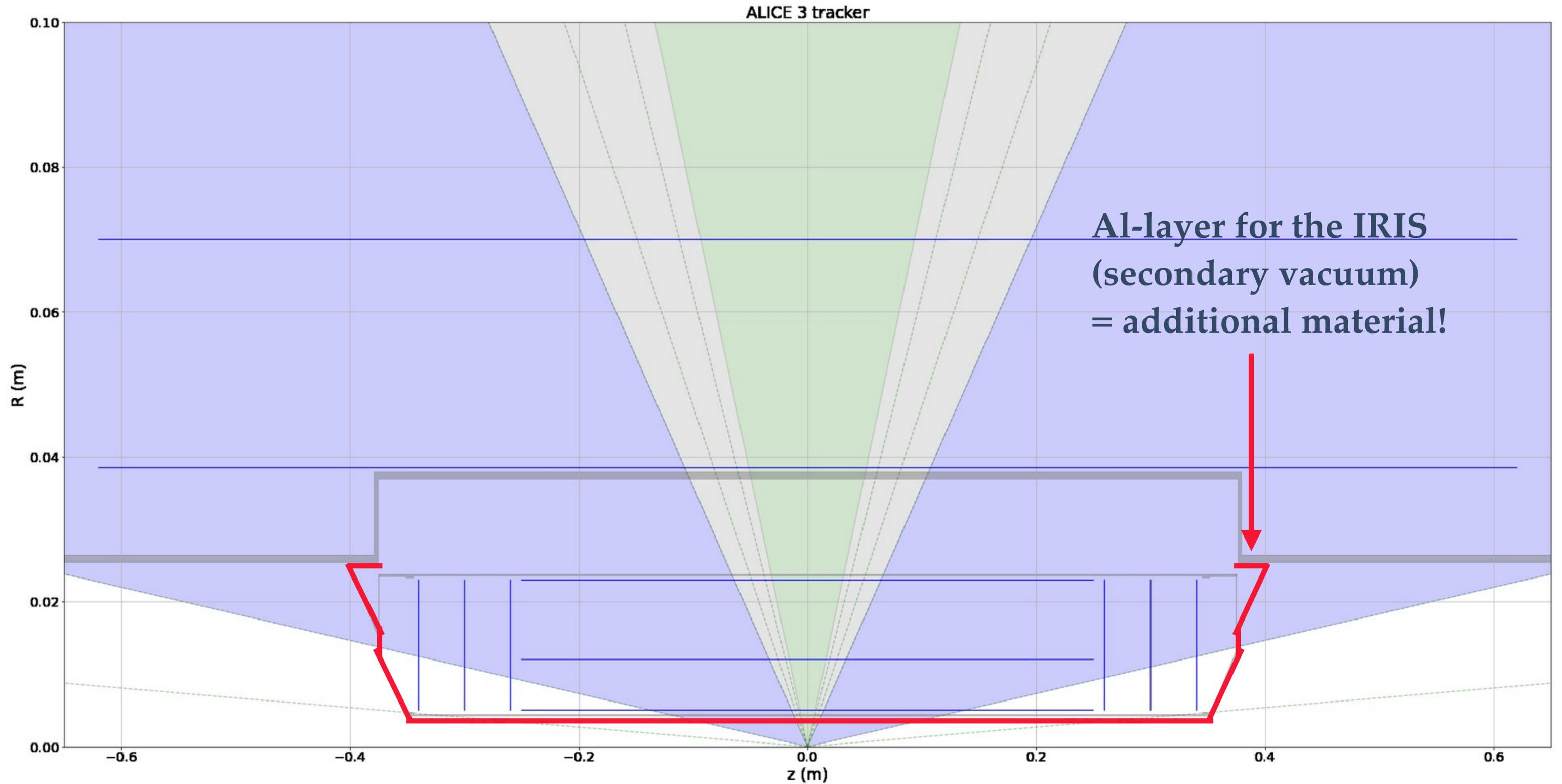
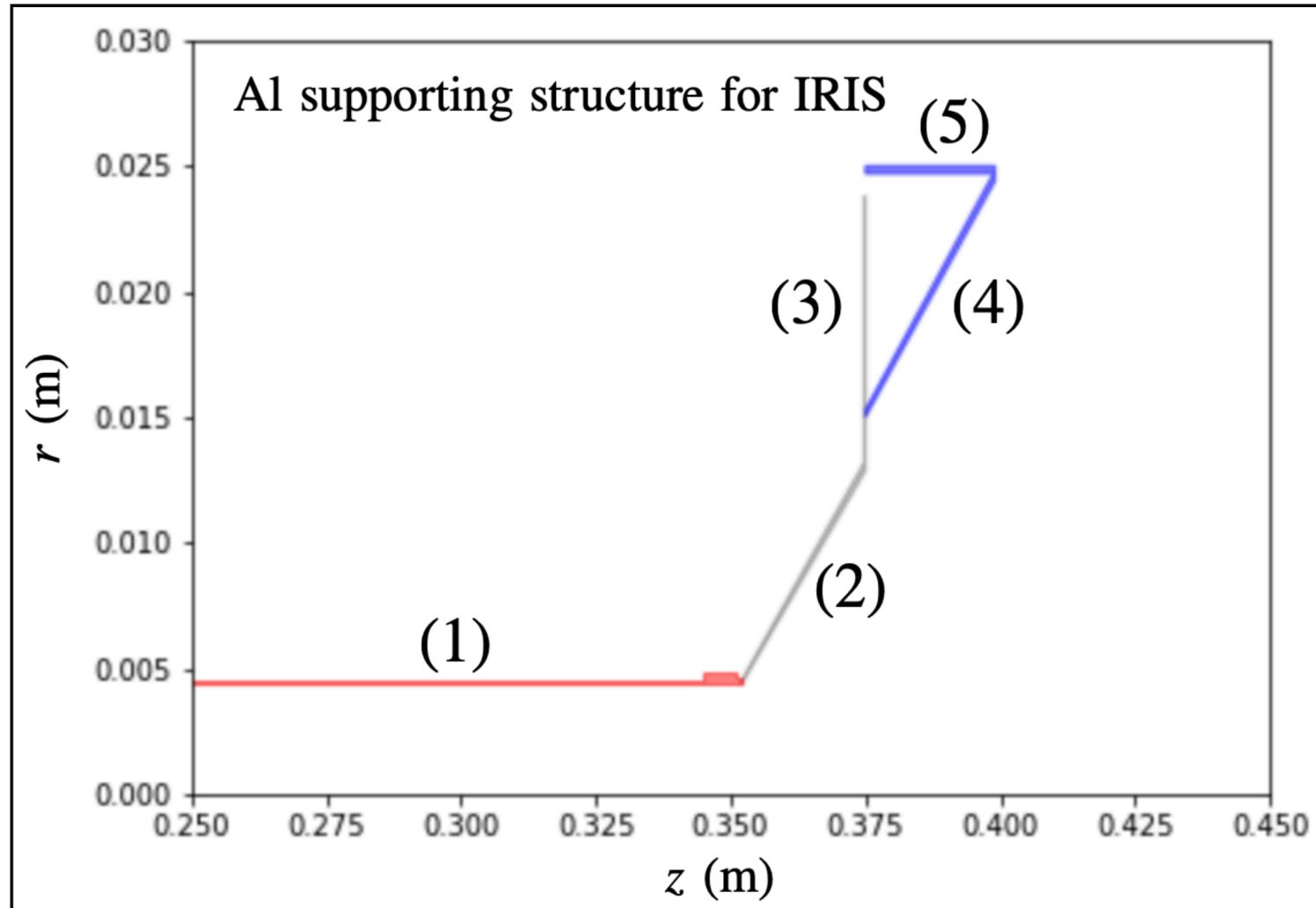


Al-layer for the IRIS@ALICE3



Al-layer for the IRIS@ALICE3



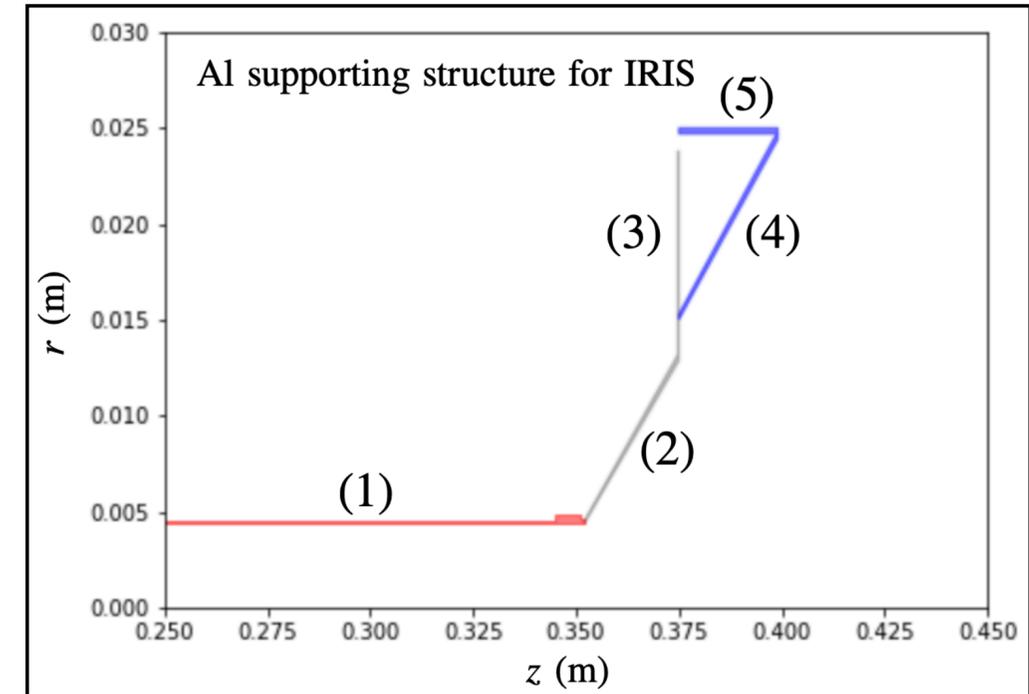
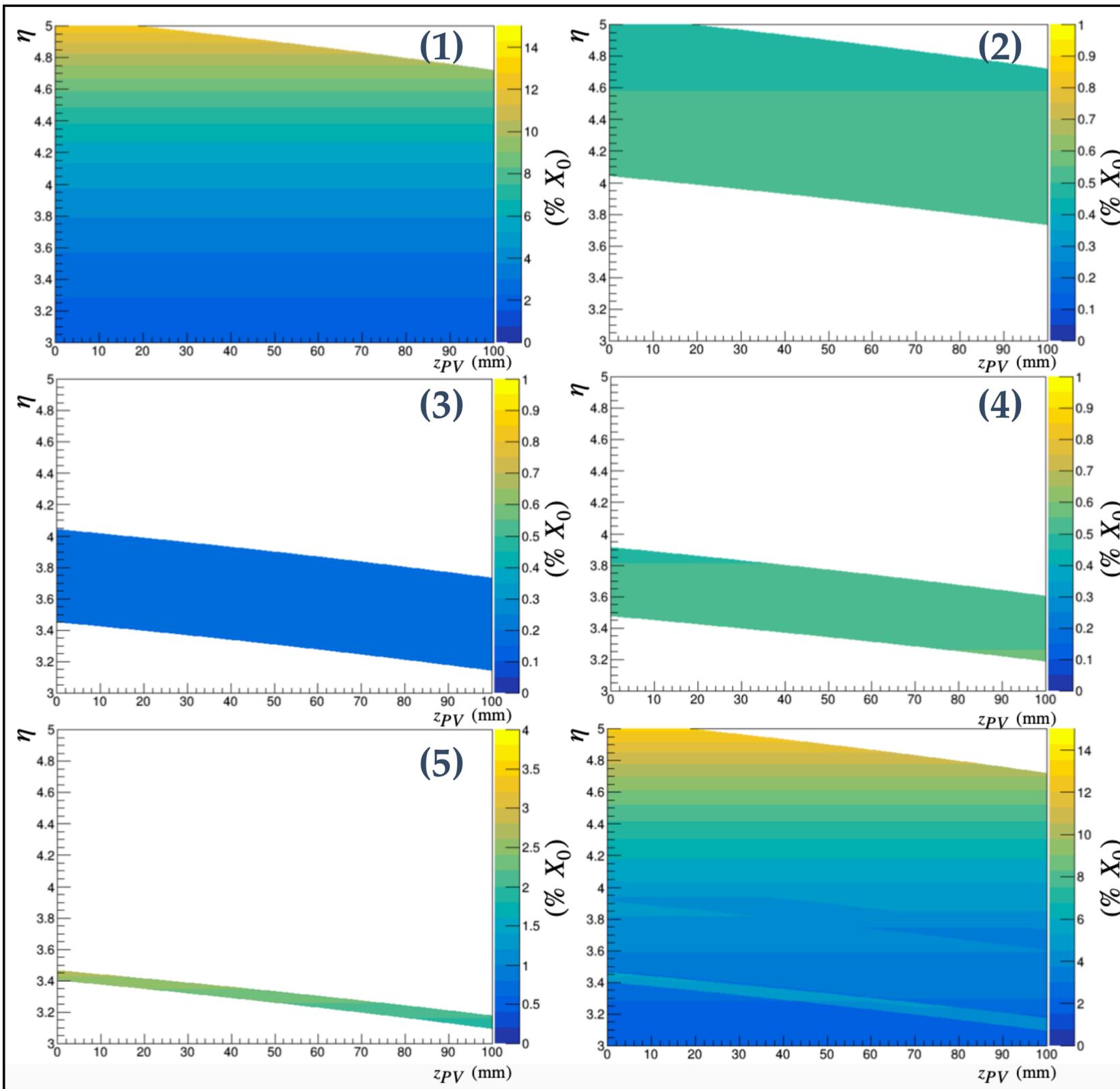
Pos1: provided by Jochen Klein.

Pos2: Parts (1)-(3) go up by $r + 16$ mm

Thickness of every part $d = 150 \mu\text{m}$

Part	Pos1	Pos2
(1)	$z = 352$ mm $r = 4.5$ mm	$z = 352$ mm $r = 20.5$ mm
(2)	$(z_1, r_1) = (352, 4.5)$ mm $(z_2, r_2) = (374.7, 13.17)$ mm	$(z_1, r_1) = (352, 20.5)$ mm $(z_2, r_2) = (374.7, 29.17)$ mm
(3)	$z = 374.7$ mm $r_1 = 13.17$ mm $r_2 = 23.79$ mm	$z = 374.7$ mm $r_1 = 29.17$ mm $r_2 = 39.79$ mm
(4)	$(z_1, r_1) = (375, 15)$ mm $(z_2, r_2) = (398.7, 24.7)$ mm	$(z_1, r_1) = (375, 15)$ mm $(z_2, r_2) = (398.7, 24.7)$ mm
(5)	$z_1 = 375$ mm $z_2 = 399$ mm $r_1 = 25$ mm	$z_1 = 375$ mm $z_2 = 399$ mm $r_1 = 25$ mm

Material Budget. Calculations IRIS L0 $r = 5$ mm



❖ (1) contributes the most ($\sim 11\%$ at $z_{PV} = 0$ and $\eta = 5$).
Consider: events @ $z_{PV} = 10$ cm and $4.8 < \eta < 5$?

- ❖ (2) contribution: $\sim 0.5\%$ X_0
- ❖ (3) contribution: $\sim 0.15\%$ X_0
- ❖ (4) contribution: $\sim 0.5\%$ X_0
- ❖ (5) contribution: $\sim 2.5\%$ X_0

Summary & Outlook

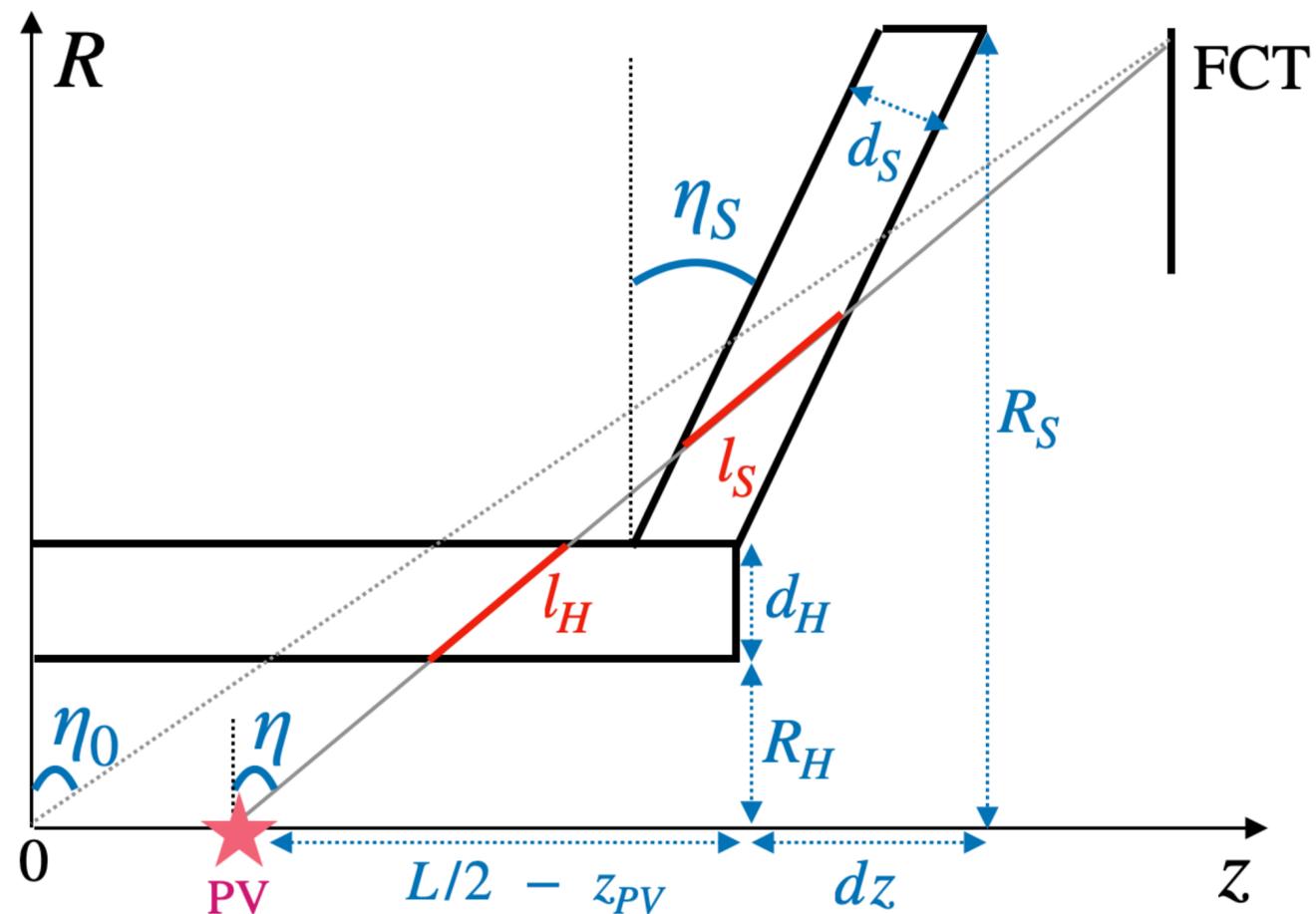
- ❖ Horizontal Al layer at 4.5 mm might be a problem (+ 11% X0) for primary particles
- ❖ **Open questions:**
 - (1) are all parts (1)-(5) Al and 150 micron thick?
 - (2) What are radial differences between Pos1 and Pos2? (here: 16 mm)
- ❖ g4me simulation?
 - (1) the Al module implemented
 - (2) study how the background (Bremsstrahlung) modifies when Al is included
 - (3) study (2) for Pos1 and Pos2 + different PV positions.

Back up

Material Budget. Simulations with g4me (Old slide)

Question (1): how much material budget does the Al-layer provide in addition to the pipe (+end caps, etc.)?

Question (2): how do the results from (1) when we consider events with different z_{PV} ?



Numerical values used:

Horizontal layer:

$$L/2 = 0.35 \text{ m}$$

$$R_H = 0.45 \text{ cm}$$

$$d_H = 150 \text{ } \mu\text{m}$$

Layer with a slope:

$$R_S = 2.4 \text{ cm}$$

$$d_S = 150 \text{ } \mu\text{m}$$

$$dz = 5 \text{ cm}$$

Pseudo-rap. coverage:

$$3 < \eta_0 < 5$$

Vertex z-Position:

$$z_{PV} < 10 \text{ cm}$$

Radiation Length Al:

$$X_0^{\text{Al}} = 8.897 \text{ cm} \approx 0.95 \cdot X_0^{\text{Si}}$$

Slope:

$$\eta_S = \text{asinh} \left(\frac{dz}{R_S - R_H - d_H} \right) = 1.67$$

η -Coverage:

$$\sinh \eta = \frac{z_{\text{FCT}} - z_{\text{PV}}}{z_{\text{FCT}}} \cdot \sinh \eta_0$$

Here, it is assumed that

$$z_{\text{FCT}} = 342 \text{ cm}$$

and, therefore: $\eta \approx \eta_0$

Effective distance through Al:

Neglecting the „edges“:

$$l_H = d_H \cdot \cosh \eta$$

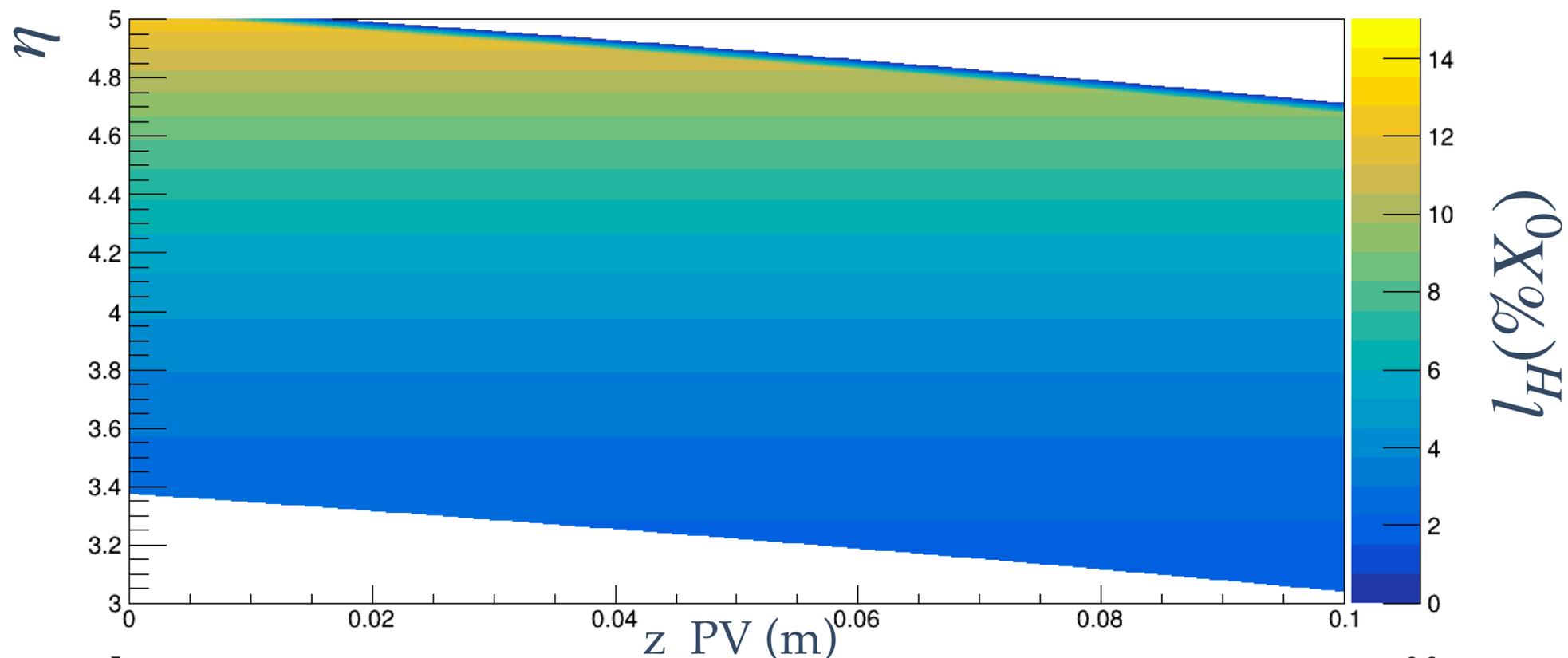
$$l_S = d_S \cdot \cosh \eta \cdot \frac{\cosh \eta_S}{\sinh \eta - \sinh \eta_S}$$

e.g. $l_H(\eta = 4, z_{PV} = 0) = 4.1 \text{ mm} \approx 4.7 \% X_0$

e.g. $l_S(\eta = 4, z_{PV} = 0) = 0.41 \text{ mm} \approx 0.5 \% X_0$

if $d_H = d_S$, then $l_H > l_S$ for $\eta > \text{asinh}(e^{\eta_S}) \approx 2.4$

Material Budget. Simulations with g4me (Old slide)



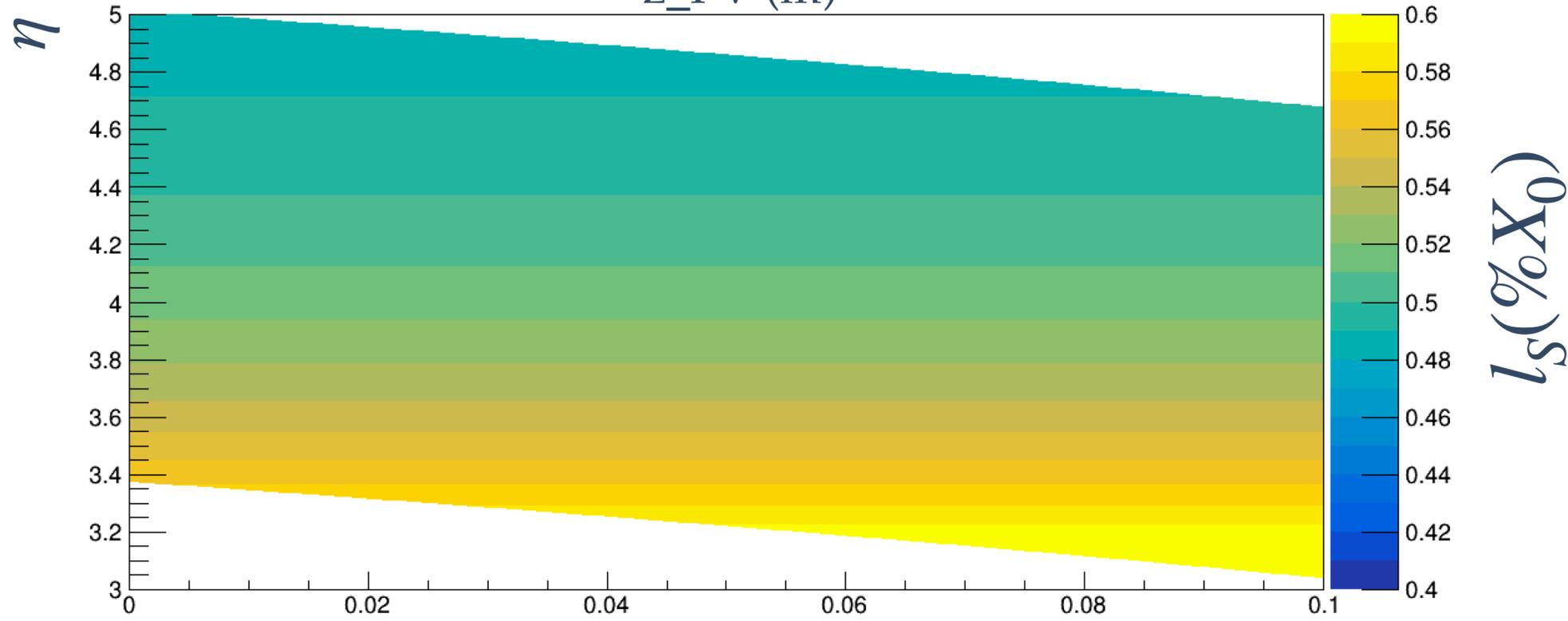
$I_{H+S}(\%)$

* Analytical calculation of the material budget (plots on the left).

e.g:

* $I_{H+S}(z_{PV} = 0 \text{ cm}, \eta = 5) \approx 13\% \text{ (!!)}$

* $I_{H+S}(z_{PV} = 10 \text{ cm}, \eta > 4.8) = 0$
 but $4.8 < \eta < 5.0$ might be a very tiny window



$I_S(\%)$

Al-layer might be a problem!
 Could be optimised? (apparently not)