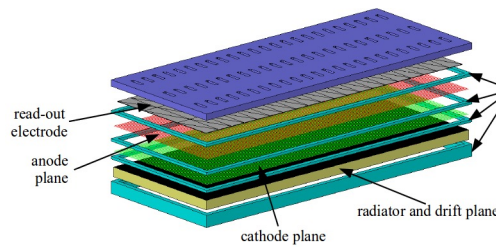
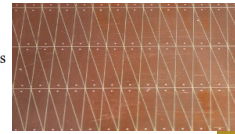


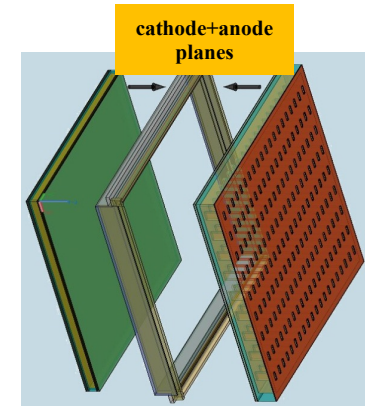
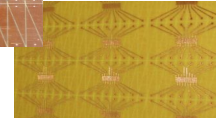
2011 – 2012 prototypes



Readout electrode



Signal transport topology



drift plane

pad plane+back plane

Prototype

TRD 2011 – small prototype

TRD 2012 – real size prototype

Feature

architecture

single MWPC (2 x 4 mm amplification region) + 4 mm drift region

A – K gap

4 mm

anode plane

20 μm gold plated W wires, 3 mm wire pitch

cathode plane

70 μm Cu-Be wires, 1.5 mm wire pitch

drift electrode

8mm Rohacell plate + 20 μm Al kapton

20 μm Al kapton + 3 mm Rohacell + 9 mm honeycomb + 3 mm Rohacell + 20 μm Al kapton

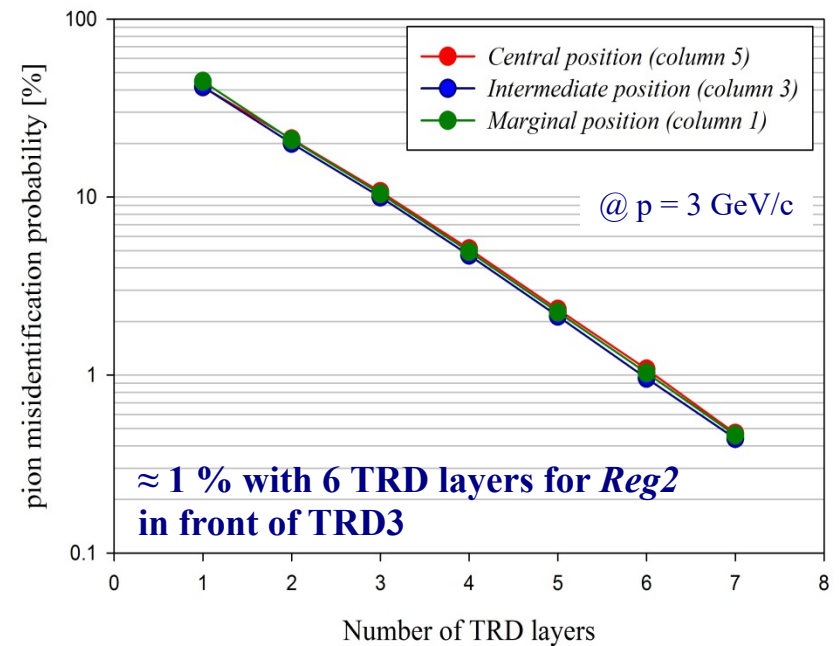
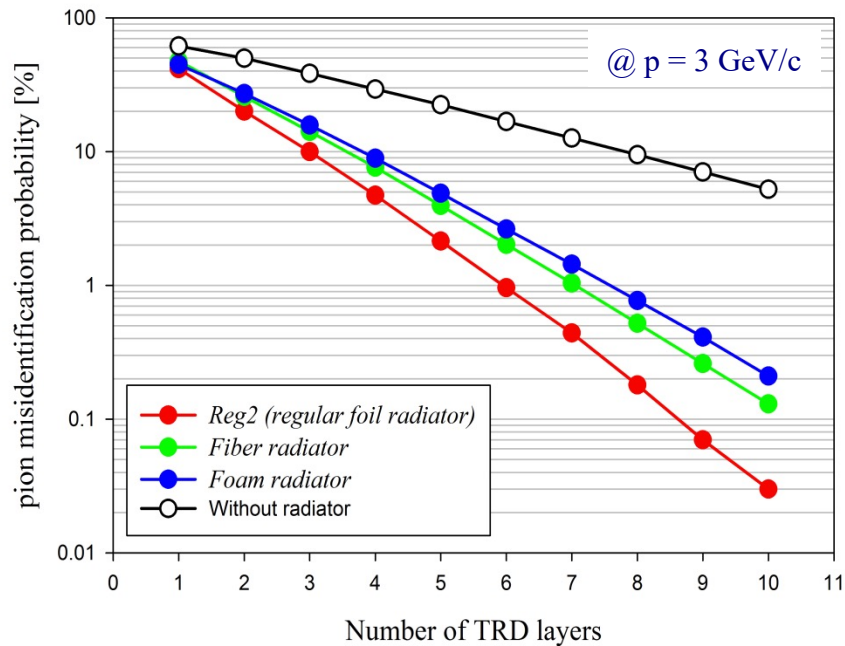
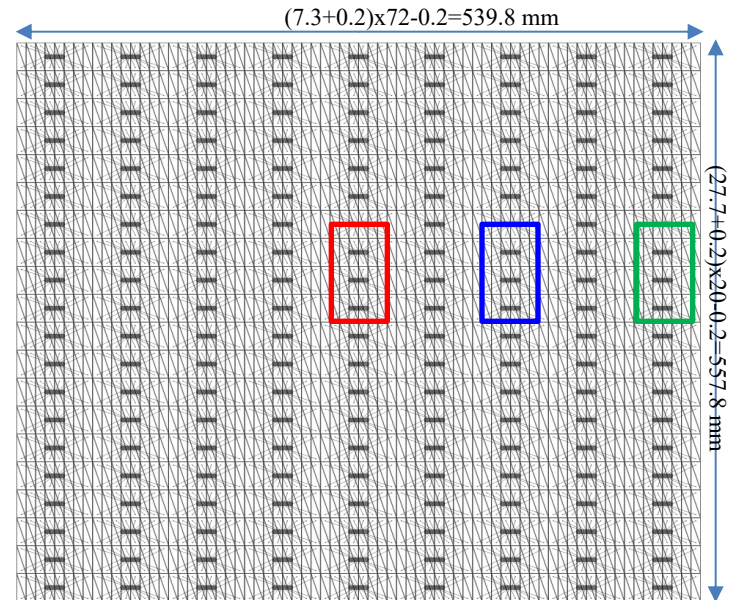
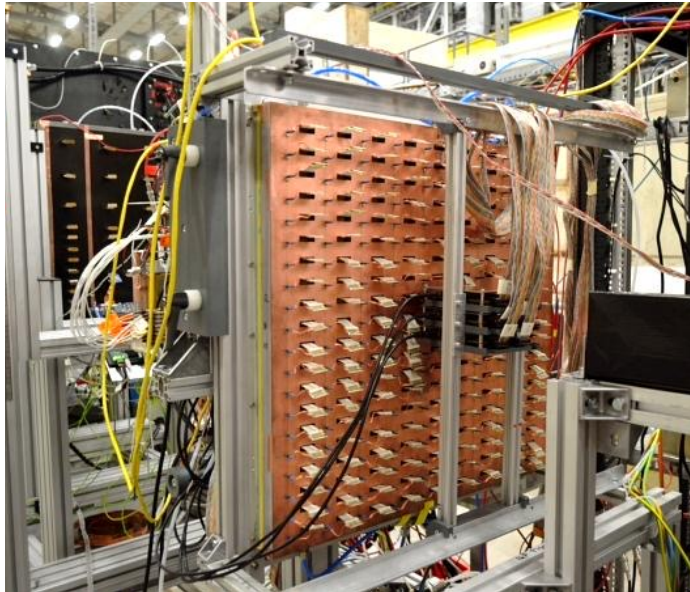
PCB 300 μm ; triangular shape of pads; readout cell area $(0.7 \times 2.7)/2 \approx 1 \text{ cm}^2$

readout electrode

192 triangular pads and total area of 8 x 29 cm^2

rows: 20; columns: 9 ; pads/row: 144; 2880 triangular pads and total area of 60 x 60 cm^2

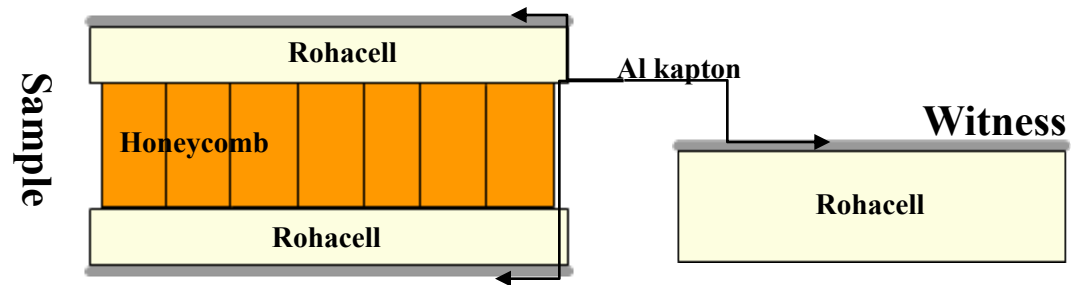
e/π discrimination TRD 2012 prototype



CBM-TRD prototype – absorption tests



- operated detector: **TRD 2012 prototype**
- gas mixture: Ar+CO₂ (80%+20%)
- HV_a=1900V & HV_d=600V
- a collimated ⁵⁵Fe source



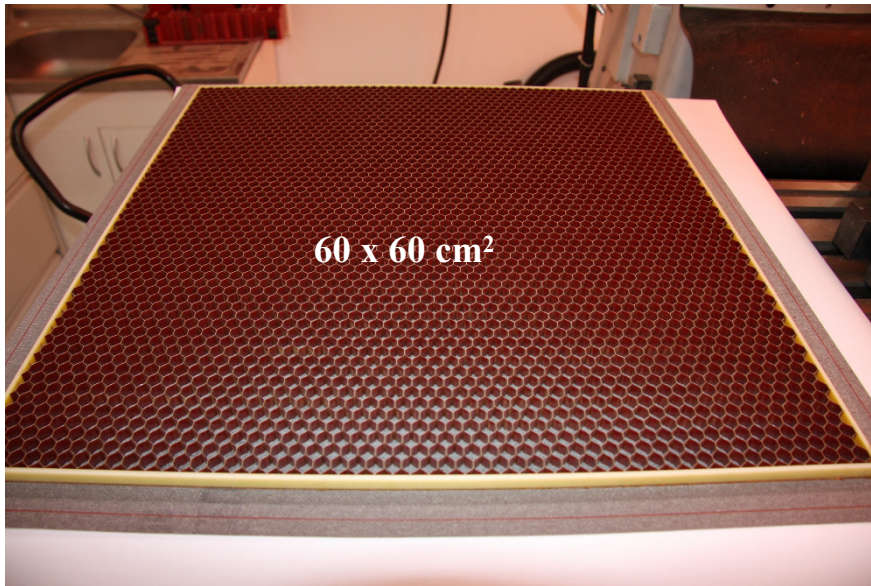
Characteristic	S1	S2	S3	S4	Witness
Rohacell thickness [mm]	2 x 3	2 x 3	2 x 3	-	8
Honeycomb thickness [mm]	9	6	6	9	-
Φ-honeycomb cell	9.6	6.4	6.4	9.6	-
Honeycomb density [kg/m ³]	48	48	32	48	-
Al kapton thickness [μm]	2 x 20	2 x 20	2 x 20	-	20
Absorption [%]	56.23**	56.75	55.03	48.12	58.20*

- The main absorber is the Rohacell plate.
- The type of honeycomb plate used for the drift electrode matters the least.
- S4 (2 x Al carbon fiber of ~300μm + honeycomb plate) has a transmission 25% better than the witness sample, and 10% better than the samples with a honeycomb + Rohacell structure.

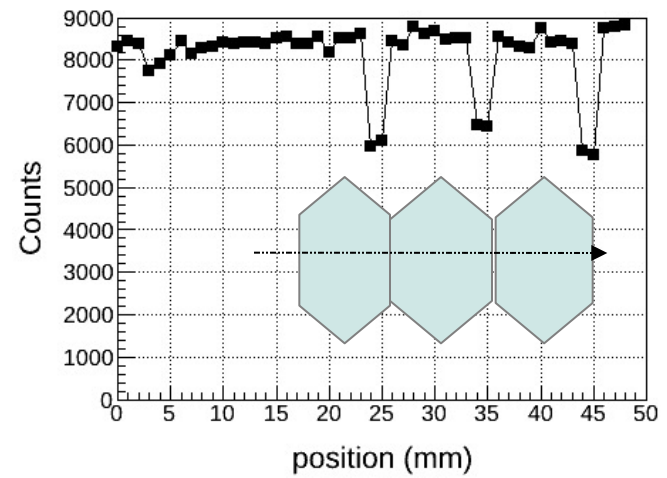
*drift electrode for TRD2011

**drift electrode for TRD2012

Drift electrode based on thin carbon layers



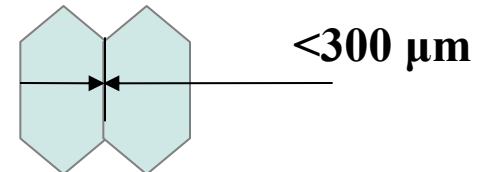
P4 sample: [?]100 μ m C/honeycomb(9.6 mm cell)[?]100 μ m C



$\Phi_{\text{coll}} = 1 \text{ mm}$

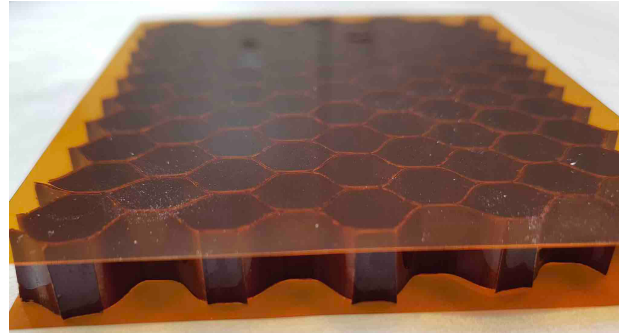
Scan step = 1 mm

30% increased absorption in the honeycomb walls, but the honeycomb walls are less than 5% of the honeycomb volume



Rough estimates of absorption for the new configuration

10x10 cm² sample: 70 µm kapton/honeycomb(9.6 mm cell)/70 µm kapton



The sample 150 µm C/honeycomb(9.6 mm cell)/150 µm C
has a transmission of ~52%

$$I = I_0 e^{-\mu \cdot x} \Rightarrow \mu \cong 3.26 \text{ mm}^{-1}$$

$$\text{if } \mu^{\text{carbon fiber}} = \mu^{\text{kapton}} \Rightarrow 74\% \text{ transmission}$$

$$\rho^{\text{diamond}} = 3.52 \text{ g/cm}^3$$

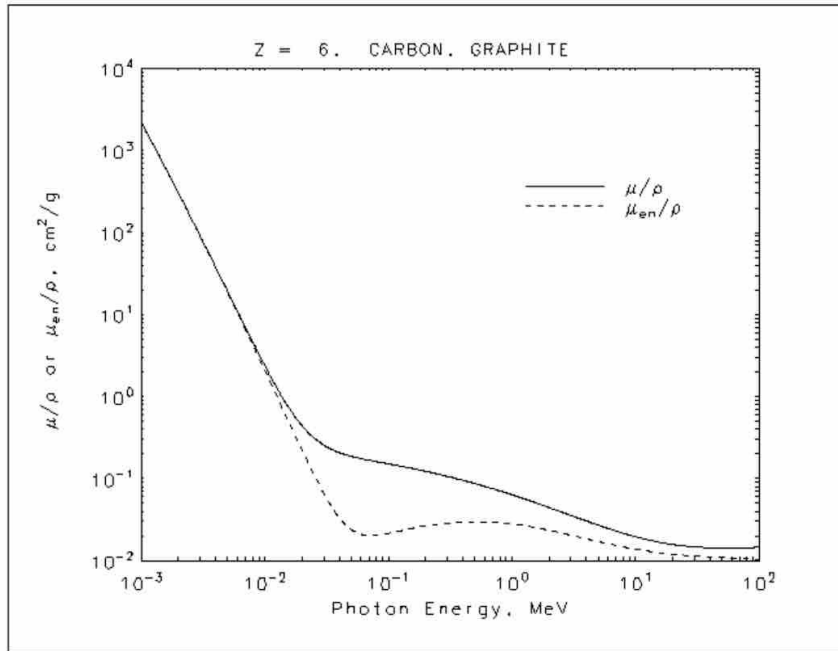
$$\rho^{\text{graphite}} = 2.25 \text{ g/cm}^3$$

$$\rho^{\text{amorphous}} = 1.90 \text{ g/cm}^3$$

$$\rho^{\text{carbon fiber}} = 2.00 \text{ g/cm}^3$$

$$\rho^{\text{kapton}} = 1.42 \text{ g/cm}^3$$

X-ray absorption



- the mass attenuation coefficient - μ/ρ
- the mass energy-absorption coefficient - μ_{en}/ρ

$$I = I_0 e^{-(\mu/\rho) \cdot x}$$

x - mass thickness = $\rho \cdot t$

t - thickness

$\Downarrow$

$$I/I_0^{(200 \mu\text{m C})} \cong 0.64$$

$$I/I_0^{(300 \mu\text{m C})} \cong 0.48$$

A trivial & precise ^{55}Fe absorption measurement device to be setup ASAP

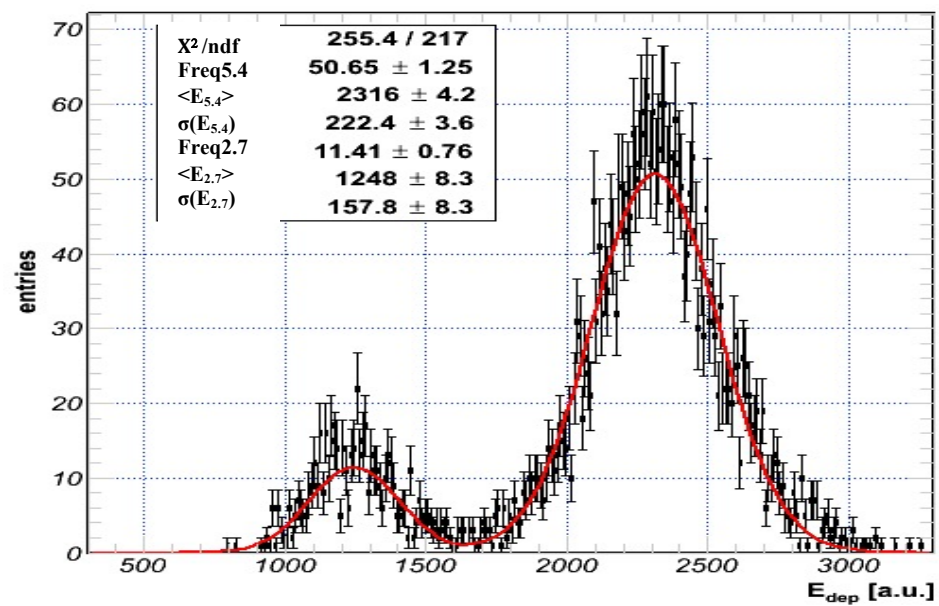
- Laura

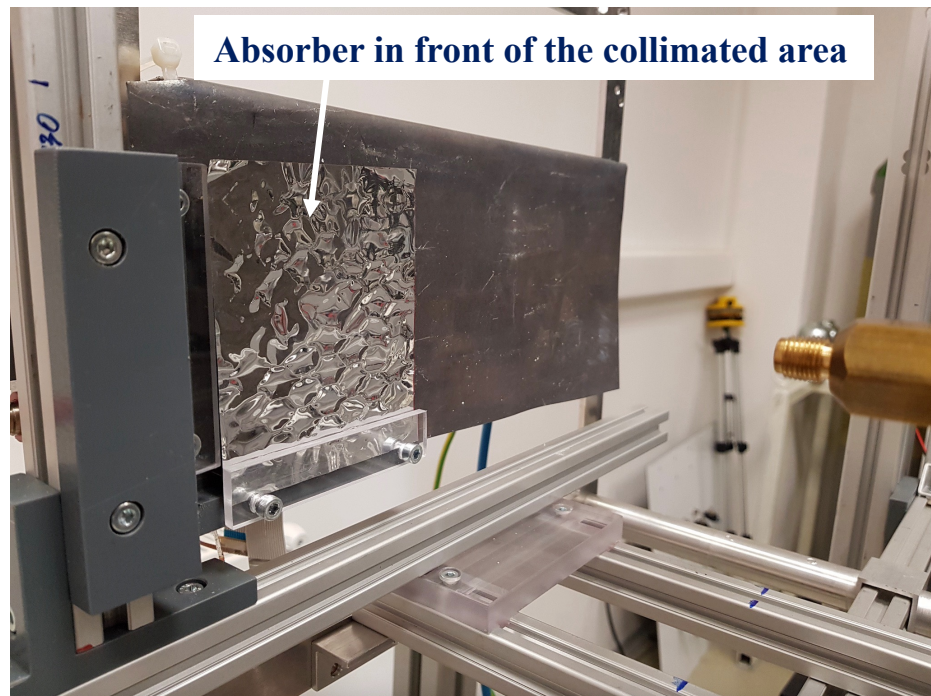
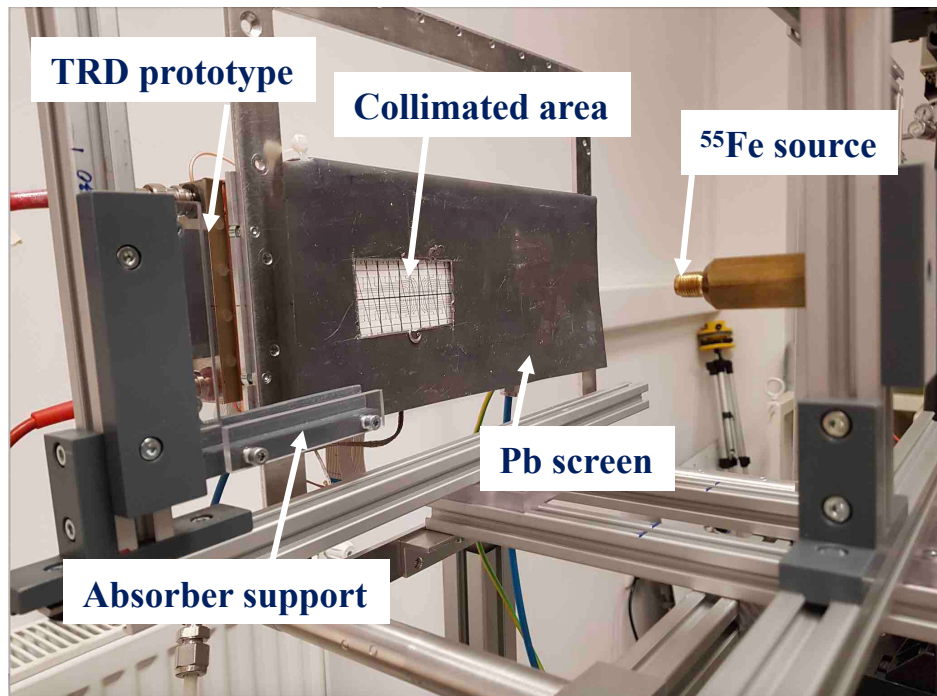
- Cara

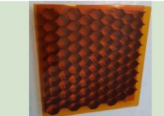
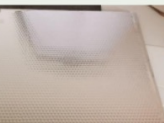
- Bugi

- Daniel - training

- Mariana for advice





1 75 μm Kapton foil + 9 mm honeycomb + 75 μm Kapton foil	
2 20 μm aluminized Kapton foil + 3 mm Rohacell foam HF71 + 9 mm honeycomb + 3 mm Rohacell foam HF71 + 20 μm aluminized Kapton foil TRD-2D 2012 entrance window	
3 20 μm aluminized Kapton foil + 3 mm Rohacell foam HF71 + 6 mm honeycomb + 3 mm Rohacell foam HF71 + 20 μm aluminized Kapton foil	
4 0.25 mm aluminized carbon fiber + 9 mm honeycomb + 0.25 mm aluminized carbon fiber	
5 20 μm aluminized Kapton foil + 9 mm honeycomb + 20 μm aluminized Kapton foil	
6 170 μm aluminized carbon fiber + 9 mm honeycomb + 170 μm aluminized carbon fiber	
7 150 μm carbon fiber + 9 mm honeycomb + 20 μm aluminized Kapton foil	
8 135 μm carbon fiber + 25 μm aluminized Mylar foil + 9 mm honeycomb + 20 μm aluminized Kapton foil	
9 100 μm carbon fiber + 25 μm aluminized Mylar foil + 8 mm Rohacell foam HF71 TRD-ALICE entrance window	

