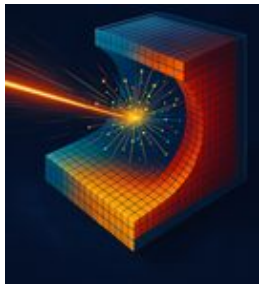
Programme/Sub-programme/Module	**5.9/5.9.2/CERN-RO**		
Project Type	**RDI**	**Continuing**	✔ **New**
Research programme/Experiments	R&D/DRD6 - Detector R&D Collaboration for Calorimeters		
Project title/ Acronym	Development of compact electromagnetic calorimeter: novel designs and advanced computing methods/***CompactCalo***		
Duration	26 month		

CompactCalo - Development of compact electromagnetic calorimeter: novel designs and advanced computing methods

Project Director: PhD. Veta Ghenescu

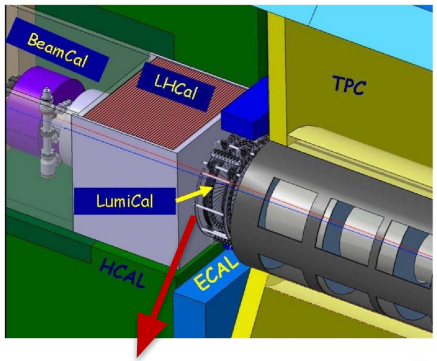
Institute of Space Science- INFLPR Subsidiary, Magurele, ROMANIA

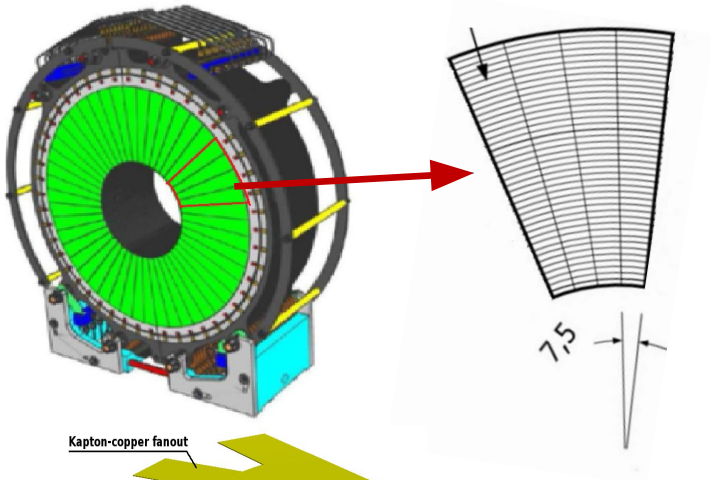


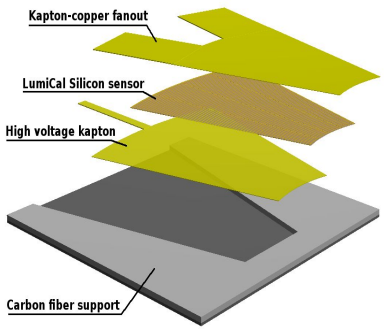
https://www.spacescience.ro/portfolio/compactcalo/

High Granular Calorimetry R&D: what for?

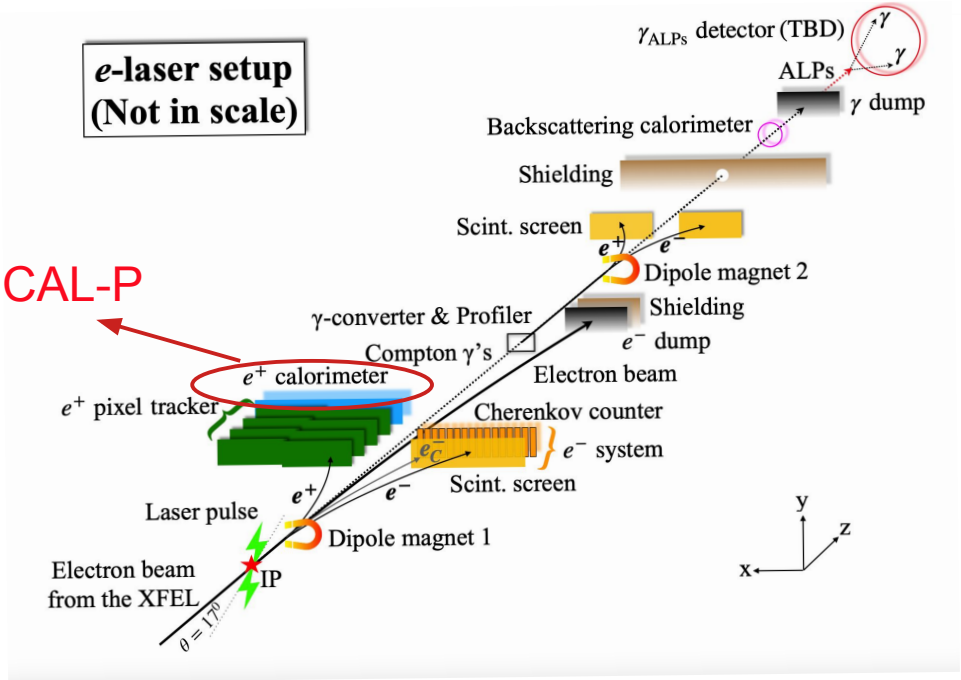
- For Higgs Factories (FCC, ILC, CLIC)

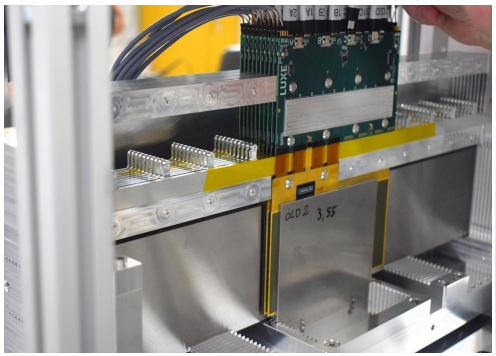


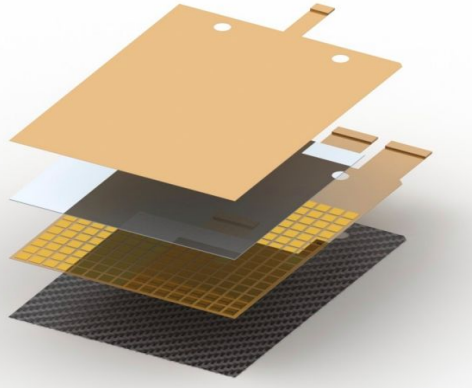




- For Lower energy experiments (LUXE)







2025 Activities

Stage I. Development and testing of calorimeter and experimental setup

Activities:

- Activity I.1. Experimental set-up configuration for measuring sensor parameters
  - Subactivity I.1.1. Purchase calorimeter components
- Activity I.2. Testing prototype calorimeter in particle beam
  - Subactivity I.2.1. Setup the experiment in the test beam area
  - Subactivity I.2.2. Data acquisition with prototype calorimeter

Budget breakdown

Expenditure	Planned			
	Total	**2024**	**2025**	**2026**
1. PERSONNEL EXPENDITURES, from which:	0	0	0	3,151
2. LOGISTICS EXPENDITURES, from which:	25,000	0	15,000	10,000
3. TRAVEL EXPENDITURES	19,446.67	0	9,446.67	10,000
4. INDIRECT EXPENDITURES – (OVERHEADS)	7,909.33	0	3306.33	4603
TOTAL EXPENDITURES (1+2+3+4)	**55,507**	**0**	**27,753**	**27,754**

Working progress

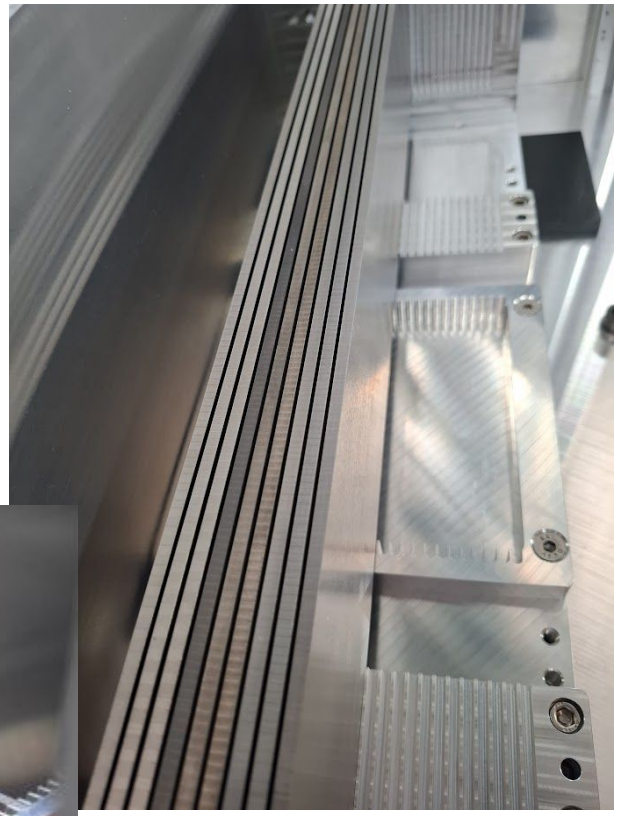
Stage I. Development and testing of calorimeter and experimental setup

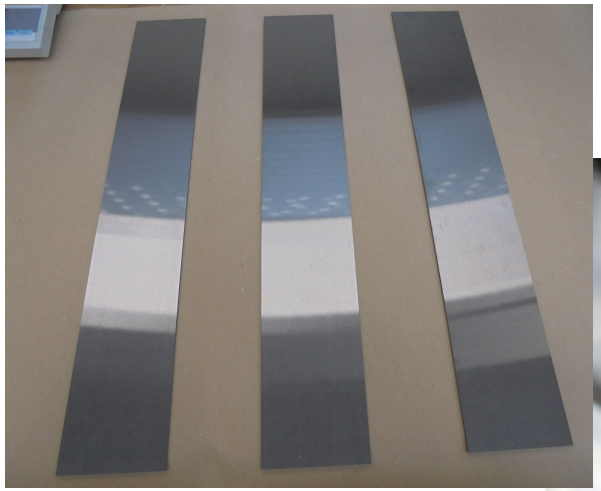
Activity I.1. Experimental set-up configuration for measuring sensor parameters

- Subactivity I.1.1. Purchase calorimeter components

W plates from a German company – called ***Wolfram Industrie***

- 3 W plates with:
  - LxHxW[mm]: 555±0.2 x 100±0.2 x 3.55+0/-0.05 mm,
  - composition: W 99.95%
- Arrived to DESY the day of the beam test start.





Working progress

Stage I. Development and testing of calorimeter and experimental setup

- Activity I.2. Testing prototype calorimeter in particle beam
  - Subactivity I.2.1. Setup the experiment in the test beam area – done!!!

DESY TEST BEAM.

DESY 2 Test Beam Schedule 2025 - Status from 19/NOV/2025

DESY 2 Test Beam Coordinators: Sven Ackermann, Ralf Diener, Marcel Stanitzki

Switch to High Contrast Schedule

Startdate	Week...	TB21	T	TB22	T	TB241	T	TB24	T
30.12.2024	1	Shutdown		Shutdown		Shutdown		Shutdown	
06.01.2025	2	Shutdown		Shutdown		Shutdown		Shutdown	
13.01.2025	3	Shutdown		Shutdown		Shutdown		Shutdown	
20.01.2025	4	Shutdown		Shutdown		Shutdown		Shutdown	
27.01.2025	5	Shutdown		Shutdown		Shutdown		Shutdown	
03.02.2025	6	Shutdown		Shutdown		Shutdown		Shutdown	
10.02.2025	7	Startup		Telescope-Dev	X	Startup		Startup	
17.02.2025	8	MONOPIX2	X	Tangerine	X			EEEMCAL	
24.02.2025	9	MONOPIX2	X	ATLAS HGTD	X			EEEMCAL	
03.03.2025	10	CMS HGCAL	X	ATLAS HGTD	X			DRD6 SiW ECAL AIDAinnova	X
10.03.2025	11	Telescope-Dev	X	DCRSD	X			CMOS LGAD	X
17.03.2025	12	CMS ETL ETROC	X	Tangerine	X			IPHC-Mimosis2.1	
24.03.2025	13	CMS ETL ETROC	X	ATLAS-ITk-Strips	X			EEEMCAL	
31.03.2025	14	Belle II CMOS	X	CMS ETL	X			EEEMCAL	
07.04.2025	15	Belle II CMOS	X					UHH-LGAD	X
14.04.2025	16	Maintenance		Maintenance		Maintenance		Maintenance	
21.04.2025	17	Telescope-Dev	X	ALICE 3 OT				ALICE 3 OT	X
28.04.2025	18			ALICE 3 OT				CalVision	X
05.05.2025	19	CMS ETL ETROC	X					CalVision	X
12.05.2025	20	CMS ETL ETROC	X	AIDAinnova-WP8.4.1					
19.05.2025	21			TelePix	X				
26.05.2025	22			TelePix	X				
02.06.2025	23	Maintenance		TelePix	X	Maintenance		Maintenance	
09.06.2025	24			TelePix	X			LUXE ECAL and DRD6	X
16.06.2025	25	MDI-2/KIPT		Tangerine	X			LUXE ECAL and DRD6	X

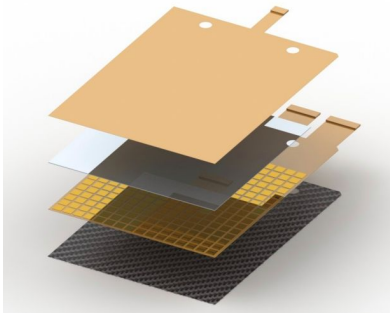
2 persons from ISS involved in data taking at TB24 area.

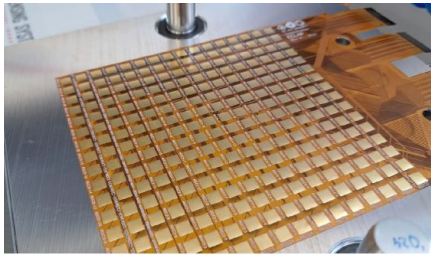
Working progress

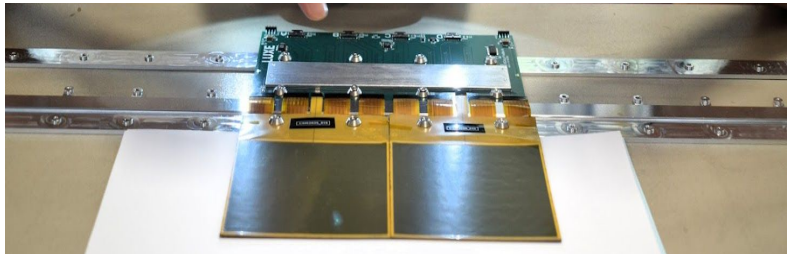
- Activity I.2. Testing prototype calorimeter in particle beam
  - Subactivity I.2.1. Setup the experiment in the test beam area – done!!!

ECAL in beam @ DESY-II

- ✔ ***Electrons of 1 to 5 GeV energy;***
- ✔ ***Data taken in June 2025***
- ✔ ***ALPIDE telescope – 6 planes***
- ✔ ***DAQ framework provided:***
  - EUDAQ (software)
  - TLU (hardware)
- ✔ ***DUT (ECAL-P multi-layer prototype)***
  - W absorber – $1X_0$
  - CSIS: Compact Silicon Sandwich
    - Kapton HV + Si sensor + kaptop fanout/readout + Carbon fiber
    - Nominal thickness: (0.07 + 0.32 + 0.12 + 0.2 + 3*0.05(glue)) = 0.86mm
    - 16 x 16 readout pads (5.5 x 5.5 mm^2 per pad)
  - FLAME/FLAXE ASICs: ASICs with 32-chs and 50ns shaping time

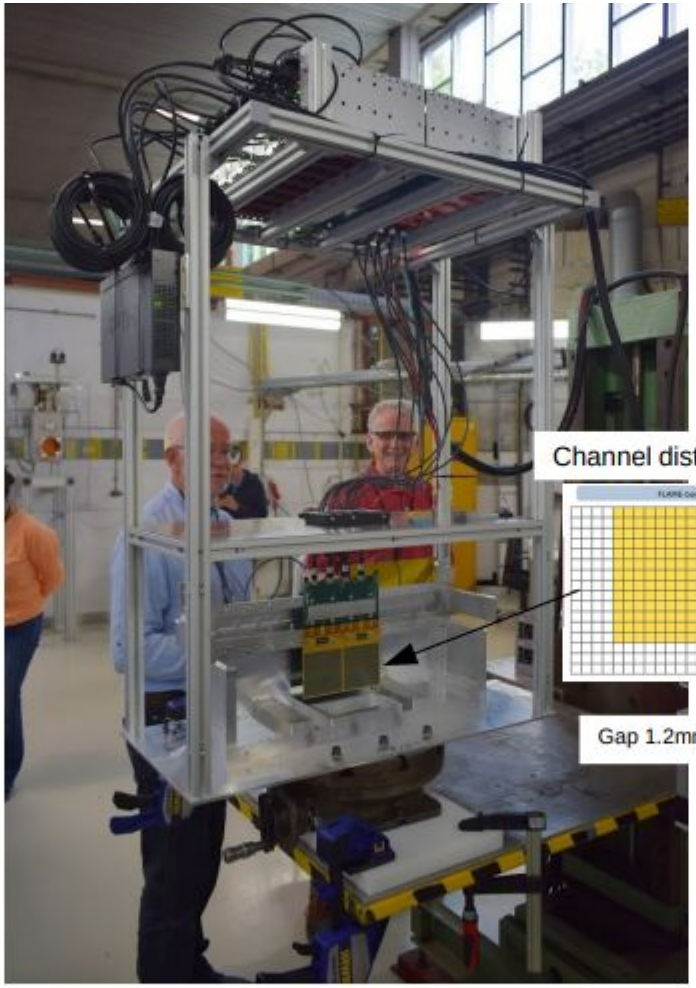


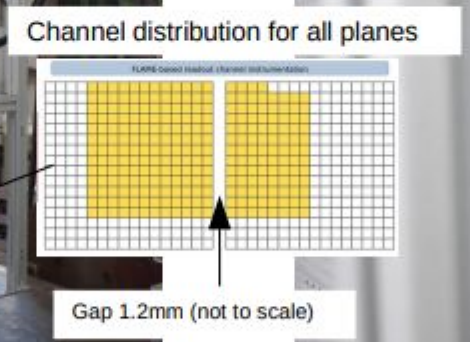


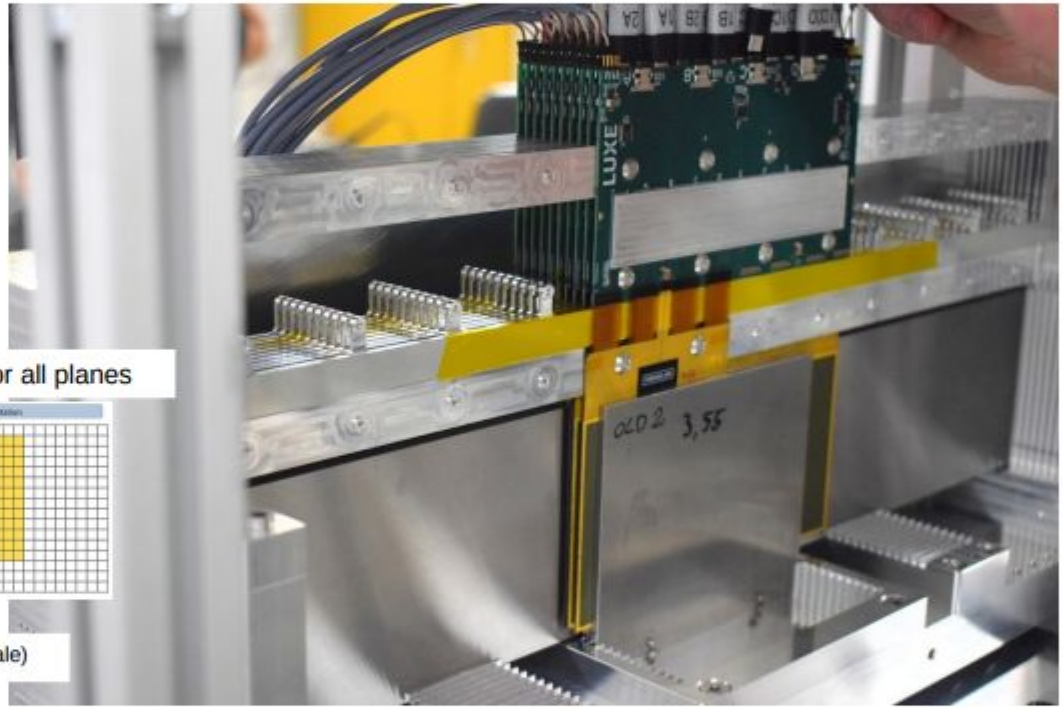


Working progress

- Activity I.2. Testing prototype calorimeter in particle beam
  - Subactivity I.2.1. Setup the experiment in the test beam area – done!!!







Working progress

Stage I. Development and testing of calorimeter and experimental setup

Activity I.2. Testing prototype calorimeter in particle beam

- Subactivity I.2.2. Data acquisition with prototype calorimeter – done!!!

ISS server for ECAL group:

- Capacity: 48TB(size) -> 39 TB (used) 80%
- Stored:

  ./TB2025 - 33 TB;
- >15 External users from: AGH – Poland (2), IFIC – Spain (4), ISS – Romania (4), TAU – Israel (5), UW – Poland (4),
- Geant4, Root, Corryvreckan and Python can be access

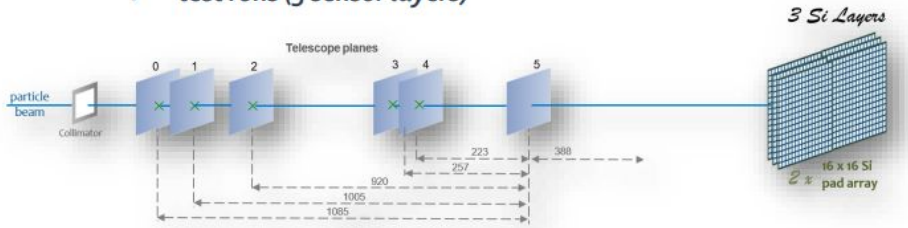
Preliminary Results - MC simulation

- Monte Carlo simulation for TB layouts:
  - Validation
  - Calibration with experimental data

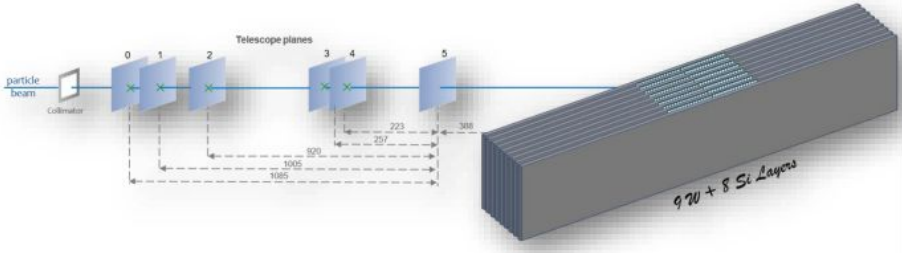
A. Identification of stack configurations used in TB2025

- *~ 5 configurations used in test-beam with some variations*

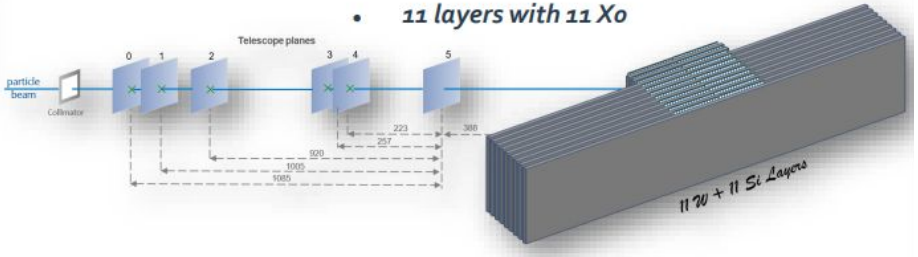
- *test runs (3 sensor layers)*



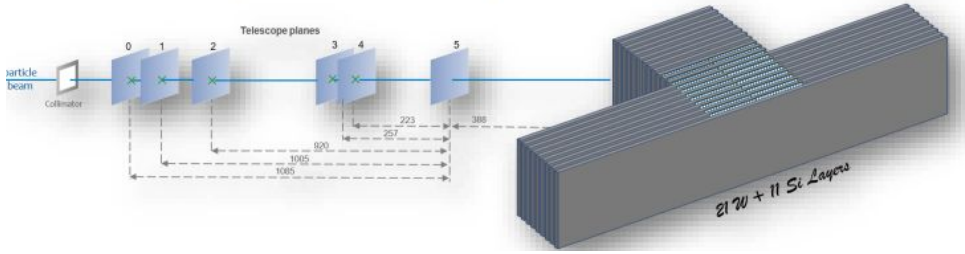
- *8-layers with 9 Xo*



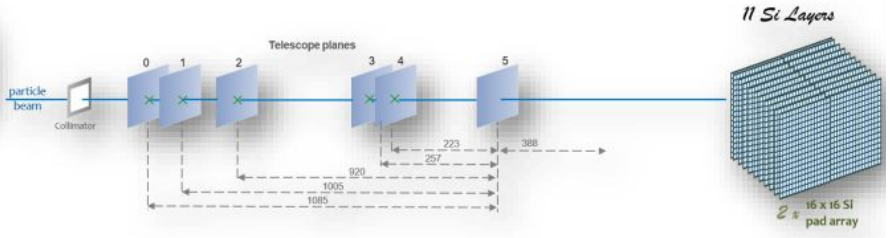
- *11 layers with 11 Xo*



- *11 layers with 21 Xo (also 15 & 18 Xo)*

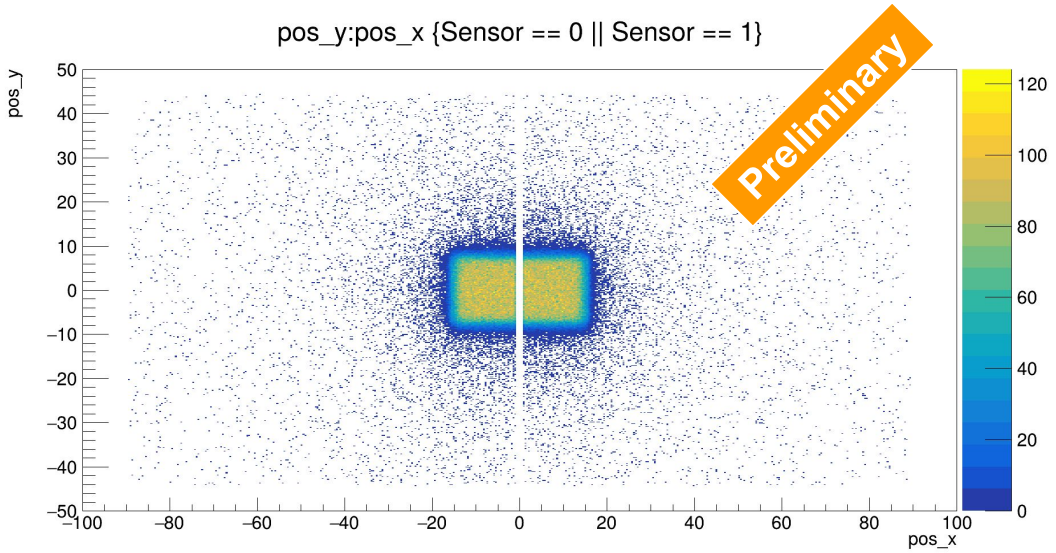


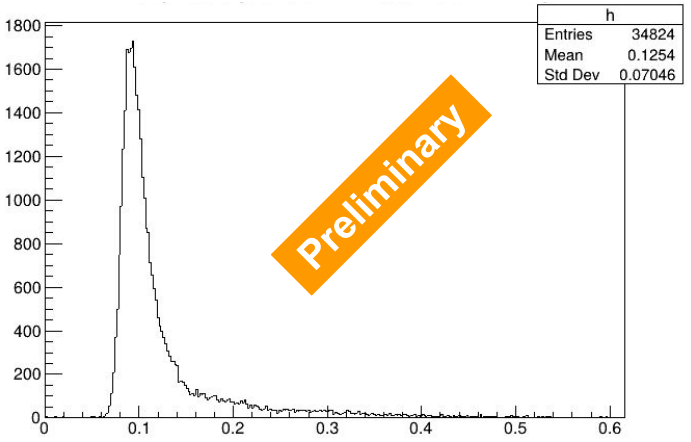
- *11 layers without W*

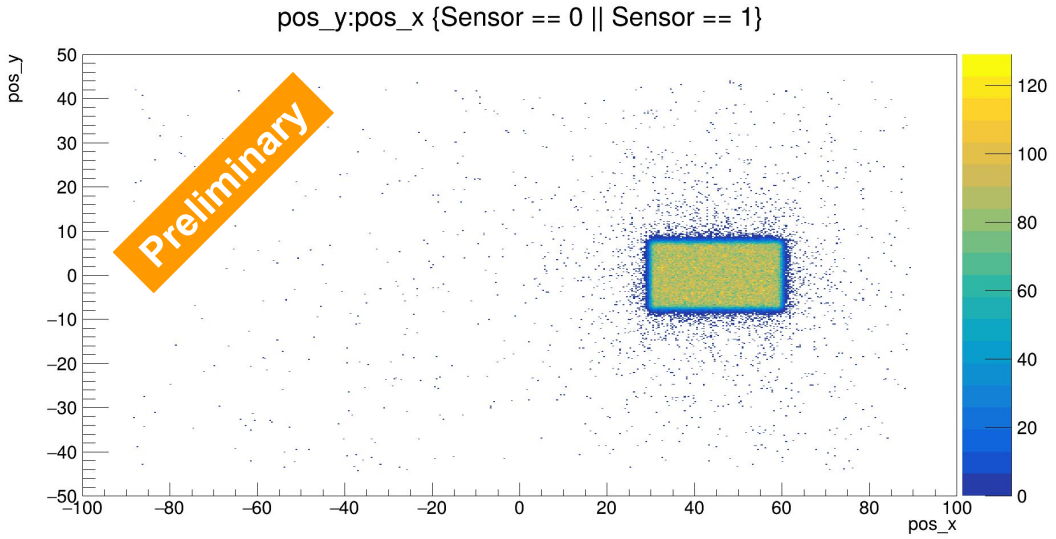


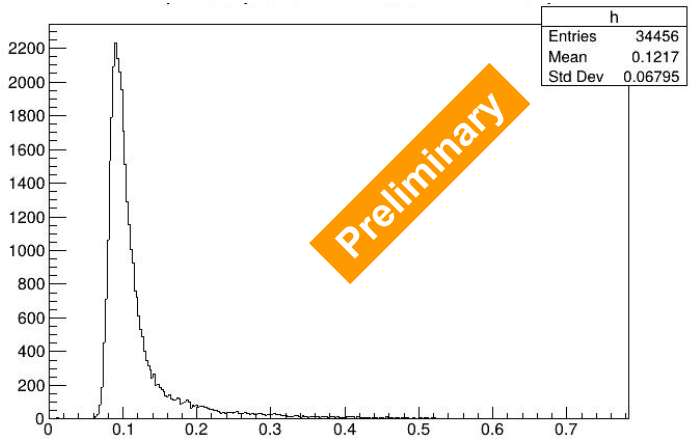
Preliminary Results - MC simulation

TB configuration implemented in G4: 11 Si layers w/o W plates:



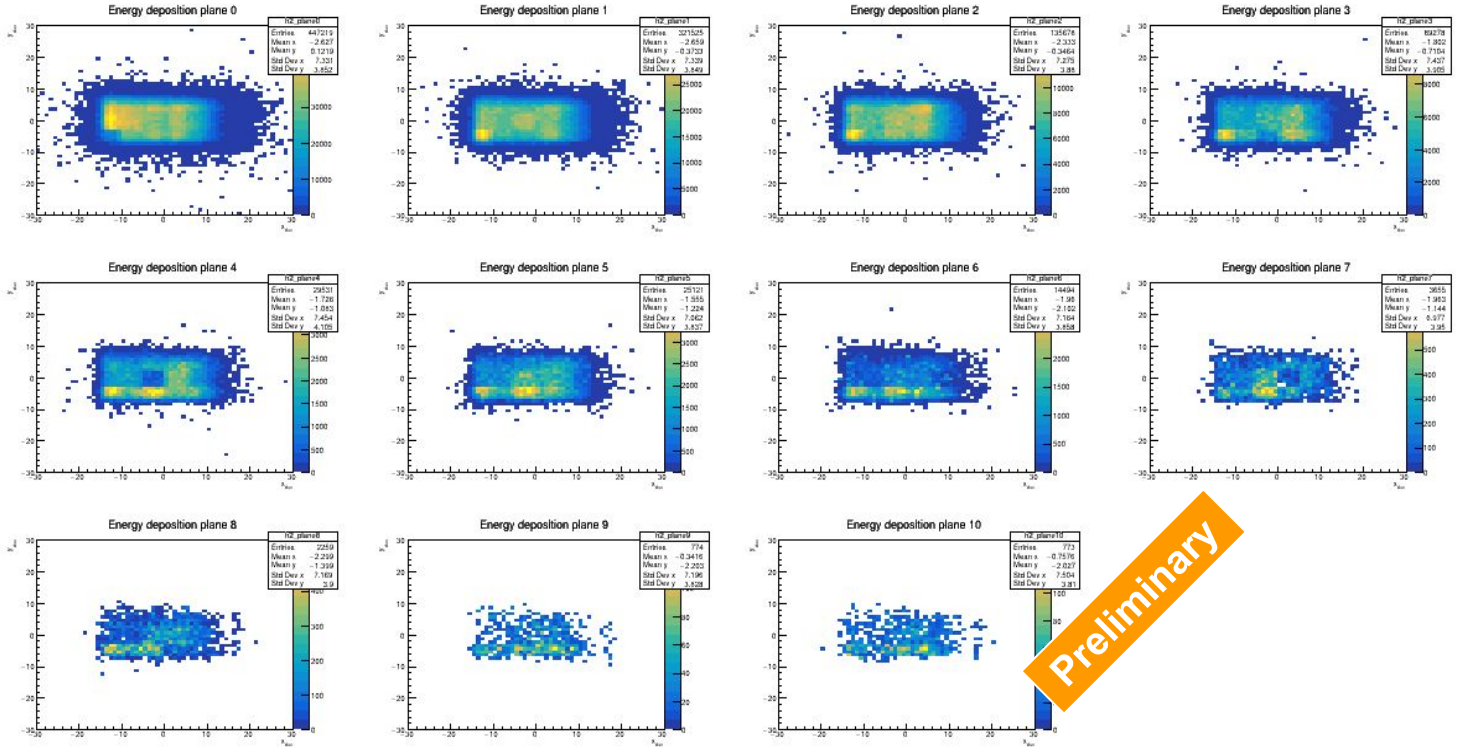




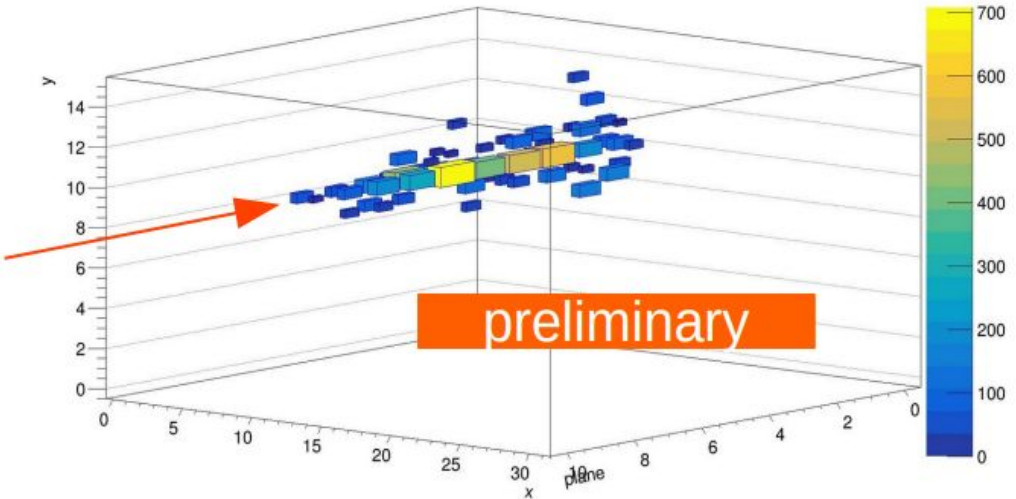


Preliminary Results - data

TB configuration: 11 Si layers w/o W plates: hit map

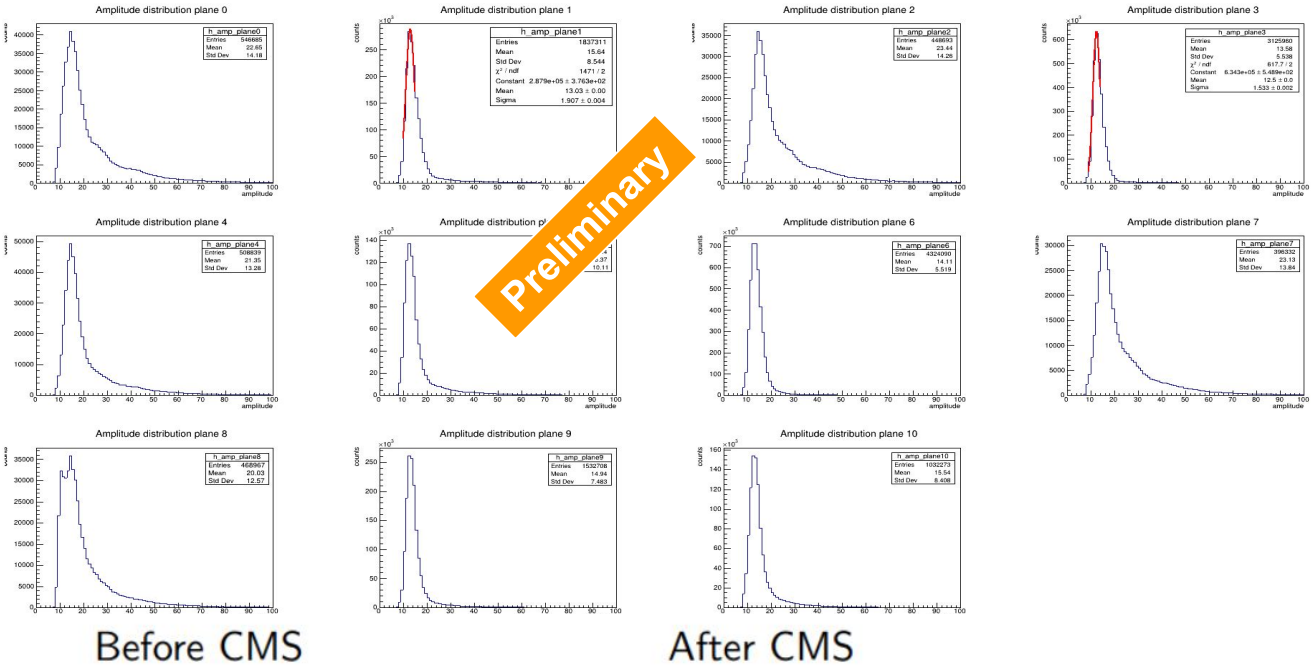


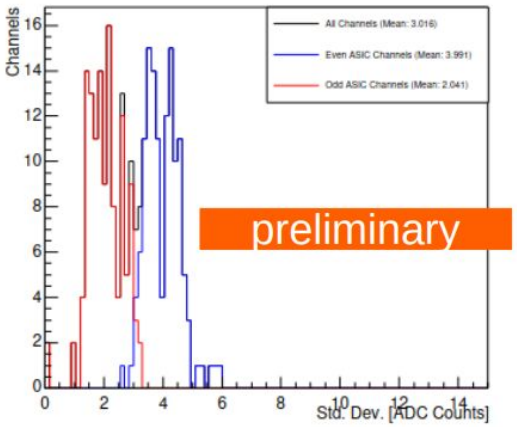
EM shower development @5GeV electron beam

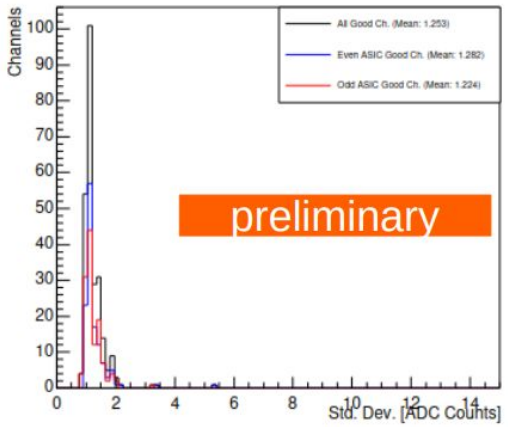


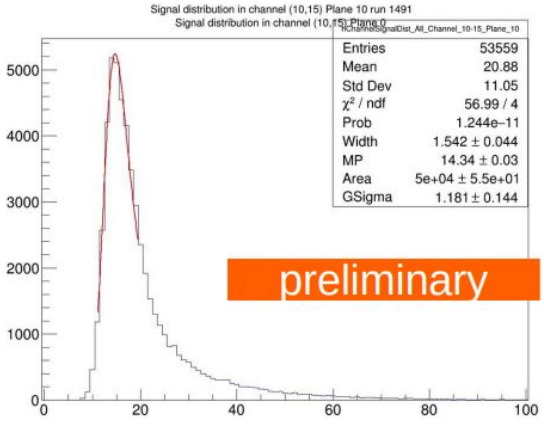
Preliminary Results - data

TB configuration: 11 Si layers w/o W plates:









Results

Papers and talks

- ***Journal papers:***

1. Potlog, PM ; Ghenescu, V; Neagu, AT; ***Simulation-Rooted Assessment of Electromagnetic Calorimeters Based on Silicon Sensors, SENSORS***, Volume 25, Issue 16, 2025

2. Abramowicz, H et al., ***Novel silicon and GaAs sensors for compact sampling calorimeters***, EUROPEAN PHYSICAL JOURNAL C, Volume 85 , Issue 6, Article Number 684, 2025

- ***Conferences and meetings:***

1. Veta GHENESCU, Alina Tania NEAGU, Mihai Petru POTLOG, ***DESIGN AND PERFORMANCE STUDY OF A VERY COMPACT AND GRANULAR ELECTROMAGNETIC CALORIMETER***, 23th International Balkan Workshop on Applied Physics and Materials Science, Constanta, Romania 09-12 July 2025 – oral talk

2. Veta GHENESCU, ***Computing facilities – data storage***, ECAL-P Workshop - Faculty of Physics, University of Warsaw - Sep 10 – 12, 2025 – oral talk

3. Mihai Petru POTLOG***, Simulation of different TB configurations***, ECAL-P Workshop - Faculty of Physics, University of Warsaw - Sep 10 – 12, 2025 – remote oral talk

Meetings and more…

ECAL workshop at DESY,27 -31 January, 2025

TB2025 crew @DESY-II,9 - 22 June, 2025

ECAL workshop at University of Warsaw,
8-10 September, 2025

LCWS2025

THANK YOU FOR YOUR ATTENTION