

Resolving the differences in the simulations of TB 2014 – geometry

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Section 1

Outline

- 1 Strategy for getting the simulations right
- 2 Comparison without upstream elements
- 3 Beam-spot location
- 4 Comparison with measured data
- 5 Conclusions
- 6 Test Beam 2015 – Sneak preview

Section 2

Strategy for getting the simulations right

Strategy for getting the simulators right

- Check details of geometry description in both simulations
- Fix geometry by the logbook and alignment measurements
- Compare details of physics (see talk by Alina)
- Benchmark physics parameters against measurement (need input from the analysers!)

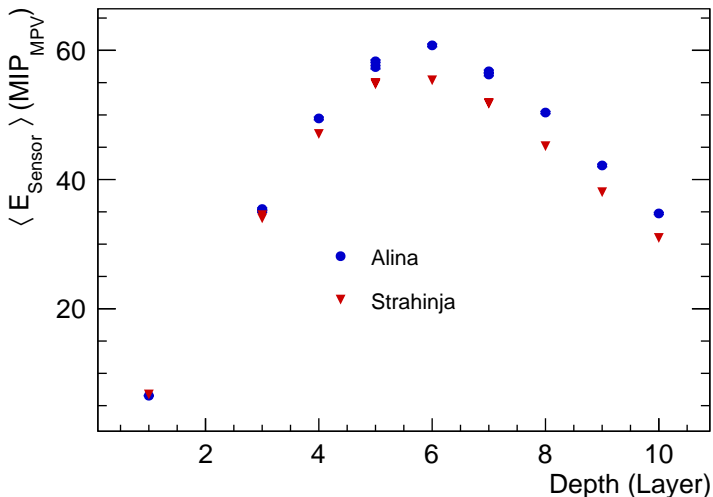
Section 3

Comparison without upstream elements



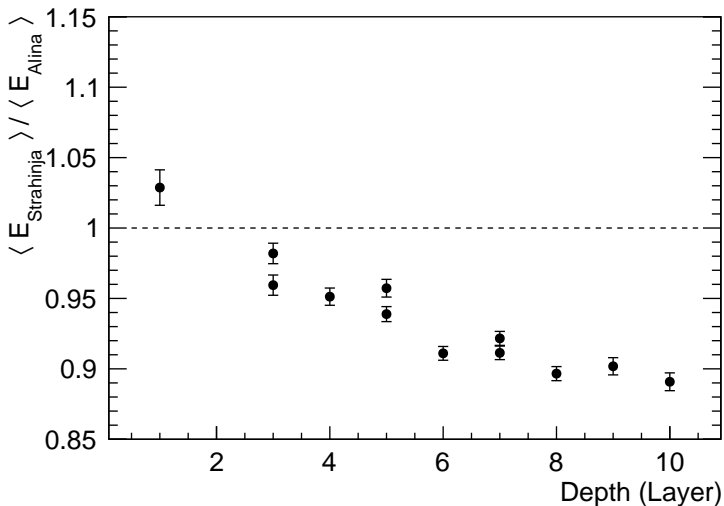
Comparison without upstream elements

No upstream elements, old beam spots



Comparison without upstream elements

No upstream elements, old beam spots



Section 4

Beam-spot location

Location of the beam spot

Extracted from:

Talk by Sasha, CLICdp WS, June '15

Talk by Jakub, 12th FCAL HW Meeting

PhD thesis of Oron, Appendix A

- Coordinates of the beam spot center:
 $X_{spot} = -1 \text{ mm}$, $Y_{spot} = -0.9 \text{ mm}$
- X coordinate of the sensor center:
 $X_{sensor} = -2.2 \text{ mm}$
- Y coordinate of the upper edge of the sensor active area:
 $Y_{sensor,top} = 15.4 \text{ mm}$
- Misalignment of sensor layers neglected $\mathcal{O}(0.1 \text{ mm})$

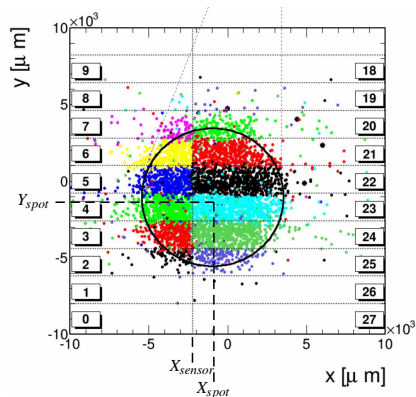
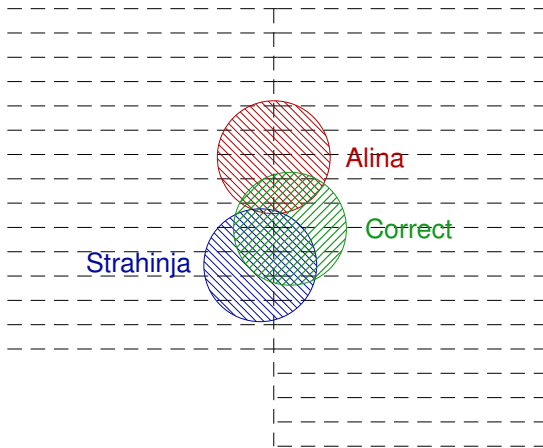


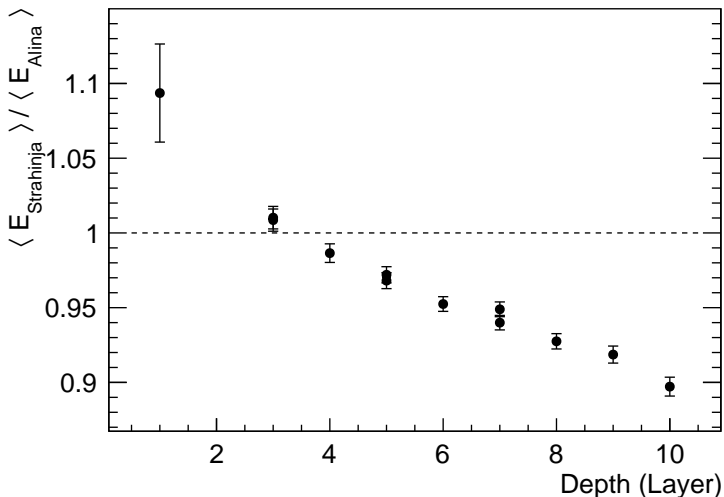
Figure from talk by Sasha at CLICdp Workshop, June '15

Location of the beam spot

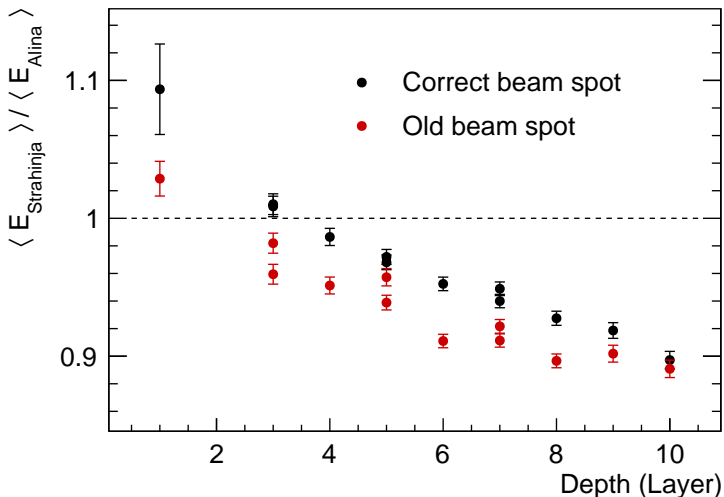


Comparison with correct beam spot

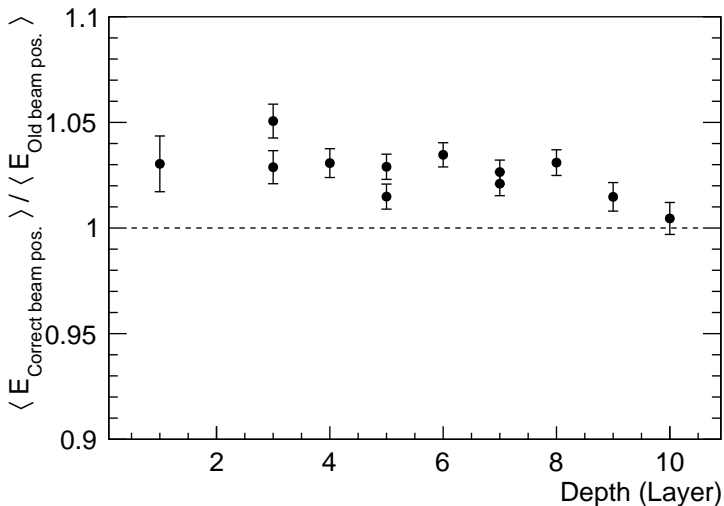
No upstream elements, Correct beam spot



Comparison with correct beam spot

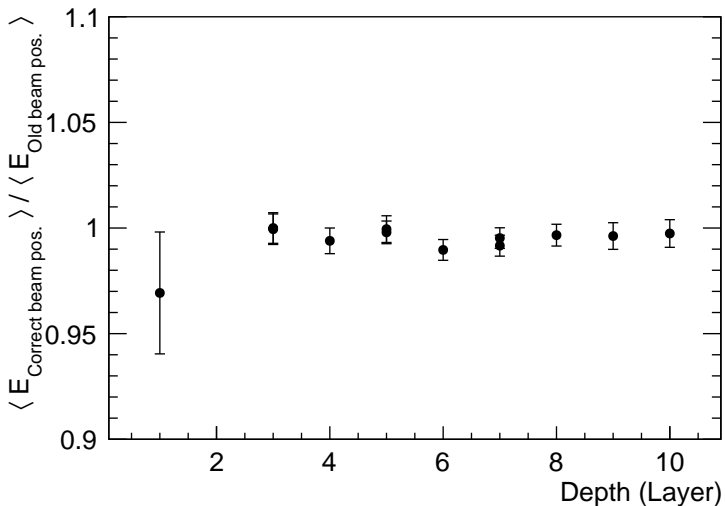


Effect of beam-spot location (Strahinja)

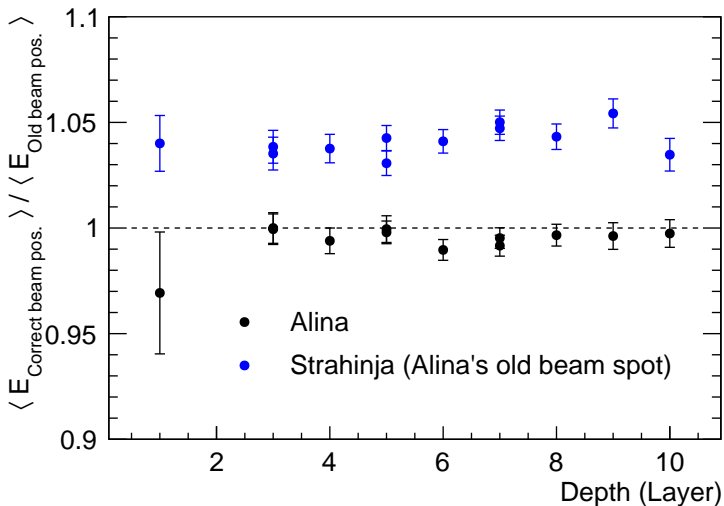




Effect of beam-spot location (Alina)



Effect of beam-spot location (Alina)

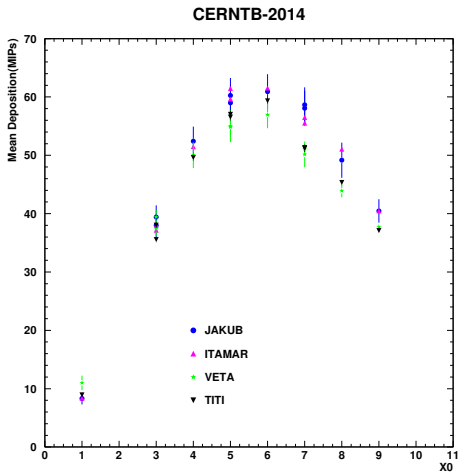


Section 5

Comparison with measured data

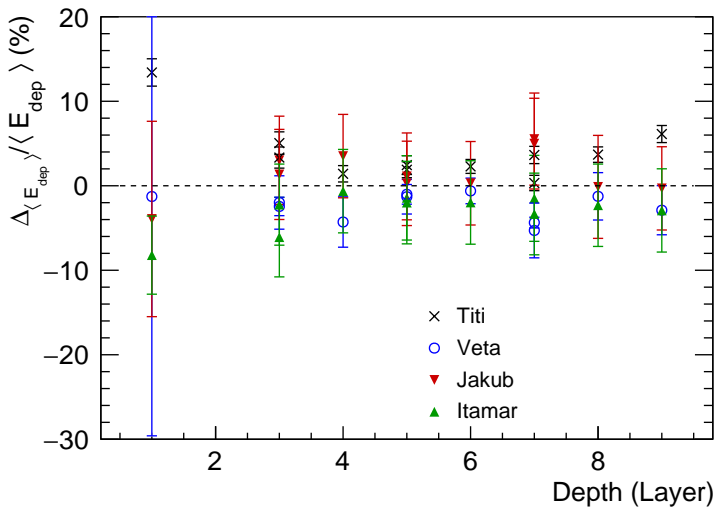


Comparison with measured data



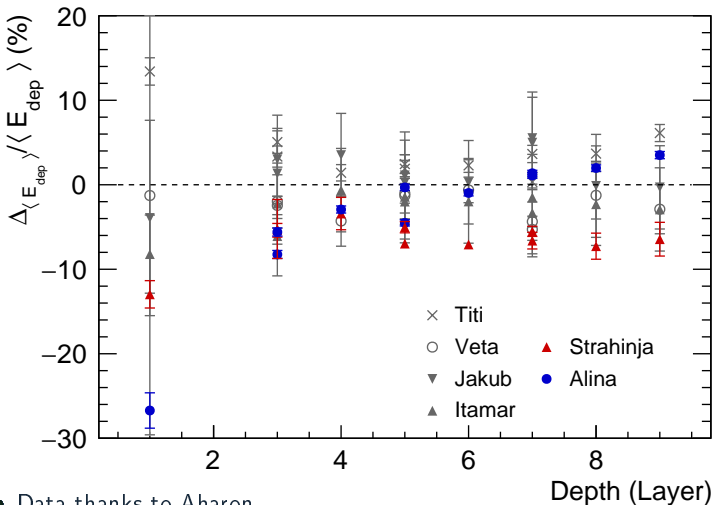
● Figure thanks to Aharon

Comparison with measured data



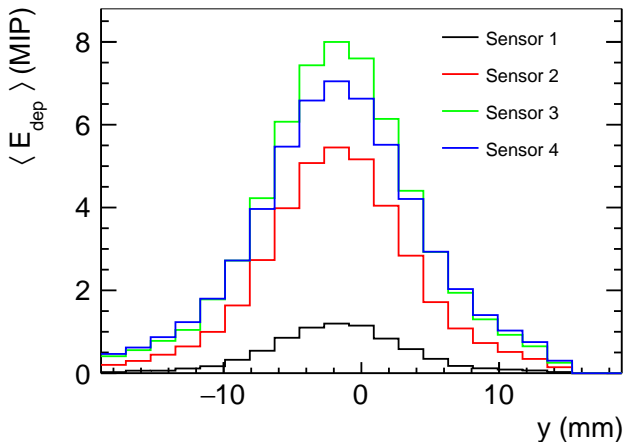
- Data thanks to Aharon

Comparison with measured data



- Data thanks to Aharon
- Simulation is within uncertainties, but ...
- Assuming the geometry is correct, 1D benchmark still not sufficient to select the physics model. But don't blame the data!

Vertical shower profile



- Vertical shower profile should be compared between simulations and with the measured data (to benchmark the simulations)

Section 6

Conclusions

Conclusions 2014

- Effects of details of geometry on the longitudinal shower profile in the FCAL stack in test beam are under study
- Corrected sensor support, upstream material and beam spot location
- 1D agreement with the data is good, but that is not enough!
- Unresolved difference in how beam spot location affects results
- Bonus question: Origin of un-vetoed tracks

Help FCAL understand the shower development in the prototype stack!

Post your analysis and simulation results on FCAL svn:

http://svnsrv.desy.de/public/FCAL/TB_and_Sim_results/

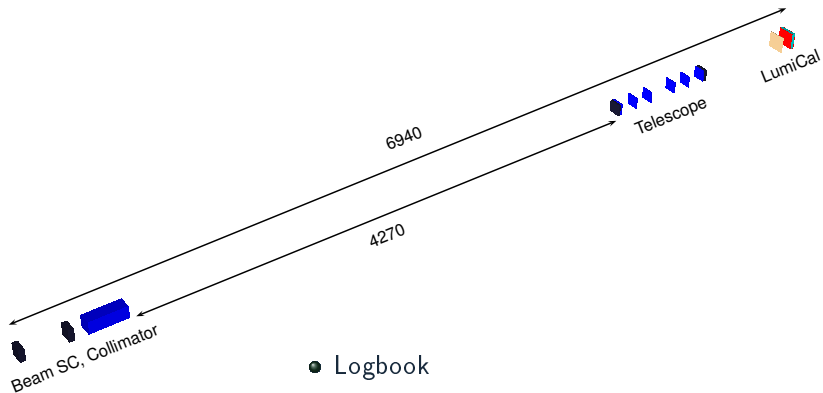
Longitudinal and vertical shower profiles wanted!

New ideas wanted!

Section 7

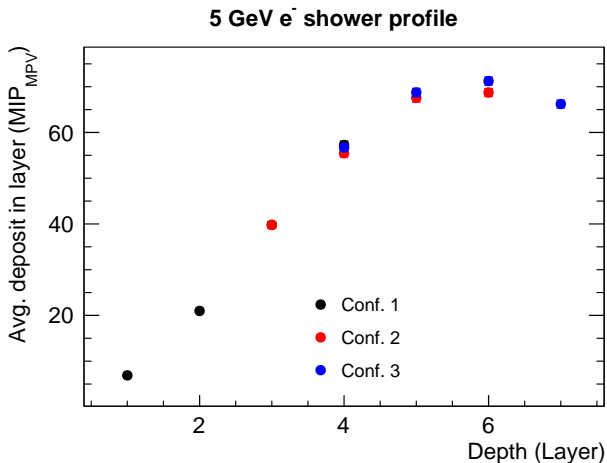
Test Beam 2015 – Sneak preview

TB 2015 – Geometry



- Logbook
- Telescope online manual (https://telescopes.desy.de/User_manual#Material_Budget)
- Yan, presentation LCWS 2015
- Corrections at SW online meeting on 16 Dec.

TB 2015 – Shower



- Beam profile rectangular 2×1 cm
- Beam center 18 mm below top of sensor (*ad hoc*)

Conclusions 2015

- Simulation ready to run.
- Physics details should first be benchmarked on the 2014 TB data.