Phase 0 calorimeter

Wolfgang Lohmann

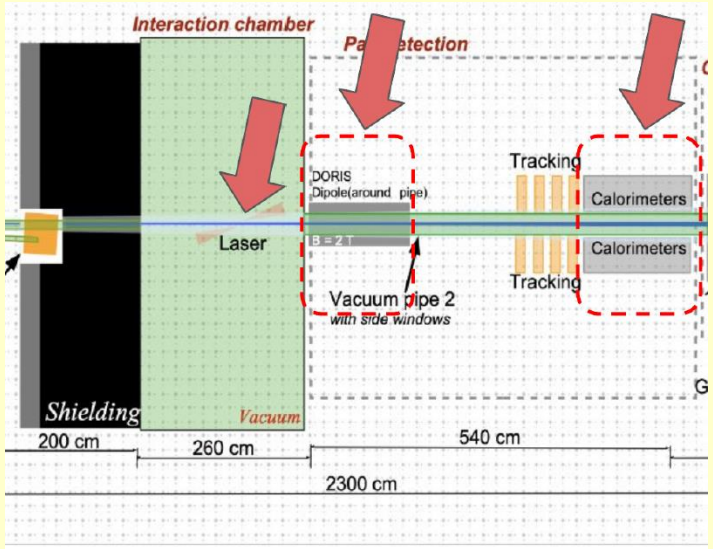
Phase 1 calorimeter

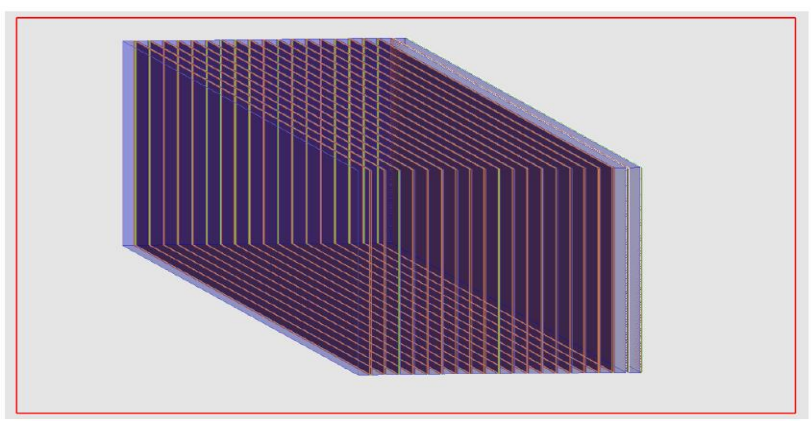
LUXE needs an electromagnetic calorimeter to count the number of electrons

- Highly granular
- Highly compact
- Fiducial volume 50 x 10 x 10 cm^3
- Good energy resolution
- Moderate timing
- Moderate radiation hardness

Phase 1 calorimeter

Ideal case:





20 Layers of W-Si calorimeter.

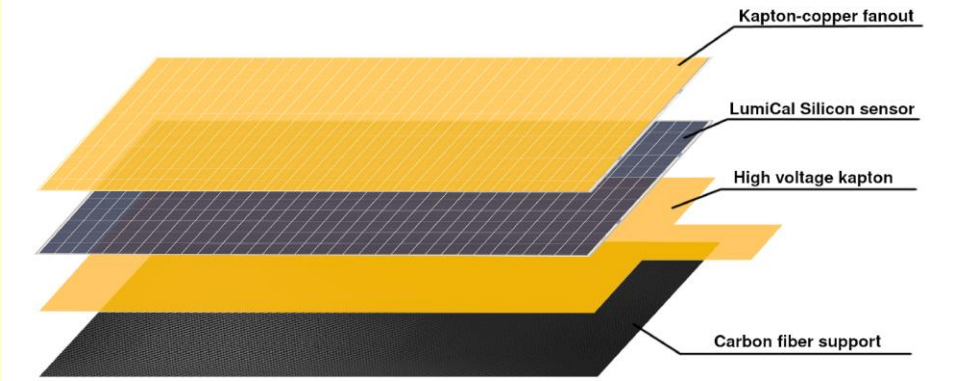
Compact detector planes
a la FCAL

Pad size 5 x 5 mm^2

Tungsten absorber thickness

1 X_0

Compact calorimeter with square pad form:



Phase 1 calorimeter

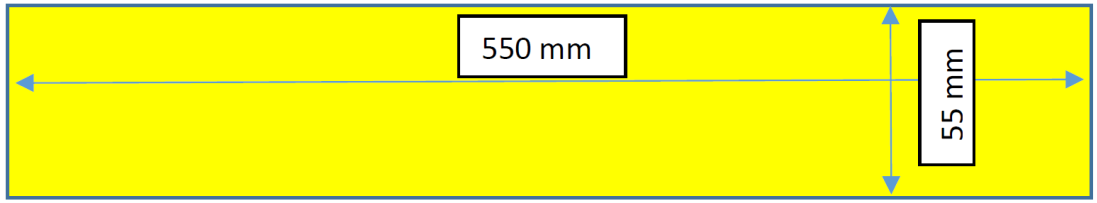


Figure 1 Front view of the calorimeter

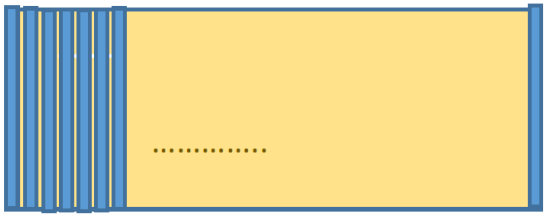


Figure 2 Side view of the calorimeter

- Weigth: 50 kg
- Sensor area: 12000 cm^2
- Readout channels: 50000
- Investment: 500 k
- Engineering personpower

Lets call it Phase 1

Phase 0 calorimeter

Option 1: Calice prototype

Fiducial volume 18 x 18 cm^2

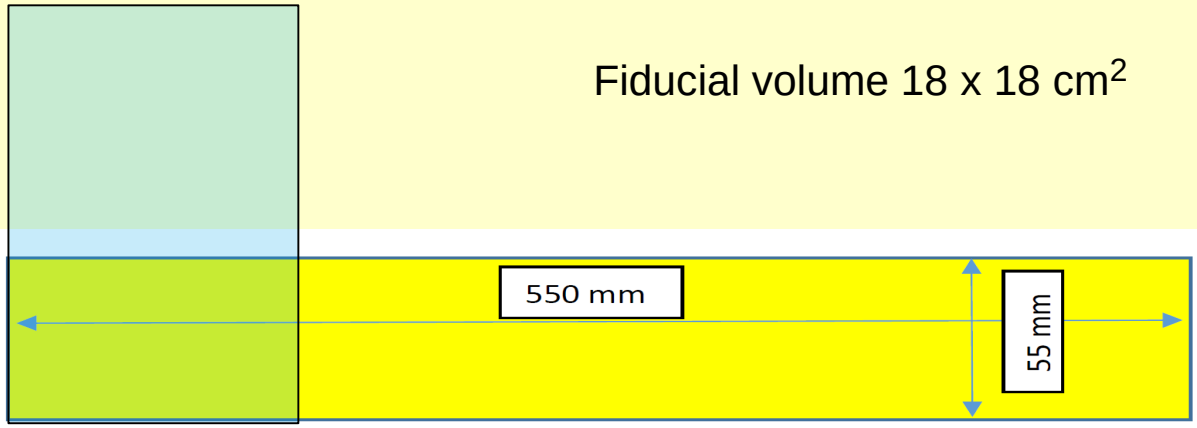
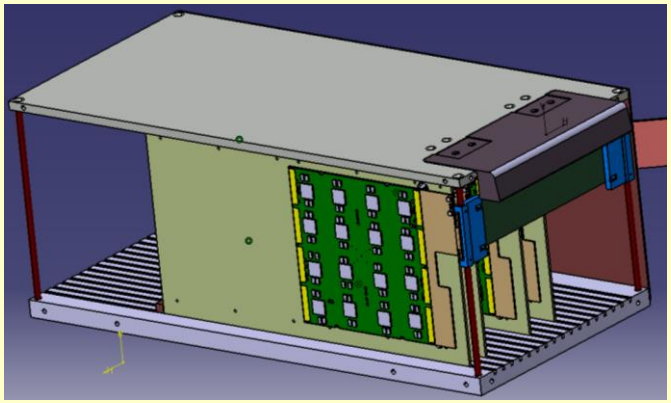
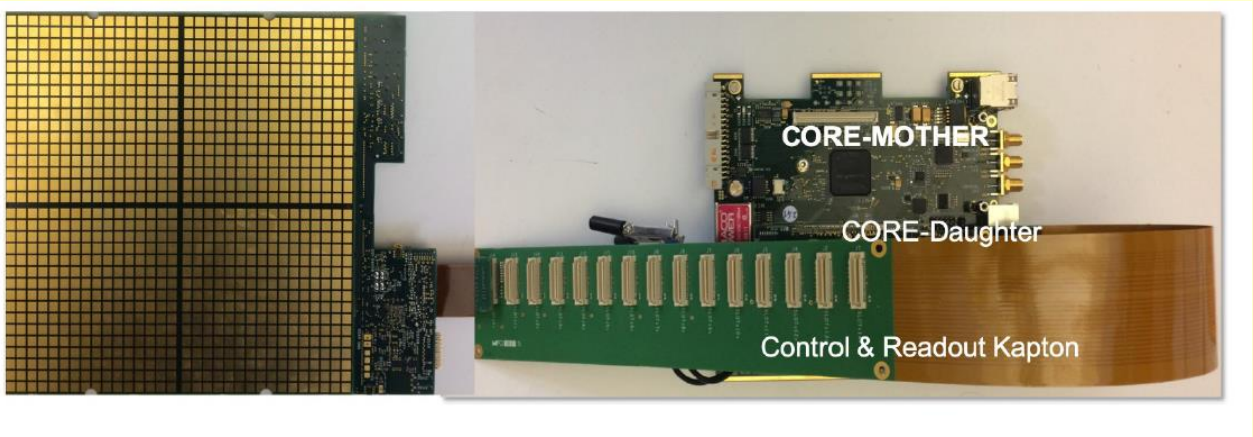


Figure 1 Front view of the calorimeter



- Pad size 5 x 5 mm^2
- 20 detector planes correspond to 12 X_0
- FE chip on sensor (less compact)
- Readout using Calice standard

Phase 0 calorimeter



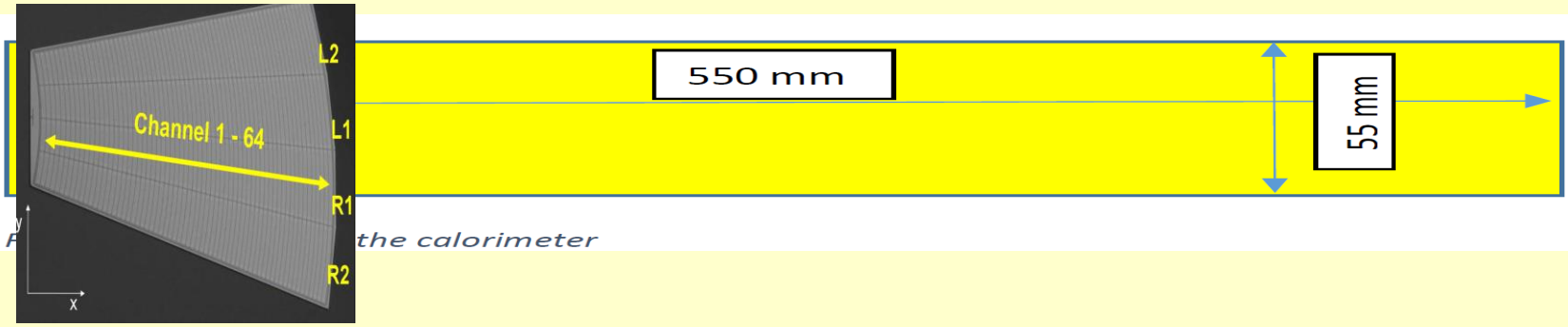
Current layout of a detector plane

Sasha‘idea

Feasible ???

Phase 0 calorimeter

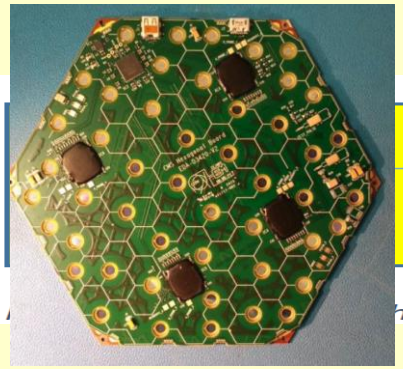
Option 2: LumiCal

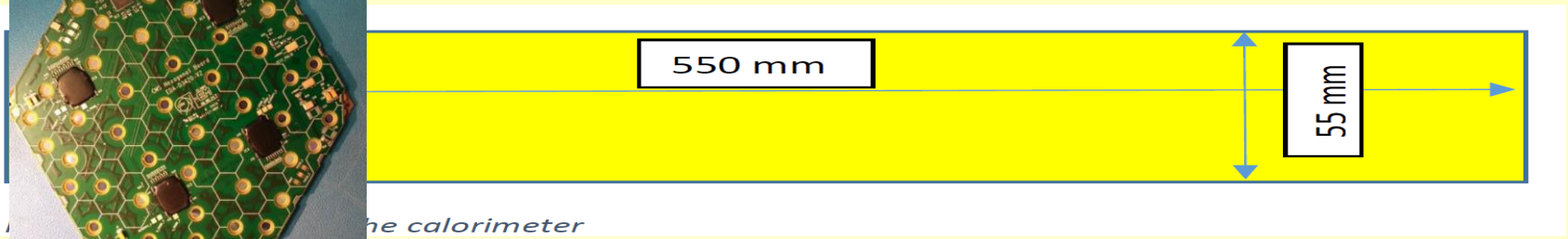


- Detector planes and tungsten absorber available
- Pitch in x: 1.8 mm, in y: 1 cm
- 20 X_0 depth
- FLAME readout, 5000 channels
- FCAL data concentrator

Phase 0 calorimeter

Option 3: demonstrator with CMS sensors





- Limited amount of LD sensors available
- Pad size ~1 cm^2
- Absorber plates from JINR ?
- CMS standard or FLAME readout ??
  (different compactness)

Phase 0 calorimeter

Option 4: LUXE phase 1 demonstrator

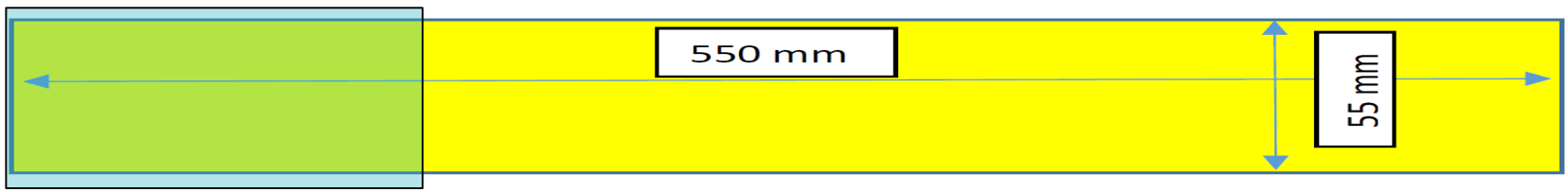


Figure 1 Front view of the calorimeter

- 6“ sensors, 15 x 6 cm^2 , 5 x 5 mm^2 pad size, 25 pieces
- Detector planes using FCAL technology
- Flame readout, 7200 channels, plus data aconcntrator
- Tungsten plates (25) from JINR
- Excellent device for high granularity and compact electromagnetic calorimeter studies