CLIC dp

CLIC detector and physics study

Scintillator Tiles Studies

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CLIC detector concept

Interaction point

Tracking system: records the paths taken by charged particles

Electromagnetic calorimeter (ECAL): measures energy of photons and electrons as well as the early parts of showers initiated by hadrons.

The Hadron Calorimeter (HCAL) measures the energy of hadrons.

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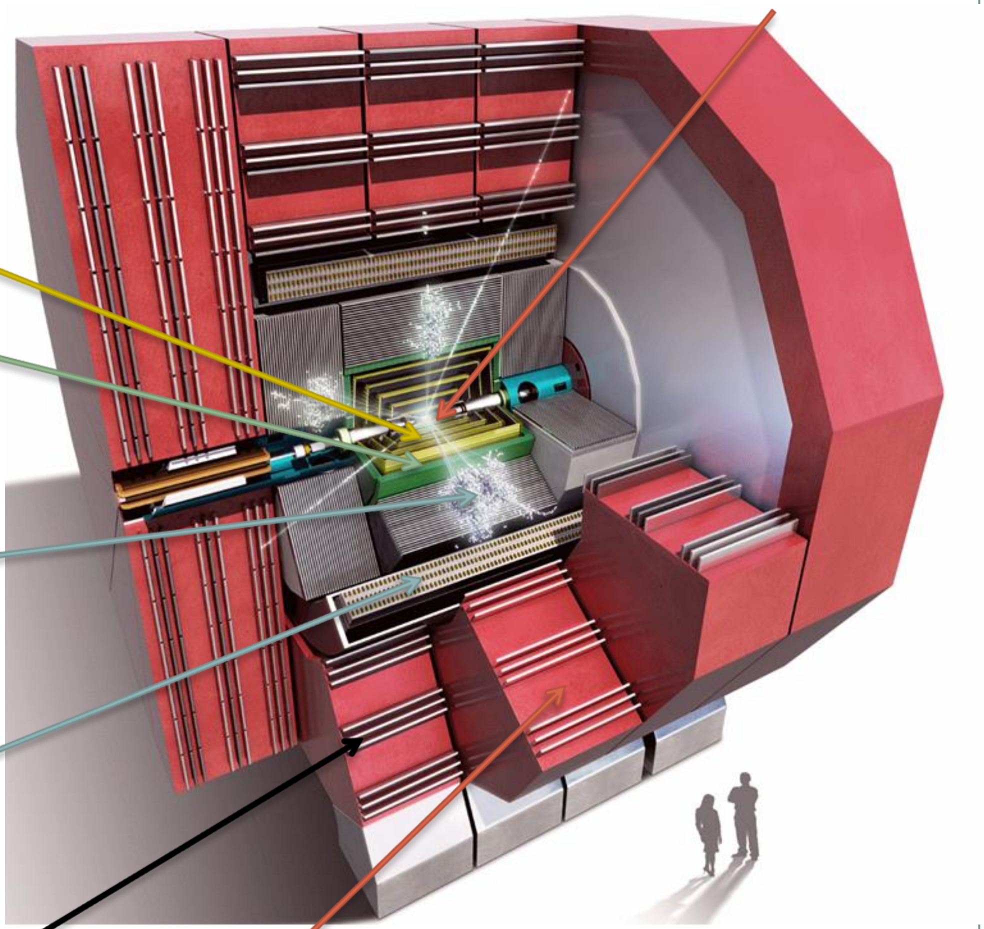
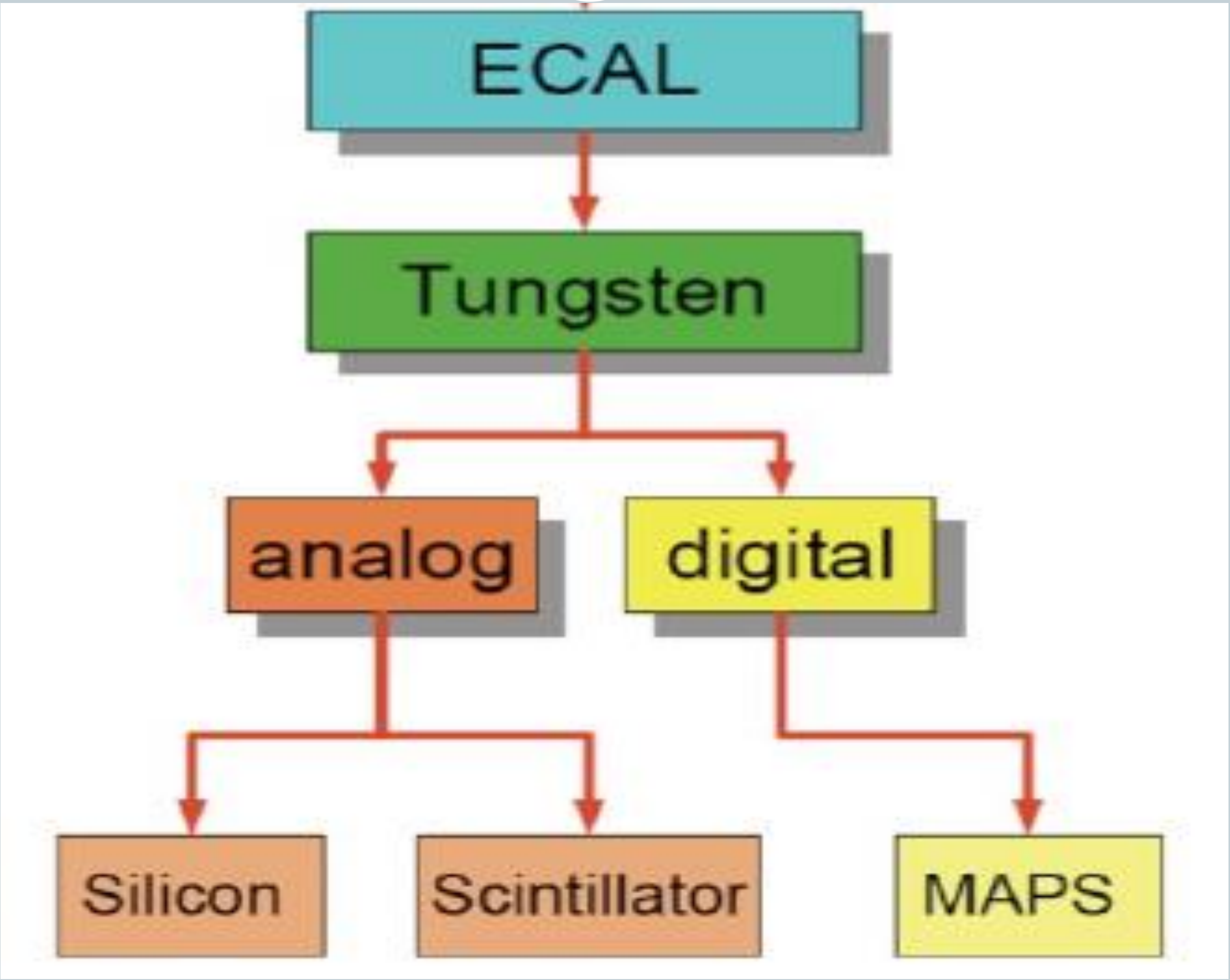


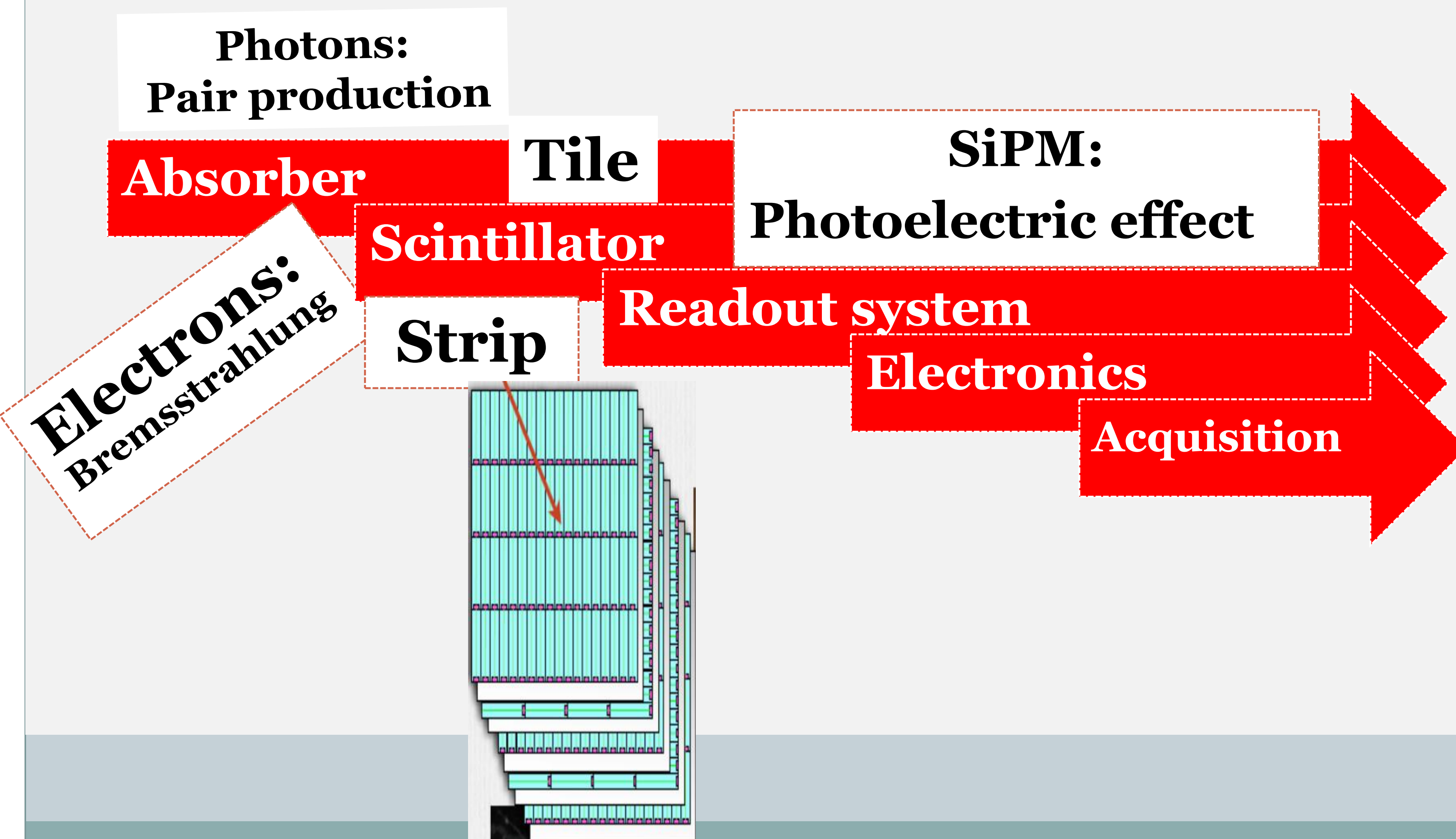
Muon system
Muon system

Return yoke: is type of iron used for confining the magnetic field that's why it's compact detector.

ECAL for Linear Collider(LC)



Scintillator calorimeter for LC



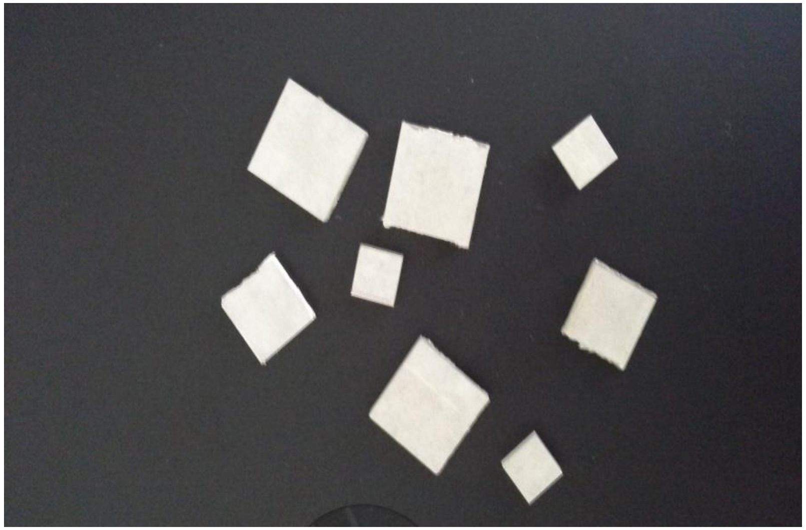
Before building, we need testing

The first step in building calorimeter with millions of cells, is building one cell.
And to build this unit cell, we made test to get answers on that these questions

- **What is the best cell size?**
- **How much light do we collect?**
- **Does it have a uniform response?**

The Task

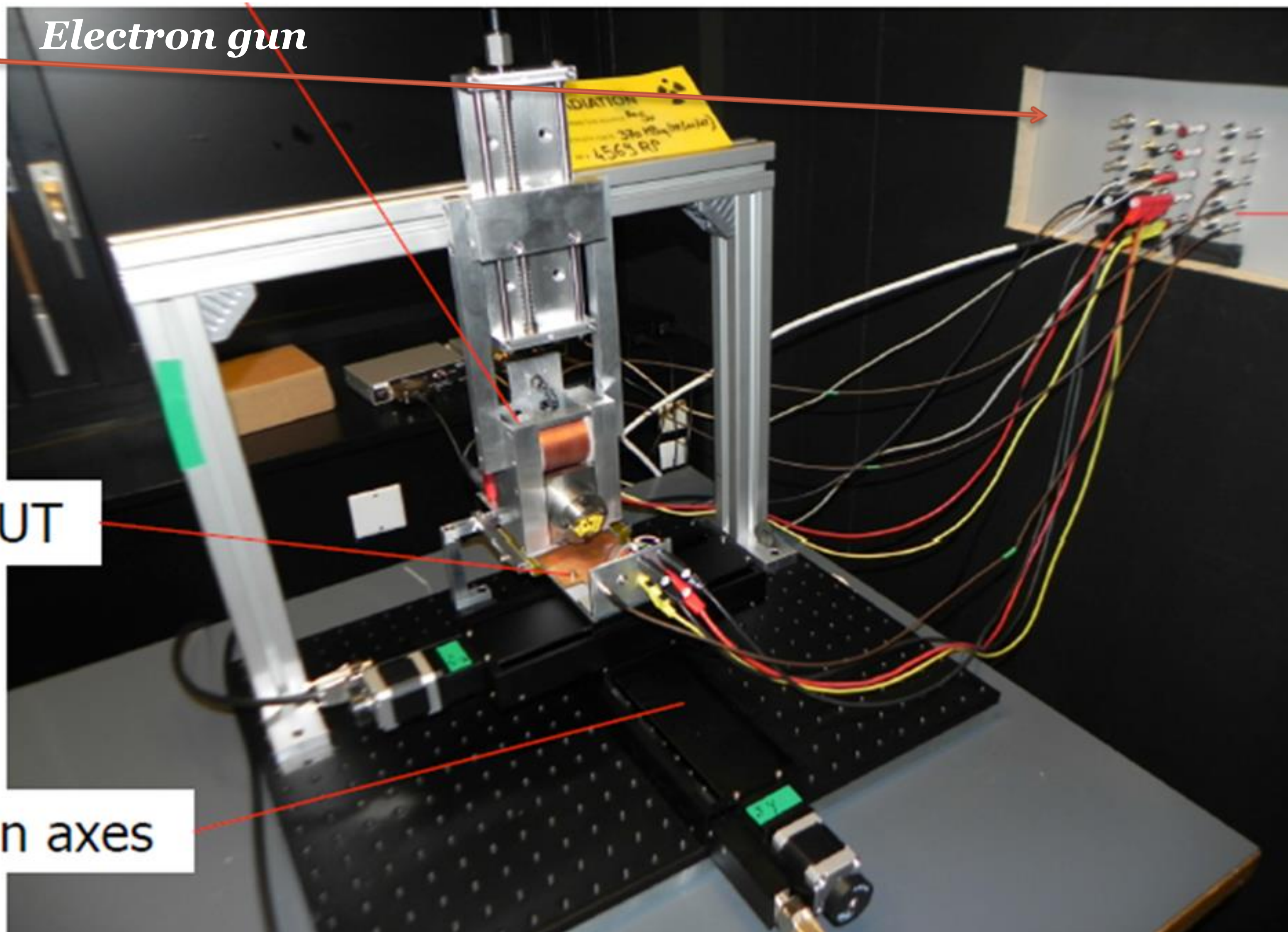
Do lab test on different plastic scintillators tiles to answer these questions



Procedures

- ✓ Experimental setup
- ✓ Calibration
- ✓ Measurements (Scan)
- ✓ Data acquisition
- ✓ Data Analysis
- ✓ Results(Answers)

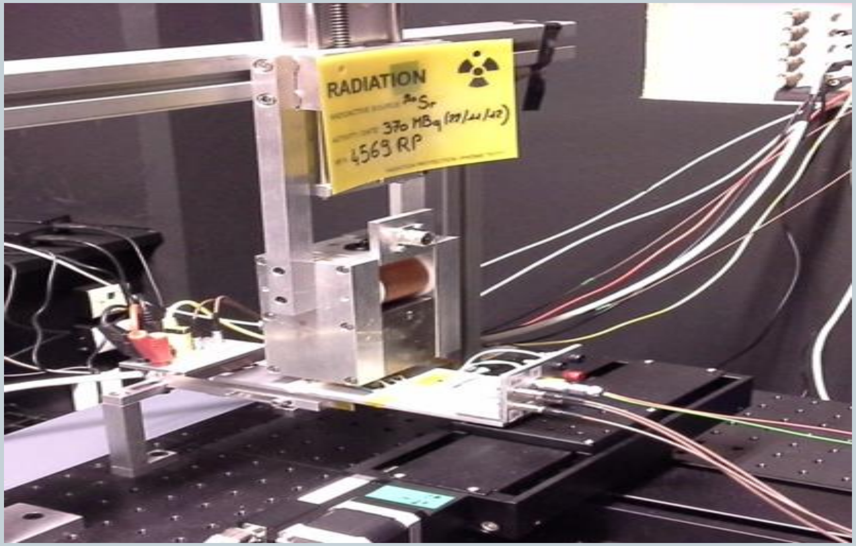
A. Experimental setup



The system Ingredients

- ***Electron gun***

- It's sr90 source.
- double beta emission.

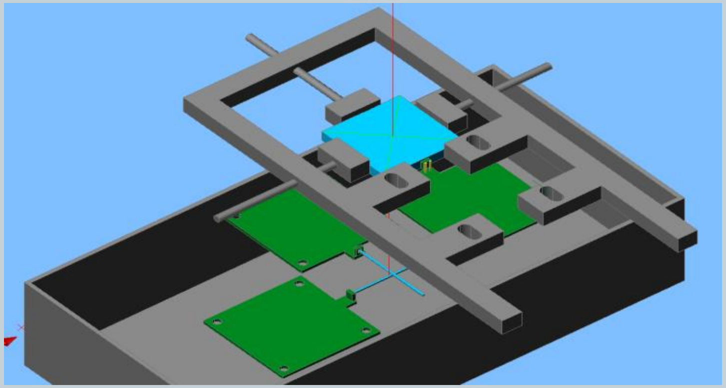


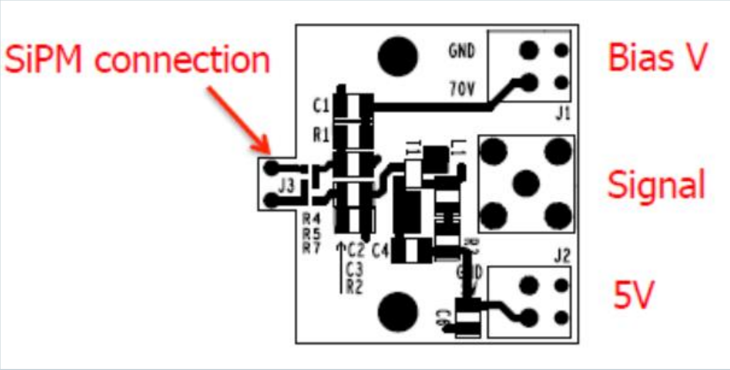
The system Ingredients

Triggering system

Goal: trigger on particles that went through scintillator

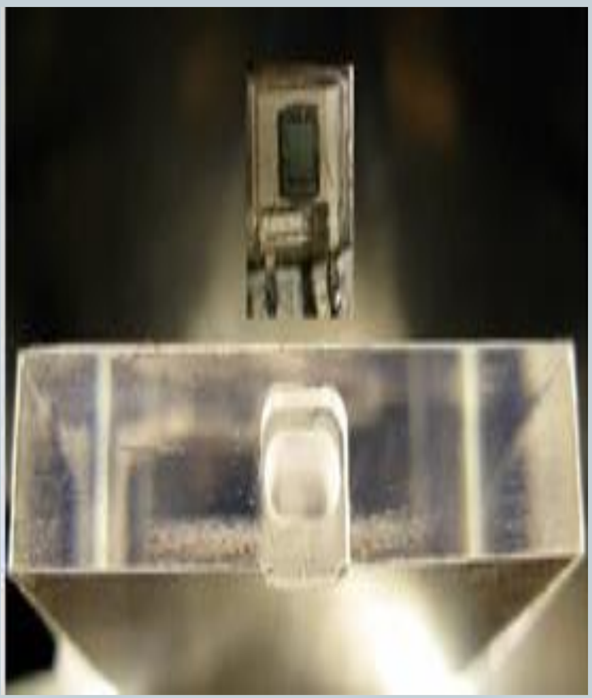
- Crossed scintillating fibers (20x1x1 mm³) as trigger, fixed underneath DUT
  - Each fiber is read out by a SiPM
  - Both SiPM signals are put in coincidence

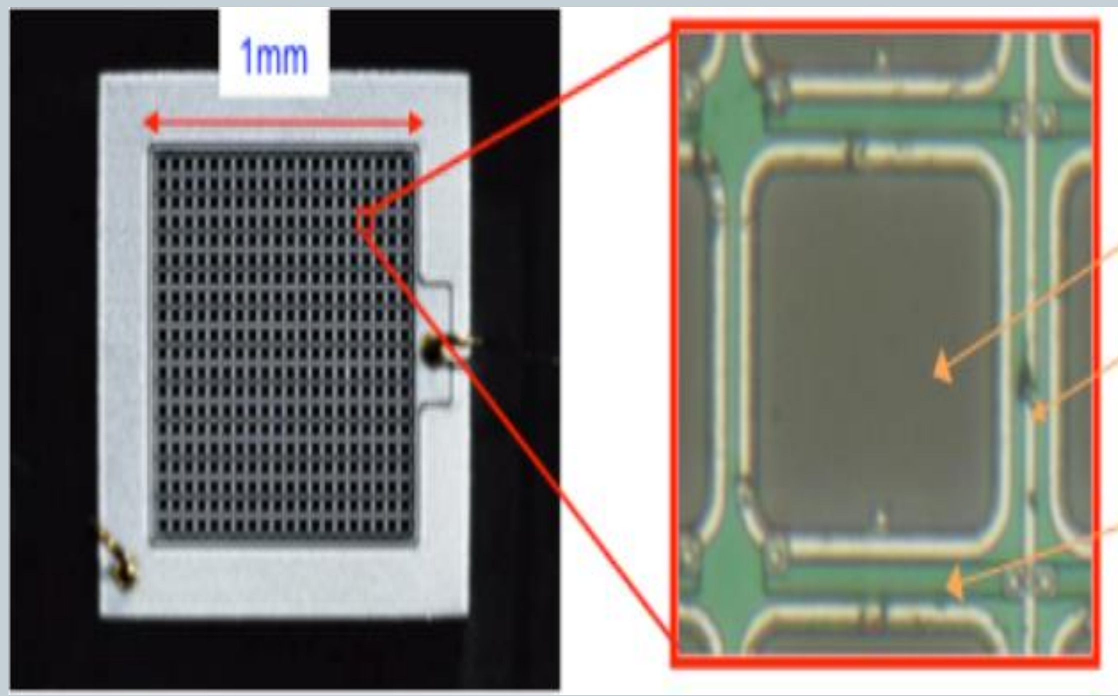




Readout system

Scintillator is direct coupling with SiPM using optical grease.





Calibration

With the gun off, perform self-triggered run to measure gain at reference temperature

Measurements

Place selected DUT in setup

Switch electron gun ON

Start automated scan

At each scan step (~60 sec):

- define position(x, y)
- Recording integration of SiPM signals for each trigger.
- Measure temperature

Data acquisition

Feedthrough
to dark room

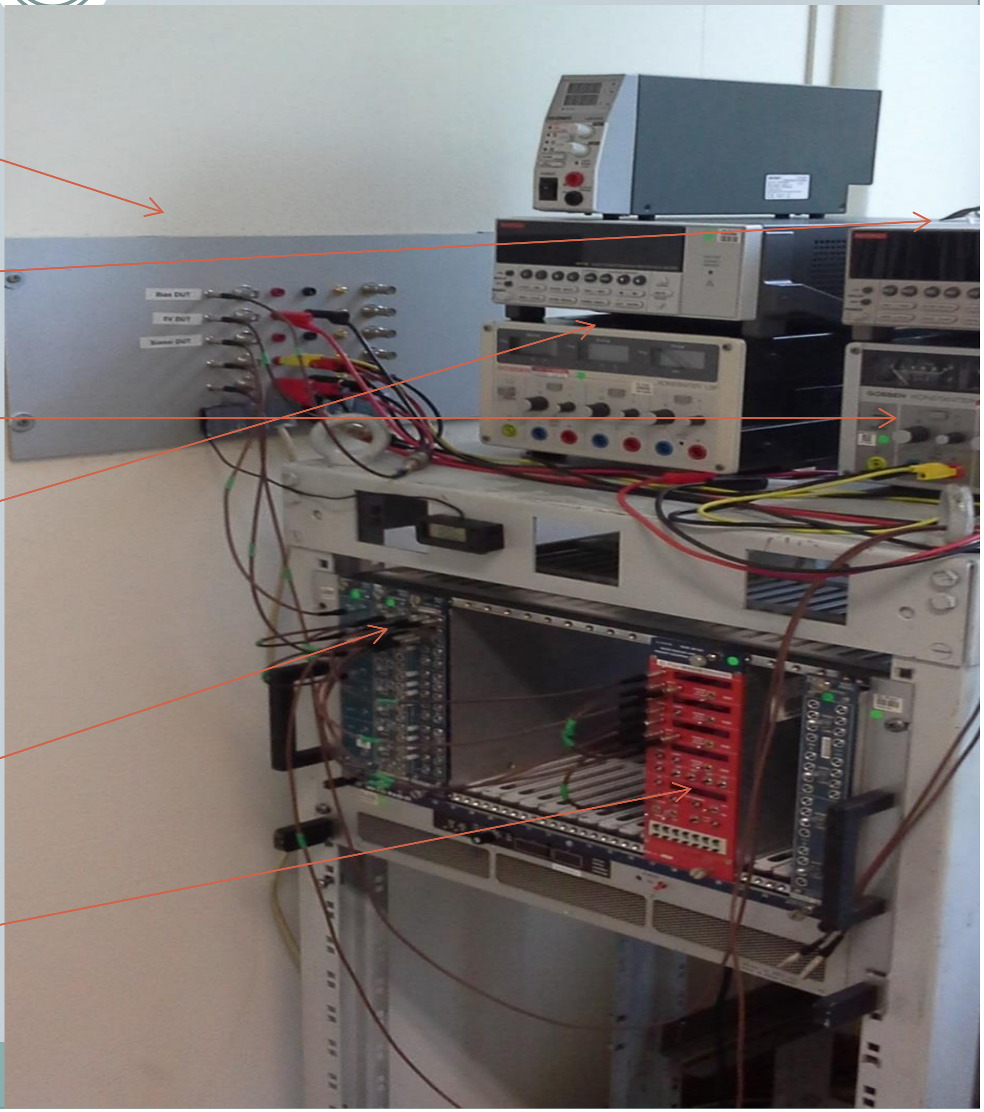
High voltage power supply
for SiPM bias

Low voltage
for amplifier

Current source for
electron gun coil

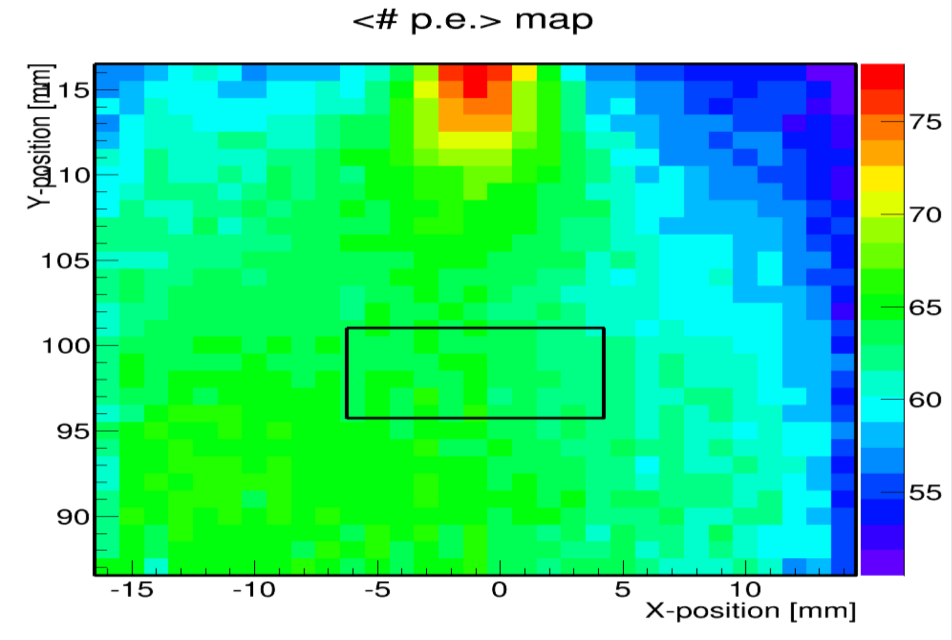
Coincidence circuit for triggering
system (NIM)

Scalers



Data Analysis:

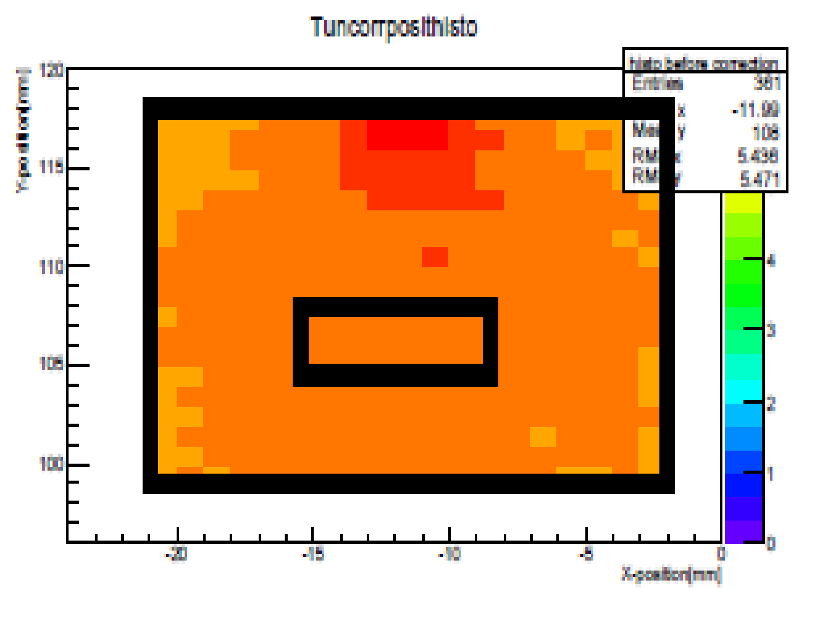
- **Each scintillator is divided into number of positions; each position is 1 x 1 mm².**
- **Get average light yield of each position.**
- **Create light-yield map for the whole scintillator.**

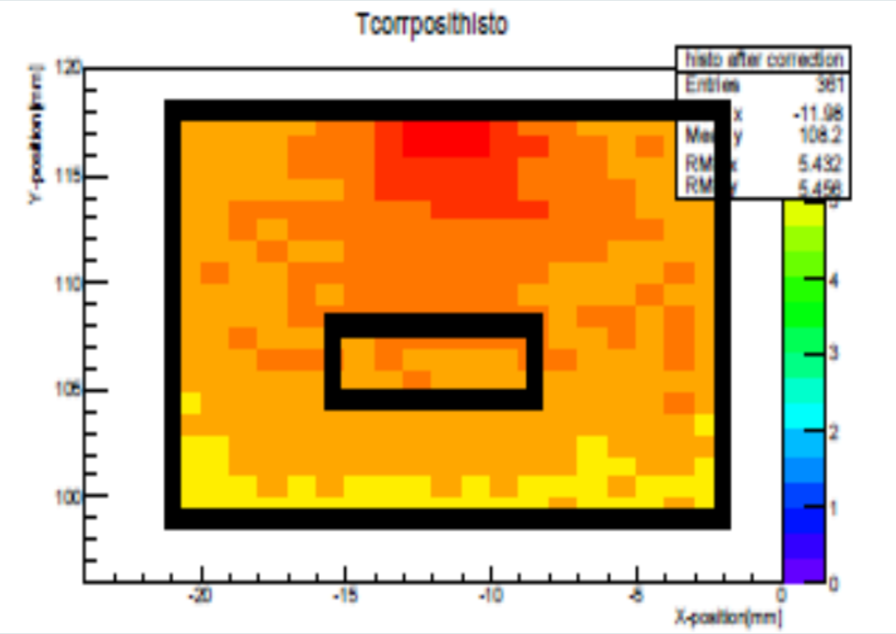


30 x30 scintillator

Data Analysis:

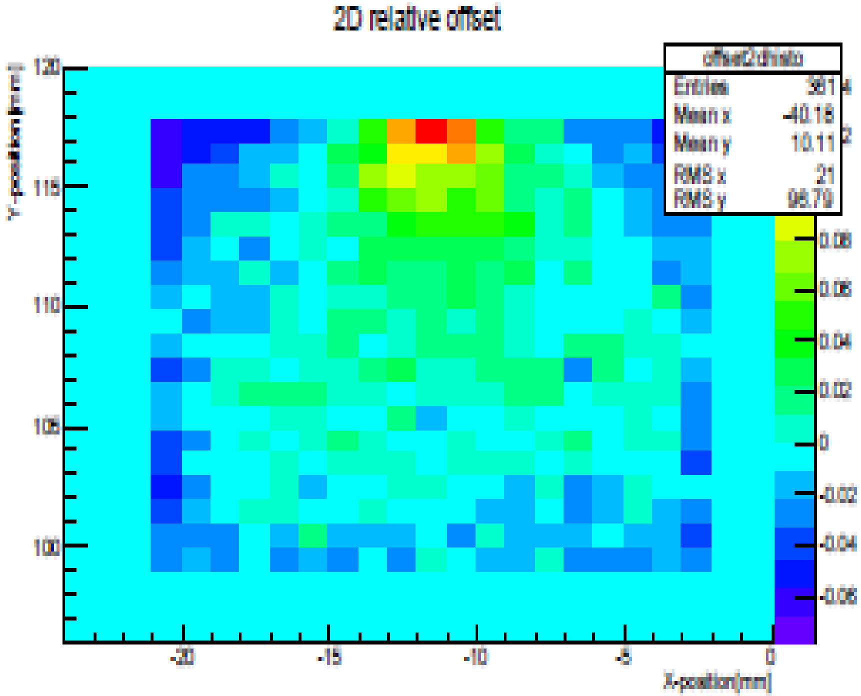
- **Every scanned position is affected by two main factors:**
  - **The position of SiPM**
  - **Temperature variation.**

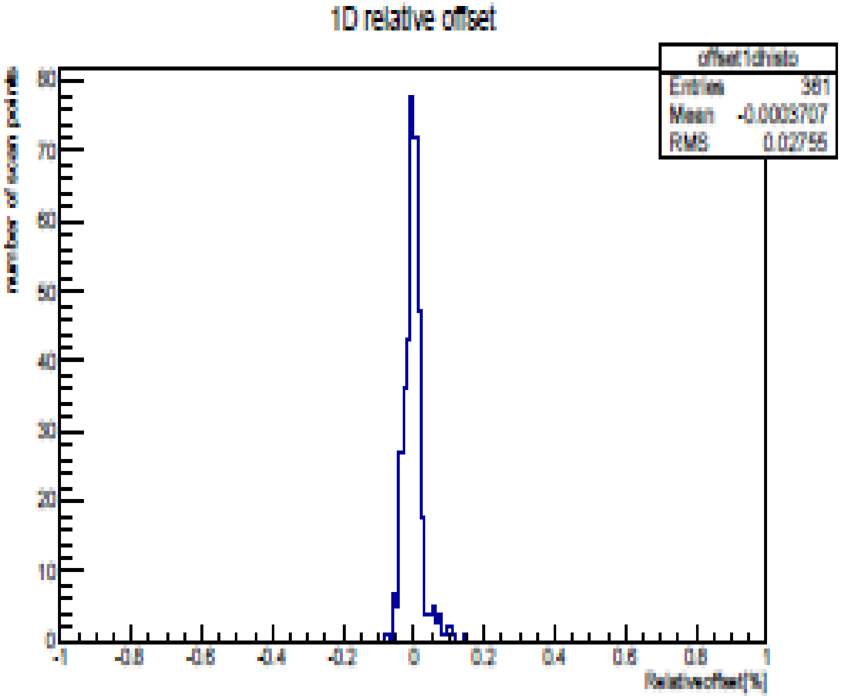




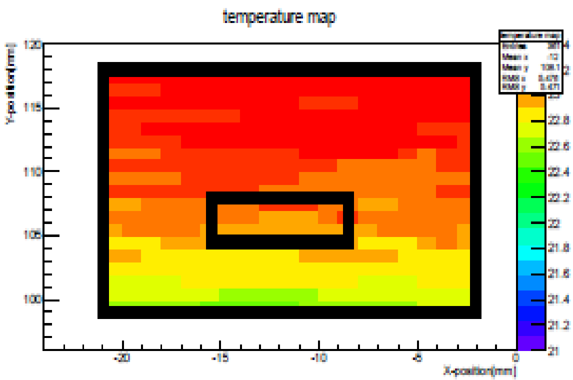
Uniformity study

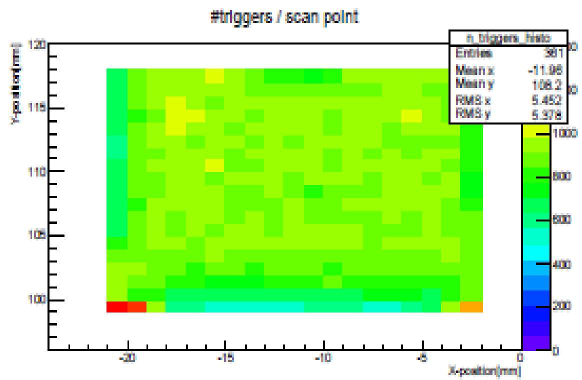
+/- 5%	+/- 10%	+/- 20%
92.5	98.9	100.0

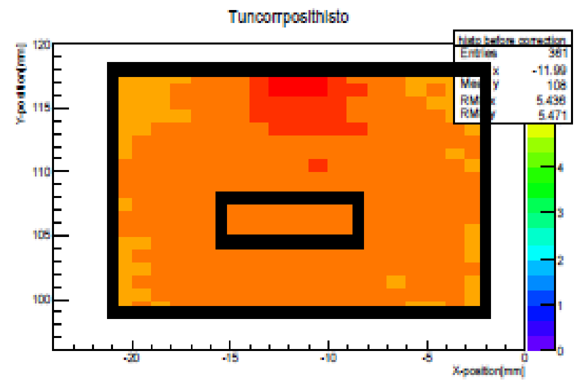


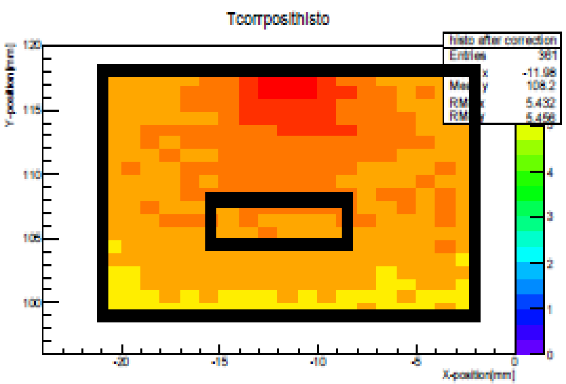


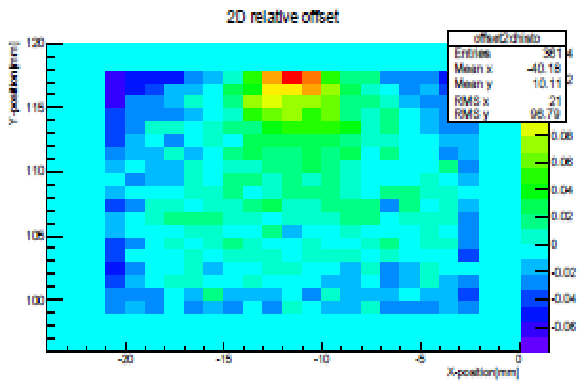
Full scan for 20x20x1 mm³ wrapped scintillator

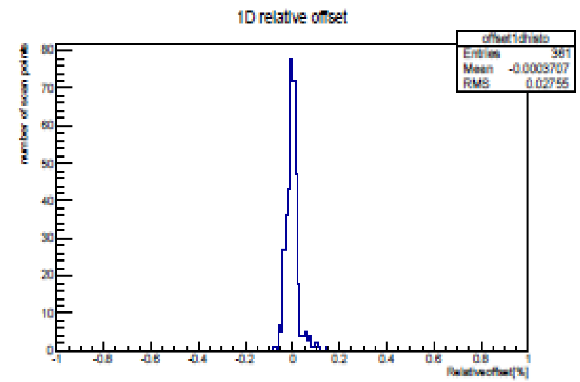













Collider

рахмат
danke
謝謝
ngiyabonga
teşekkür ederim
spas
Баярлалаа
mersi
kia ora
barka
welalin
tack
mahalo
tapadh leat
спасибо
faafetai lava
vinaka
dank je
misaotra
paldies
grazzi
спасибі
blagodaram
matondo
kiitos
dankie
thank you
gracias
хвала
nanni
nandri
dhanyavad
mauruuru
ačiū
asante
manana
bedankt
hvala
köszönöm
dankon
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terima kasih
rahmet
shukriya
mercé
мерси
kam sah hamnida
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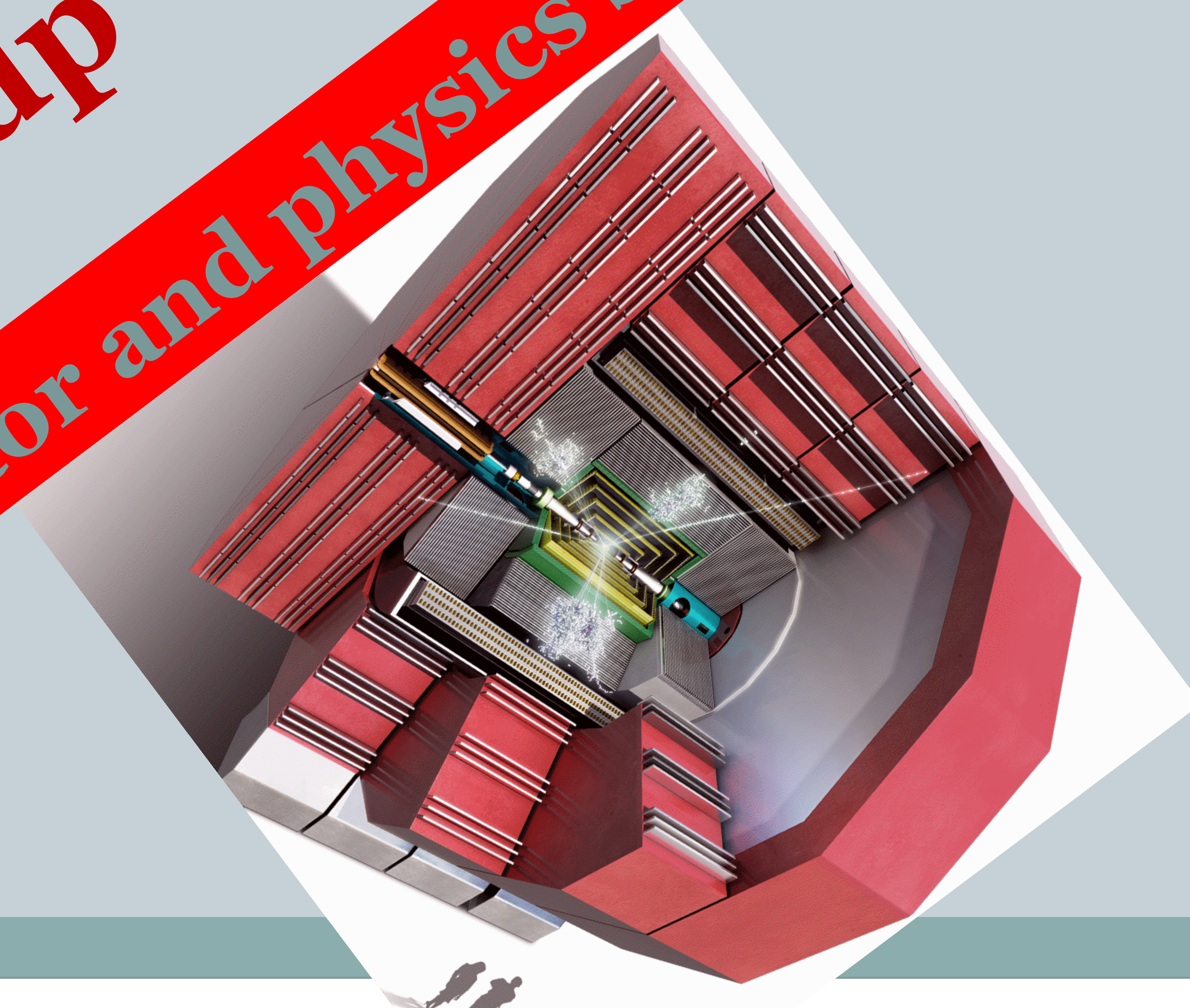
diolch
dhanyavadagalu
তোমাকে ধন্যবাদ
xièxie
감사합니다
merci

Back up

CLIC dp

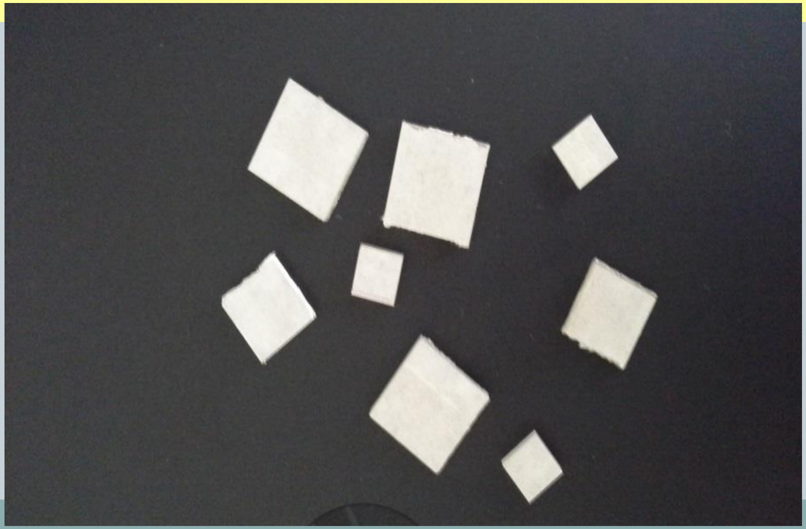
CLIC detector and physics study



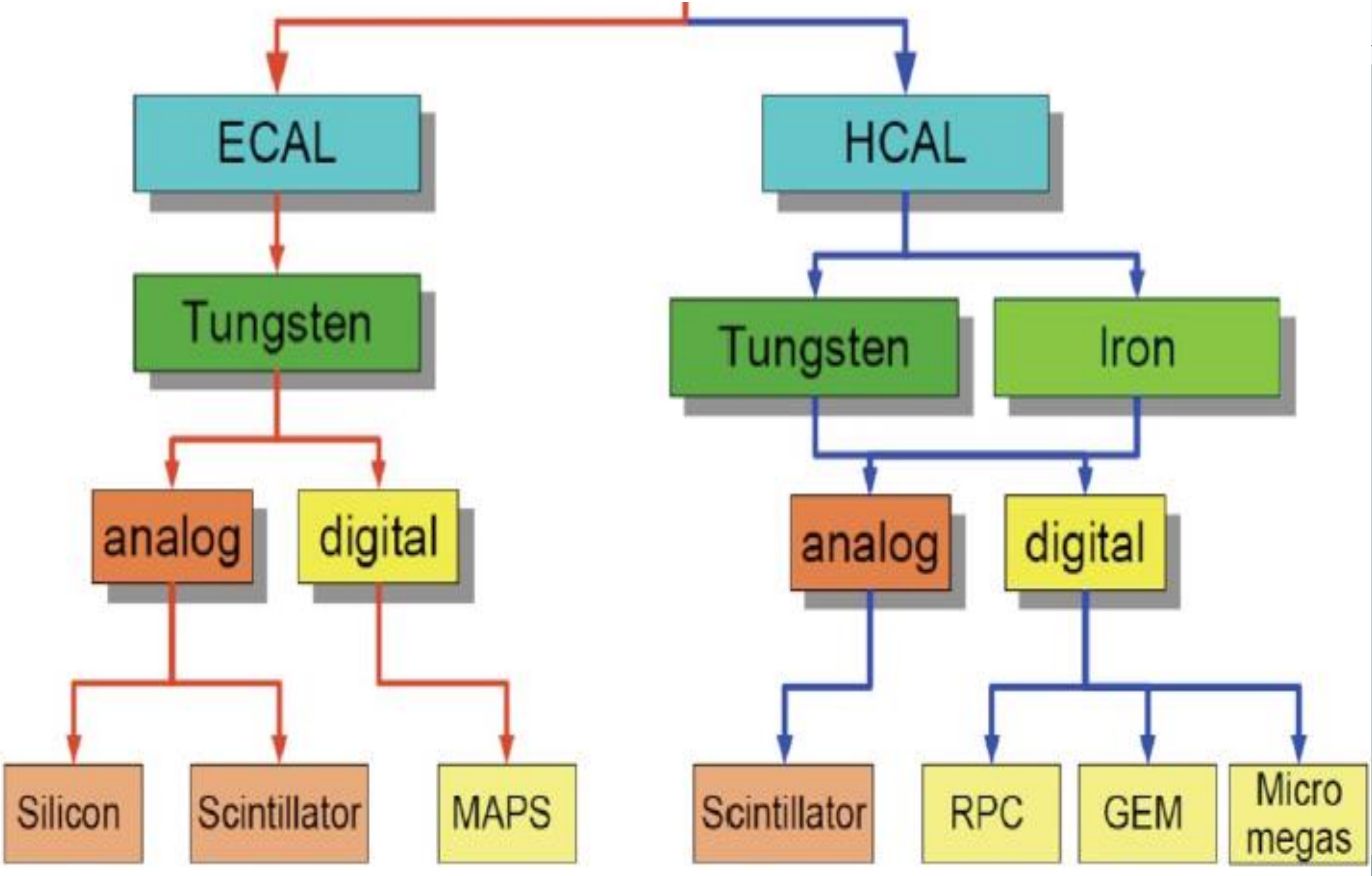
The Task

Before building the whole scintillator, we need first built one cell. So we do lap test on different plastic scintillator cells to answer that questions.

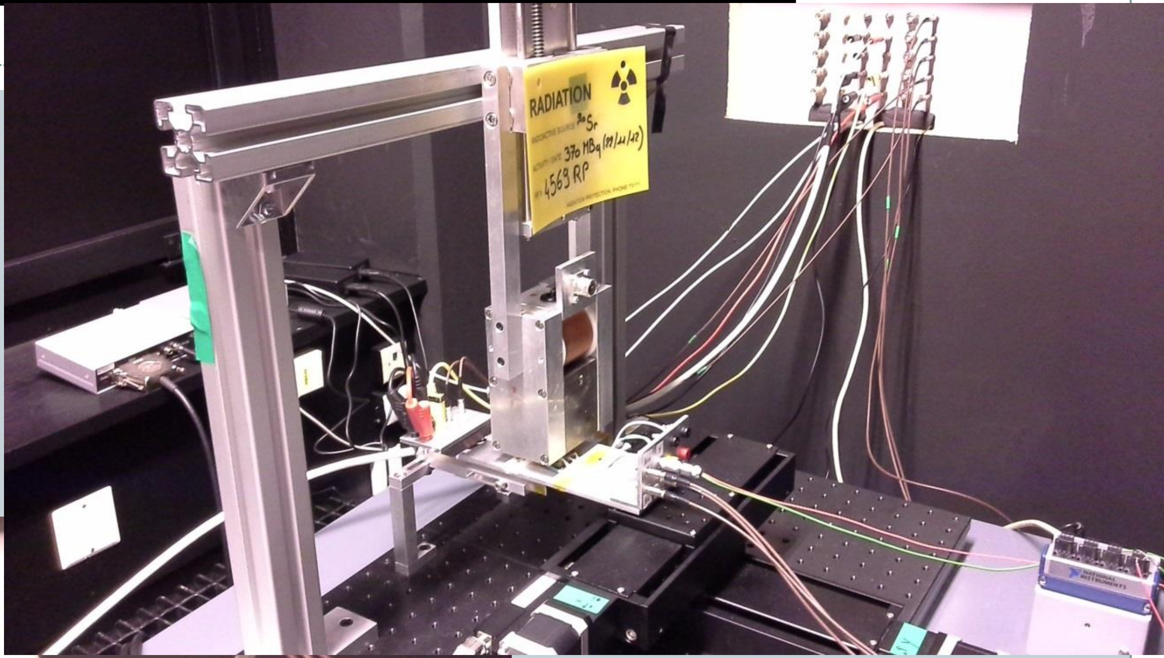
- **What is the best cell size?**
- **How much can cell collect light ?**
- **Is it have uniform response?**

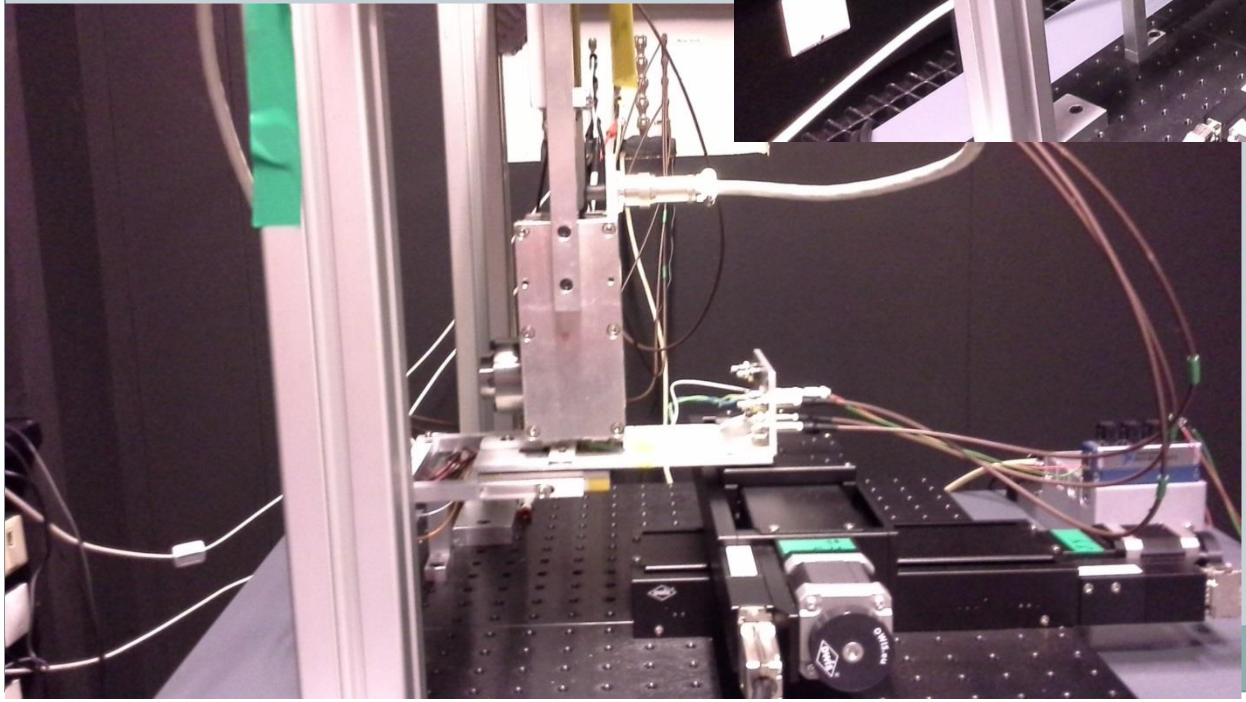


Calorimeter for Linear Collider(LC)

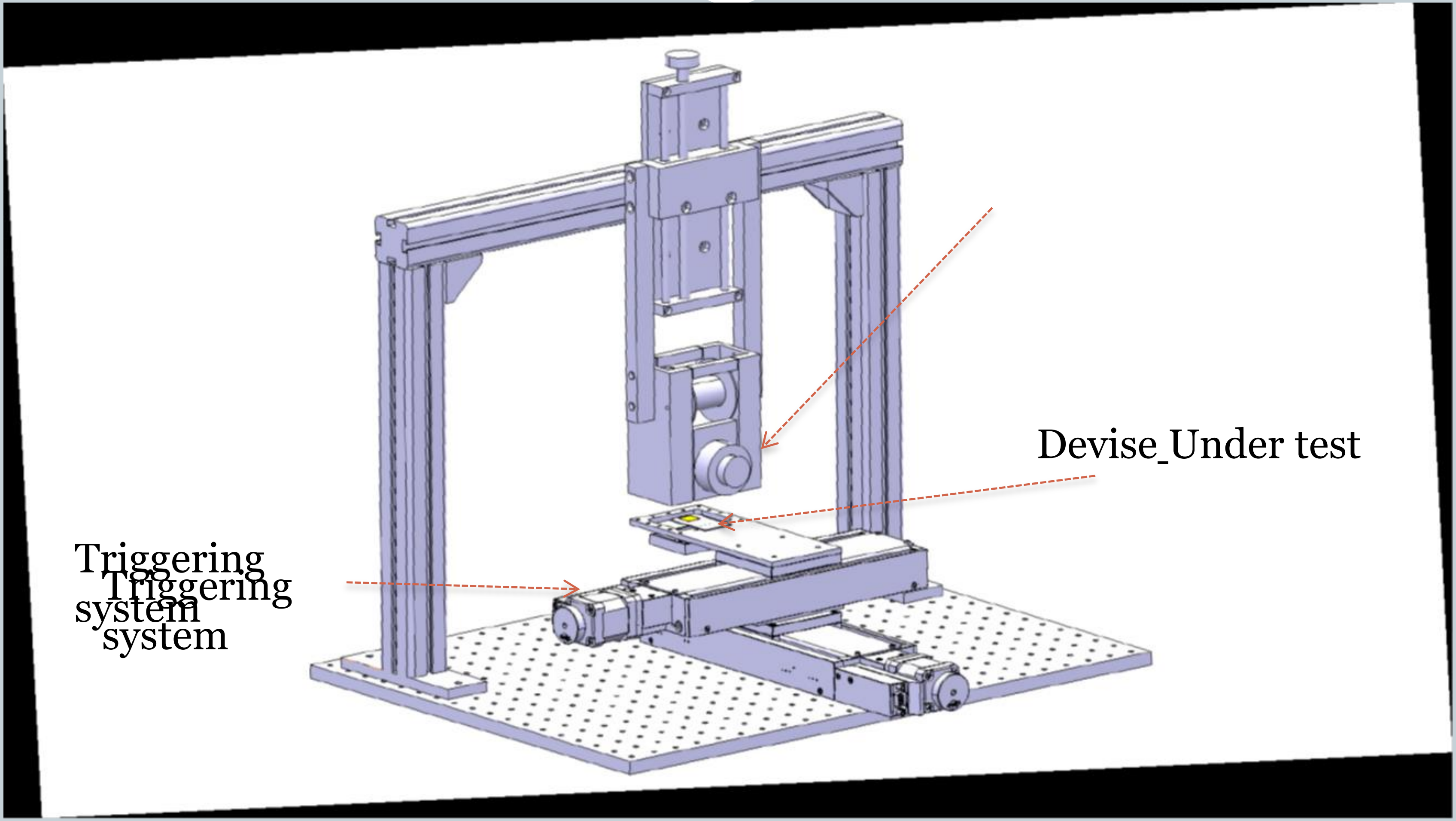


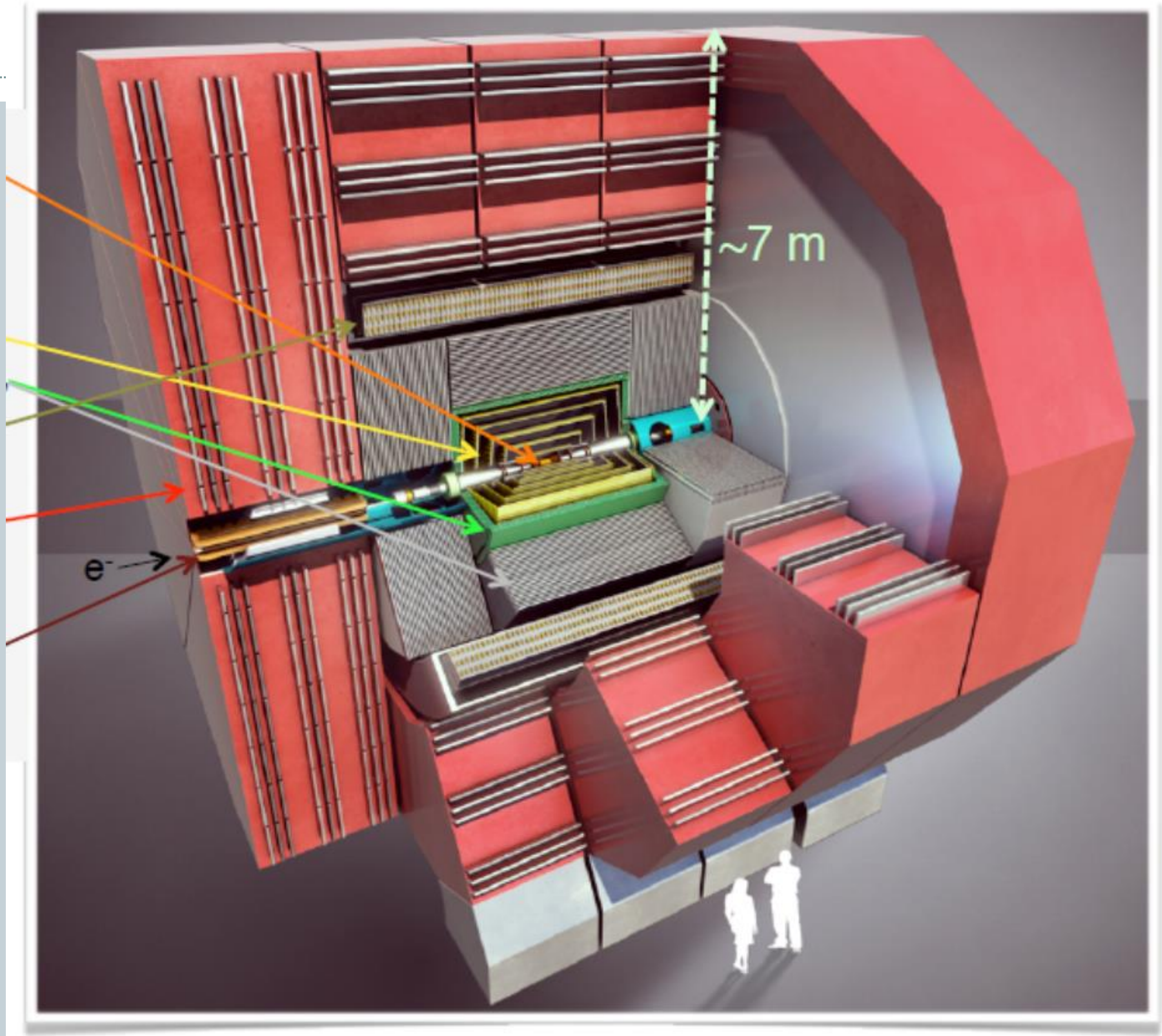
A. Experimental setup



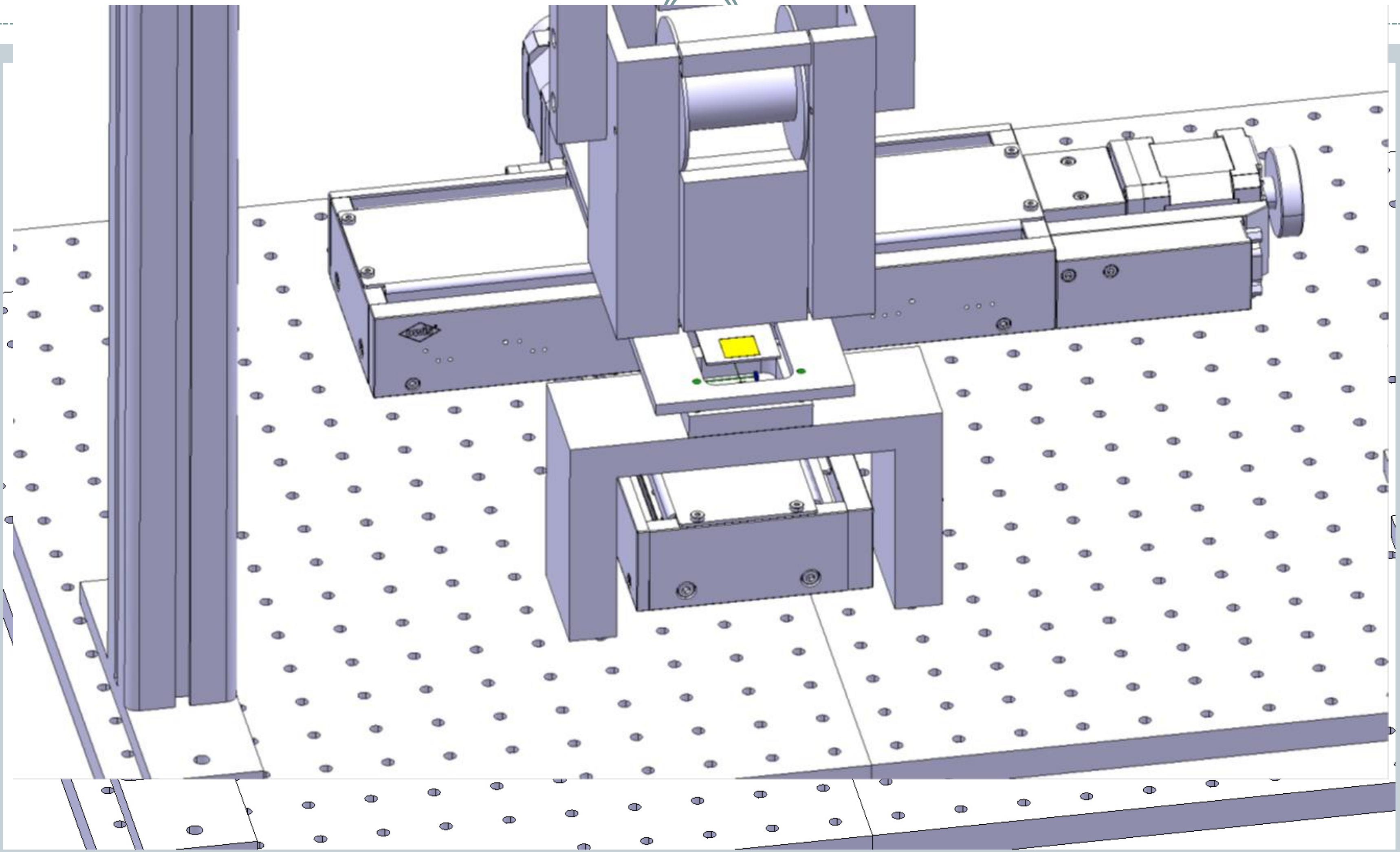


Experimental Setup




~7 m
e⁻

Backup

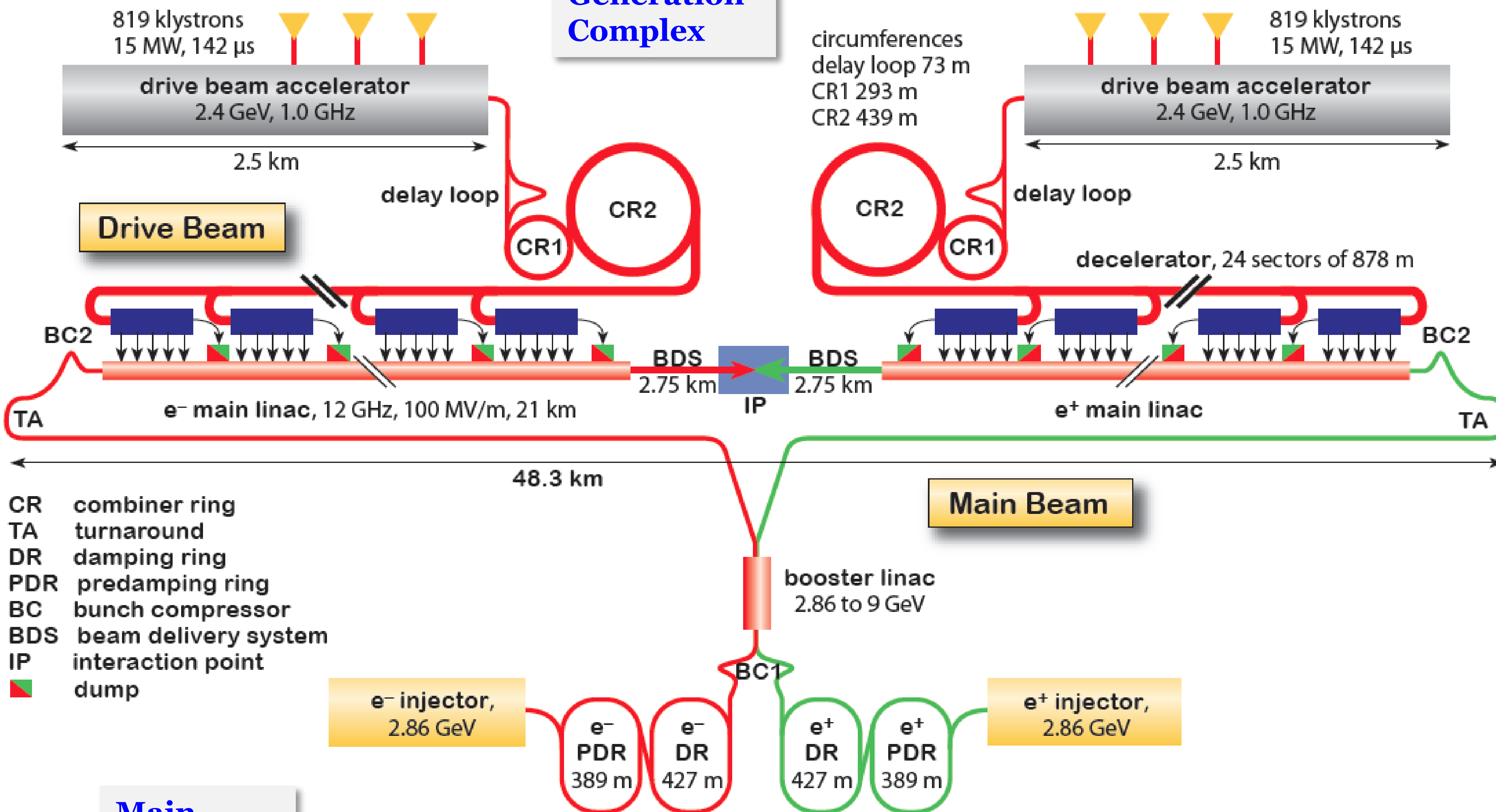


CLIC: The Basis

Goal: Lepton energy frontier

Drive Beam Generation Complex

CLIC at 3TeV shown



Main Beam Generation Complex