



# The CLIC detector

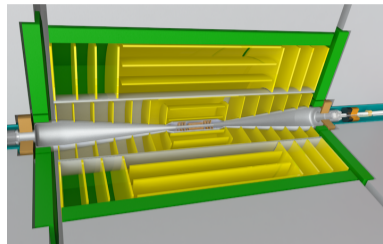
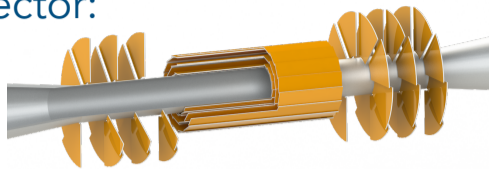
Emilia Leogrande (CERN), on behalf of the CLICdp Collaboration  
EPS-HEP 2019, 10-17 July, Ghent (BE)



## All-silicon tracking system

Double-layered vertex detector:

- pixel  $25 \times 25 \mu\text{m}^2$
- $0.2\% X_0$  per layer
- cooling via air flow

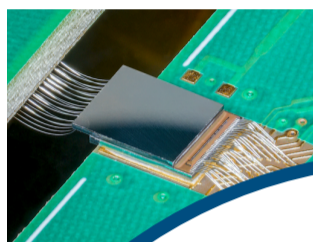
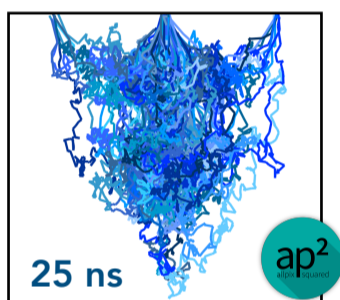


Single-layered tracker:

- strips  $50 \mu\text{m} \times [1-10] \text{mm}$
- $1\% X_0$  per layer
- carbon-fibre support

Many technologies in R&D

- CLICTD prototype for tracker
- monolithic CMOS in 180nm
- pixel  $300 \times 30 \mu\text{m}$
- next: lab tests and test beams
- simulation of charge carrier motion in monolithic CMOS



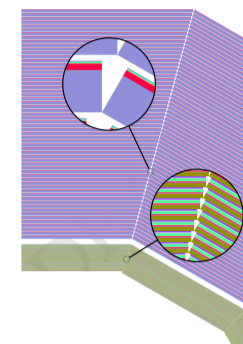
## Particle-flow calorimeters

Si-W ECal

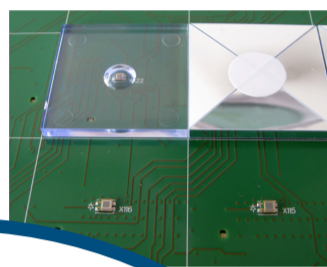
- cell  $5 \times 5 \text{mm}^2$
- 40 layers
- $22 X_0, 1 \lambda_1$

Scintillator-Steel HCal

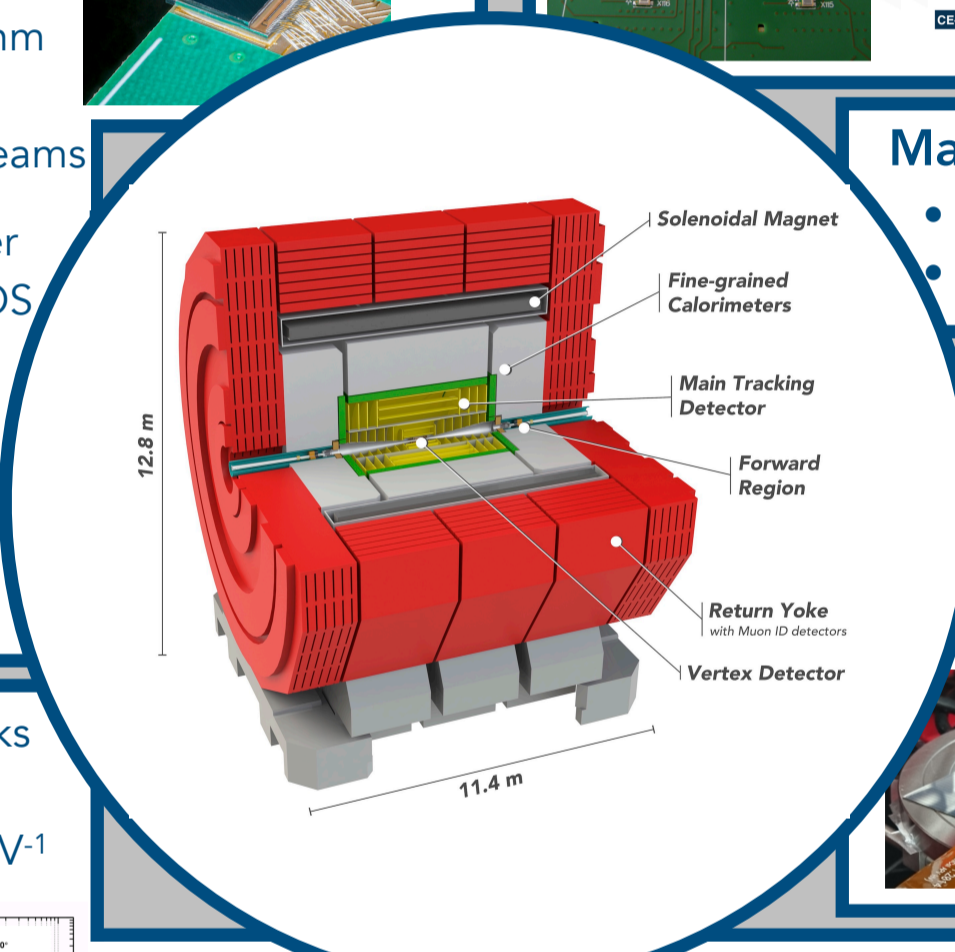
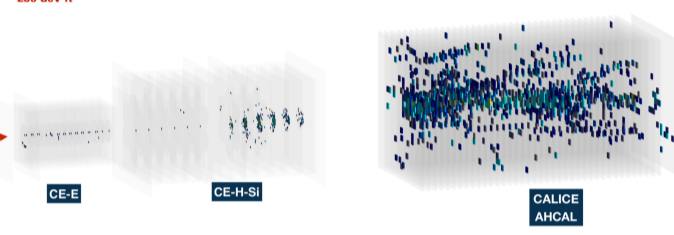
- cell  $30 \times 30 \text{mm}^2$
- 60 layers
- $7.5 \lambda_1$



Prototype assembly and test beams with CALICE



October 2018 run 517 - event 30:  
250 GeV  $\pi^+$



## Magnet and muon detector

- 4T superconducting solenoid
- RPC muon chambers in Fe yoke

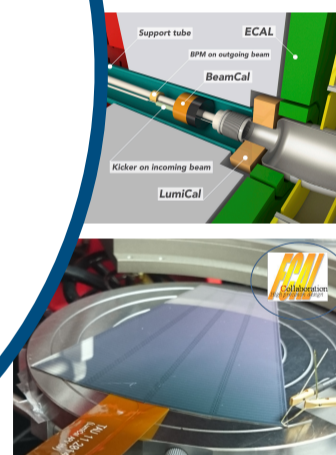
## Forward calorimeters

Si-W LumiCal

- 40 layers
- $39 < \theta < 134 \text{mrad}$

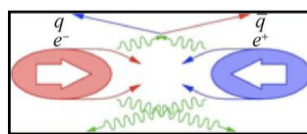
GaAs-W BeamCal

- 40 layers
- $10 < \theta < 46 \text{mrad}$



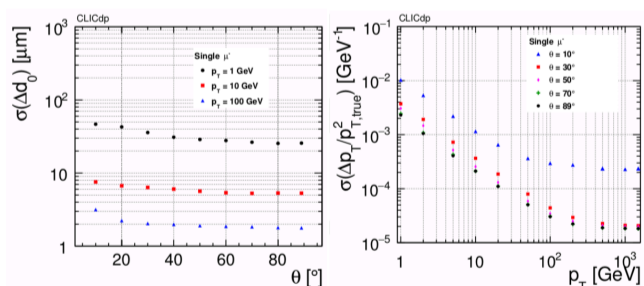
## Performance in full simulation

with  $\gamma\gamma \rightarrow \text{hadrons}$   
main background



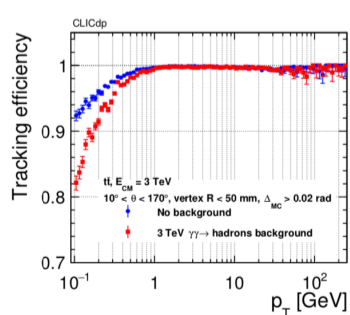
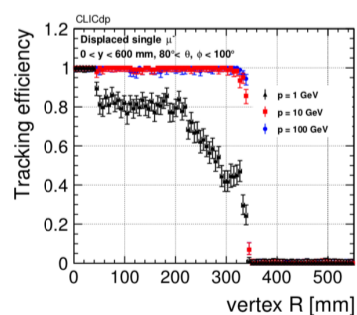
For high-energy central tracks

- $d_0$  resolution below  $1 \mu\text{m}$
- $p_T$  resolution  $\sim 2 \times 10^{-5} \text{GeV}^{-1}$



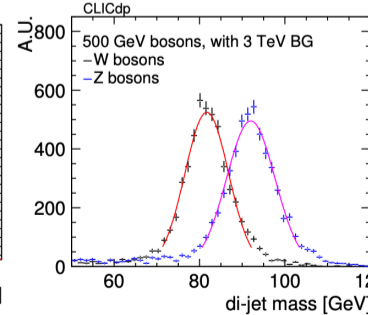
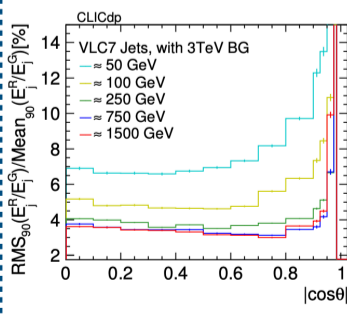
Conformal tracking algorithm

- excellent efficiency for displaced  $\mu$
- background effect only  $p_T < 1 \text{GeV}$



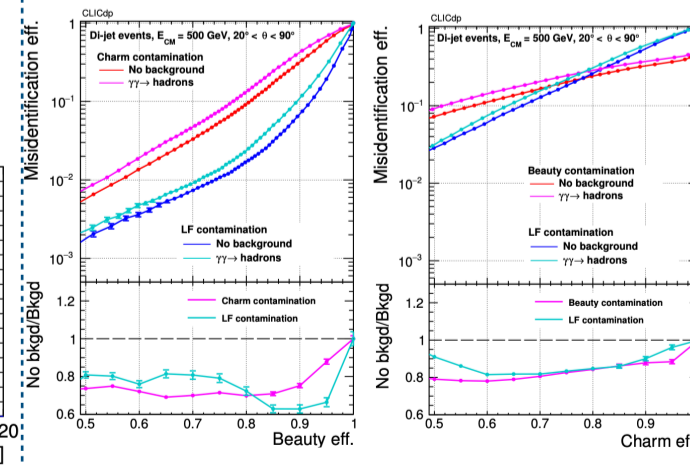
Pandora PFA

- jet energy resolution
- W/Z mass separation



LCFIPlus algorithm

- b- and c- tagging
- light quark contamination



## References

- CLICdet: The post-CDR CLIC detector model [https://cds.cern.ch/record/2254048]
- A detector for CLIC: main parameters and performance [https://arxiv.org/abs/1812.07337]
- Detector technologies for CLIC [https://arxiv.org/abs/1905.02520]
- The Compact Linear e+e- Collider (CLIC): Accelerator and Detector [https://arxiv.org/abs/1812.07987]
- CLIC 2018 Summary Report [https://arxiv.org/abs/1812.06018]

