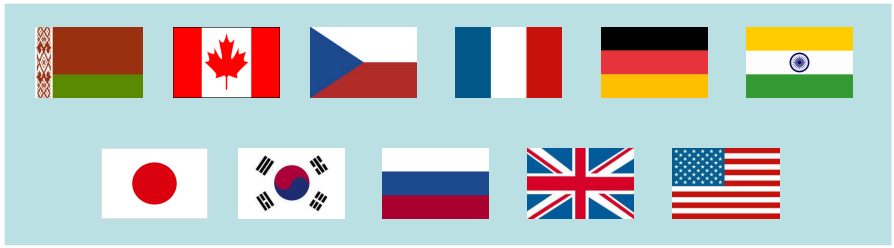
CALICE
Calorimeter for ILC

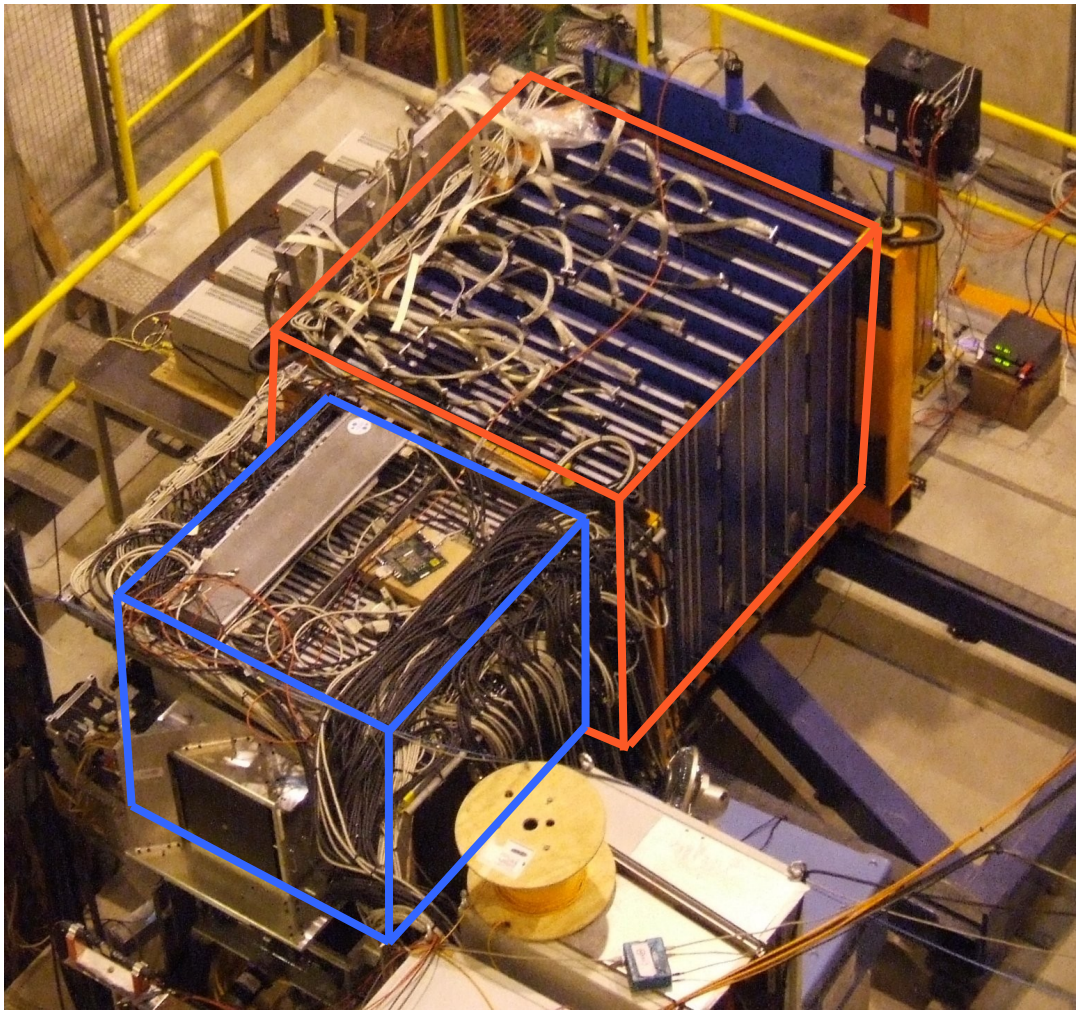


First look into AHCAL and TCMT test-beam data

content

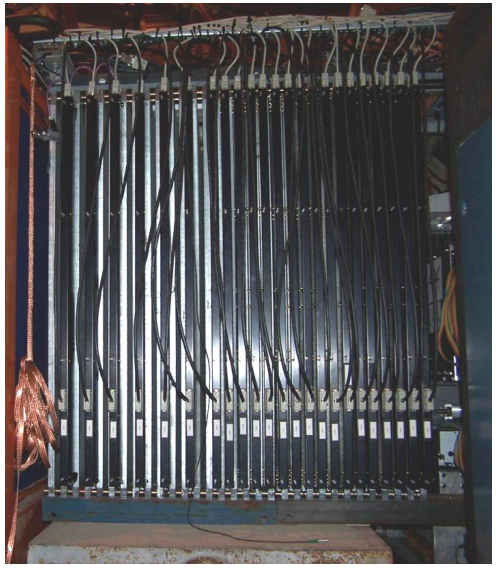
- CERN installation of AHCAL & TCMT
- muon calibration
- electromagnetic shower in HCAL
- hadron shower
- combined response

AHCAL & TCMT in operation



One talk for two detectors?

Yes, there is a reason!

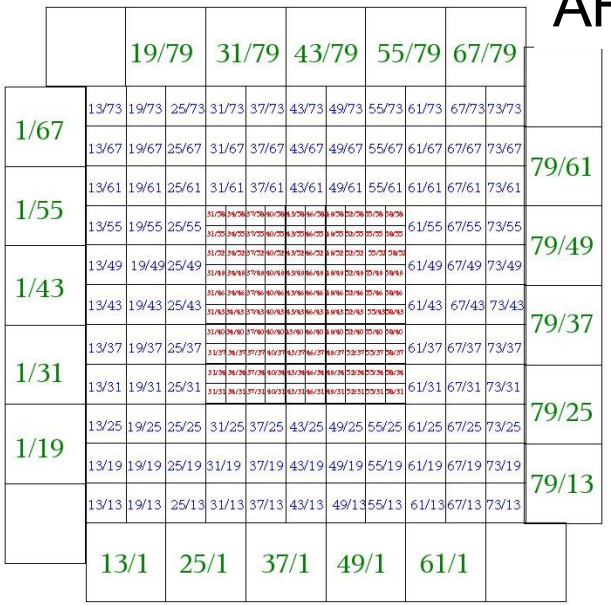


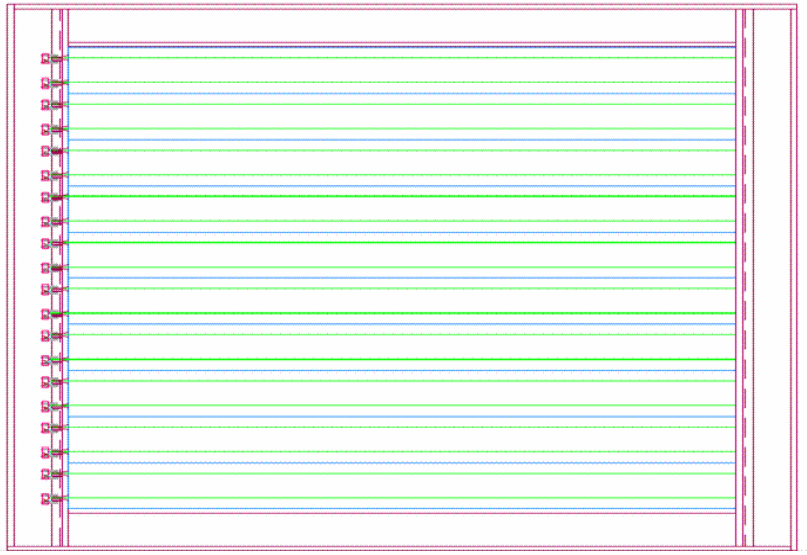
Analog Hadronic CALorimeter
is an
iron-scintillator-sandwich calorimeter
using SiPM readout

TailCatcher and MuonTracker
is an
iron-scintillator-sandwich-calorimeter
using SiPM readout

active layer layout

AHCAL TCMT





216 cells per layer

3x3cm², 6x6cm², 12x12cm² – 0.5cm thick

23 (of 38) layers

~5000 (of 8000) channels

2 cm sampling

20 strips per layer

5x100cm² – 0.5cm thick

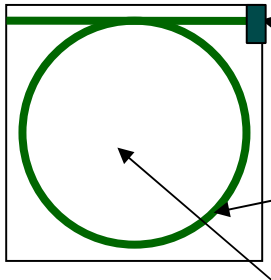
16 layers

320 channels

2 & 10 cm sampling

different shape same technology

AHCAL



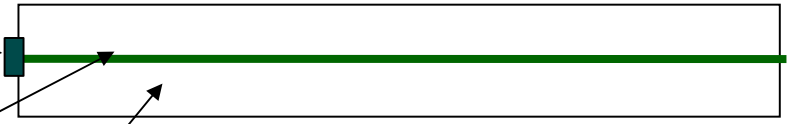
6x6cm²

SiPM

wavelength shifting fibre

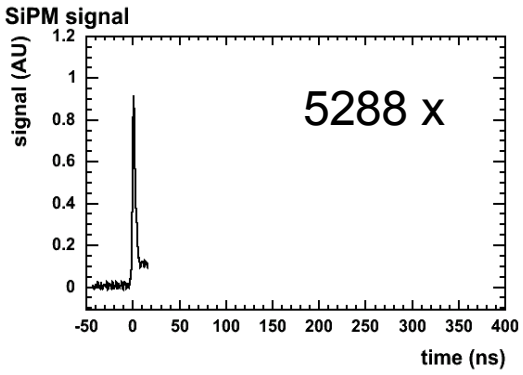
plastic scintillator

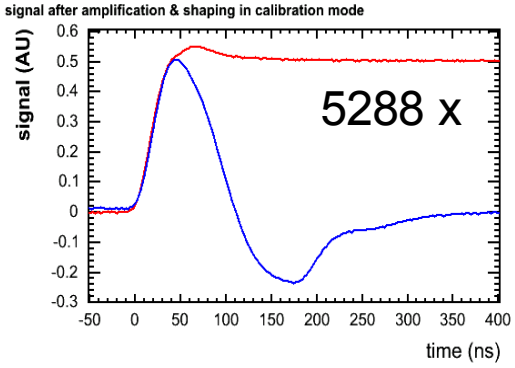
TCMT

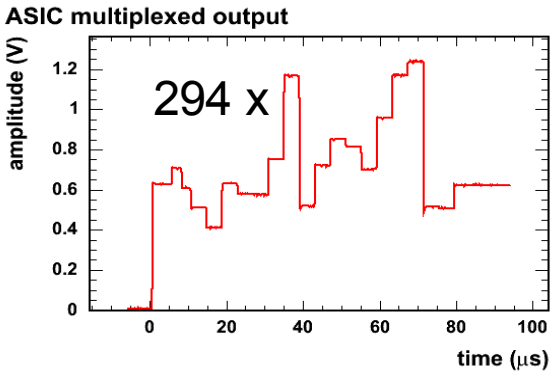


5x100cm²

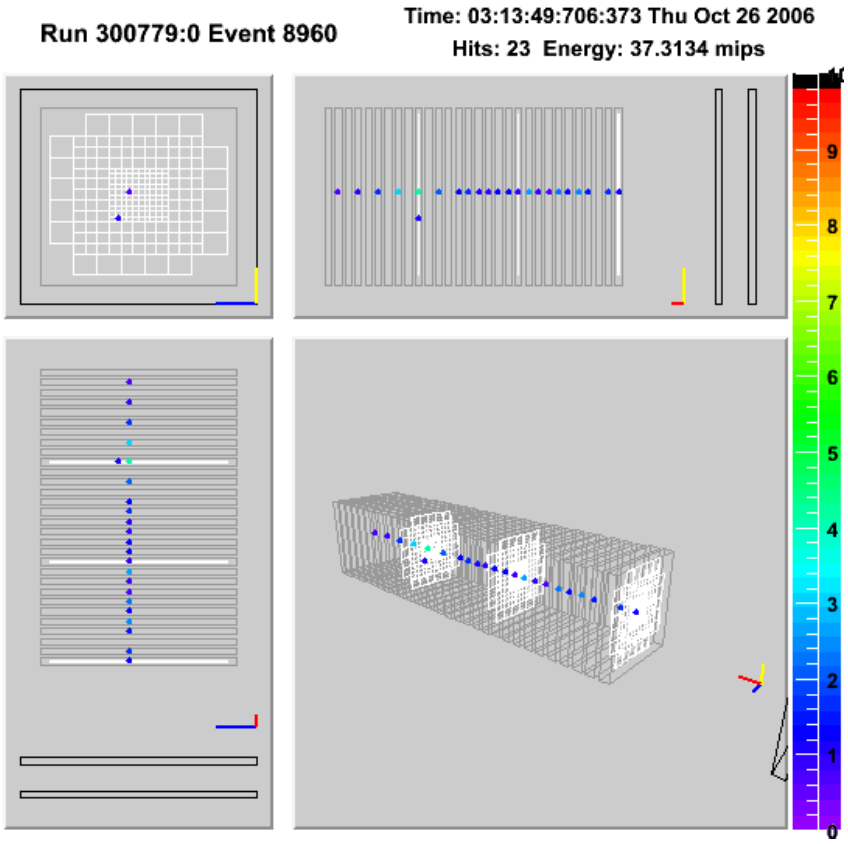
➔ **both detectors use the same readout-electronics**

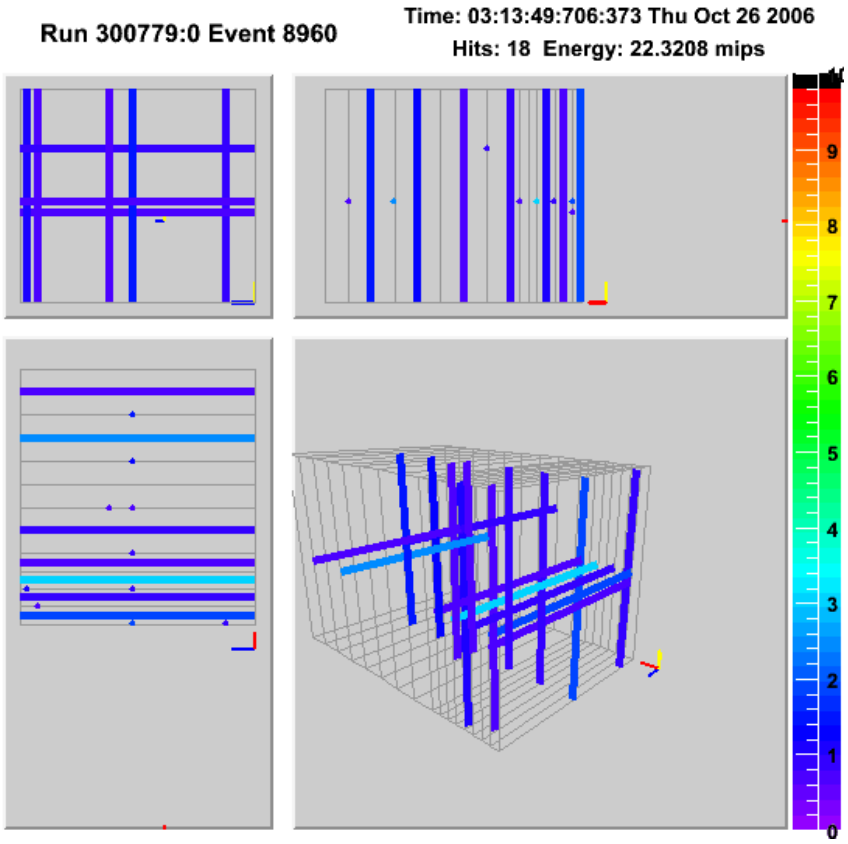




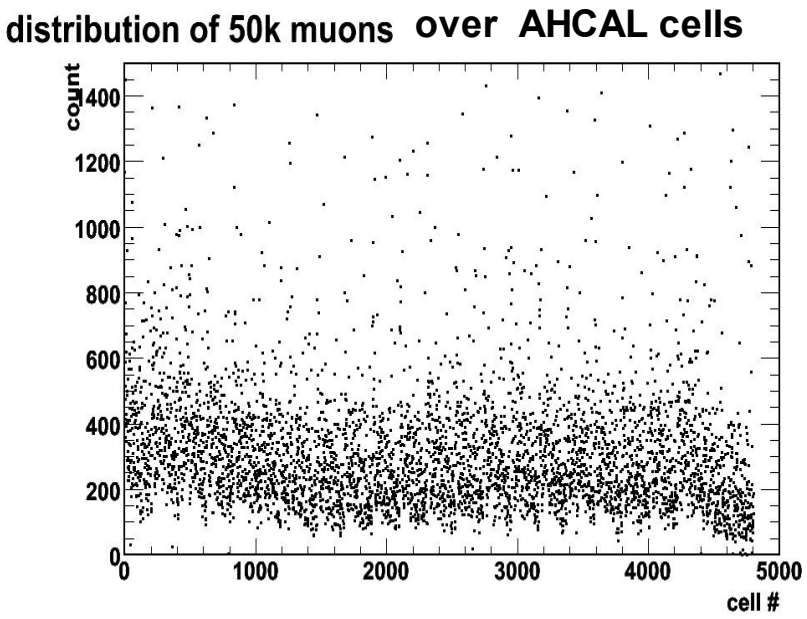


muon calibration

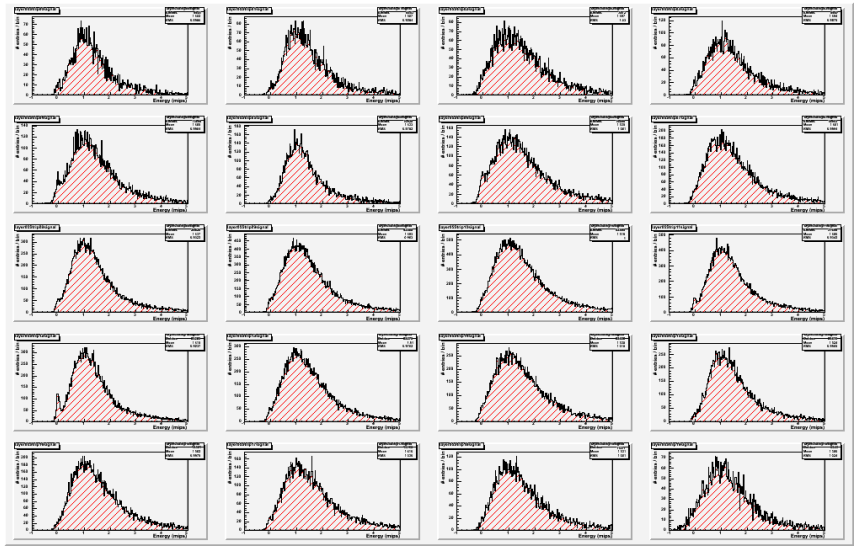




muon calibration



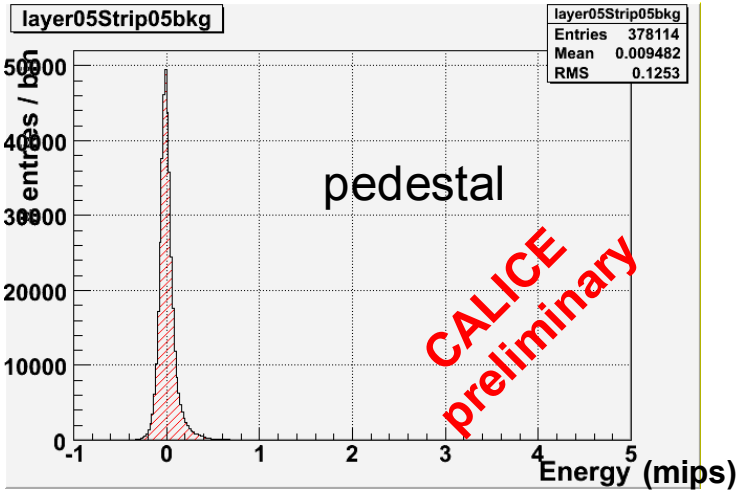
TCMT example layer 5:

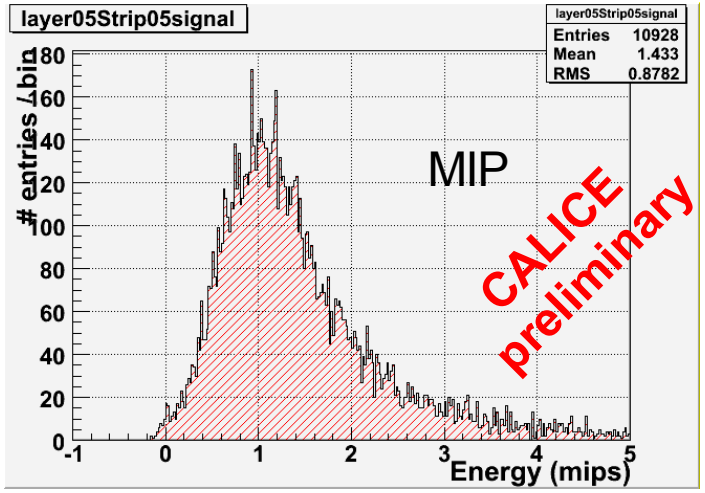


a good calibration needs enough muons in **all** channels

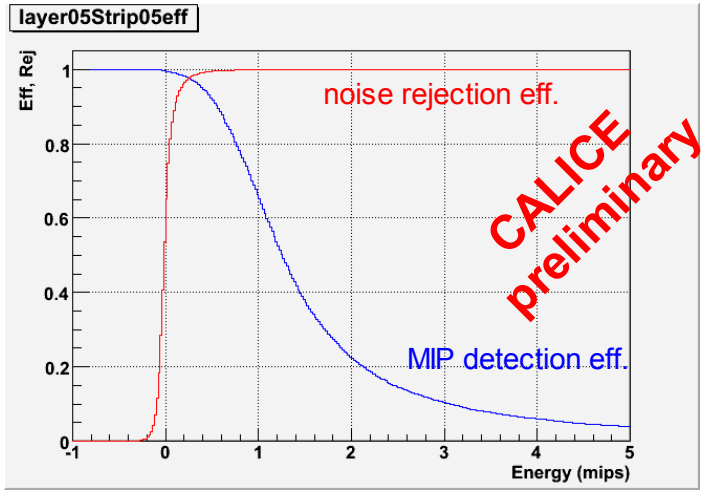
➔ the CERN test-beam offers a muon calibration of the full detector with maximum data taking rate

muon efficiency for TCMT

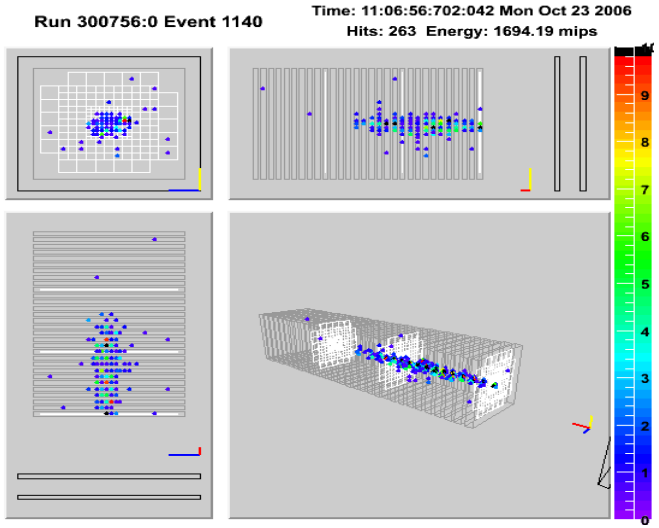


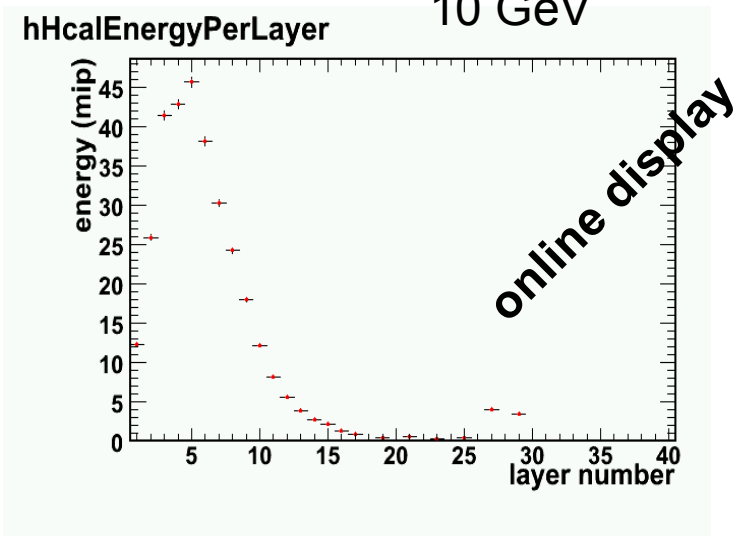


CALICE preliminary:
Efficiency vs. rejection
for TCMT strips:
* for E > 0.4 mips,
typically > 95% effic
with > 95% rejection

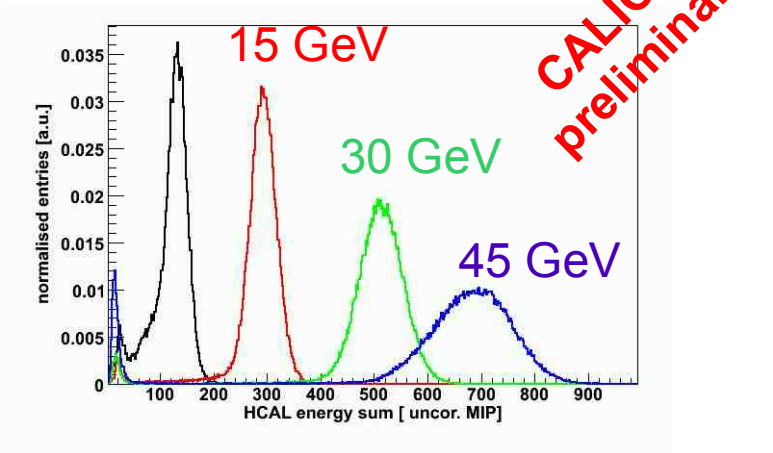


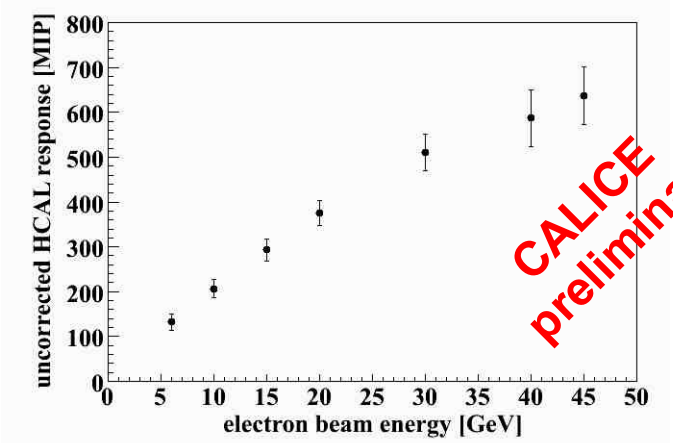
HCAL positron signal



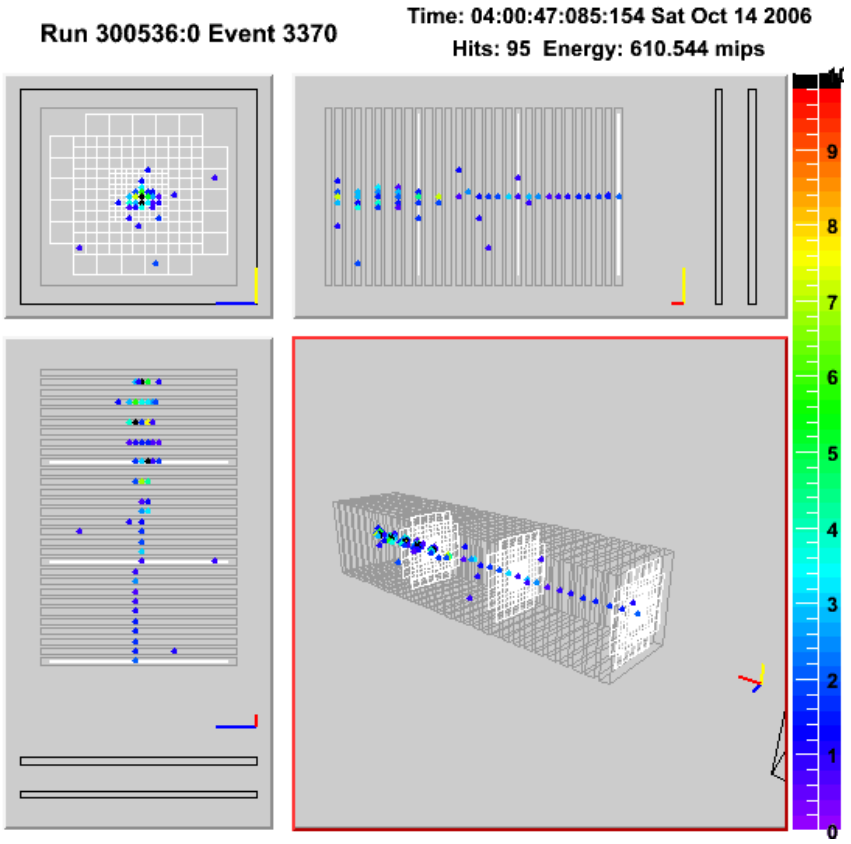


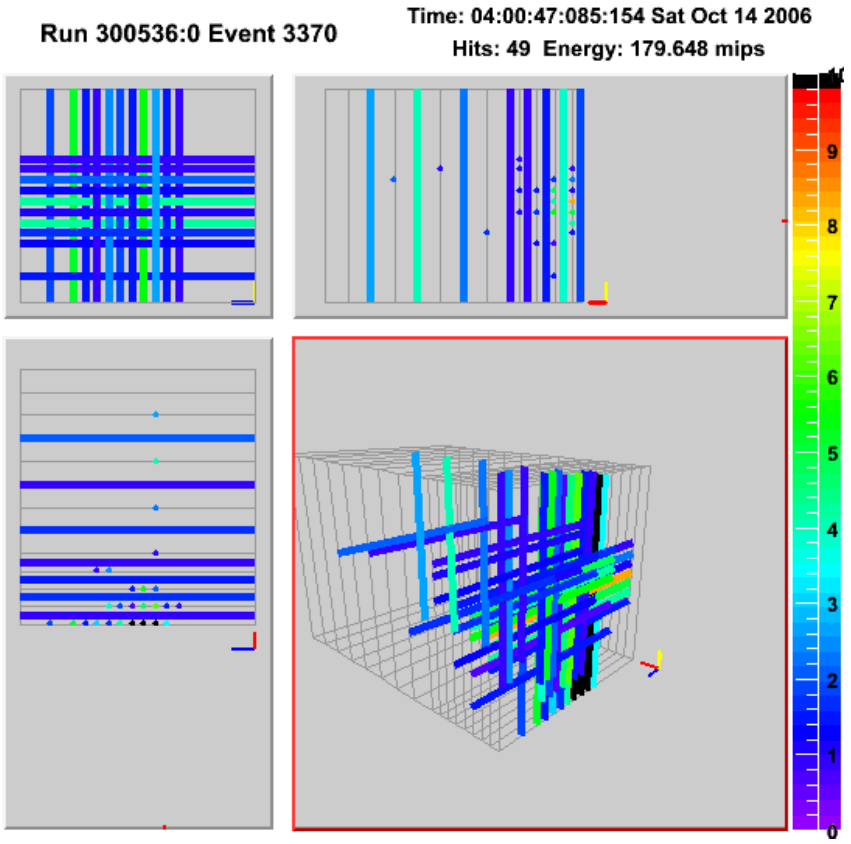
6 GeV





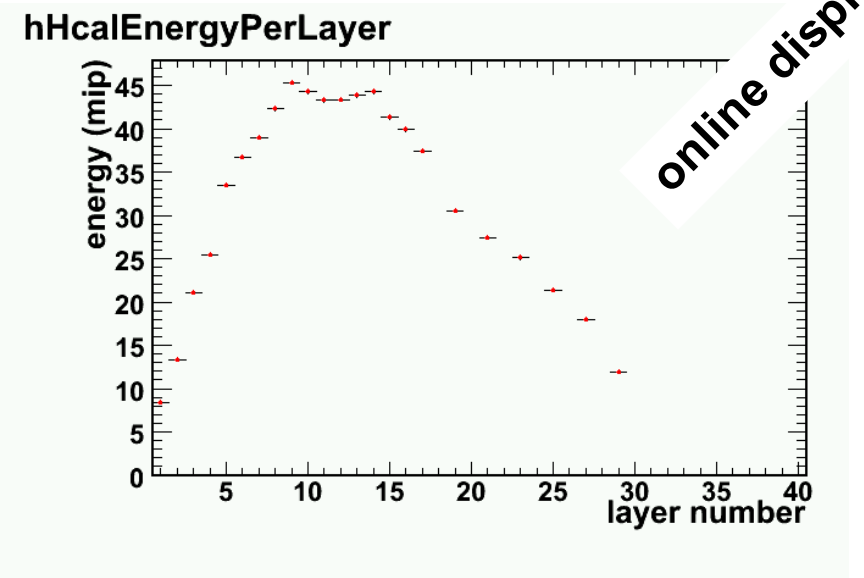
pions in AHCAL & TCMT





longitudinal shower distribution in HCAL

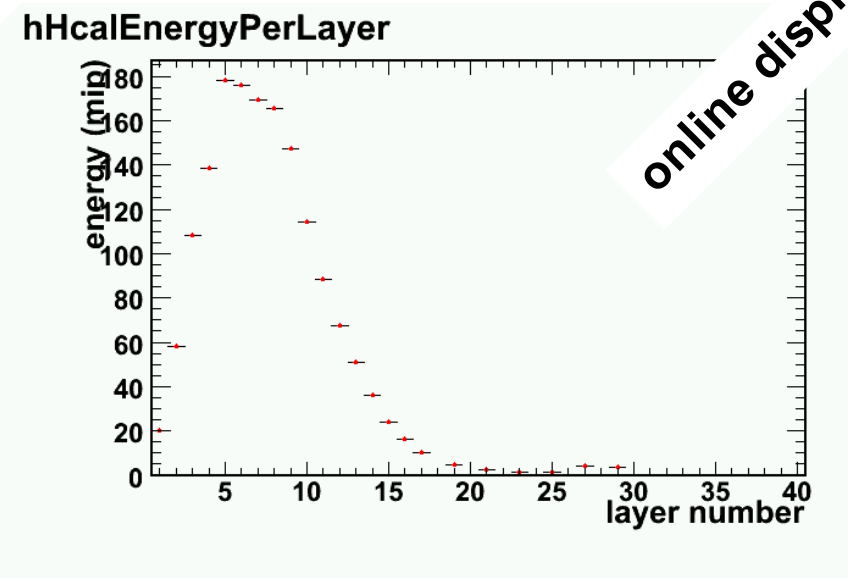
40 GeV pion



not contained

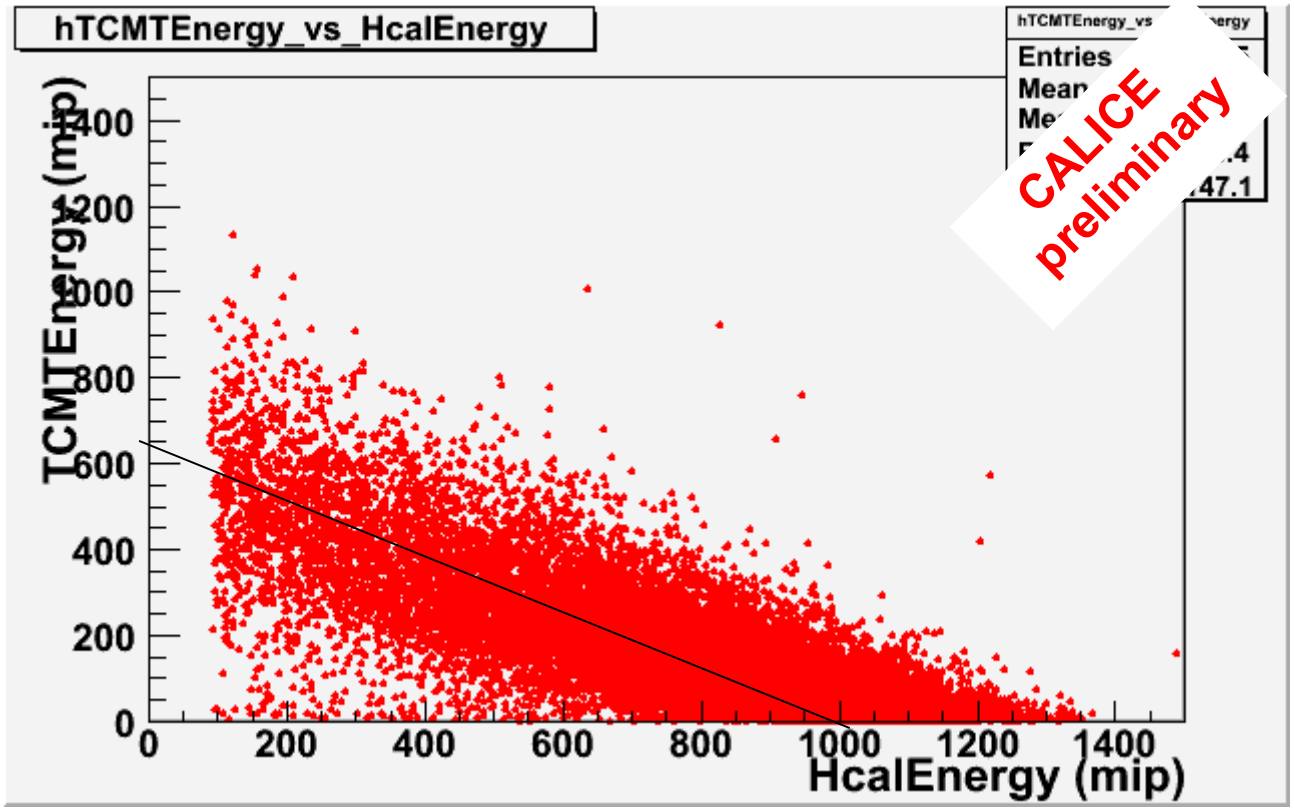
➔ need tailcatcher

50 GeV positron



contained

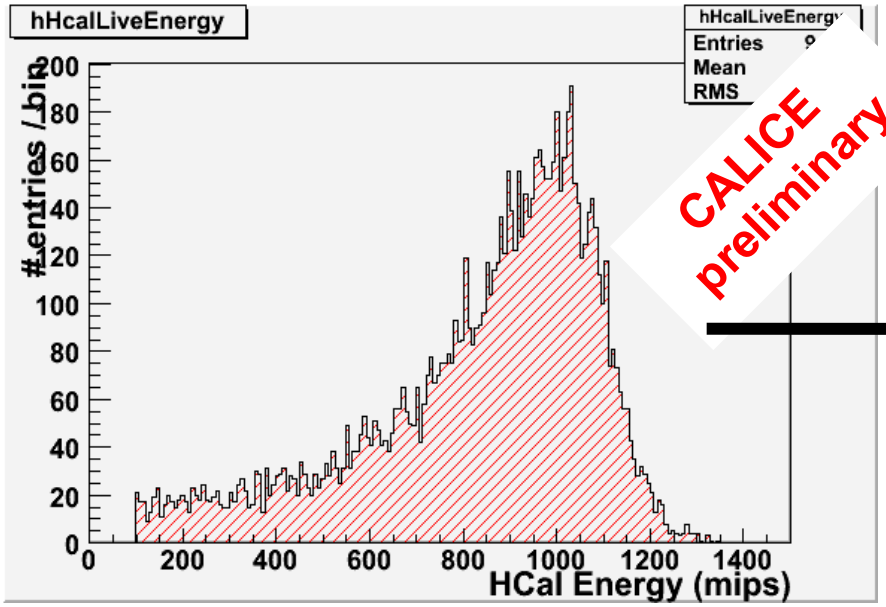
80 GeV pions signal of AHCAL & TCMT



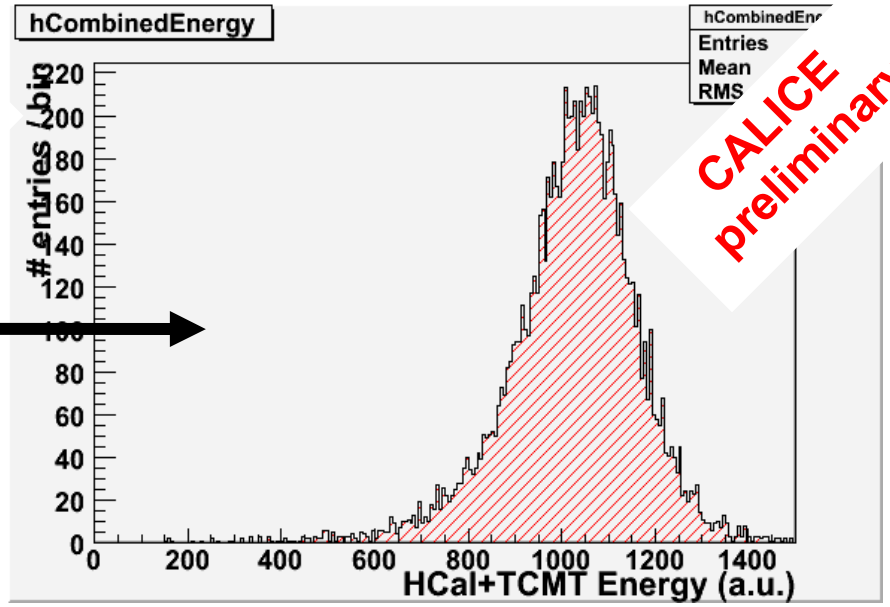
Combining the HCAL and TCMT response

The MIP-calibrated energy is summed on event-base. Different sampling fractions are corrected with a constant factor between HCAL and TCMT.

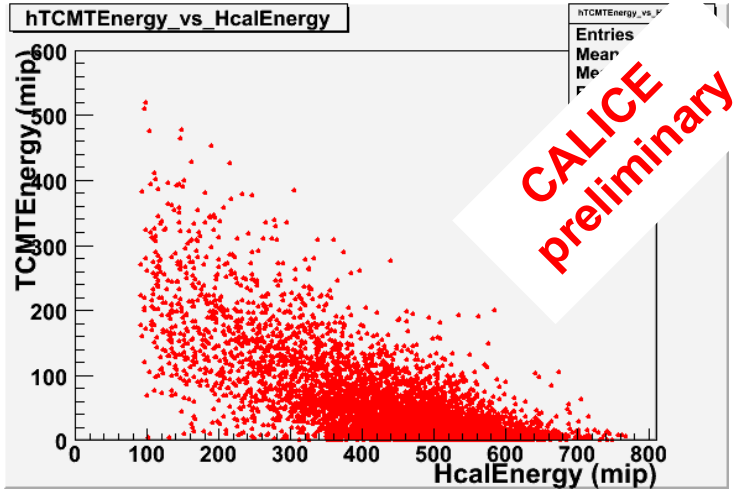
HCAL alone



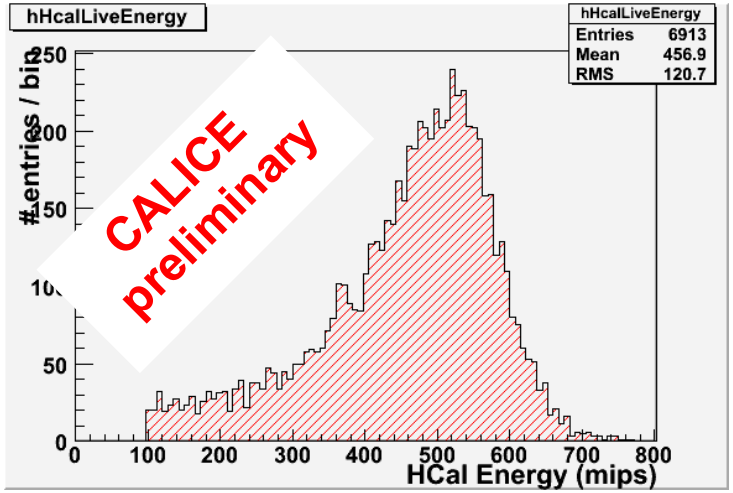
HCAL & TCMT

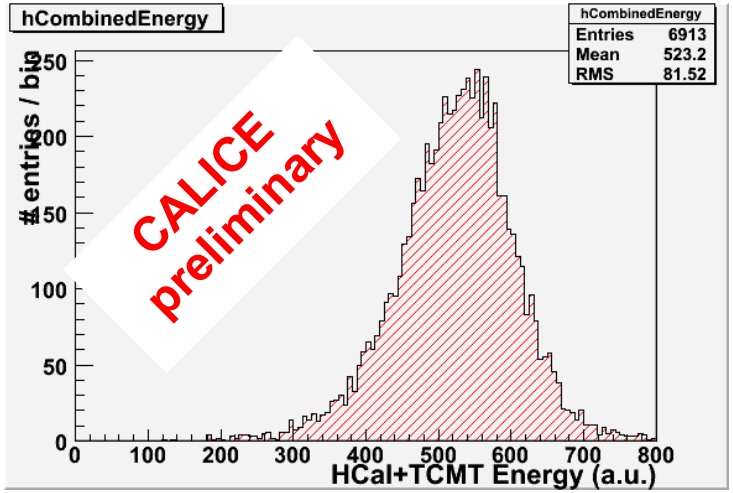


30 GeV pion



improvement still visible !





summary & outlook

- successful integration of AHCAL & TCMT into the same readout electronics
- we have all data for calibration and understanding of the detectors in hand
- promising first results of the combined detectors

- soon: complete analysis of the data taken so far
- next year: full performance test with complete detectors @ CERN & FNAL