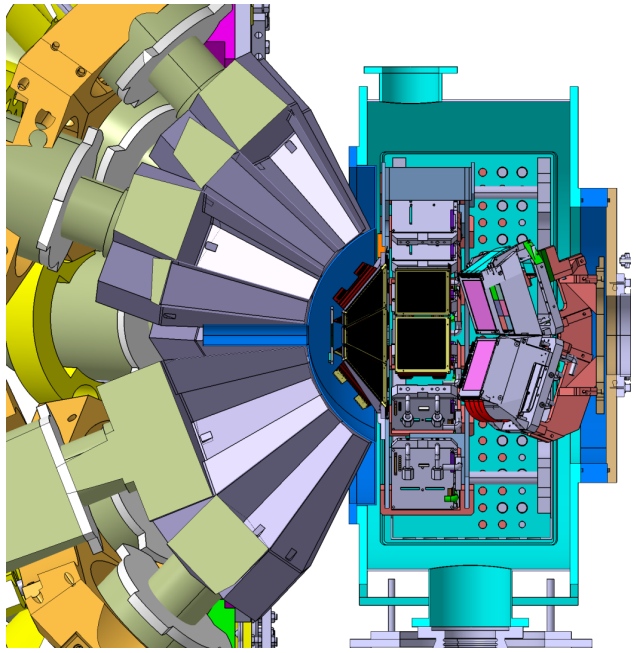
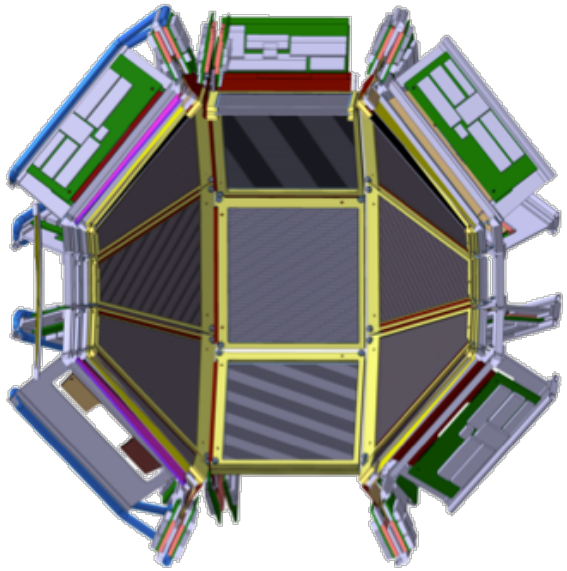
MUGAST – GASPARD : Status of detectors



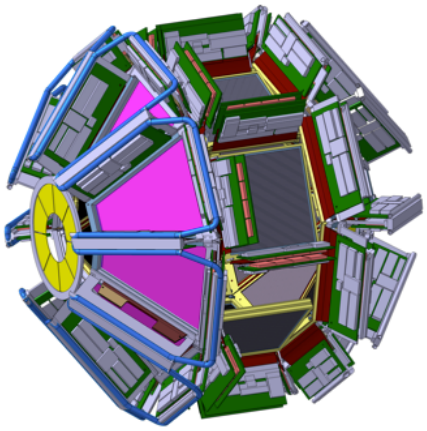


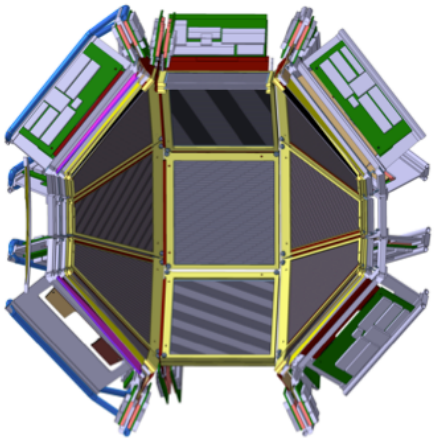
M. Assié for GASPARD-TRACE collaboration

GASPARD : Gamma Spectroscopy and PARticle Detector

4π Si array fully integrable in PARIS/AGATA/EXOGAM2

Direct reactions measurement and particle-gamma coincidence





Physics cases :

13 LoI for Spiral2

. Shell evolution
. Pairing
. Clusters
. Near Barrier reactions
. Astrophysics

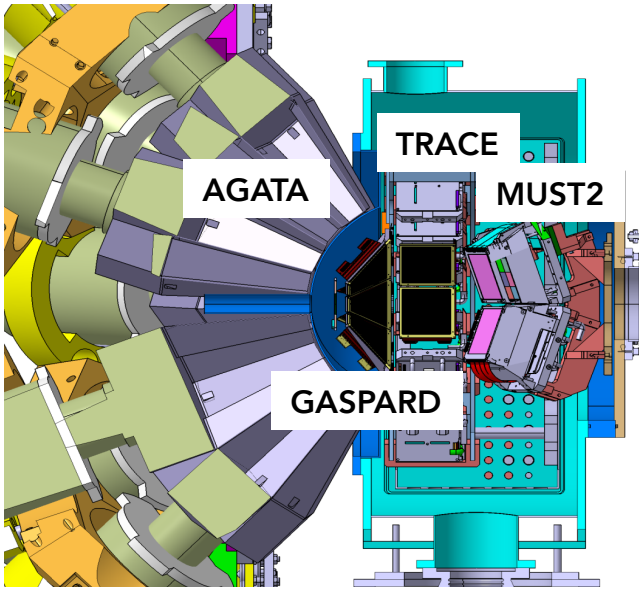
.Combination of **energy resolution (gamma) and good efficiency**

. Good **granularity** (pitch <1mm)

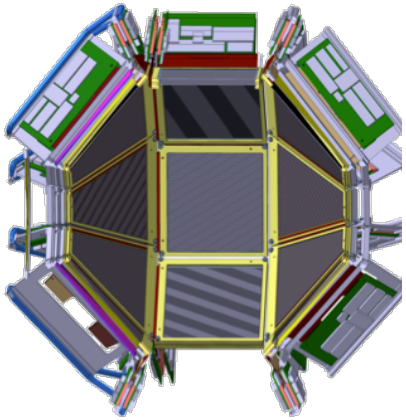
. **PSD** to identify low energy particles (1st layer)

. Integration of **special targets** (cryogenic ,Chymène…)

. **Integrated electronics** (iPACI, PLAS) designed by IPN & INFN Legnaro



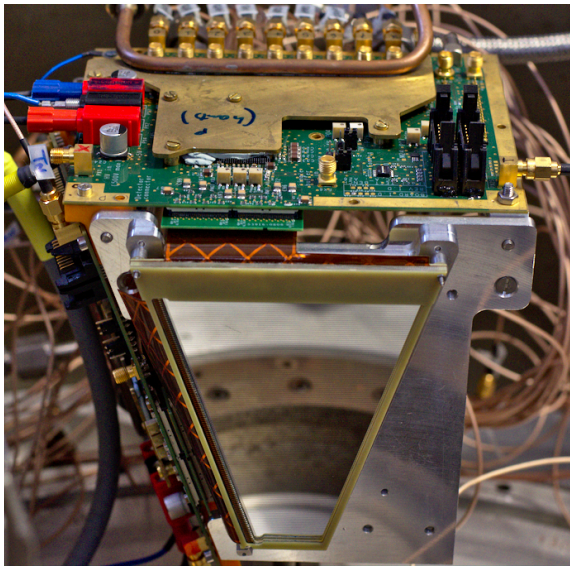
Detectors for GASPARD

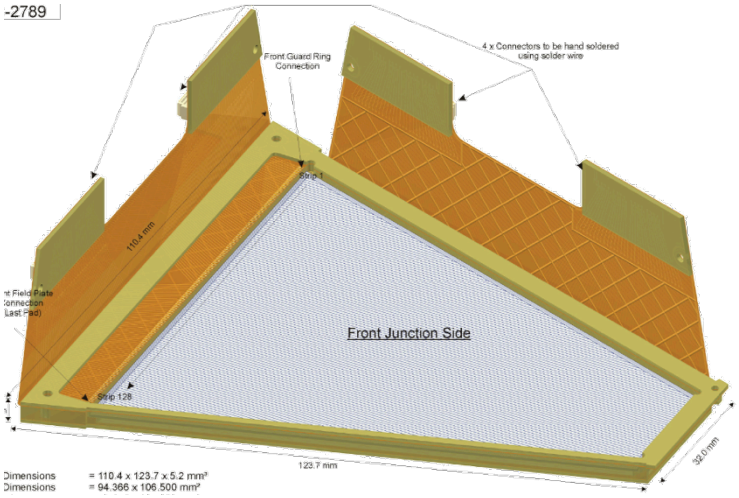


Trapezoidal DSSSD

Ordered at Micron Semiconductors : nTD, 4 deg. cut
- **2 prototypes 500 um** IPNO (nov. 2013)
- **3 pre-series** U. Surrey, Santiago, IPNO (end 2015)

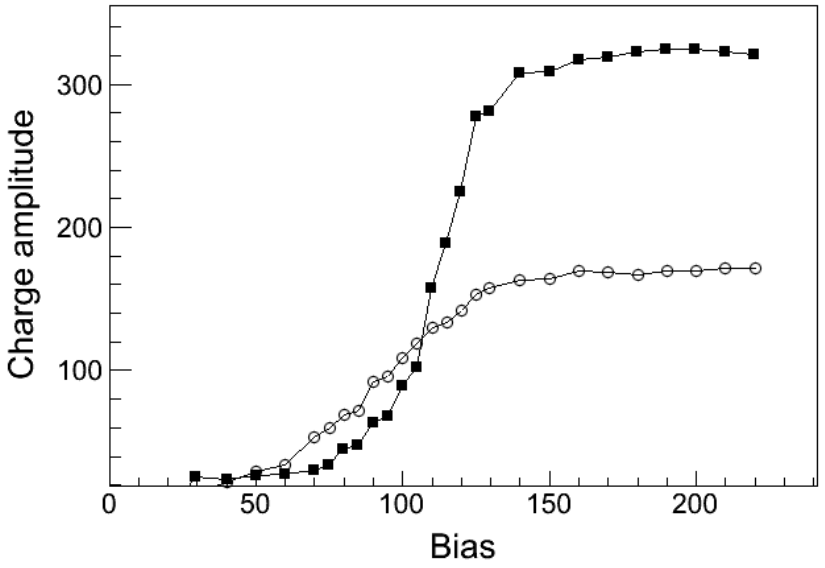
Received : 1st prototype june 2015
2nd prototype (new design) to be received end of the month
(2 units ready)



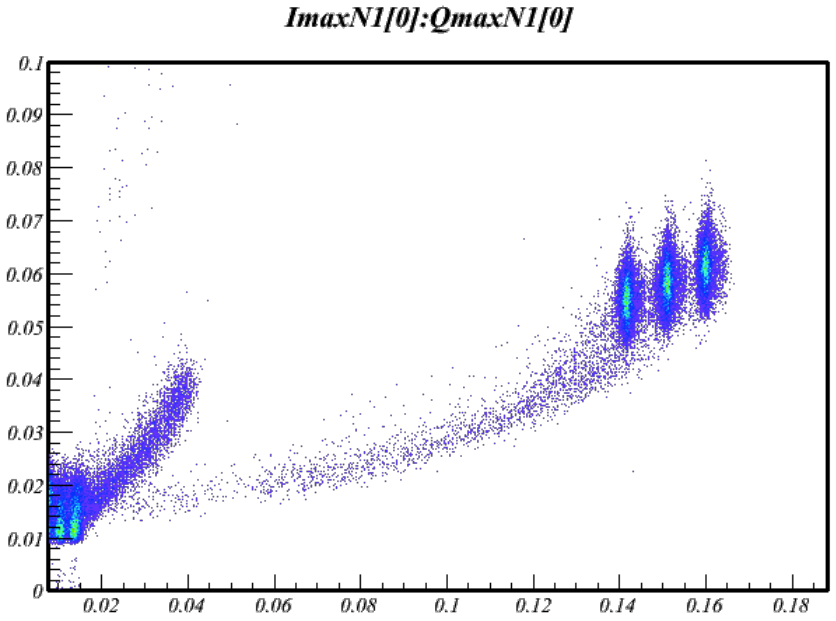


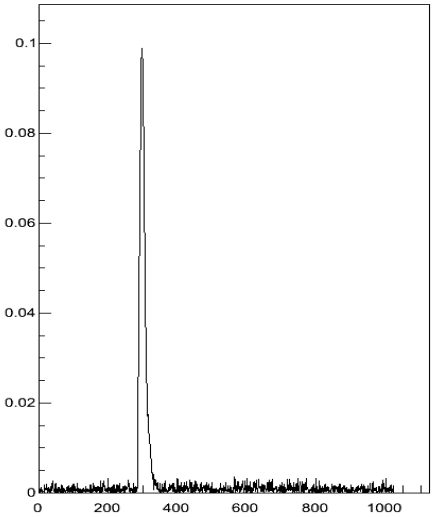
Test of the trapezoidal prototype

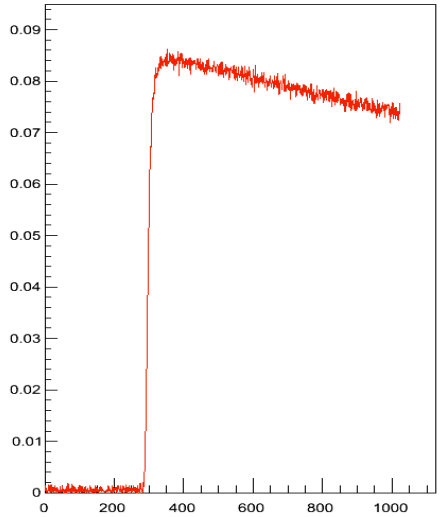
. **Plot of the current vs. bias**
--> the detector is depleted around 120V



. **Imax vs. Energy plot**



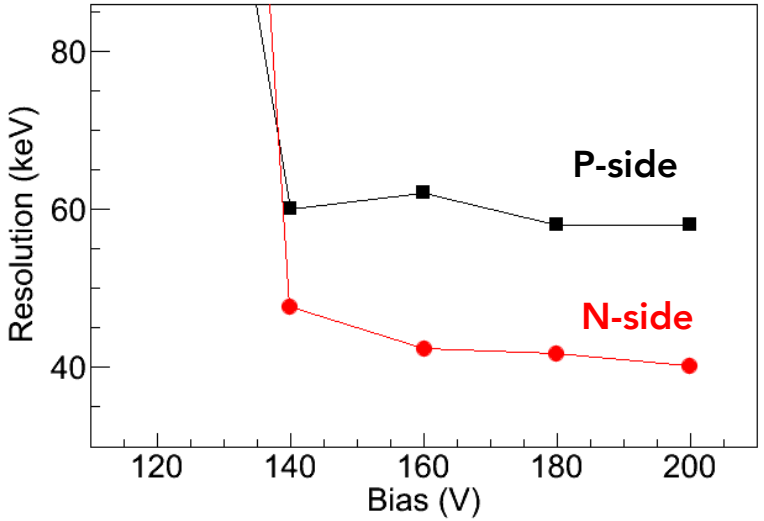




Test of the trapezoidal prototype

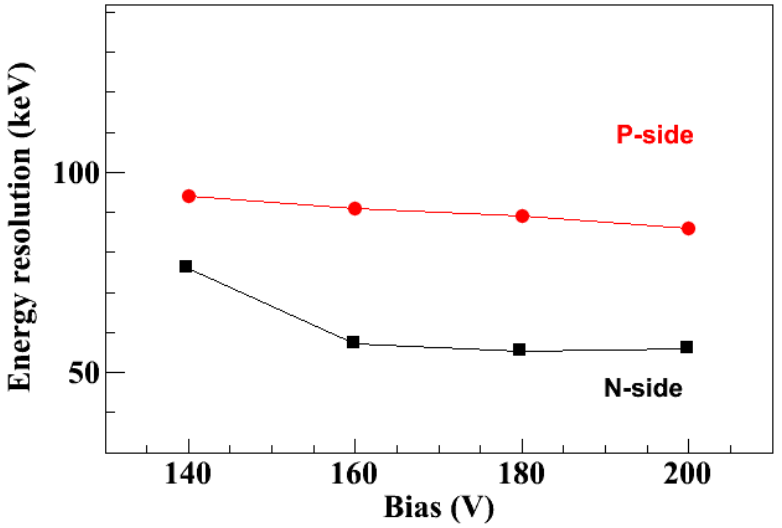
PACI test bench :

! Resolution with no filter or shaper applied.

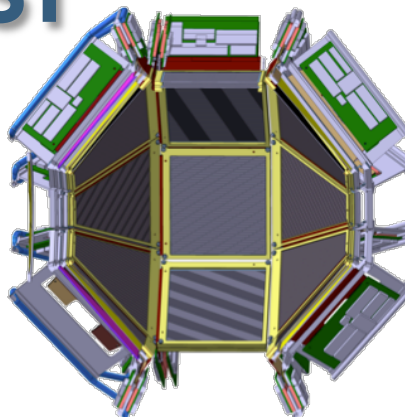


iPACI test bench

→ more or less the same behaviour.



Detectors for GASPARD / MUGAST

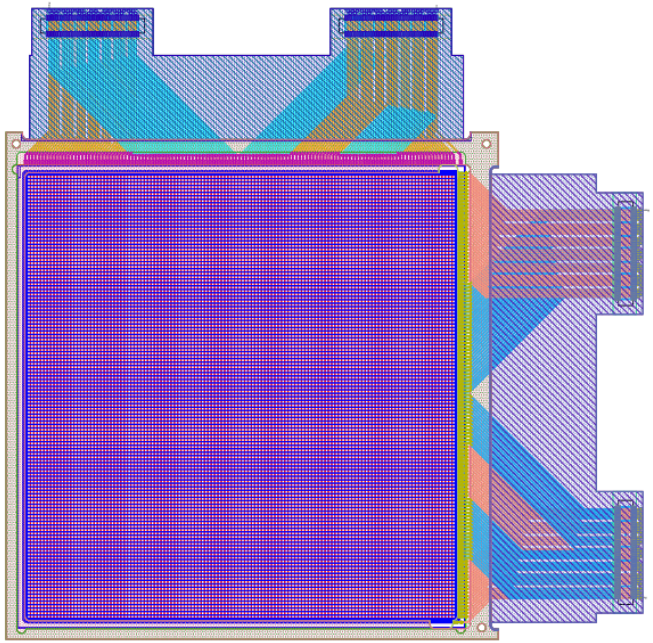


Squared DSSSD

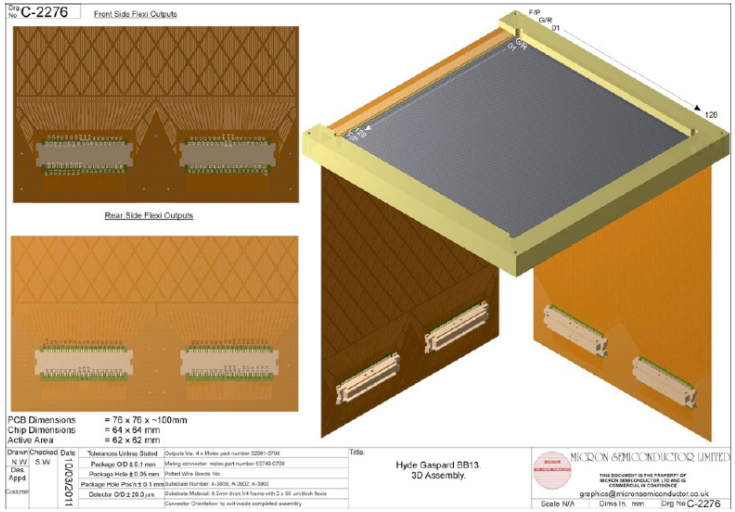
Ordered at Micron Semiconductors :

- **2 prototypes** 500um INFN (end 2014)
- **1 prototype 1.5mm** INFN (end 2014)

All prototypes : to be received soon ???



<u>Detector for tests :</u>
BB13 nTD 500um thick
"random cut", reverse mounted



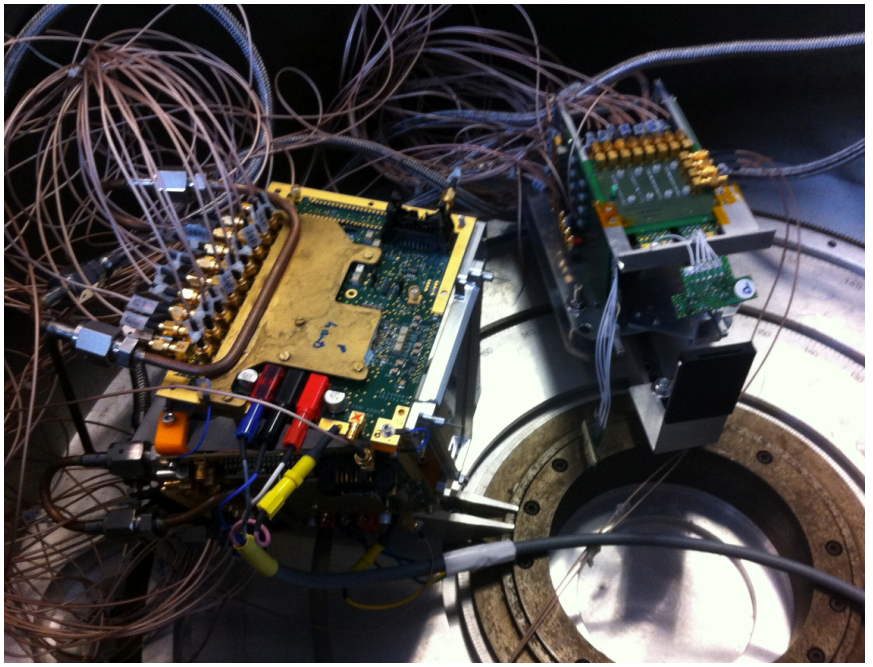
Test bench for (trapezoid) detectors

Test bench @ IPNO :
- **numerical**
  .1) PACI : 4X+4Y

  .2) iPACI: 9X+9Y

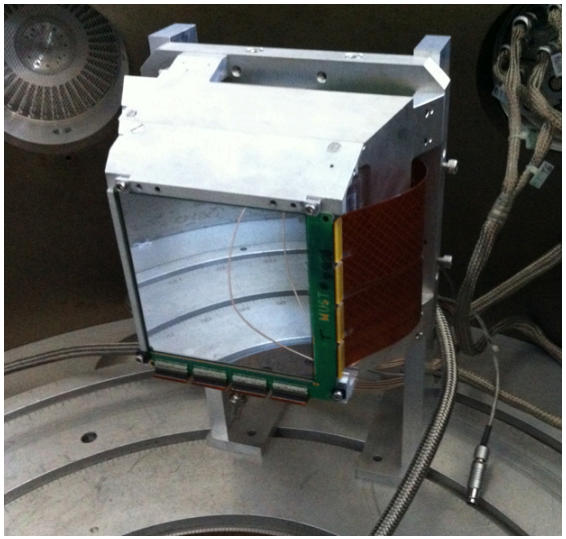
  --> to be adapted for the test of the next prototype.

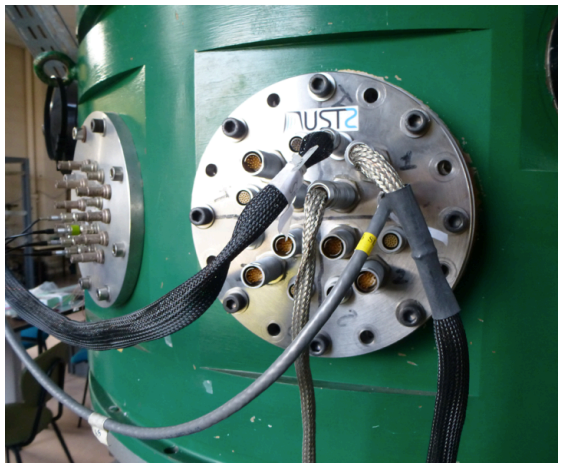
All read by **WaveCatcher** (see. D. Breton's talk)



- **analog (MUFEE) : 128X+128Y**

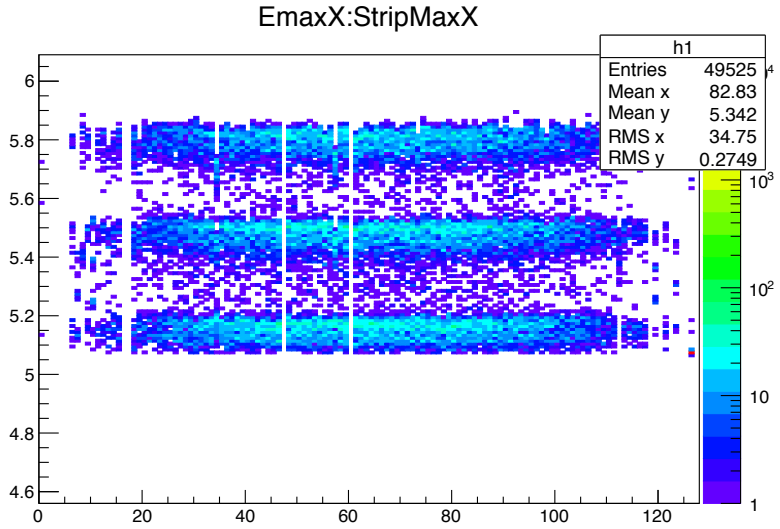
  --> possibility to read all 256 channels
  --> with short and long kaptons.

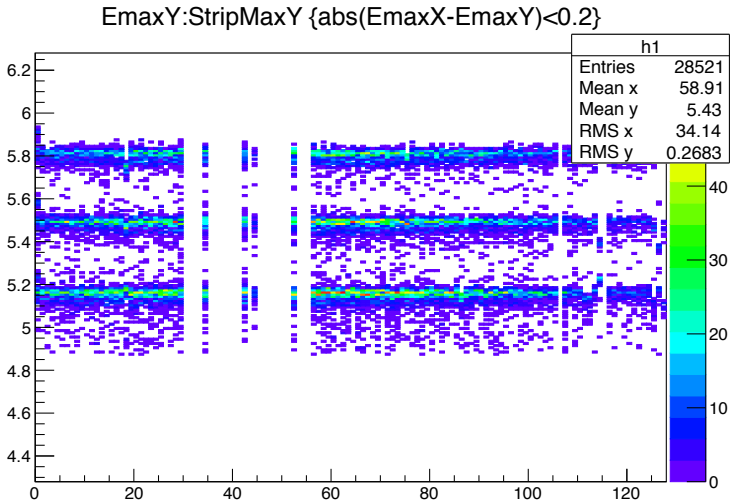


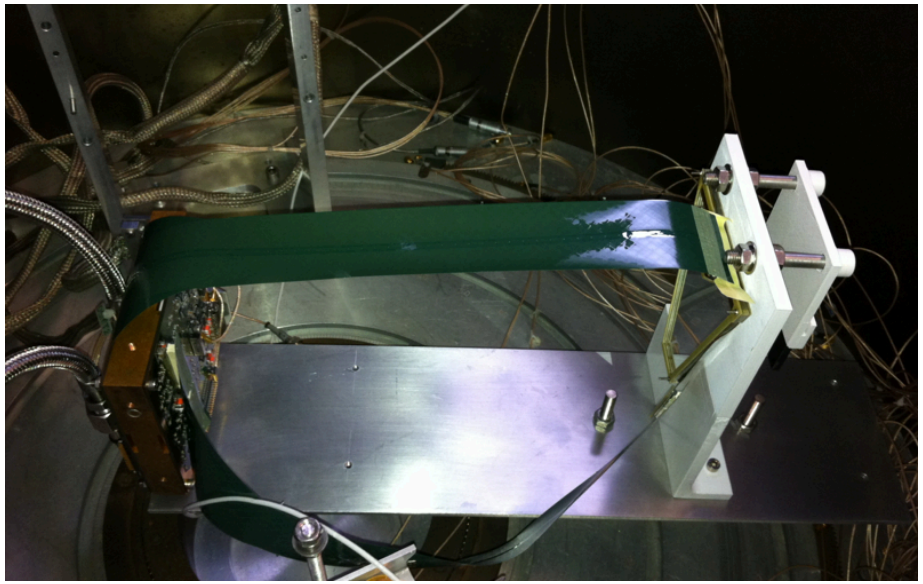


In-beam test @ ALTO in 2017 (?)

Tests for MUGAST



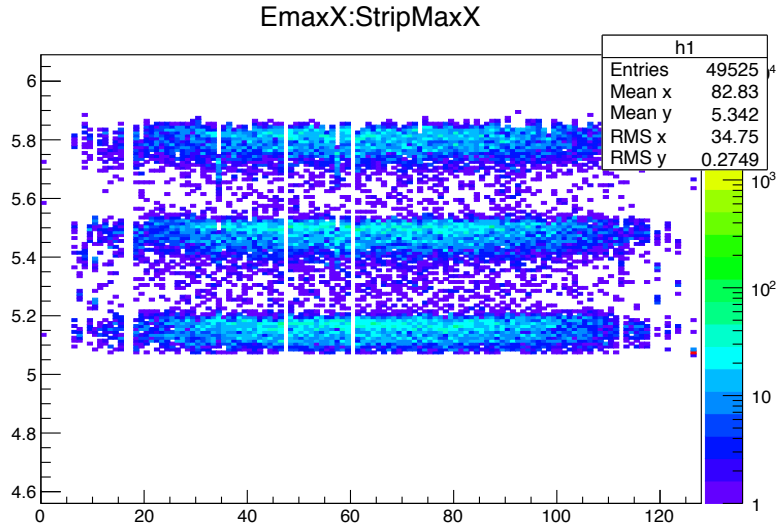


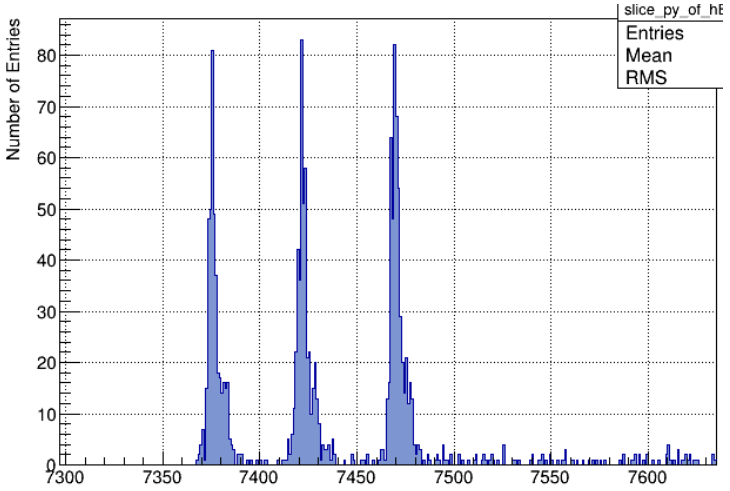


Detector more noisy than MUST2

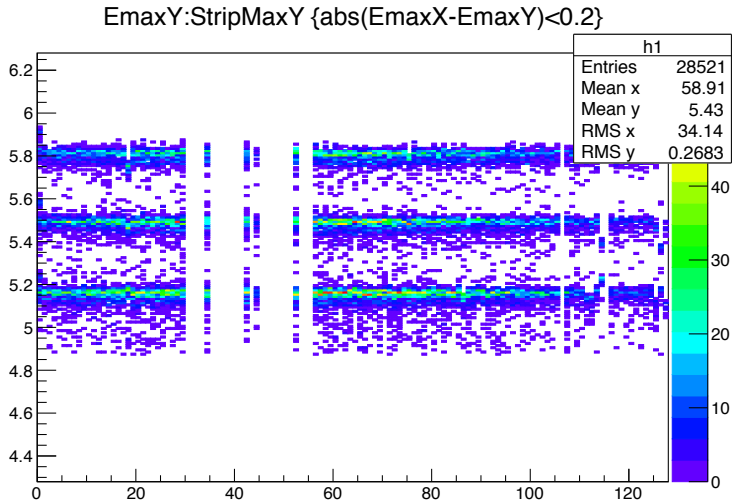
Long or short kaptons :
basically no difference for the 2 lengths

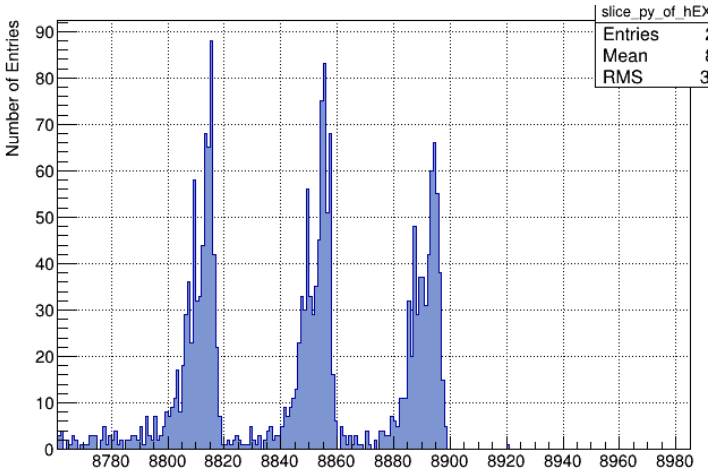
Tests for MUGAST





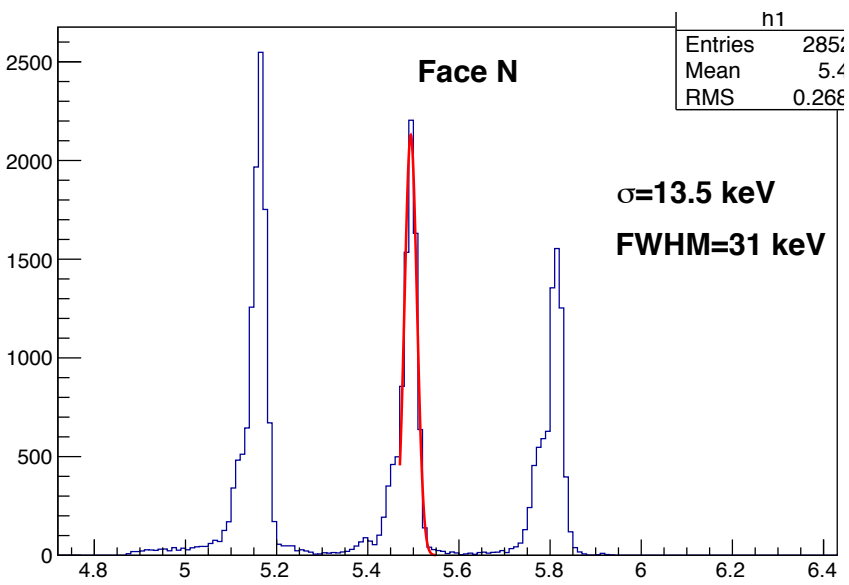
<-- Energy

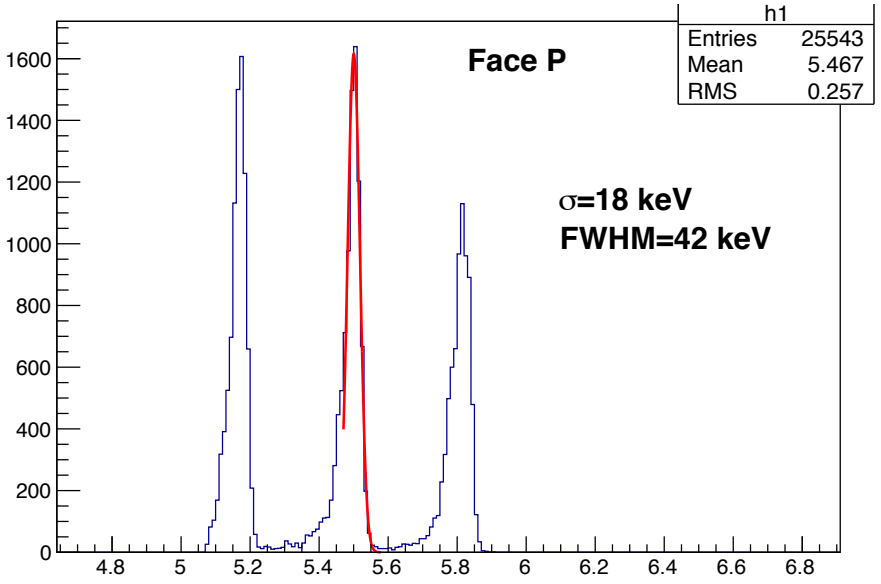




Energy -->

Test MUGAST : energy resolution

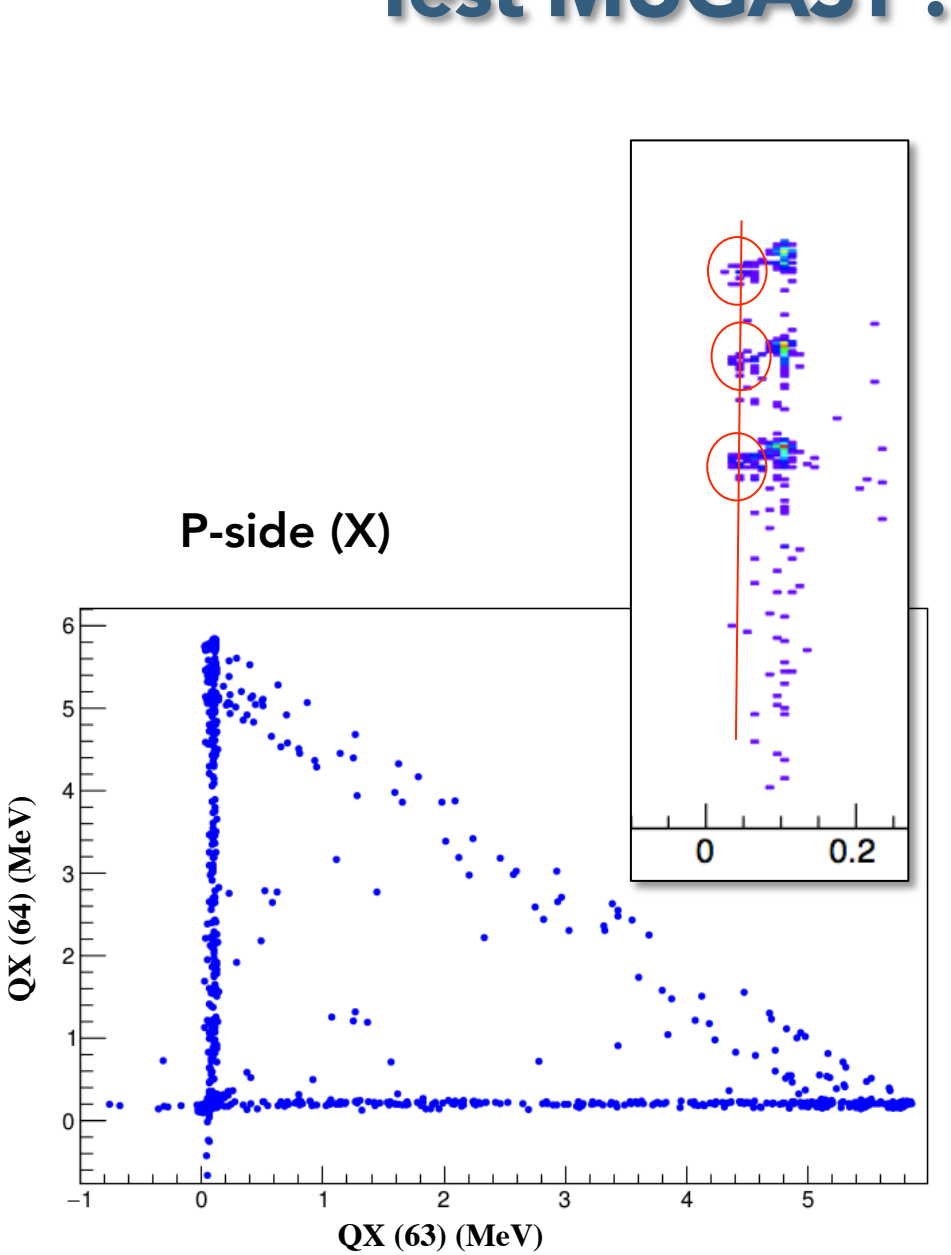


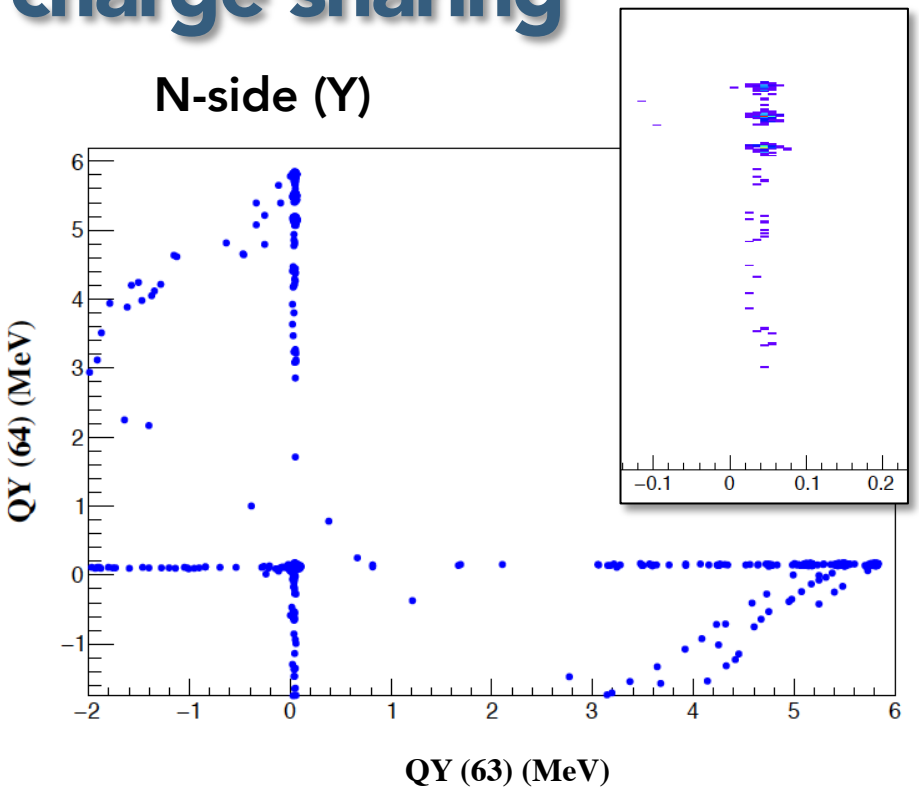


Sum of all strips (N or P side)

Conditions applied :
- same energy on both side within 200 keV
- multiplicity =1

Test MUGAST : charge sharing

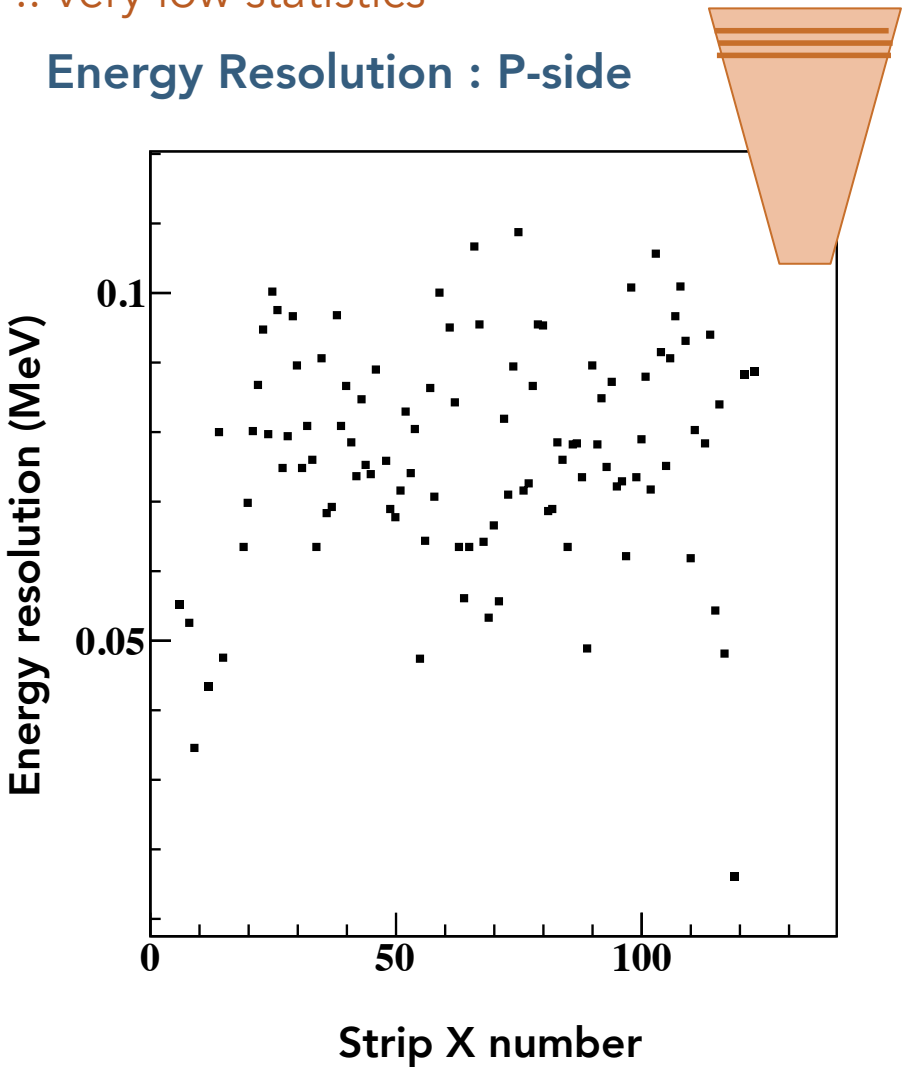




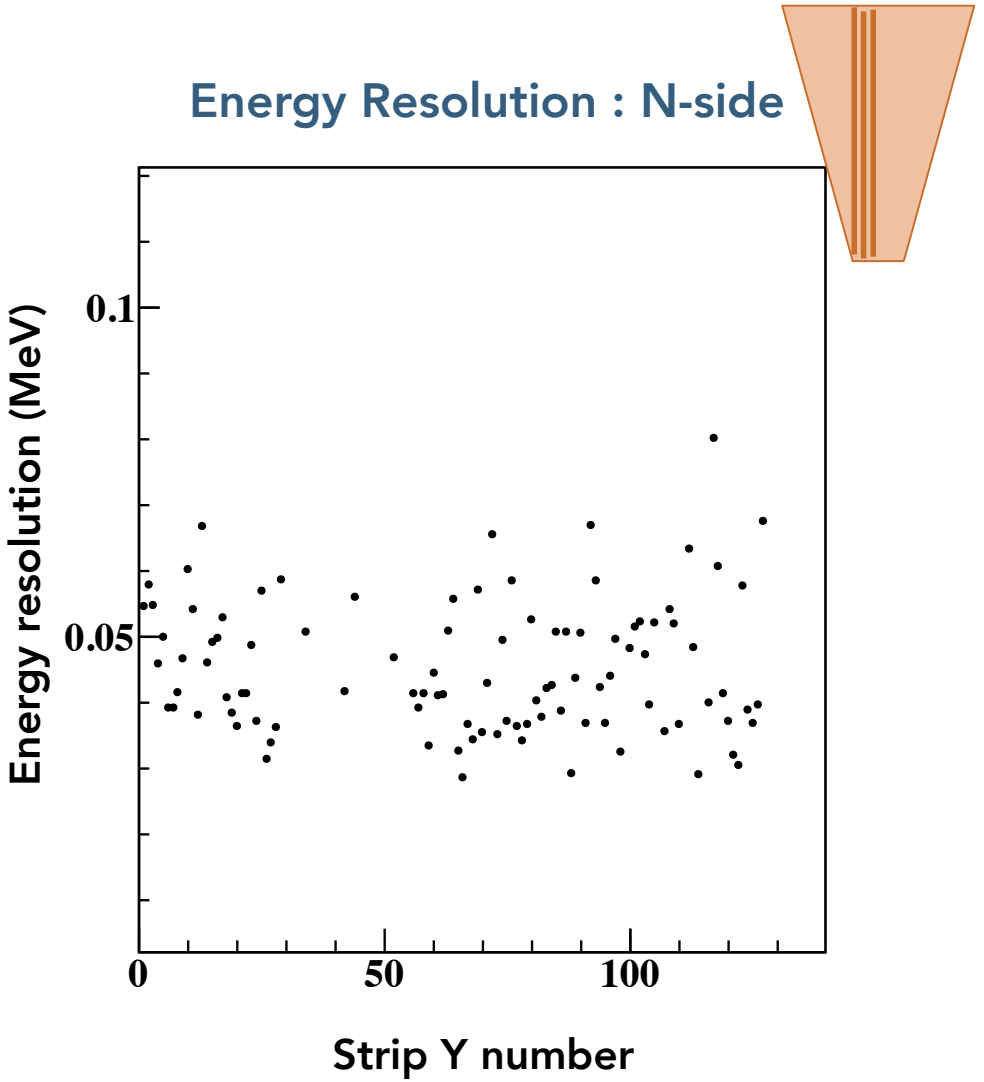
Test MUGAST : resolution of the strips

!! very low statistics

Energy Resolution : P-side



Energy Resolution : N-side



Perspectives

- Study of the energy resolution as a function of the strip with more statistics
- Test of the second prototype with the iPACI test bench (18 channels)
- Test of the square detectors @ INFN ?