GRAN SASSO SCIENCE INSTITUTE
CENTER FOR ADVANCED STUDIES INFN

CYGNO Experiment

MANGO Update: Thick or Thin

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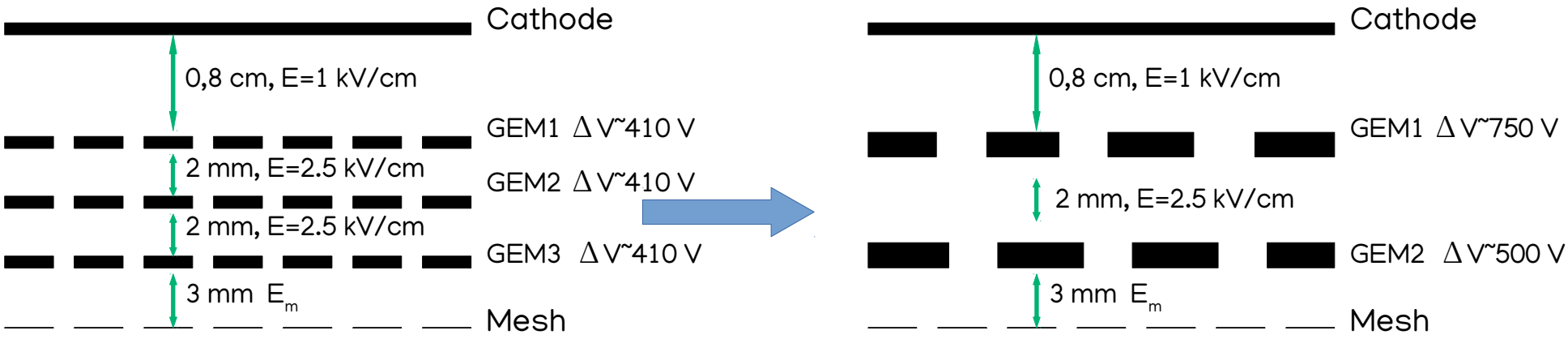
New Setup

- Since March 2nd the three thin GEMs (50 µm) have been replace by two thicker GEMs (125 µm)

- The DAQ has been set up at LNGS as in Frascati, with a trigger system and digitizer



Data Taking

- We looked for the working point of this configuration moving GEM voltages until we could see signal on the camera with a certain stability

Mixture	GEM1 (V)	GEM2 (V)
60/40 (premixed)	770	500
70/30	700	500
80/20	630	440

- The trigger was set with a coincidence of the camera taking a picture and the PMT signal over threshold

- The PMT threshold was defined so that when looking at the signals of the GEM and PMT on the oscilloscope, over 80% of the times PMT and GEM signal were in coincidence

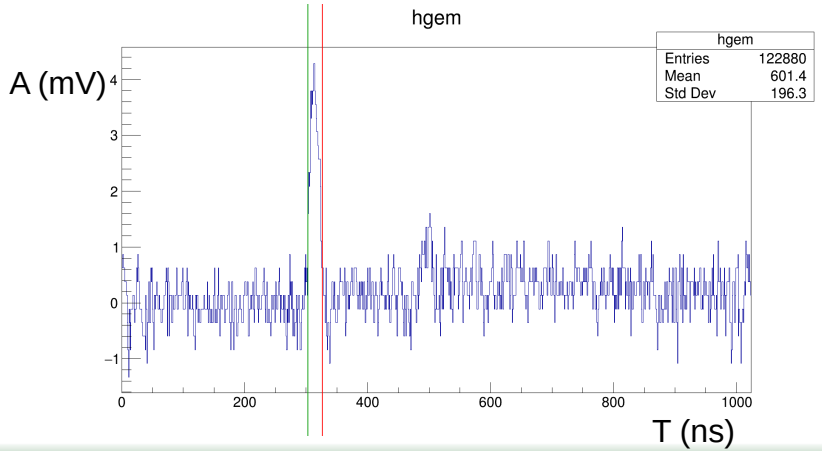
Data Analysis

- I had problems at reconstructing with the official code, so Davide lent his code to have a faster preliminary analysis

- We always used iron source so only round spots in the centre of the camera had to be reconstructed

- I ran some small sample tests also with the reco code and Davide's code seems to consistently underestimate the integral when the spots are small (to be kept in mind)

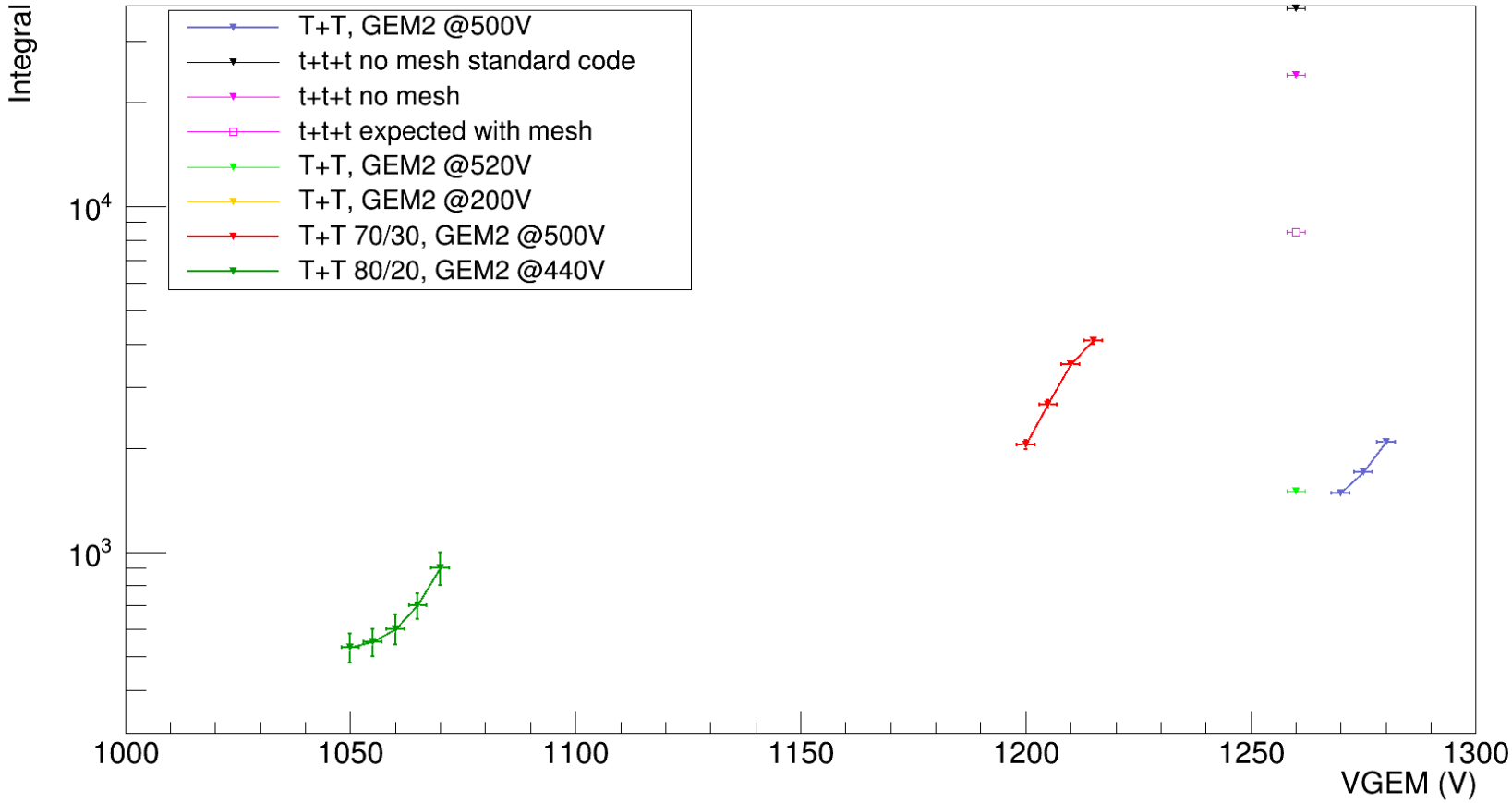
- For the waveforms a simple code looking for signal over the baseline was used



GAIN SCAN

Gain Scan

- To compare with the 3 thin config a couple of known runs were used



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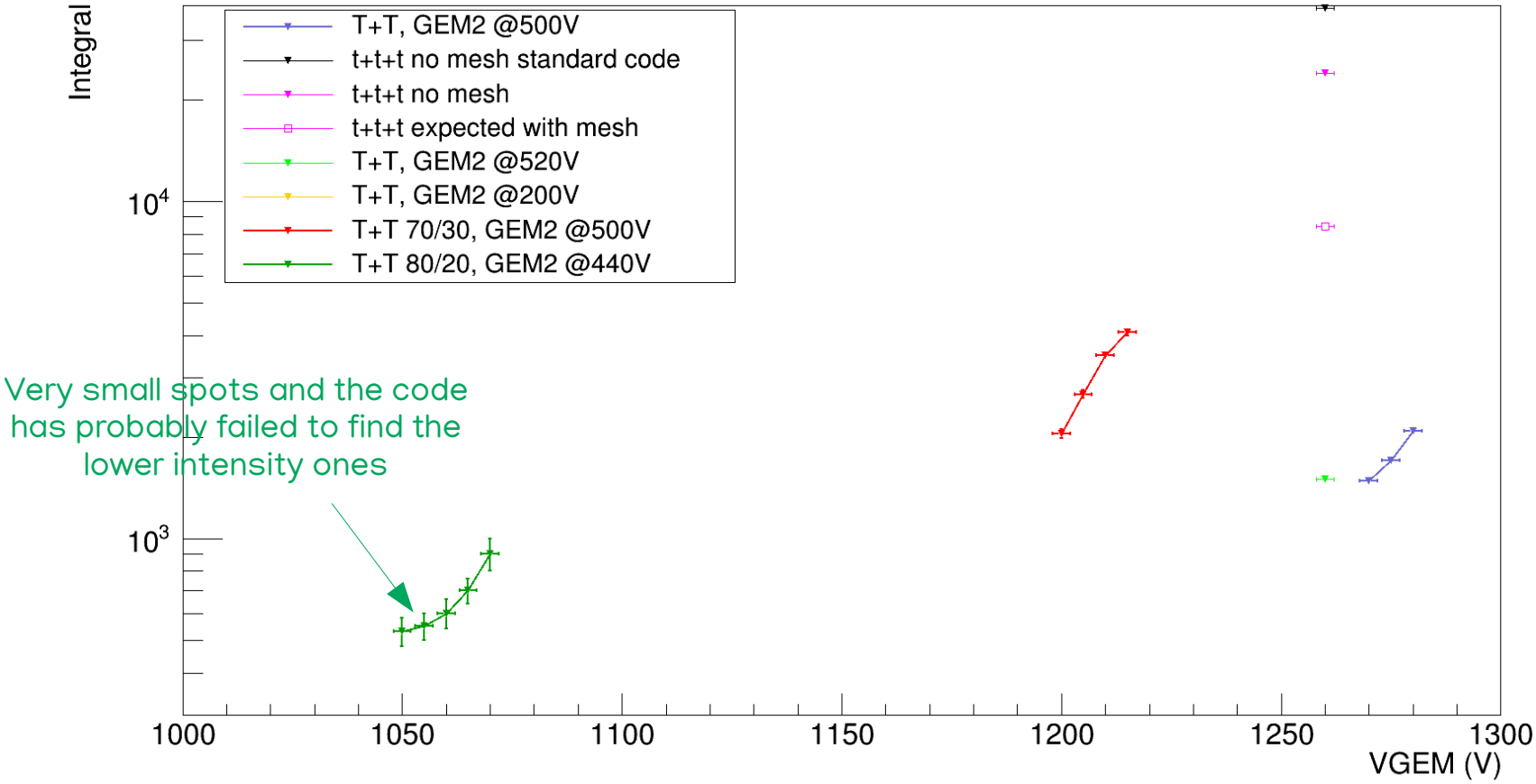

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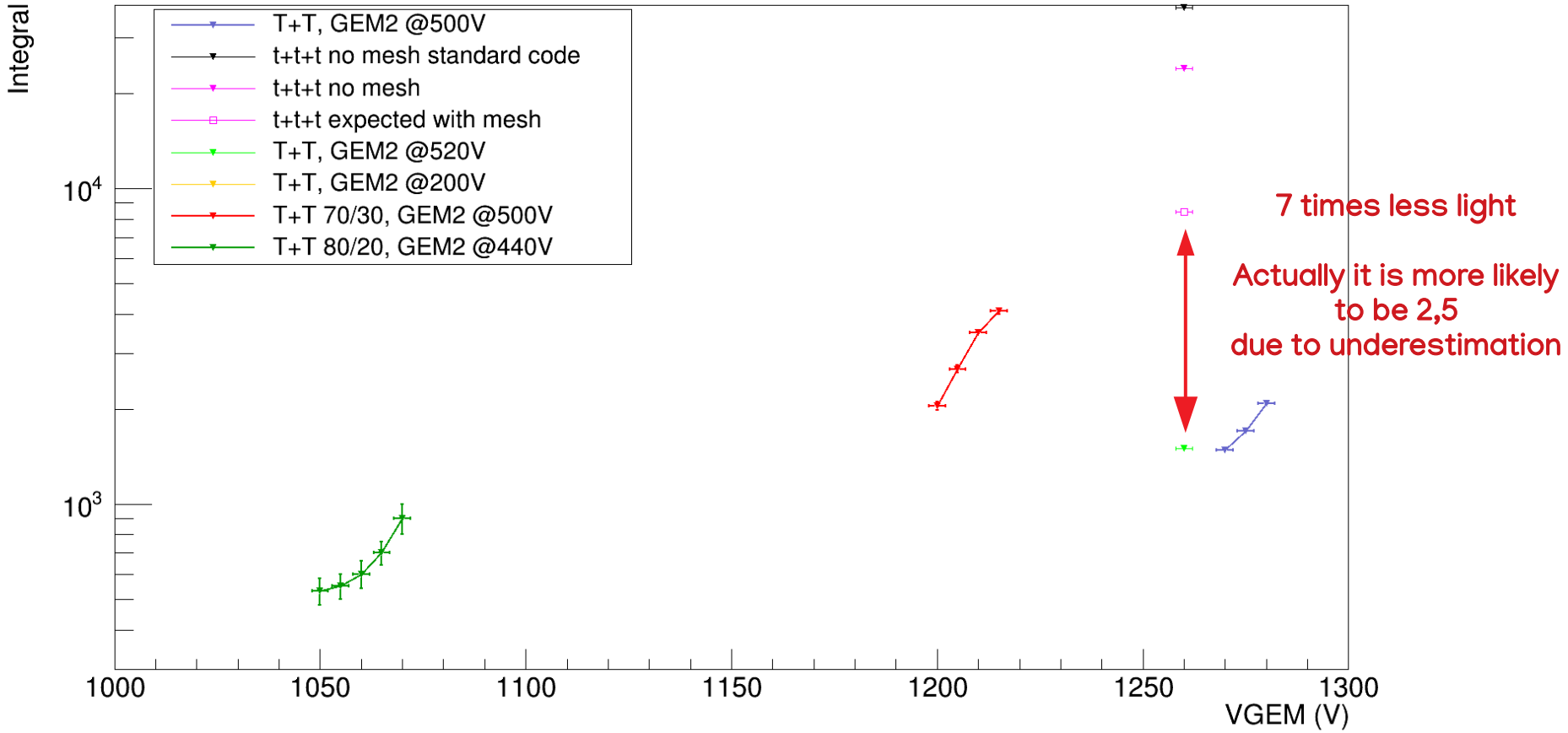
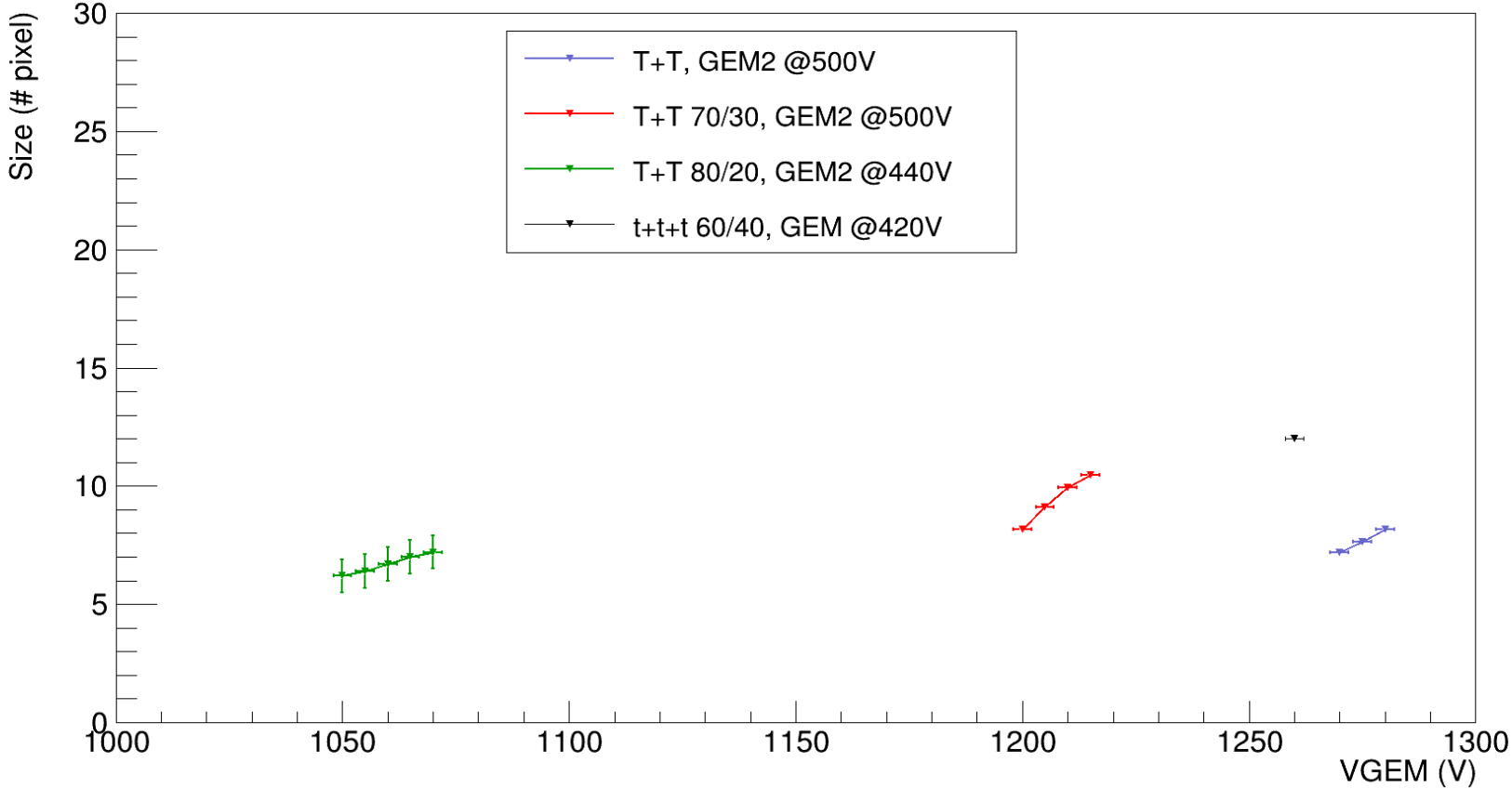


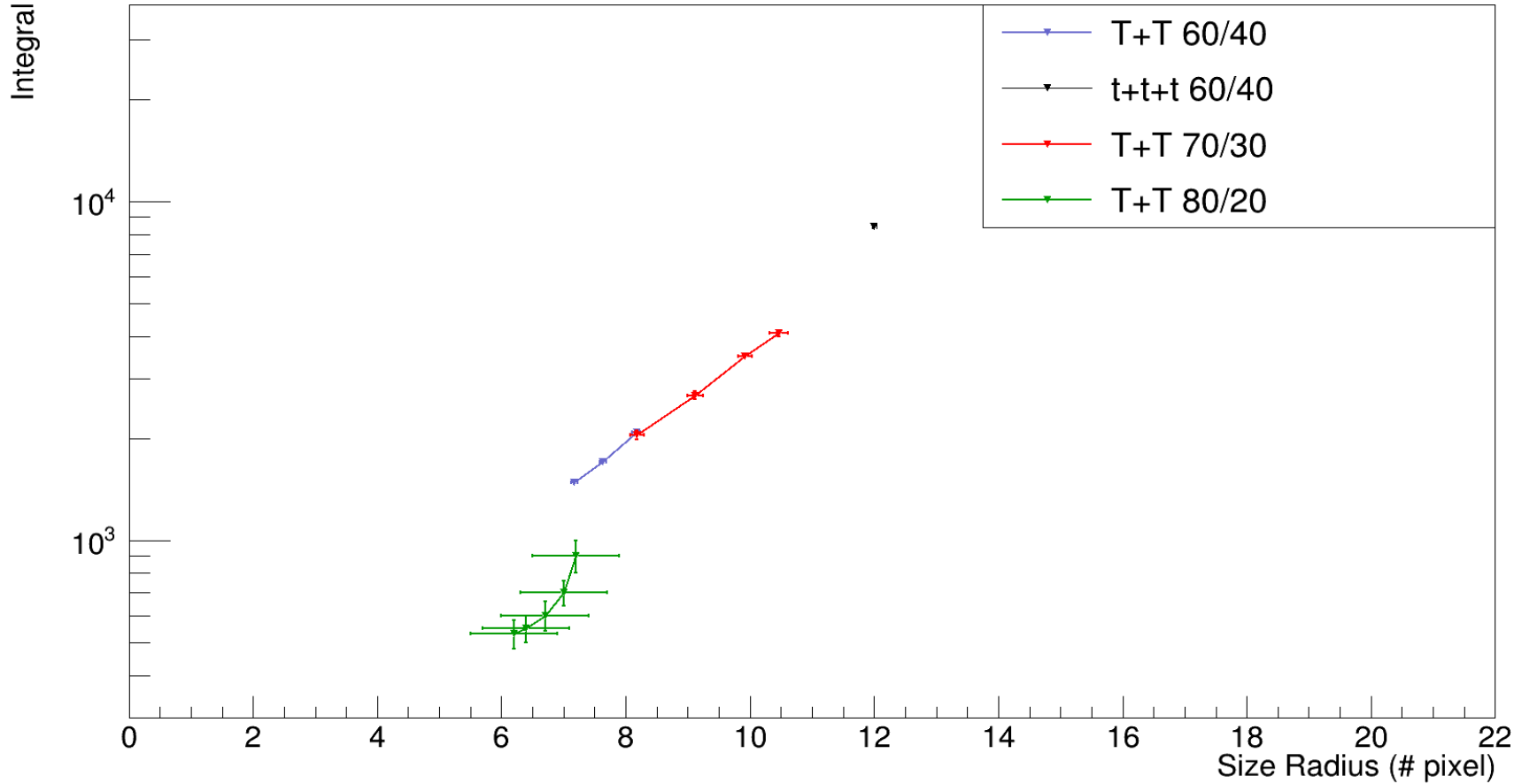
Size

- Size of the spots measured using the number of pixels of the cluster (assuming spots are circles and calcuting the size as its radius)



Size

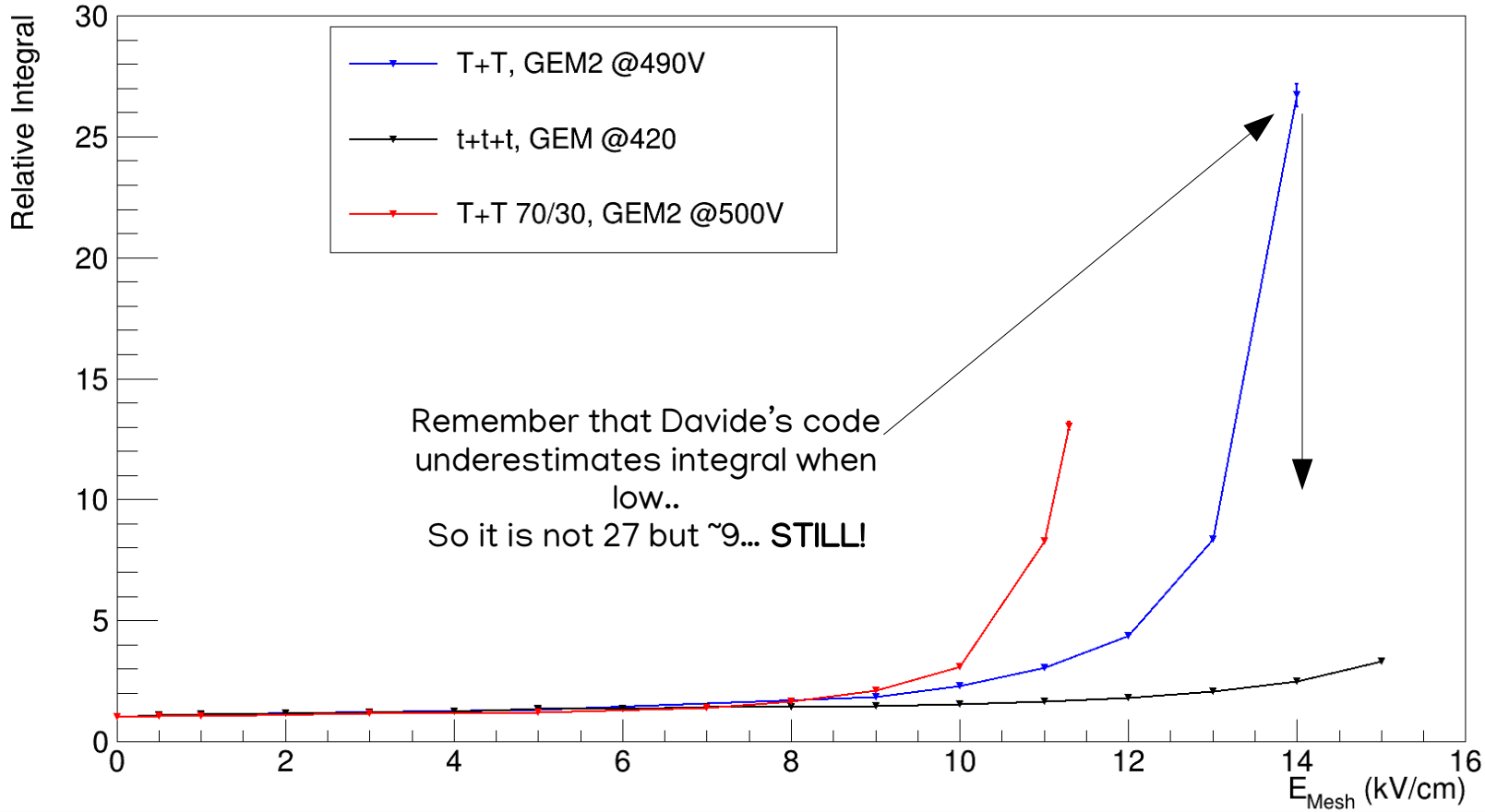
- Are we gaining more in light or spot dimension?



EL

Light from the camera

- Looking at the different gas mixtures (80/20 not done)



Light from the camera

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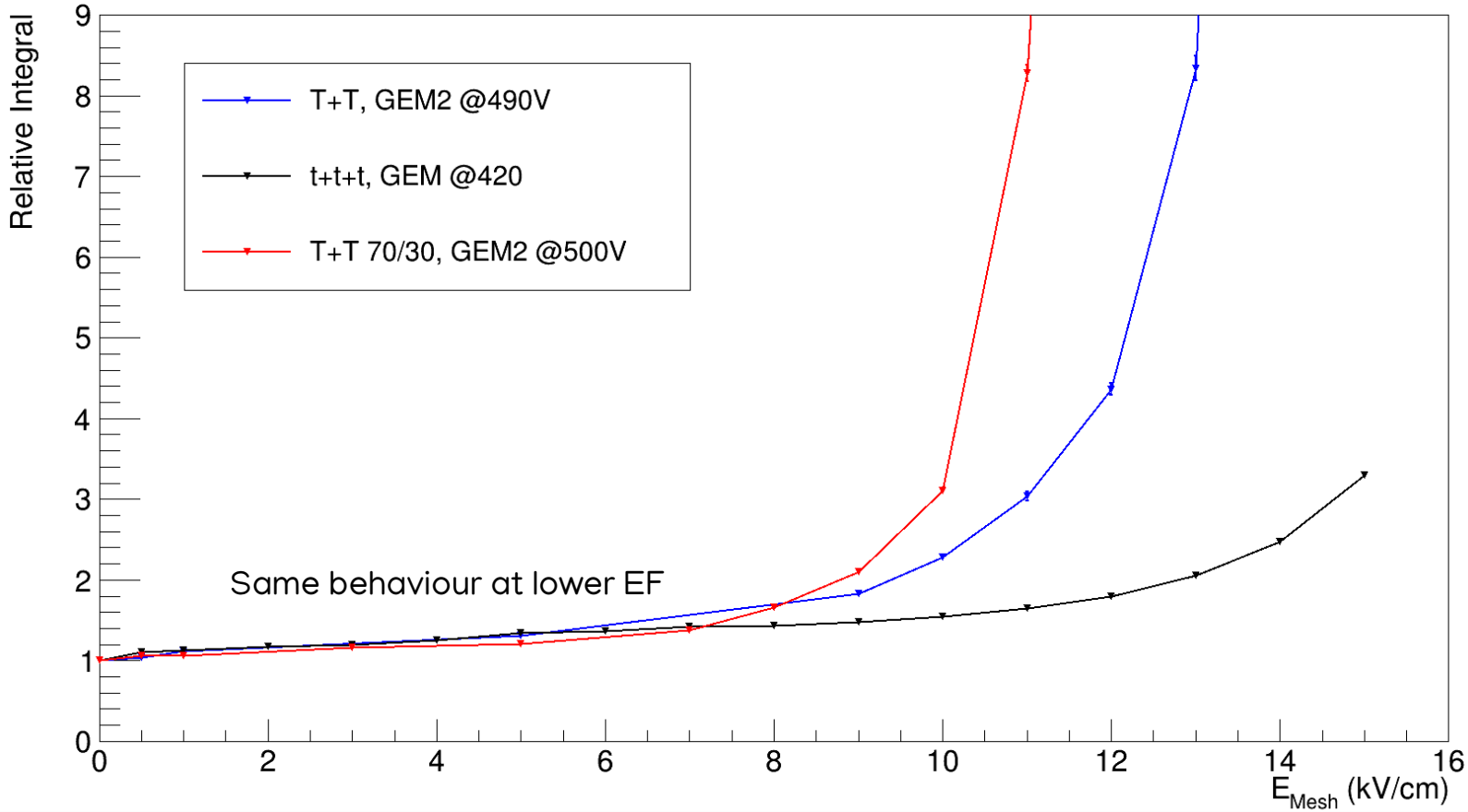
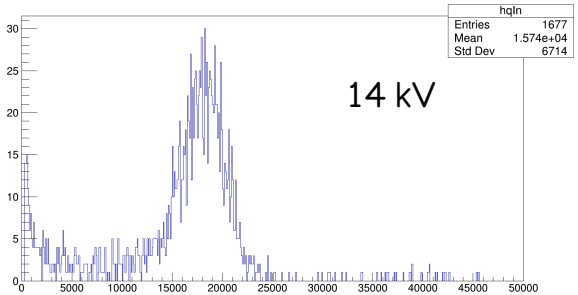
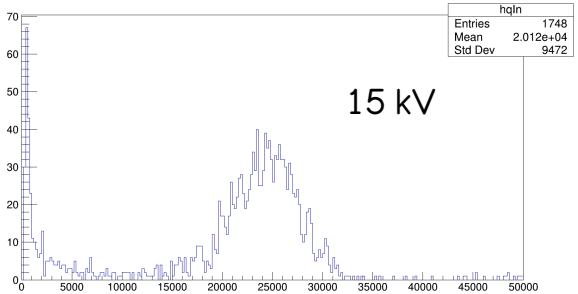


Light from the camera

- Looking at the signal distribution at the highest electric fields the thick ones seem to behave differently

t + t + t (60/40)





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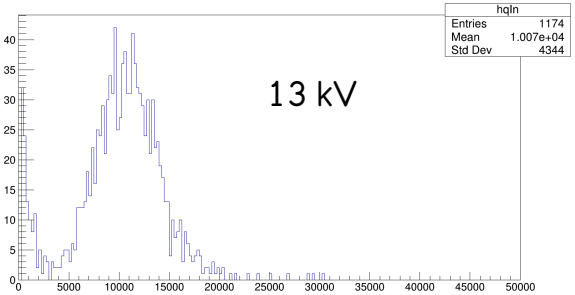
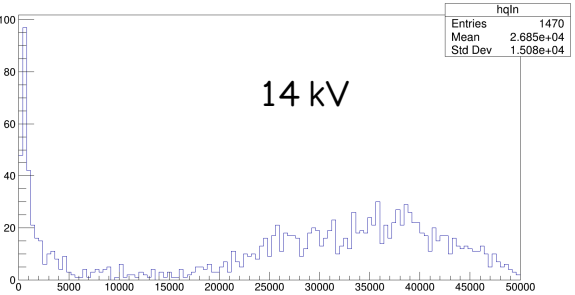
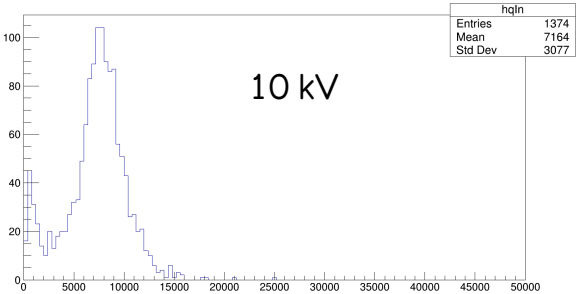
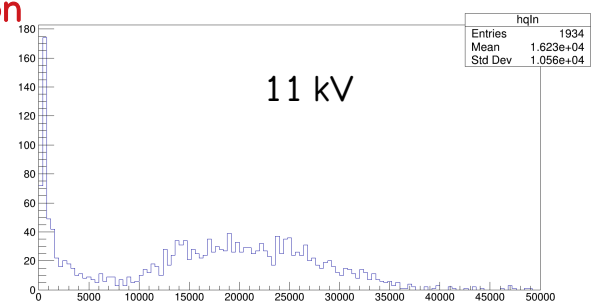




T + T (70/30)

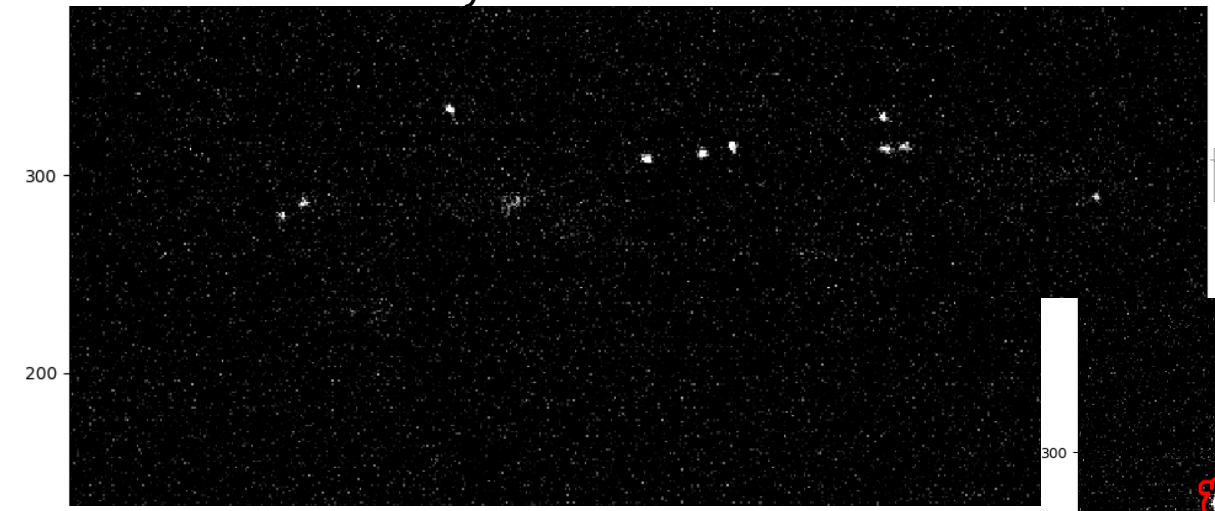


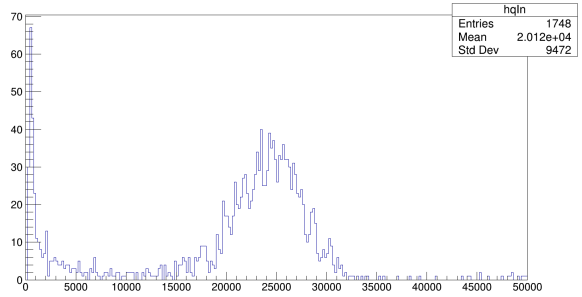
Strong degradation of resolution

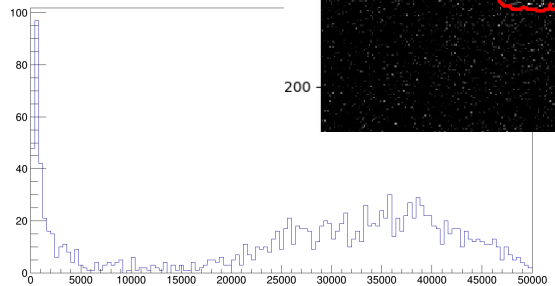


Light from the camera

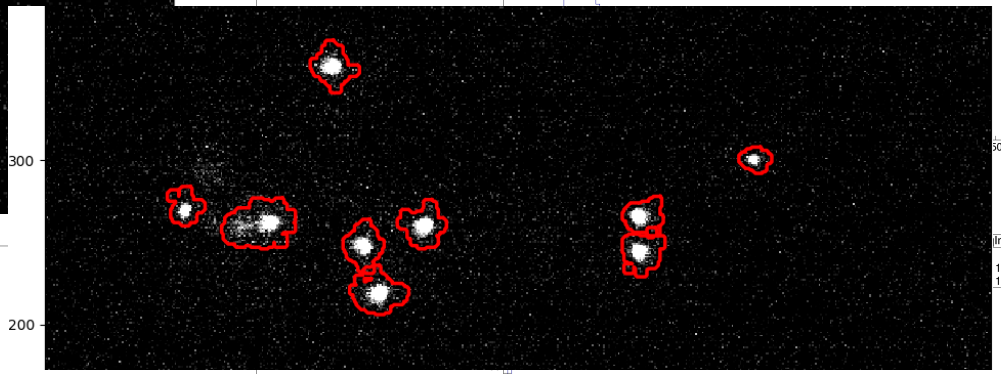
- Looking at the signal distribution at the highest electric fields the thick ones seem to behave differently





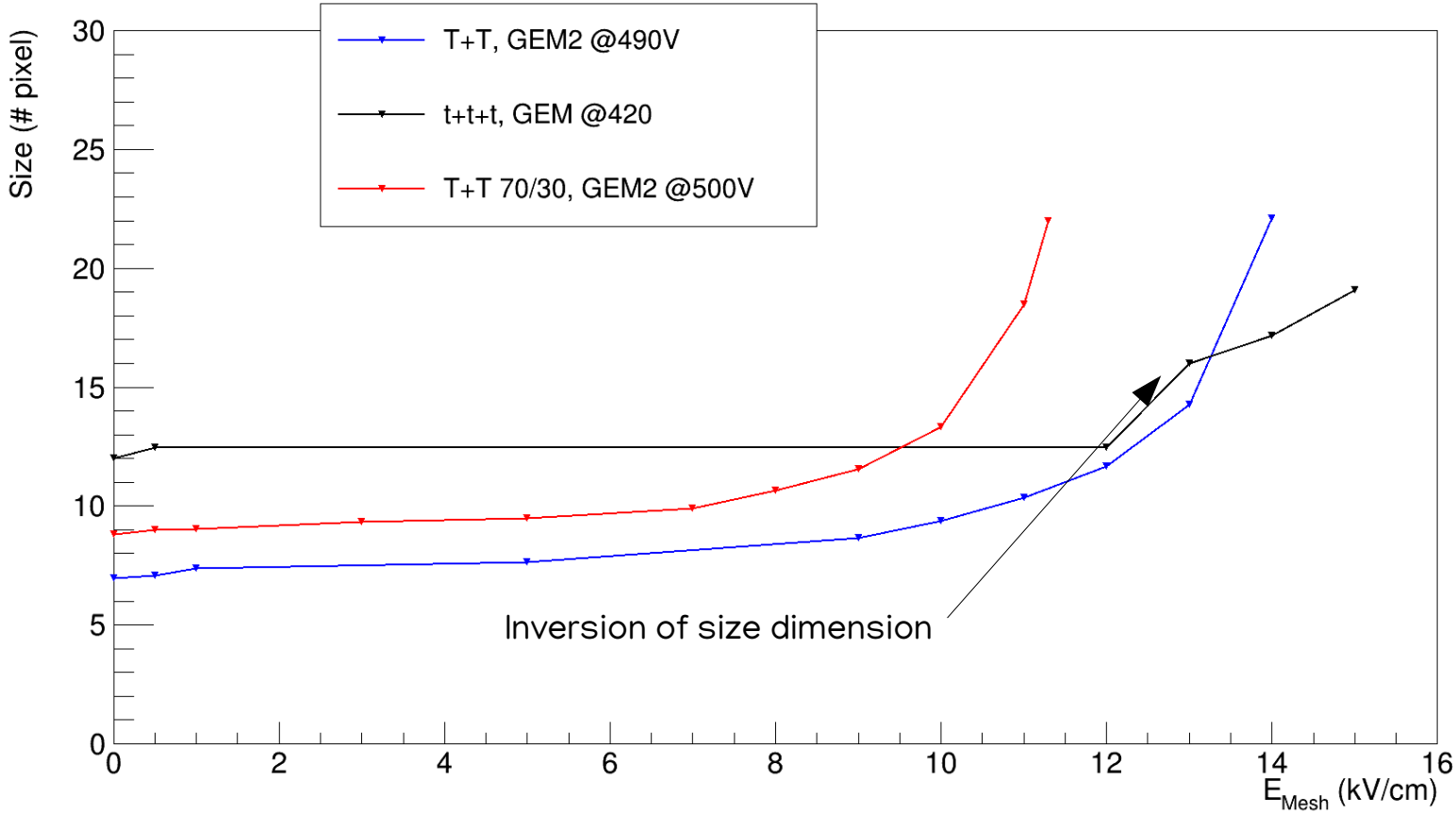


T + T (70/30)



Size

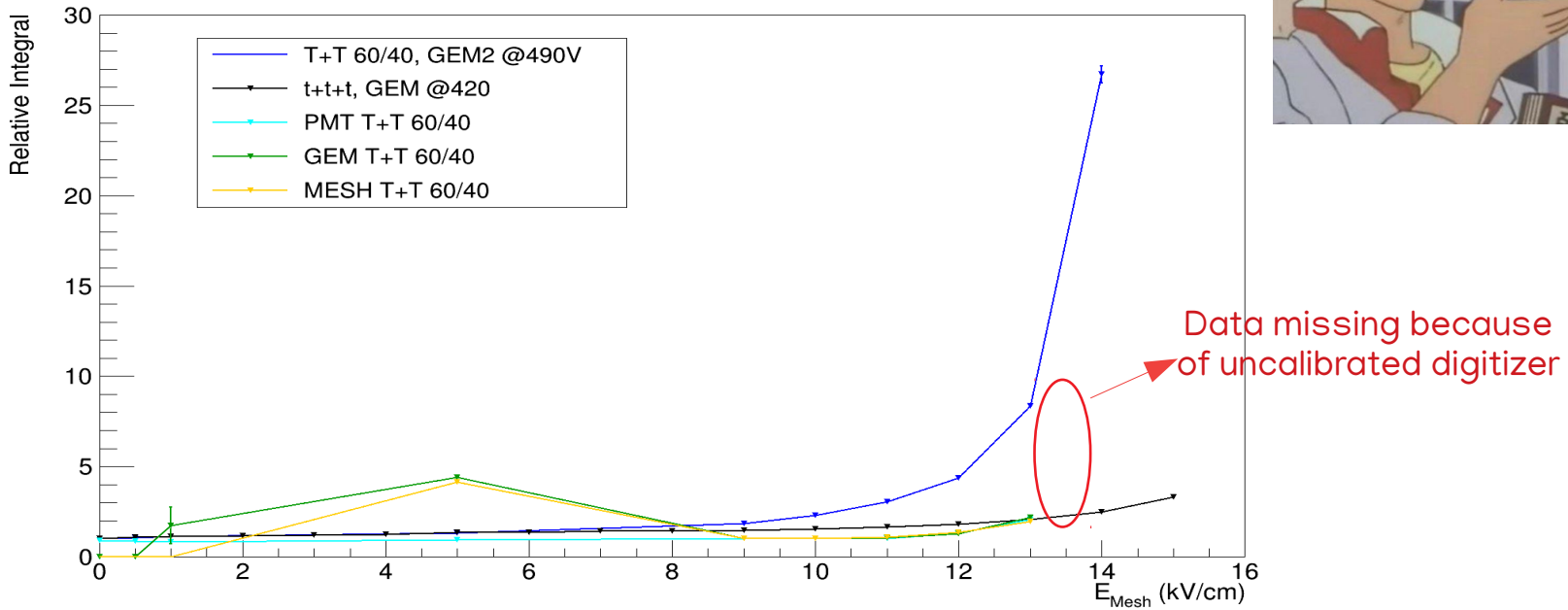
- Looking at the size



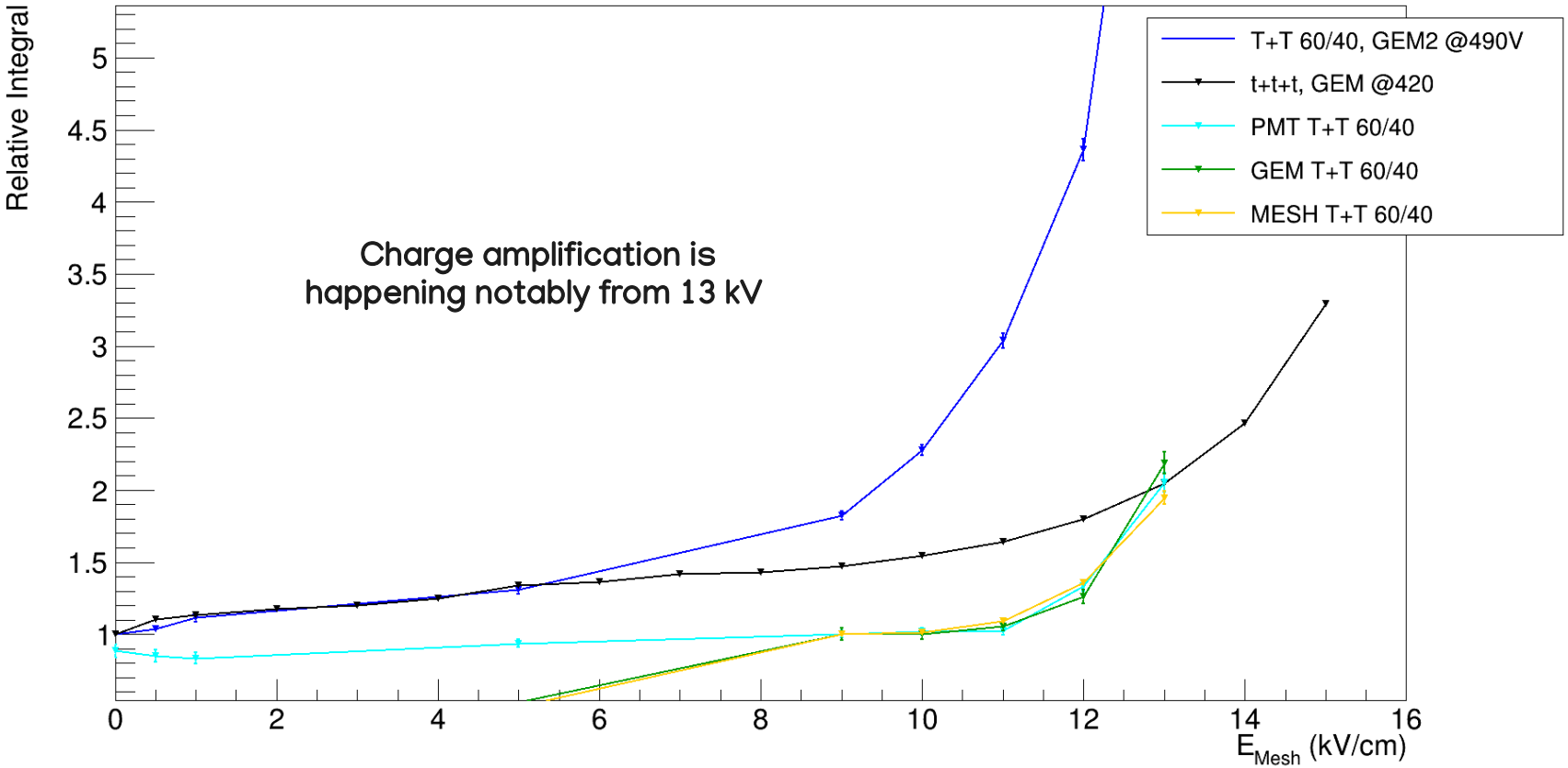
EL 60/40

- The analysis of the charge was harder at low E_{mesh} because the signals were very small (Lower EF in the holes, dimensions of the hole)

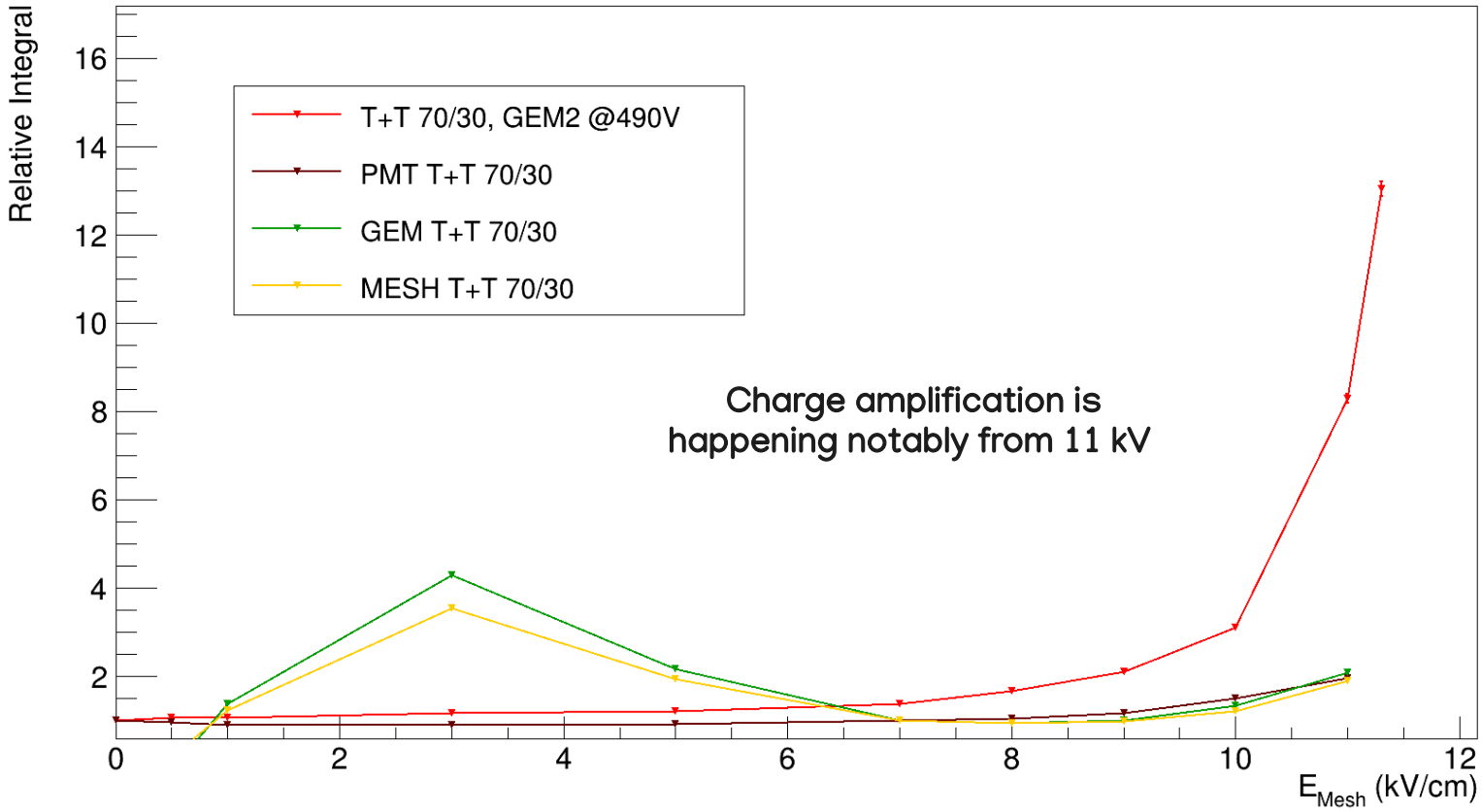
- Beware that PMT data may not be very reliable as we forgot some tape on it



EL 60/40


Relative Integral
5
4.5
4
3.5
3
2.5
2
1.5
1
0
2
4
6
8
10
12
14
16
E_Mesh (kV/cm)
Charge amplification is
happening notably from 13 kV
T+T 60/40, GEM2 @490V
t+t+t, GEM @420
PMT T+T 60/40
GEM T+T 60/40
MESH T+T 60/40

EL 70/30


Relative Integral
16
14
12
10
8
6
4
2
0
2
4
6
8
10
12
E_Mesh (kV/cm)
T+T 70/30, GEM2 @490V
PMT T+T 70/30
GEM T+T 70/30
MESH T+T 70/30
Charge amplification is
happening notably from 11 kV

Conclusions and Next

- Data taken in stable conditions of gas and DAQ with two thick GEMs

- It looks like the iron spots are fainter but smaller

- EL seems still present for 60/40 with more intense light production

NEXT

- Using regular code to better assess light yield and spot dimension