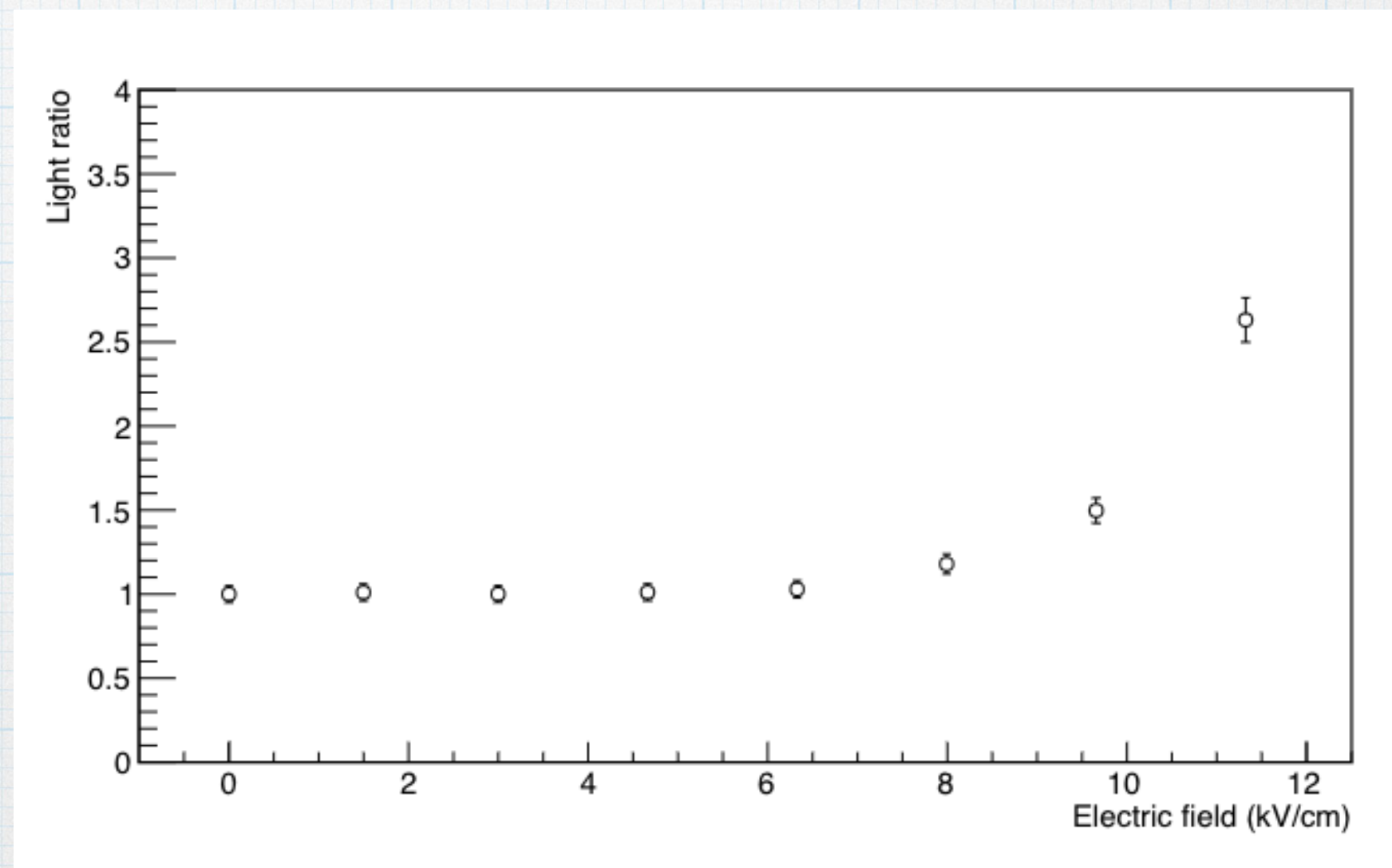
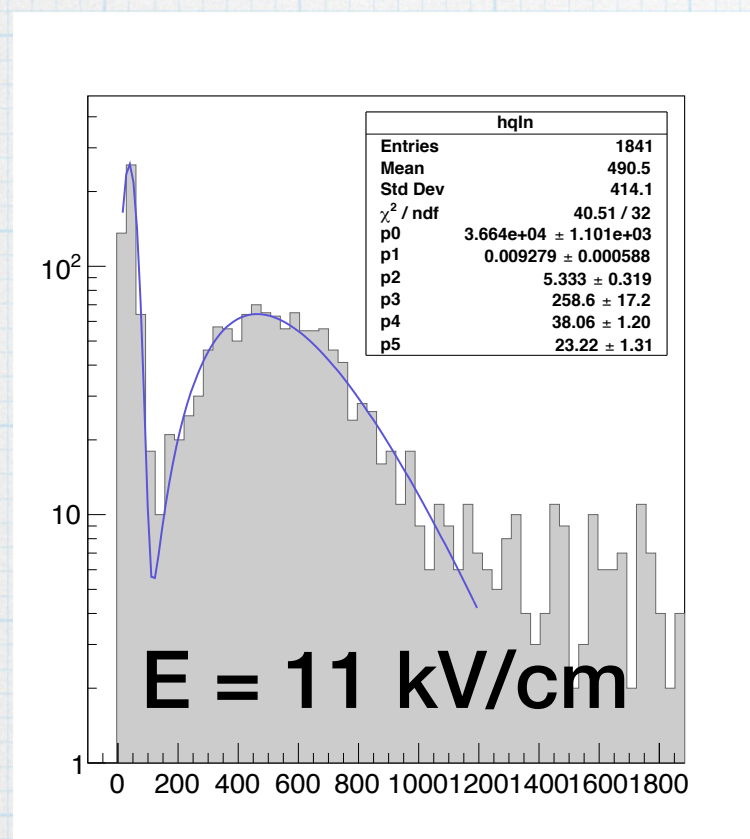


y d pink floyd p

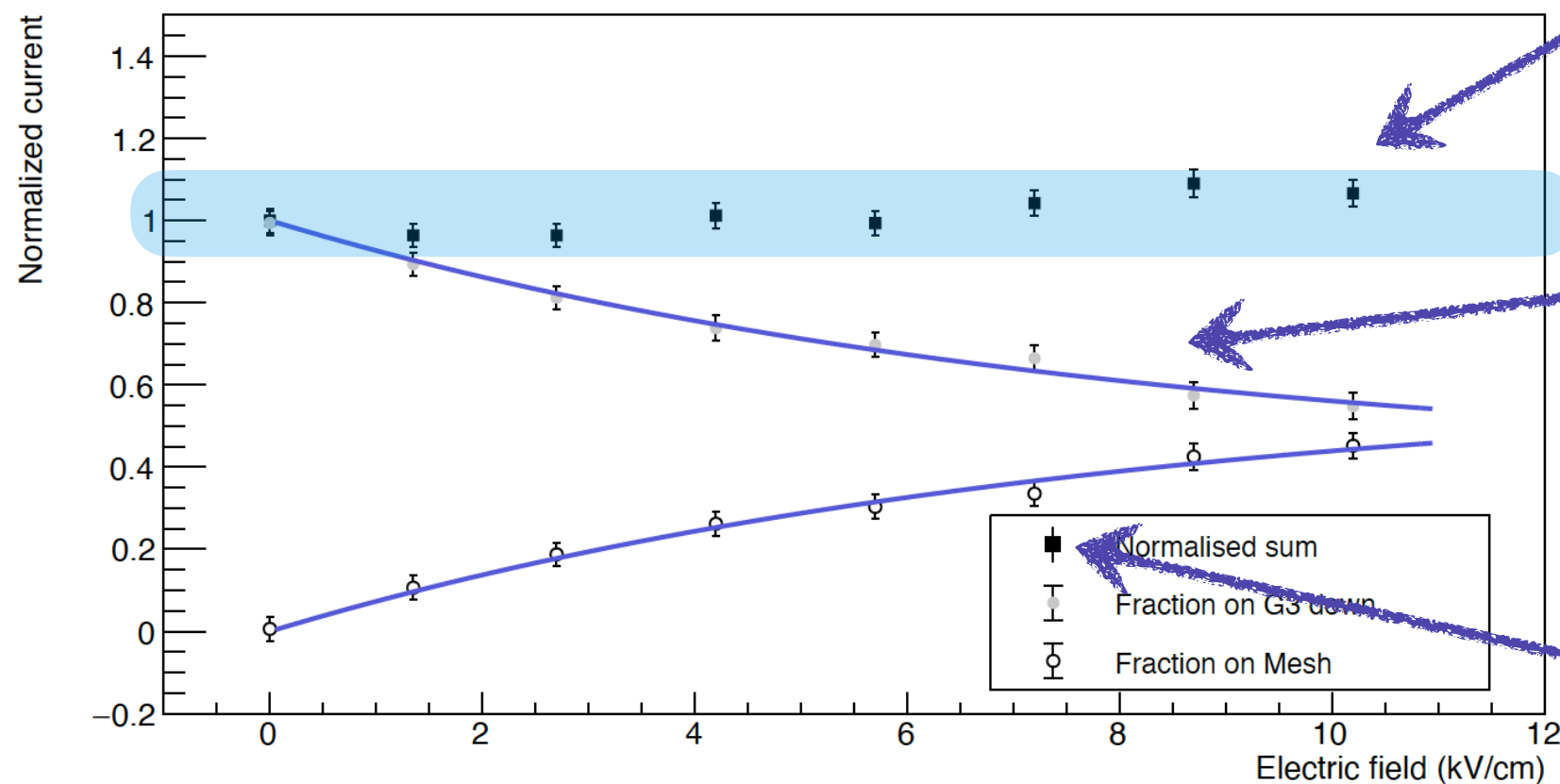
LET THERE BE
MORE LIGHT



Short exposure data (100 x 0.5 sec) to study in detail the ^{55}Fe peak position;



The currents drawn by the bottom electrode of last GEM and by the mesh were monitored, to check possible increase in total charge, indicating a multiplication process

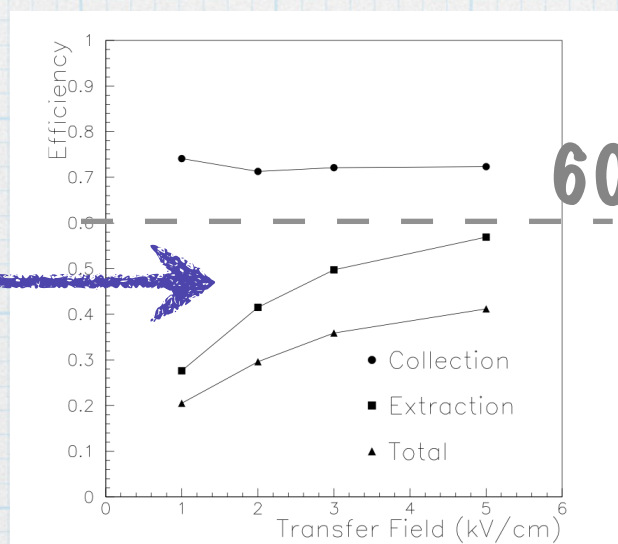


Sum of currents

Fraction of current on G3 down

Fraction of current on Mesh (at max 60%)

Garfield simu

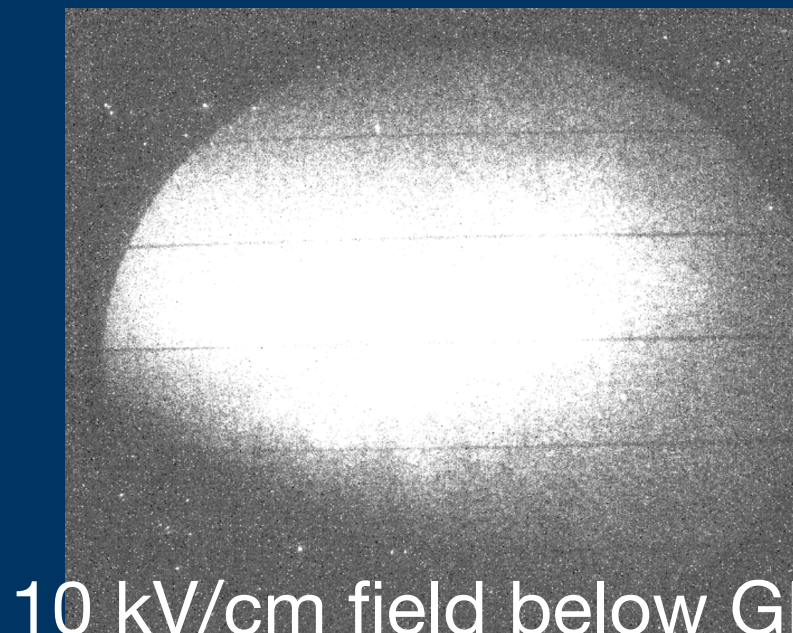


60%

Sum is constant and sharing changes

New test at LNF (2)

- In LEMON we are trying to study in more details luminescence phenomena induced by electrons below the last GEM as a part of more general studies about gain saturation and possible solutions;
- A mesh is being used to accelerate them;
- The mesh screens more than 55% of light, spoils image reconstruction and triggers sparks;
- ITO would be a solution;



Light increase is very well visible and now we are trying to understand if electric field is also inducing some charge gain;

New Measurements

We started to use LEMON with a mesh 3 mm away from the GEM#3;

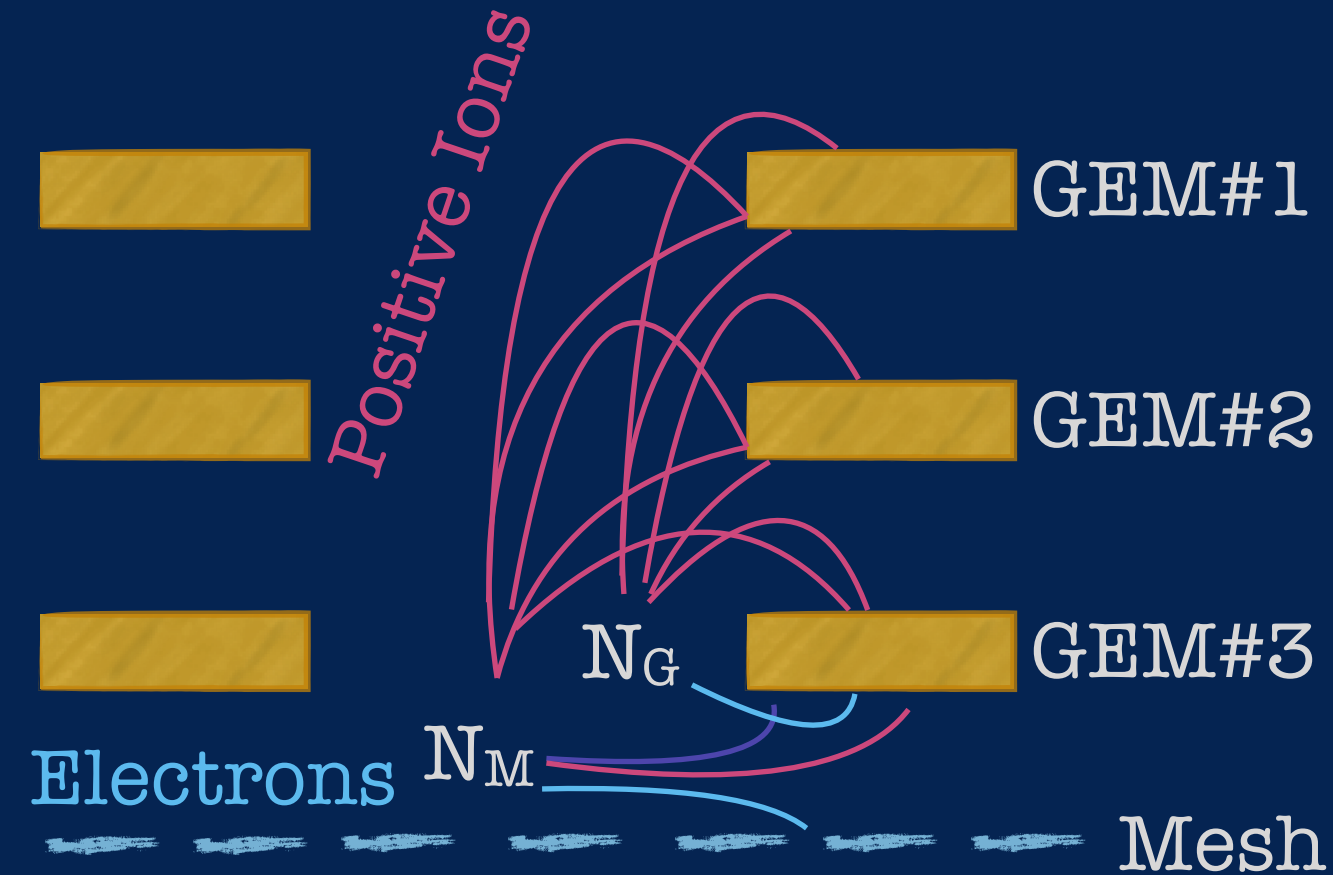
CAEN-HVGEM (A1515TG), allows to acquire the current provided to each channel;

G3D is connected to ground through a 10 M Ω resistor;

The current drawn by G3D is also acquired by reading the ΔV across the resistor;

The current drawn by the Mesh is acquired by reading the ΔV across a 10 M Ω resistor;

Simple model



In general, we expect $\Sigma_{tot} = 0$
and in particular $I_M + I_{3D} = -(I_{3U} + I_{21})$

Let's assume all charge is produced in GEM#3 (N_G) and, in case, in the gap above the Mesh (N_M);

ϵ = electron extraction efficiency from GEM#3;

α = fraction of ions reaching GEM #1 and #2;

β = fraction of ions collected on GEM #3;

$$I_{3D} = -(1 - \epsilon) \times N_G + \beta N_M$$

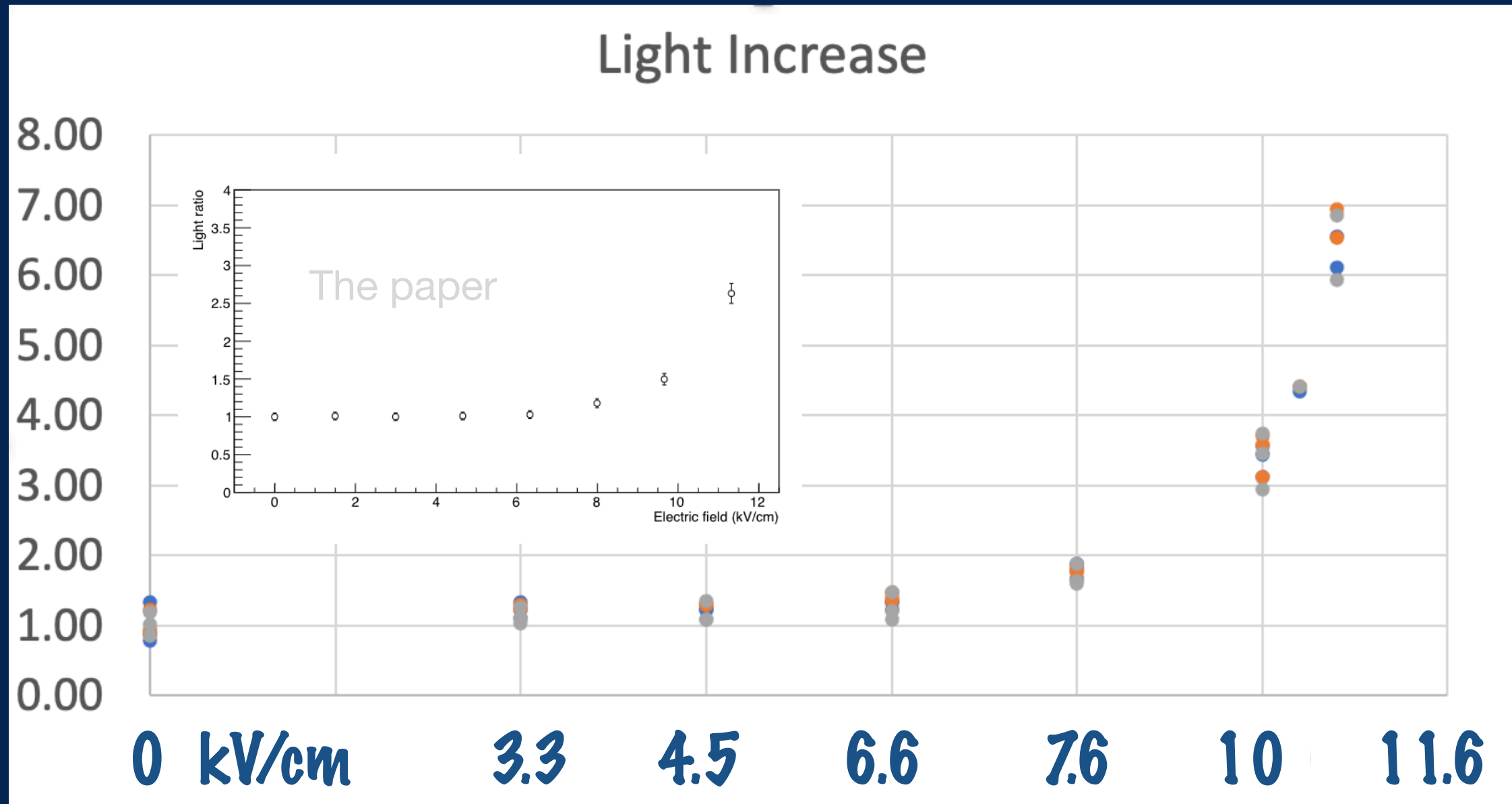
$$I_M = -\epsilon N_G - N_M$$

$$I_{3U} = (1 - \alpha)[N_G + (1 - \beta)N_M]$$

$$I_{21} = \alpha[N_G + (1 - \beta)N_M]$$

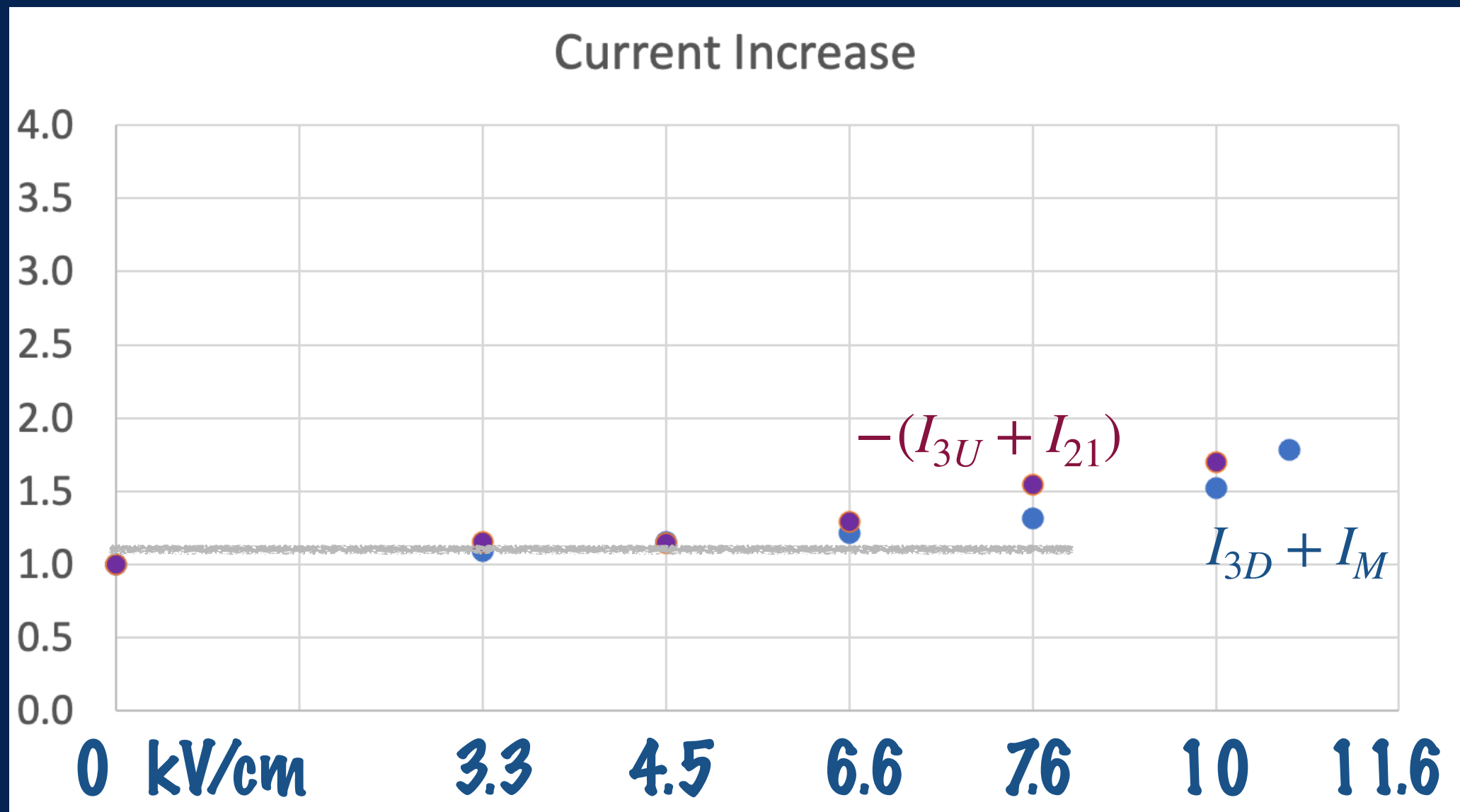
$$\alpha = \frac{I_{21}}{I_{3U} + I_{21}}$$

If $N_M = 0$ (no gain because of the Mesh) $I_{3D} + I_M = -(I_{3U} + I_{21}) = -N_G$



Light is measured in different regions and in different grounding schemes: all measurements in good agreement;

Because of not-perfect flatness of the mesh, light increases a lot, up to a factor 6-7;



An evident increase of current was detected in all scans for both “polarities”

This indicates some increase in charge (gain) for fields larger than 6 kV/cm

Anyway the increase is lesser than the light one (a factor 2 w.r.t. a factor 6-7)

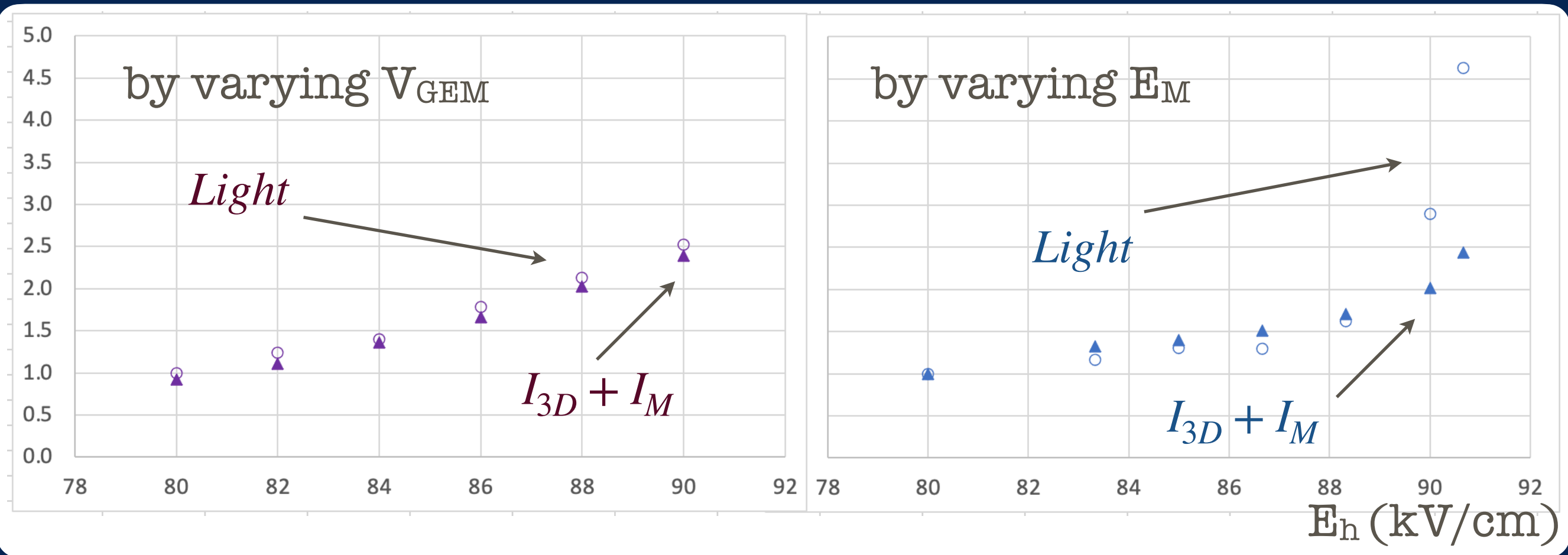
GEM#3

Electric field in the holes
can be evaluated as

$$E_h = \frac{V_{GEM}}{50\mu m} + E_M$$

Mesh

We studied the behavior of light and current as a function E_h ;



When increasing V_{GEM} light and current have the same behavior;
Effect of the E_M seems completely different;