PMT reconstruction: simulation requirements

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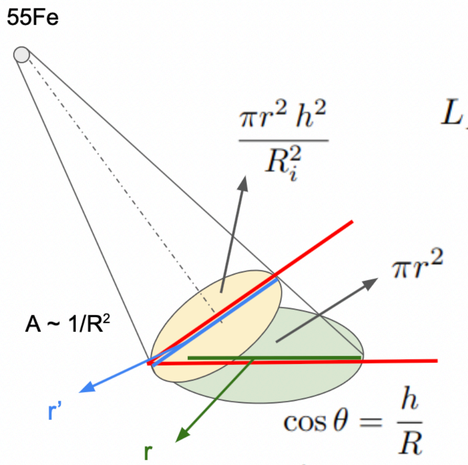
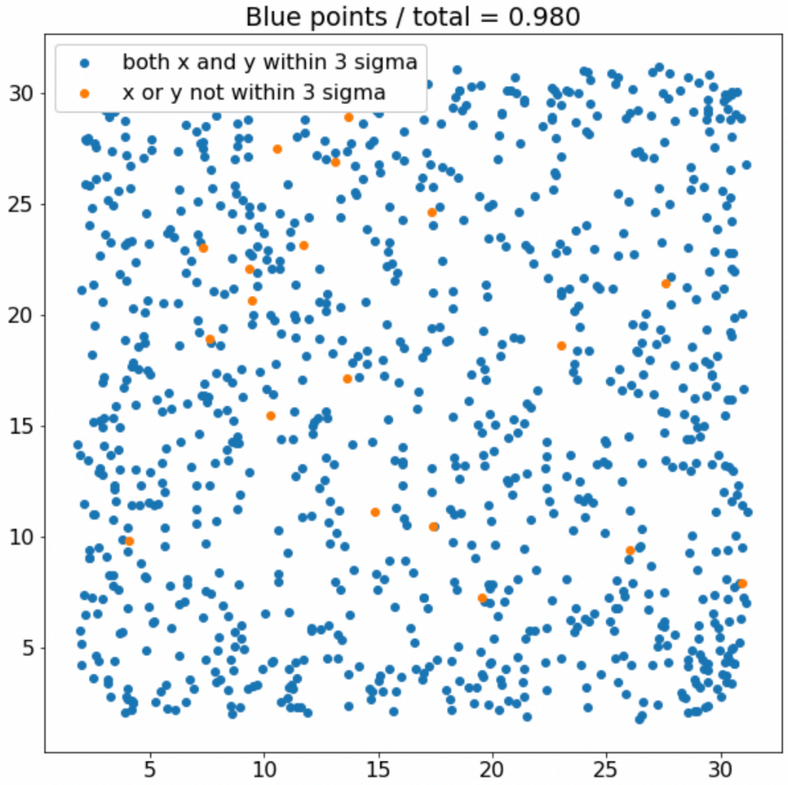
^{55}Fe spots: position from PMTs

- **Light** collected by **PMTs depends on the position** of the spot on the GEM plane
- From the **integrated charge** it is possible to reconstruct the **spot position** (see Francesco B's presentation at the **last GM**).
- We currently are comparing the **reconstructed positions with the** new **data** collected in these days underground at LNGS.



$$L_{PMT} = \frac{L_{spot}}{4\pi R_i^2} \frac{\pi r^2 h^2}{R_i^2}$$

Reconstruction Efficiency tested on a very naive toyMC



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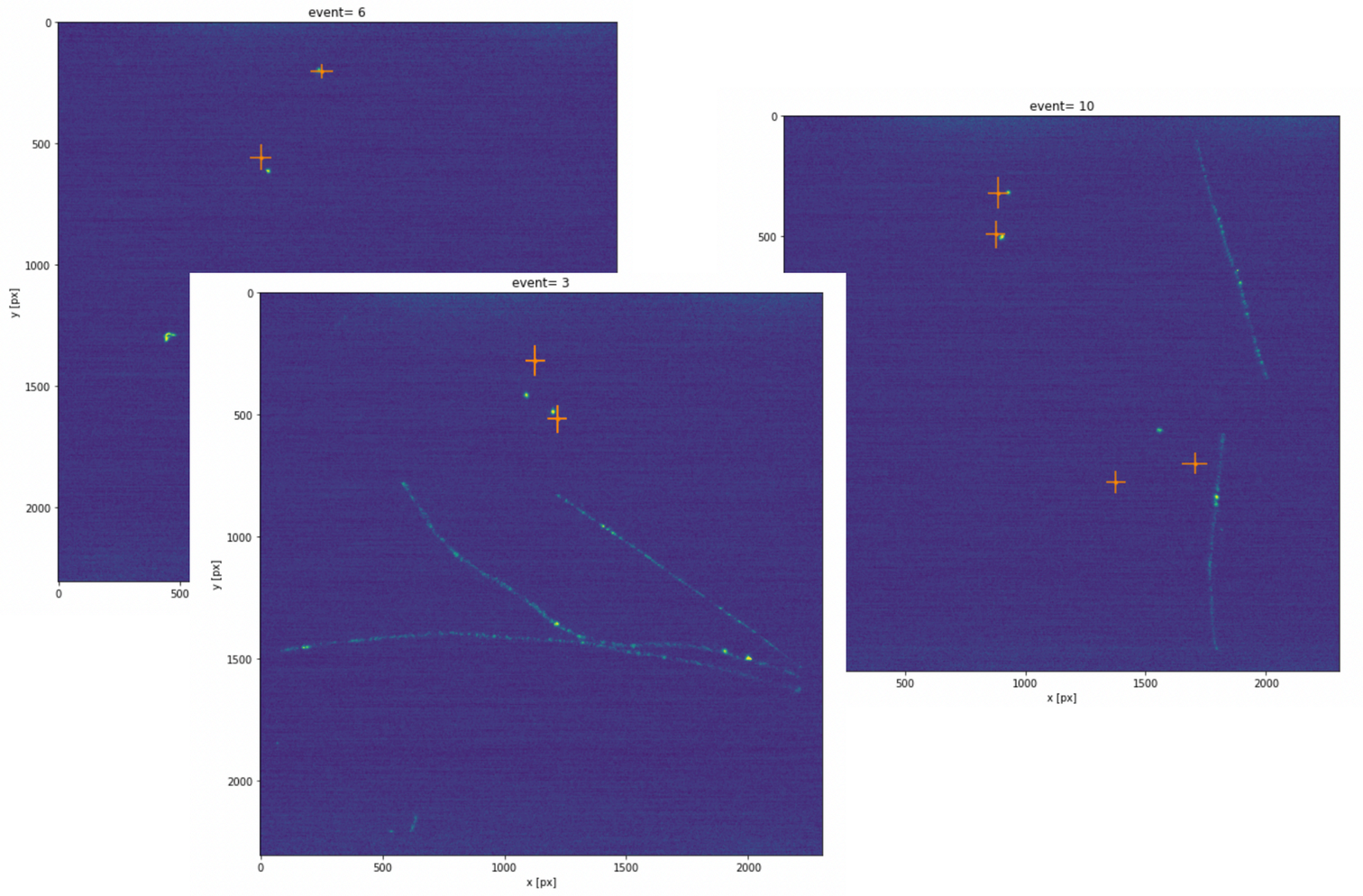


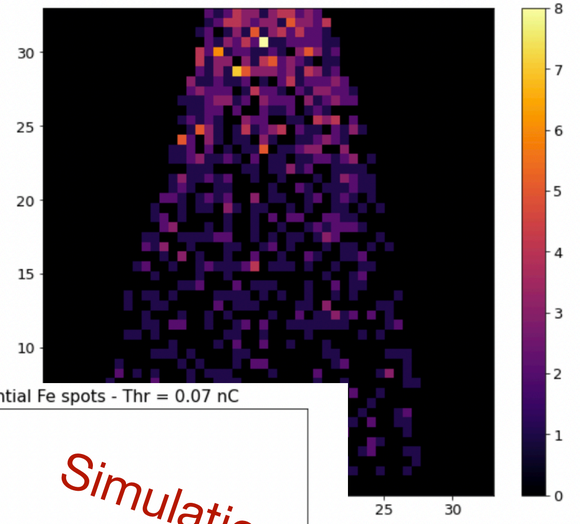
Fast parametric simulation: status

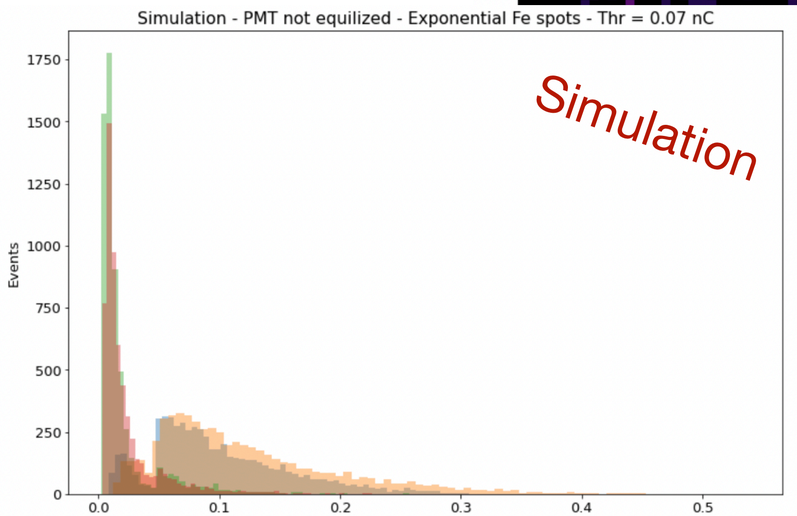
- From ^{55}Fe **data** extract mean and sigma of relevant quantities (energy of the spot in terms of total light produced at the GEM plane)

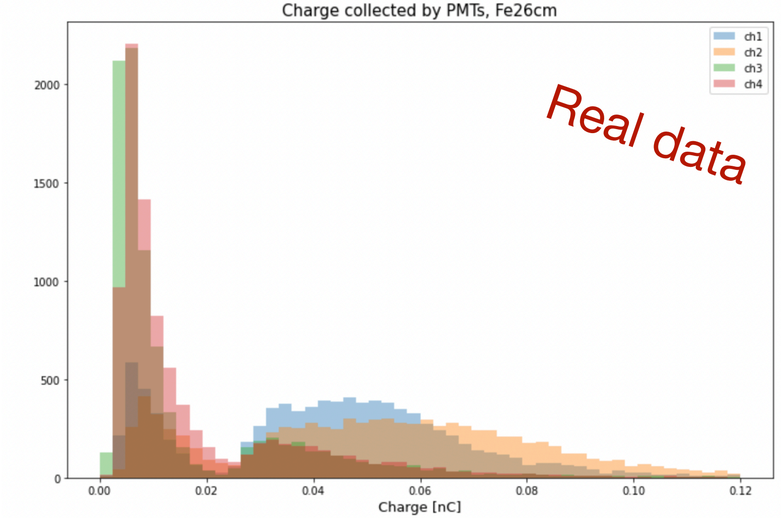
- **Simulate** ^{55}Fe position, attenuation length, spot intensity

- Include light attenuation and **generate charge** in the PMTs

$Q \propto R^{-4}$







We need a simulation!

- We developed a **very simplistic toy MC** simulation of the charge collected by the four PMTs, but it's very naive and many of the physical experimental effects that are relevant for the measurement are not included.

- To test our reconstruction algorithm **we need a more accurate simulation**, because the comparison with the data is affected by a lot of biases (the pictures are affected by optical effects, vignetting, etc., while the PMTs look directly to the GEM light).

- The **PMT simulation** should be able to:
  - simulate the spatial distribution of the $^{55}\mathrm{Fe}$ source in the TPC and specifically at the GEM plane
  - simulate the PMT waveforms with all the main physical effects (noise, position dependence, …)