



Test Beam 2018 - Analysis Summary

SiPM-based module

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❖ **Goals:**

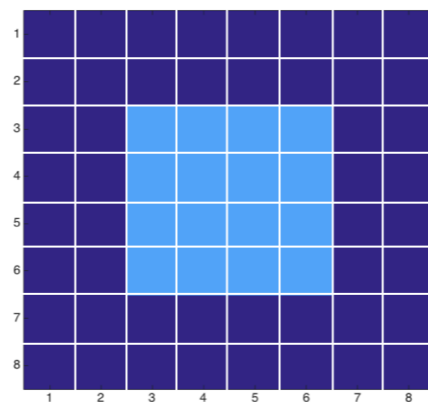
- ❖ Measurement of the scintillation light yield (avoiding non-linearity and saturation problems)
- ❖ Test the system response linearity with the beam energy

❖ **Available data:**

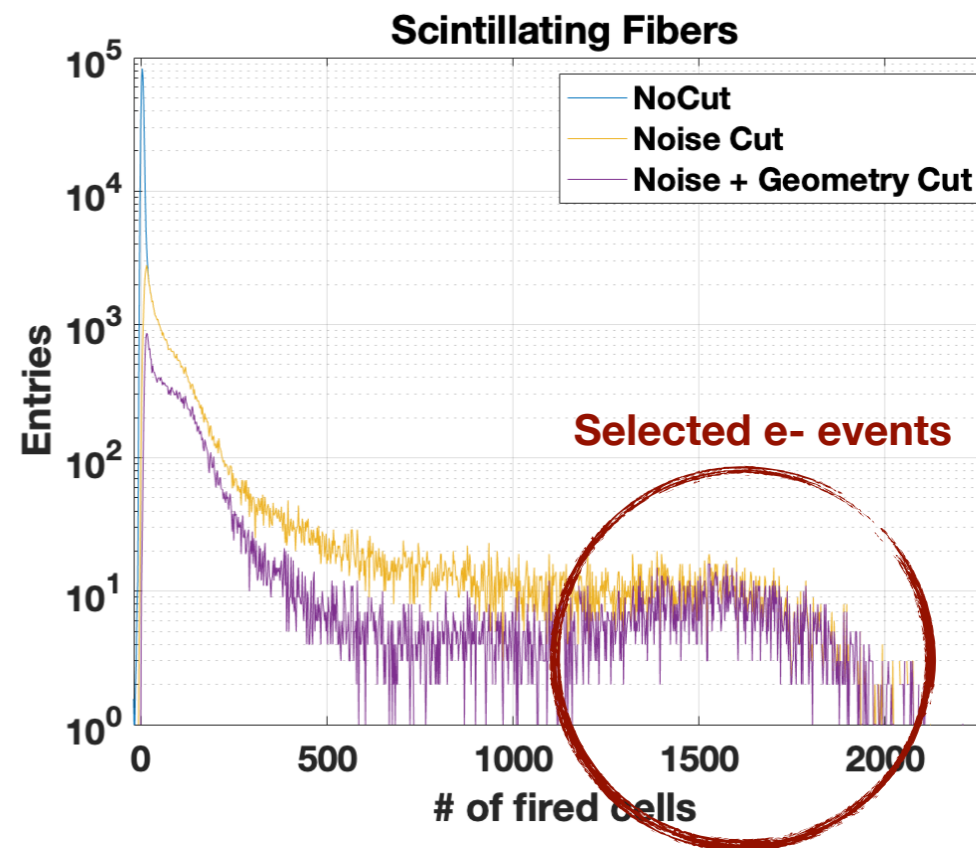
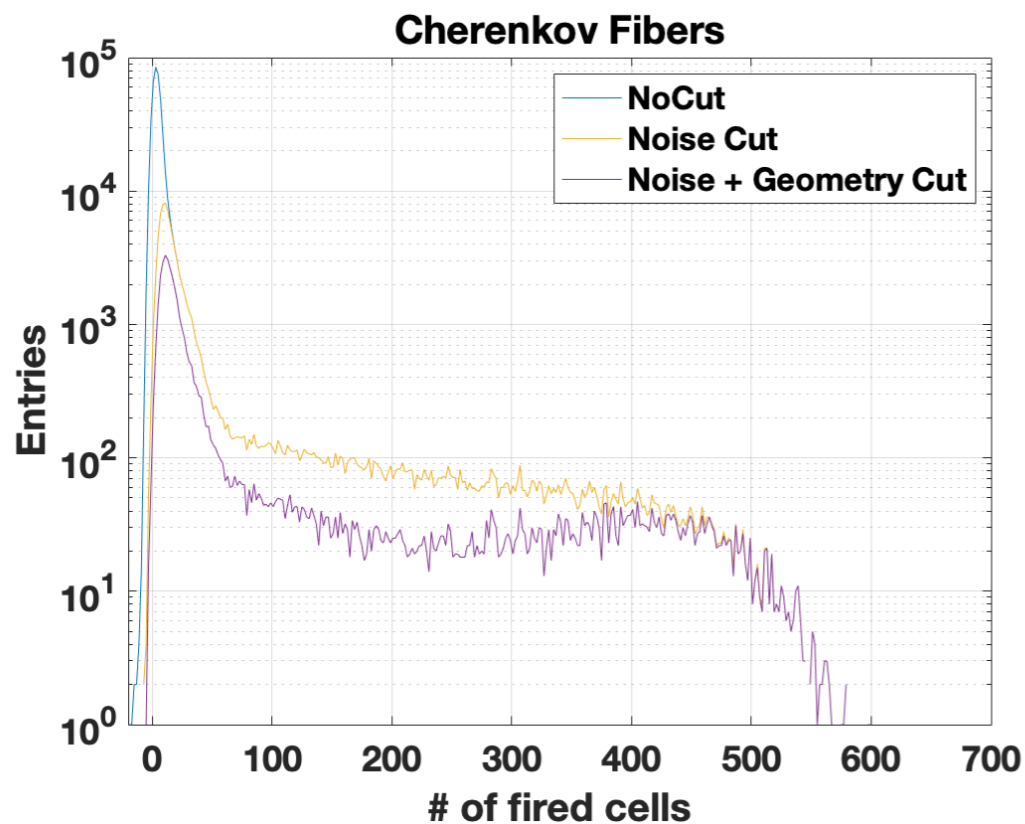
Energy (GeV)	Run numbers	Number of real events	Selected events	T (°C)
10	12738-12742	29286	5633	24
20	12726-12729 12737	30882	6607	24.5
30	12754-12758	44826	5030	23
40	12743-12751	418265	36308	23.5-24.5
50	12753	>45000	To be checked	Few events
60 (2° beam)	12752 12762-12767	>650000	22000 (to be selected)	Few events
40 π	12730-12735	30000	To be checked	

Cuts for e- selection

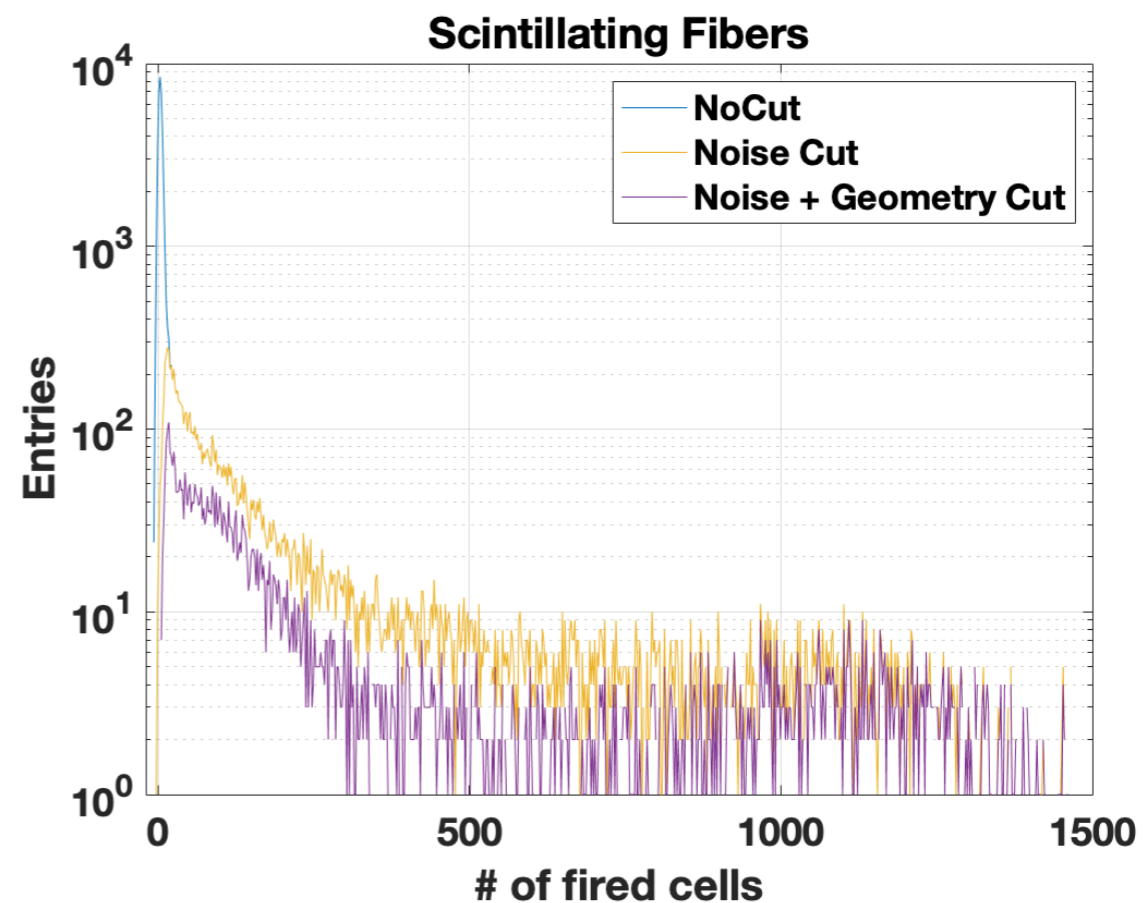
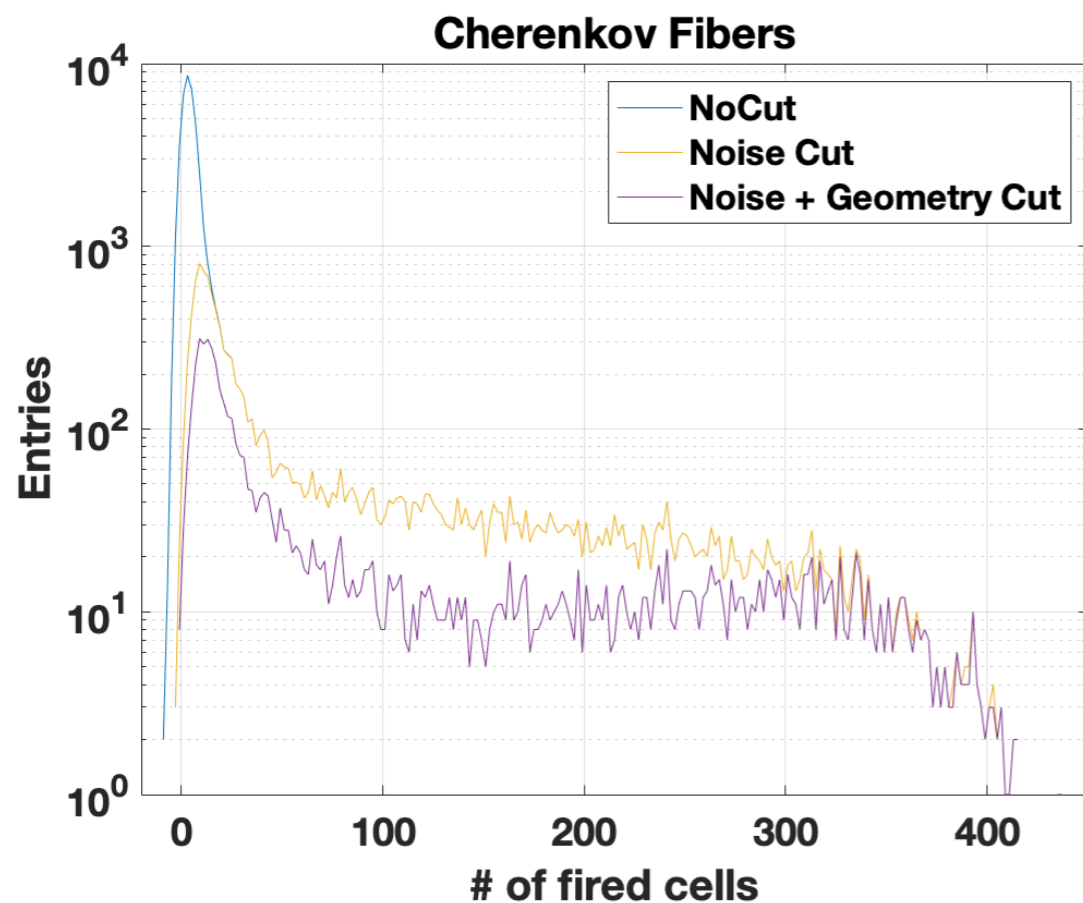
- ❖ **Noise cut:** events with the total number of fired cells (sum on all SiPM signals) greater than 20 p.e.
- ❖ **Geometrical cut:** events with the maximum signal in the central box (4x4)



* example of 40 GeV Data (2018)

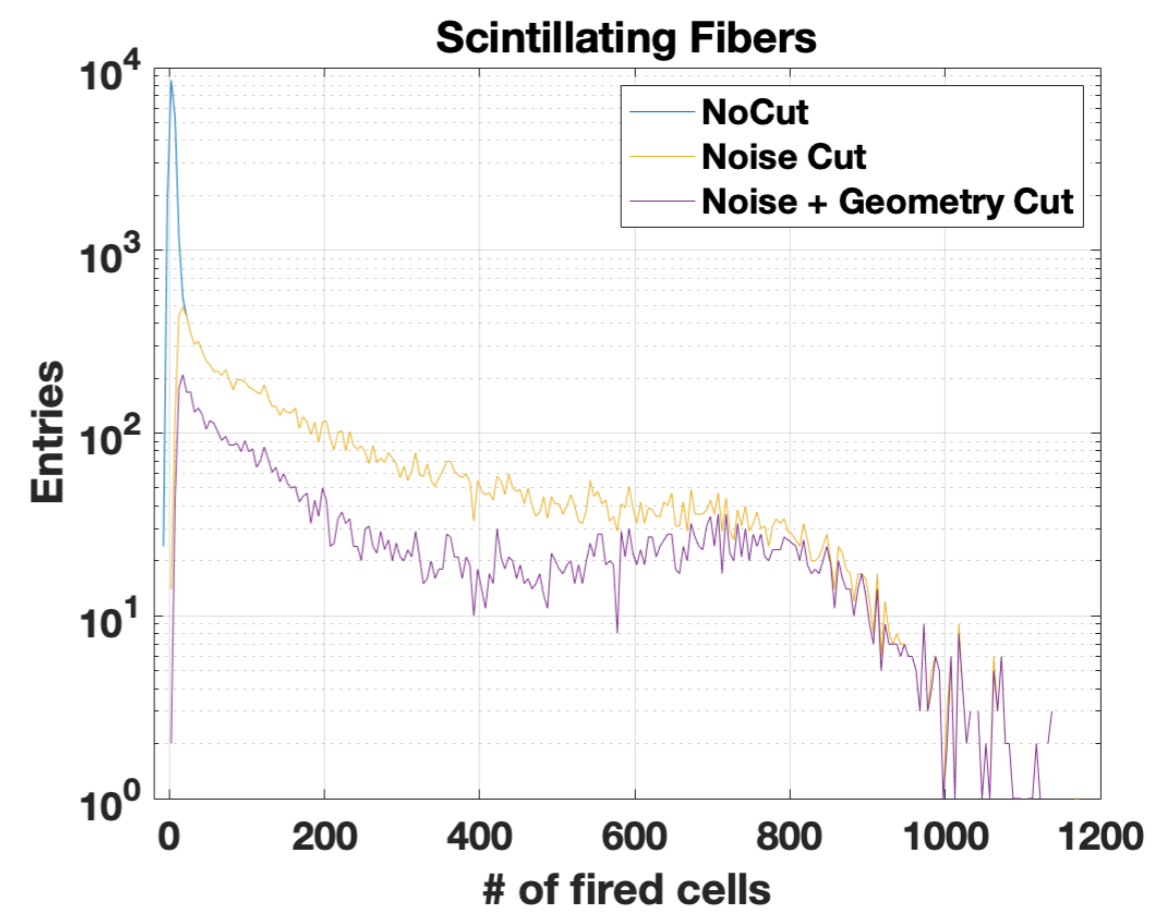
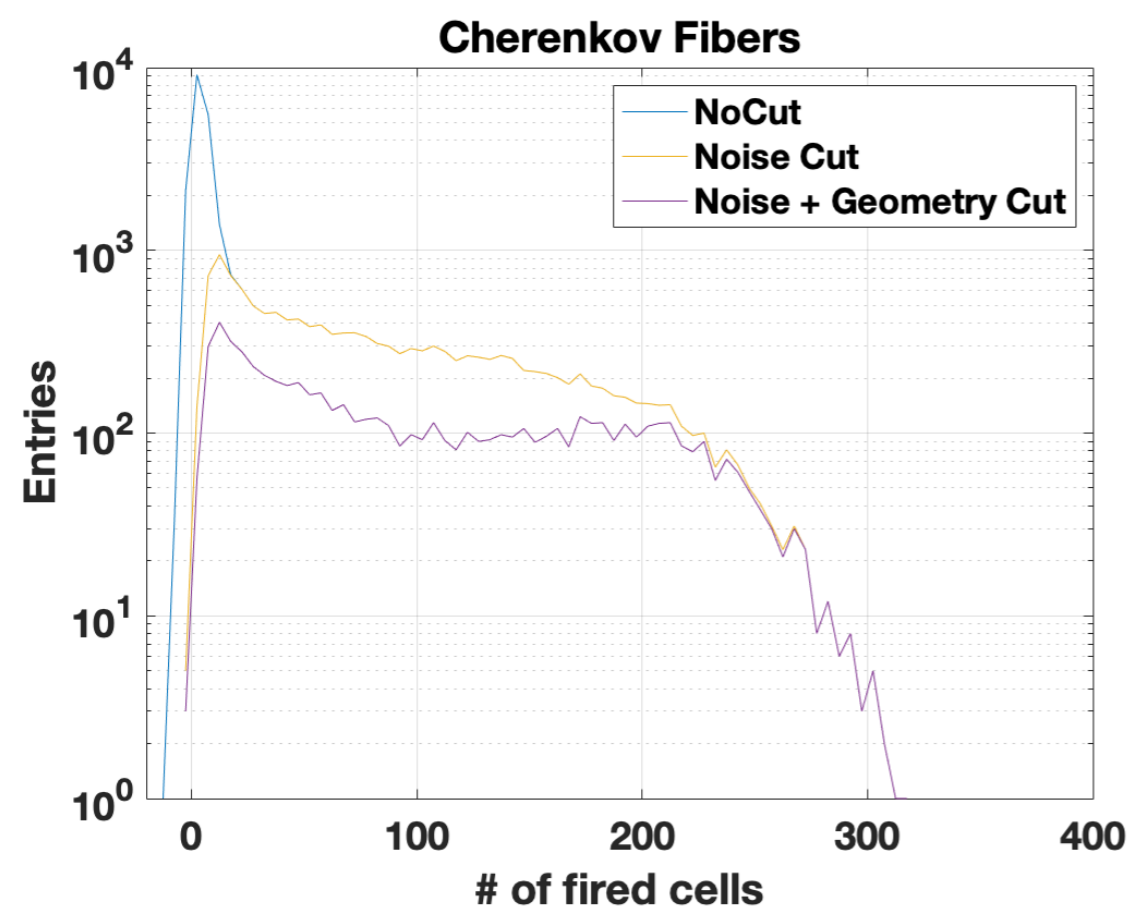


- Selected events: 5030, the 11.2 % of 44826 total events (25% are e-)



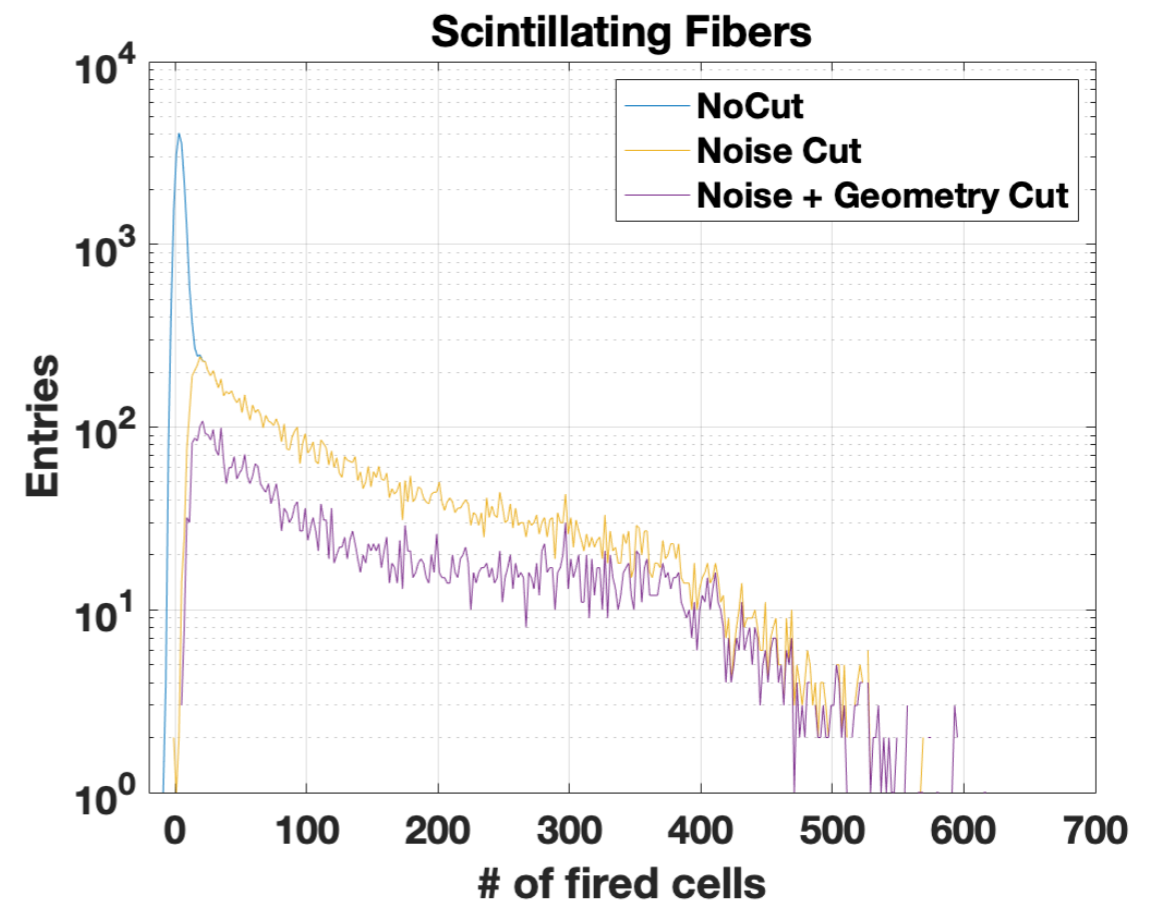
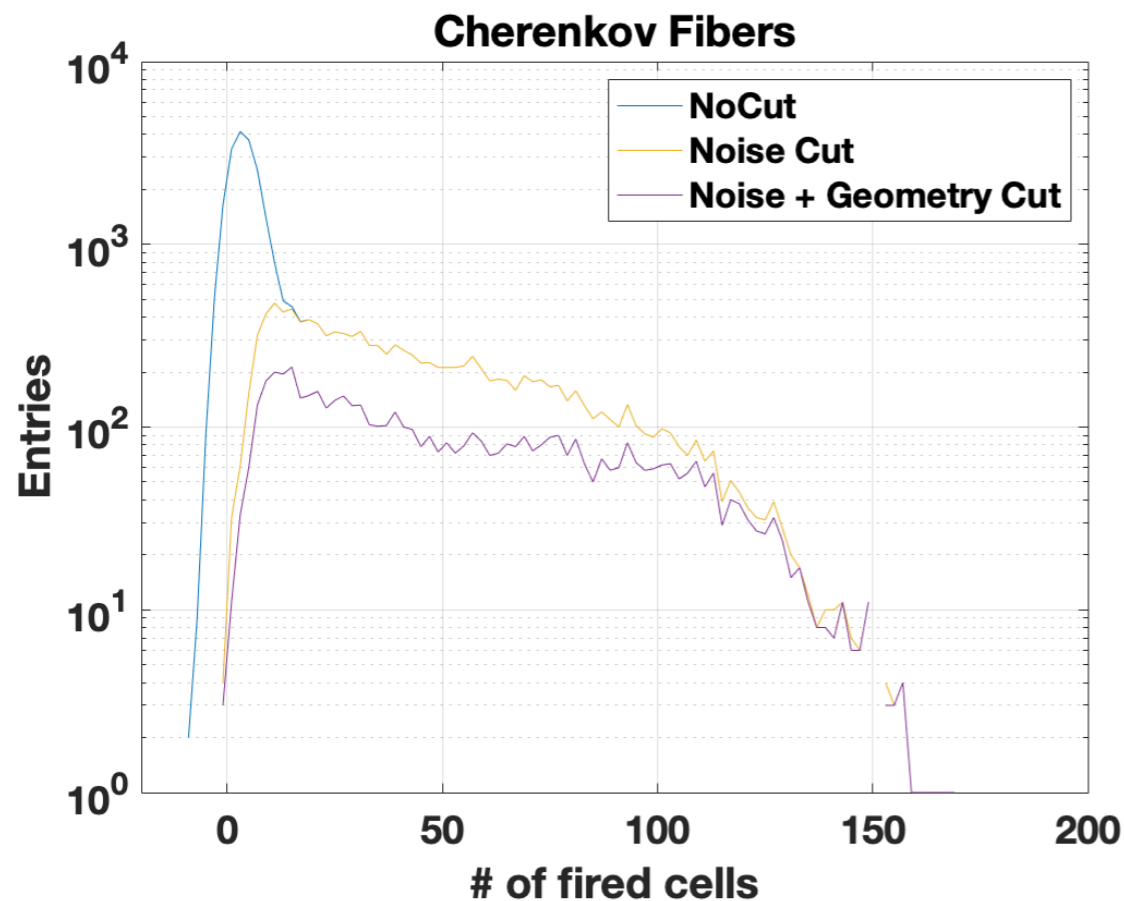
20 GeV (All good runs)

- Selected events: 6607, the 21.4 % of 30882 total events (most e-)



10 GeV (All good runs)

- Selected events: 5633, the 19.2 % of 29286 total events (most e-)

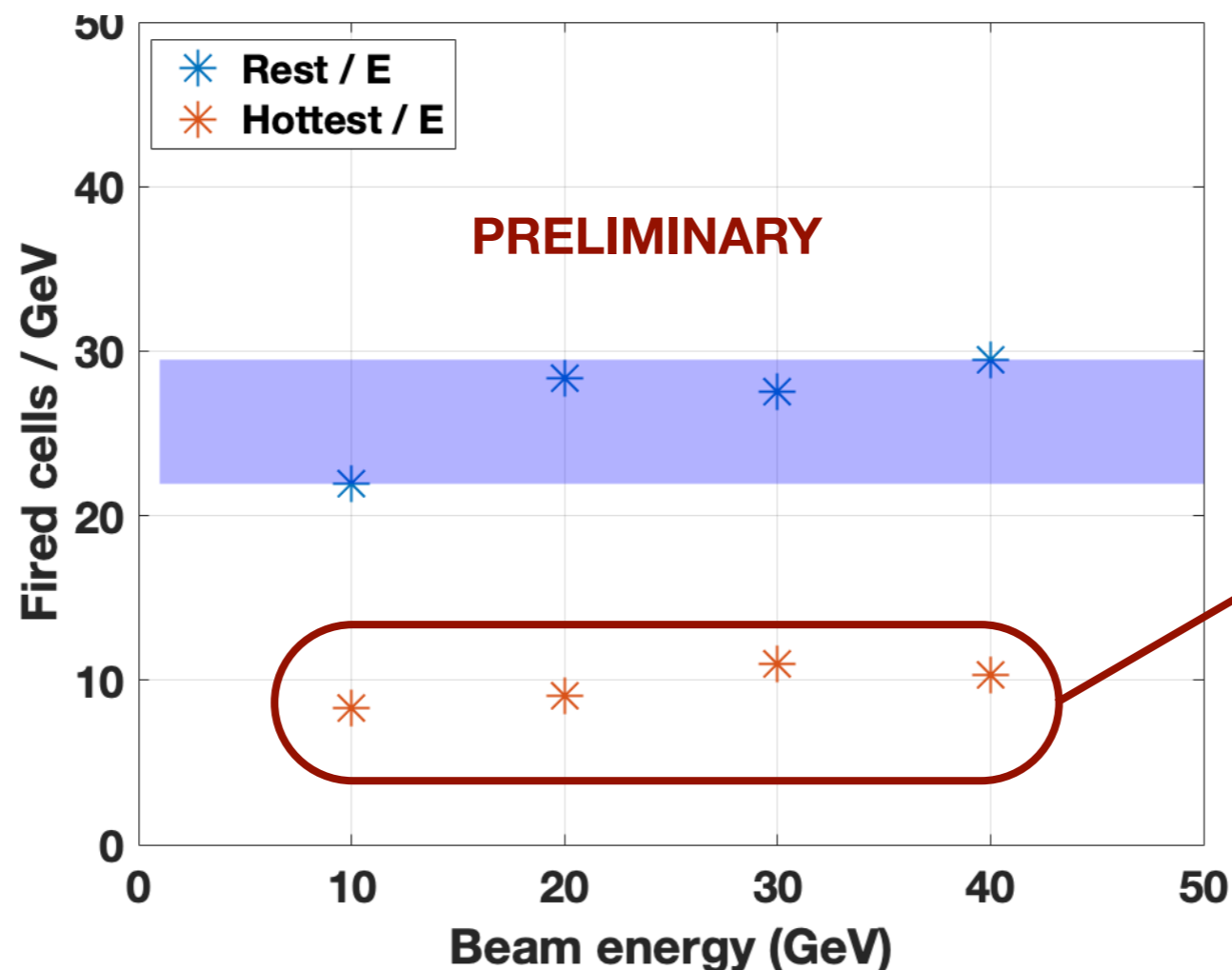


- To improve the e- selection we will use the signal from ancillaries detectors (preshower and Muon counter)

❖ In 2017 **non-linearity and saturation** problems affects the measurement of the S light yield → Filters

❖ **PRELIMINARY RESULTS:**

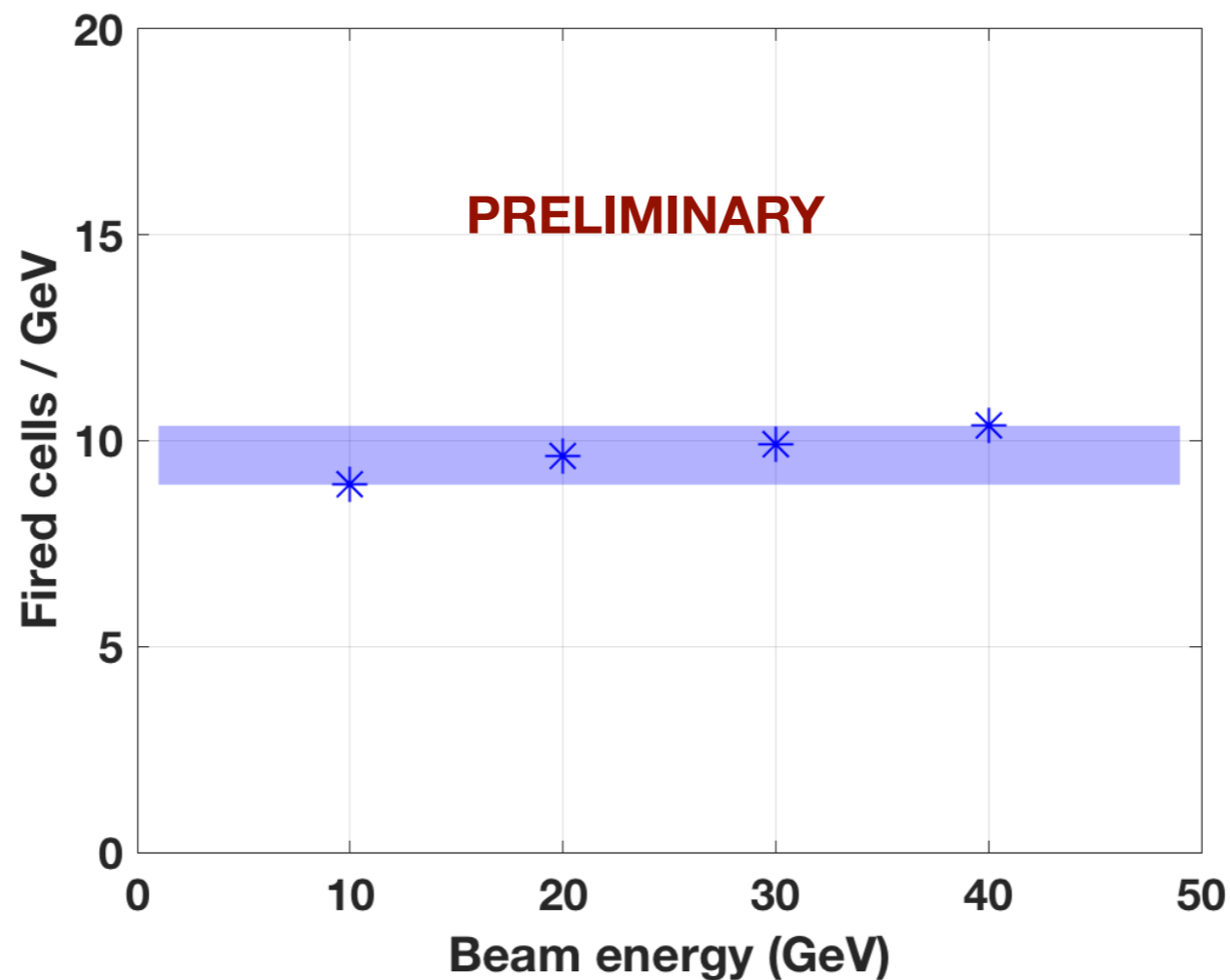
- ❖ Only geometrical & noise cut applied
- ❖ **Scintillation** signal: $V_{op} = 5.5 V_{ov}$ (57.5 V) and **PDE ~ 25%**



**Hottest < 400 fired cells
~ 25% of the sensor
occupancy**

Cherenkov light yield

- ❖ The Cherenkov channel is the same of the 2017 beam test → The Cherenkov light yield should be similar
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 - ❖ Only geometrical & noise cut applied
 - ❖ **Cherenkov** signal: $V_{op} = 5.5 V_{ov}$ (57.5 V) and **PDE ~ 25%**



**2017 C light yield:
~ 24 fired cells/GeV**

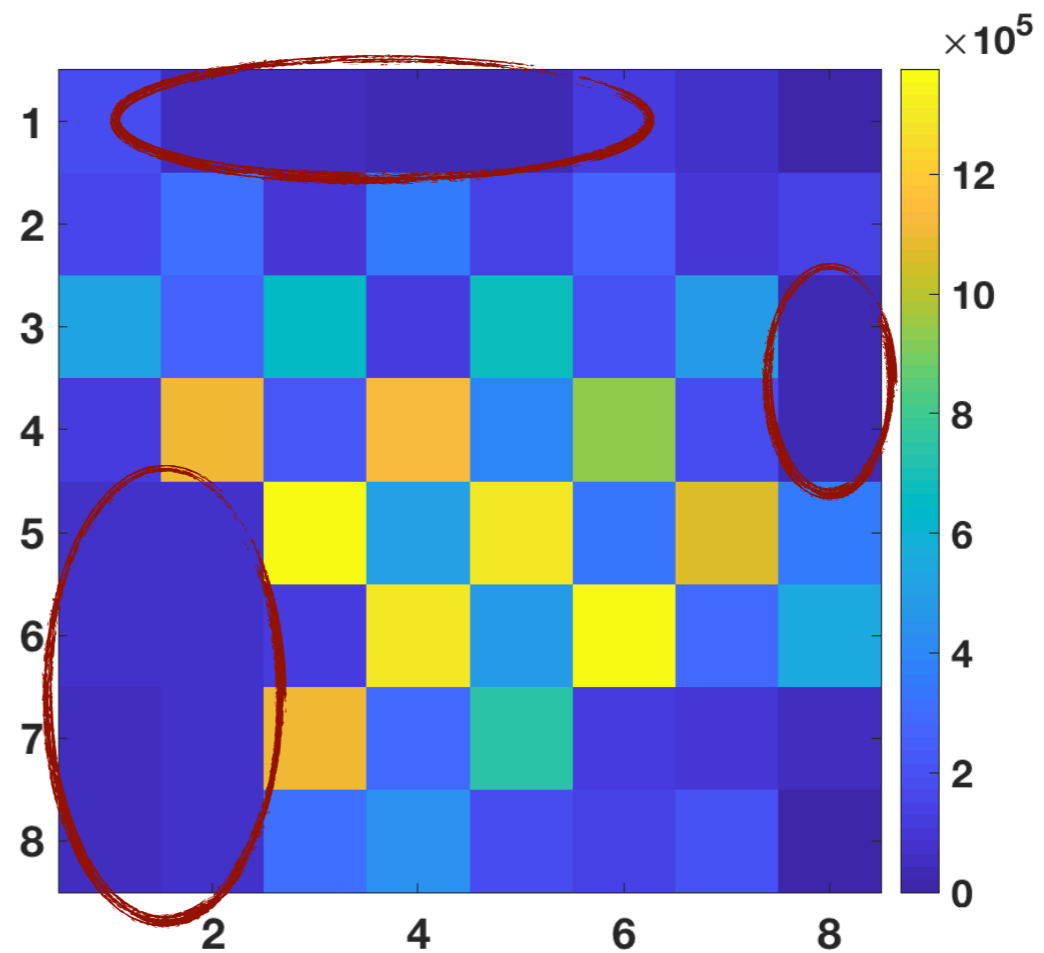
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A different response of some SiPM of the matrix was found



Calibration needed

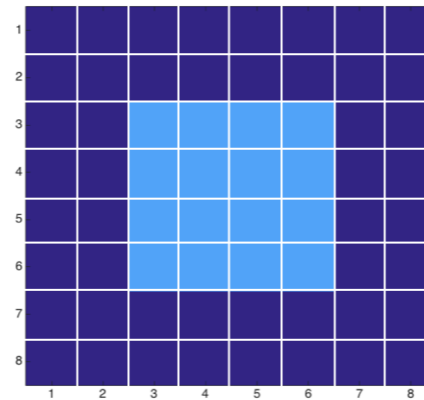


- ❖ Calibrate the fibre response, sending the same laser pulse in all the 64 fibres
- ❖ Improve the e- selection: data from PSD and Muon counter
- ❖ Same studies with 50 and 60 GeV data
- ❖ Measurement of the optical cross talk between fibres in the lab

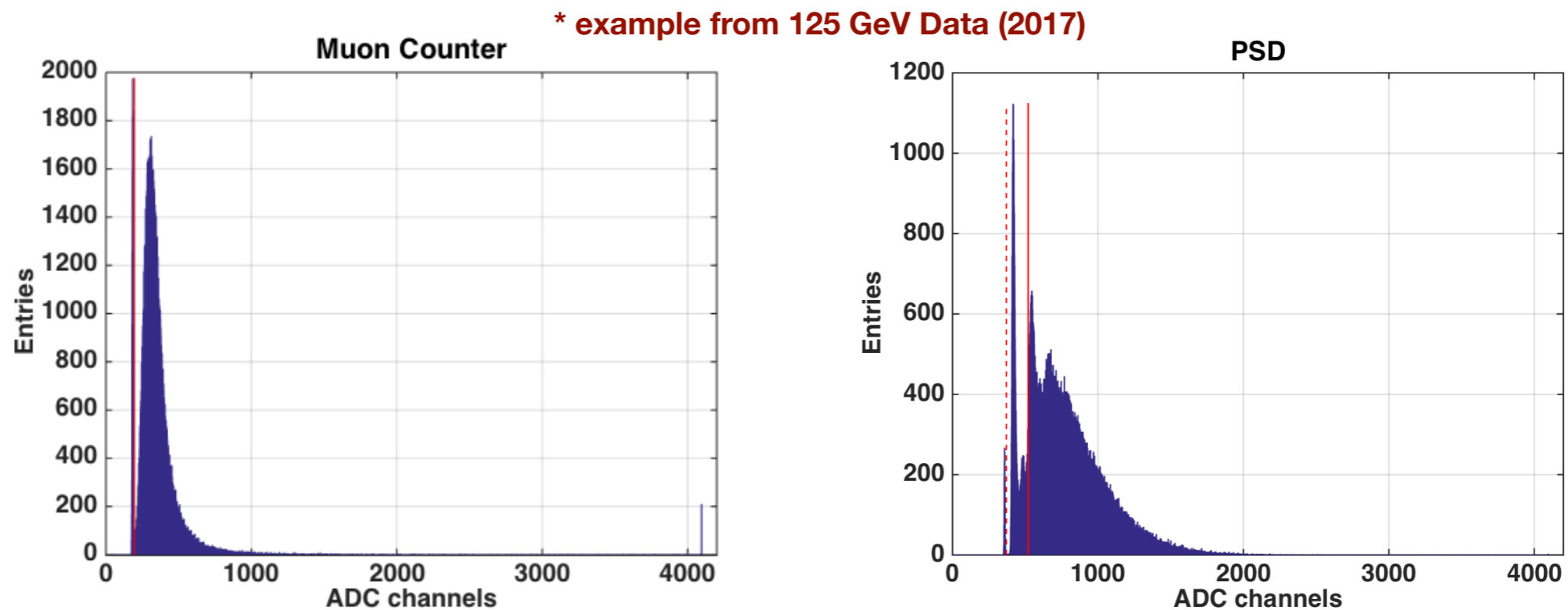


Cuts for e- selection

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- ❖ **Muons cut:** events with a signal in the muon counter below threshold
- ❖ **PSD cut:** events with a signal in the PSD above threshold



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