# PMT analysis

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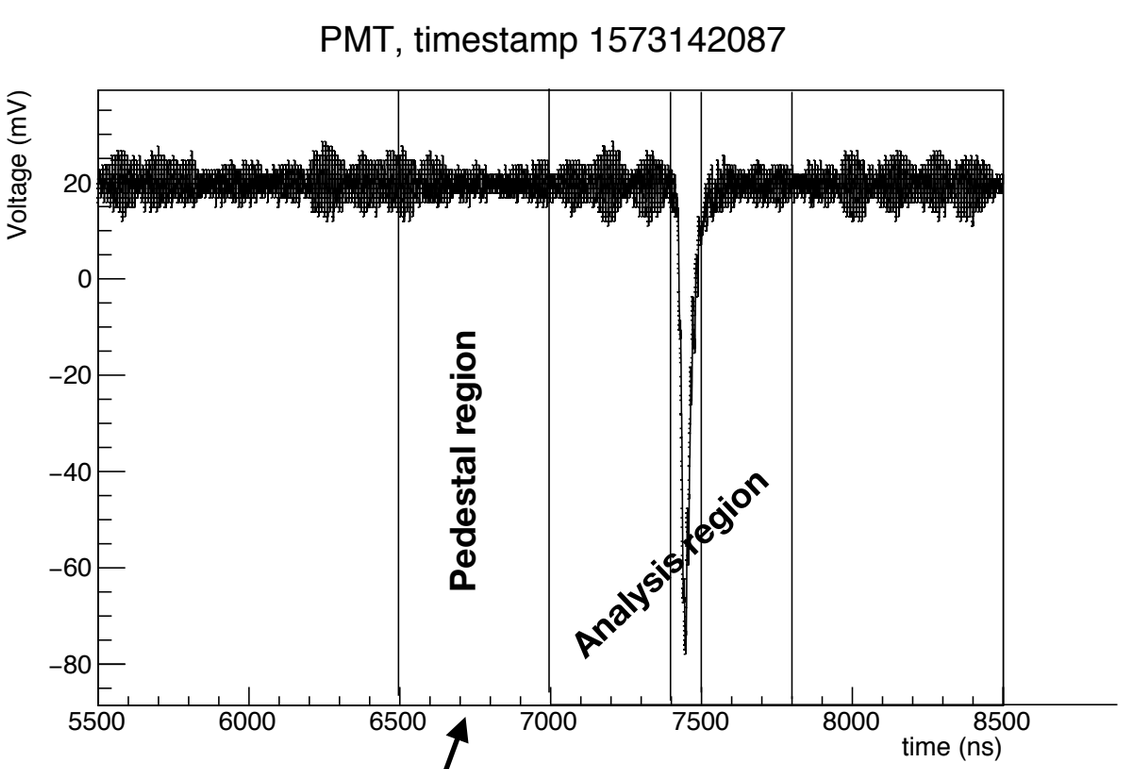
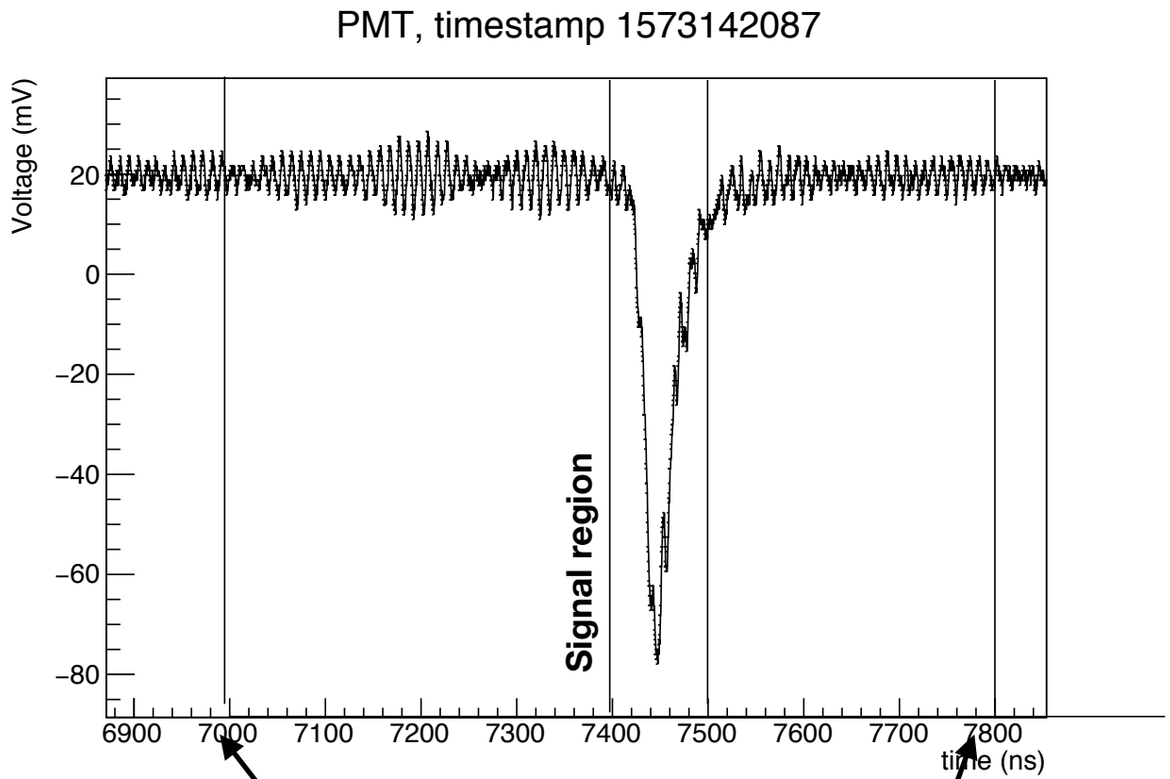
23/04/2020

# PMT Waveform analysis

Full range of waveform is 25 us
The analysis concentrate on sub-range of the waveform




Average Voltage in pedestal region subtracted in Analysis Region.

**CAVEAT: pedestal region too close to analysis region ?**

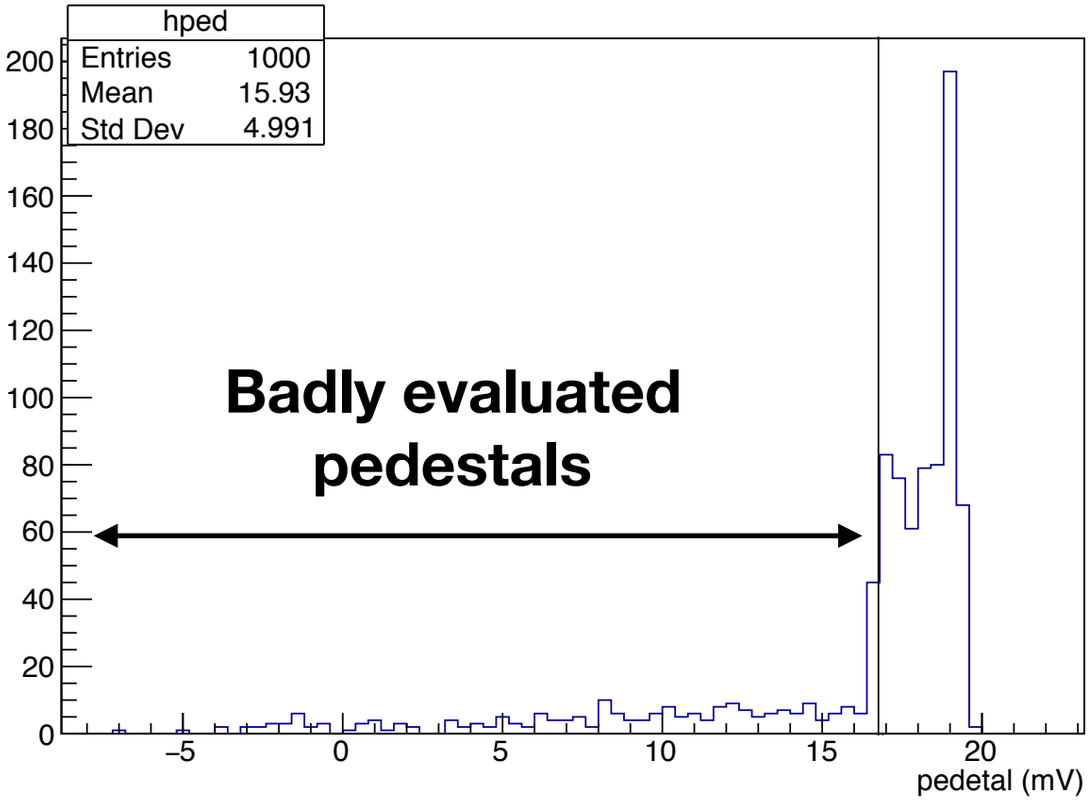
**total region of analysis: 800 ns**

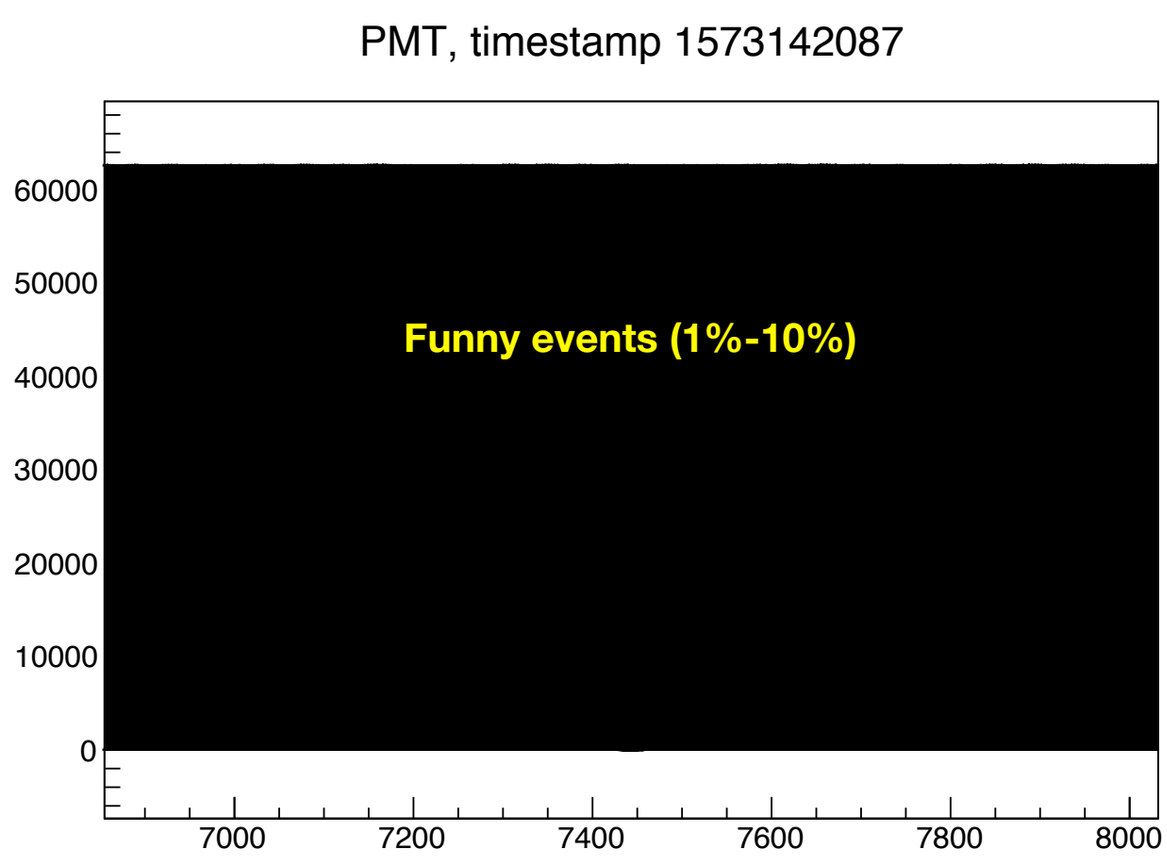
# Pedestal

- **Pedestal is evaluated between 6500 and 7000 ns: Typical value 20 mV**
- **Average values is subtracted to the waveforms points**

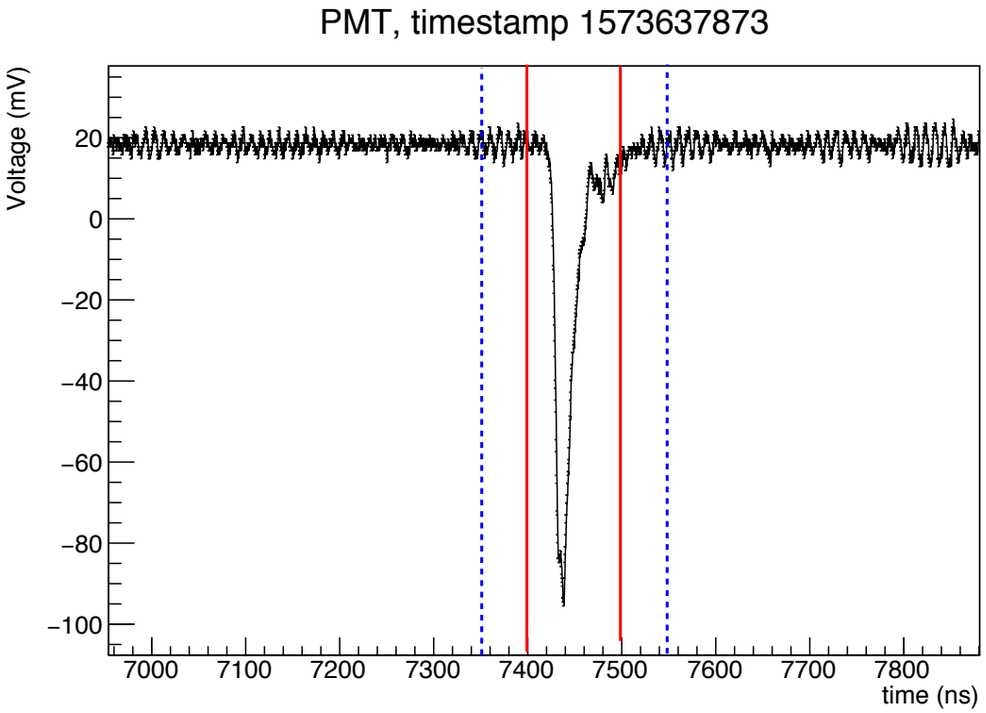
**Bad events:**

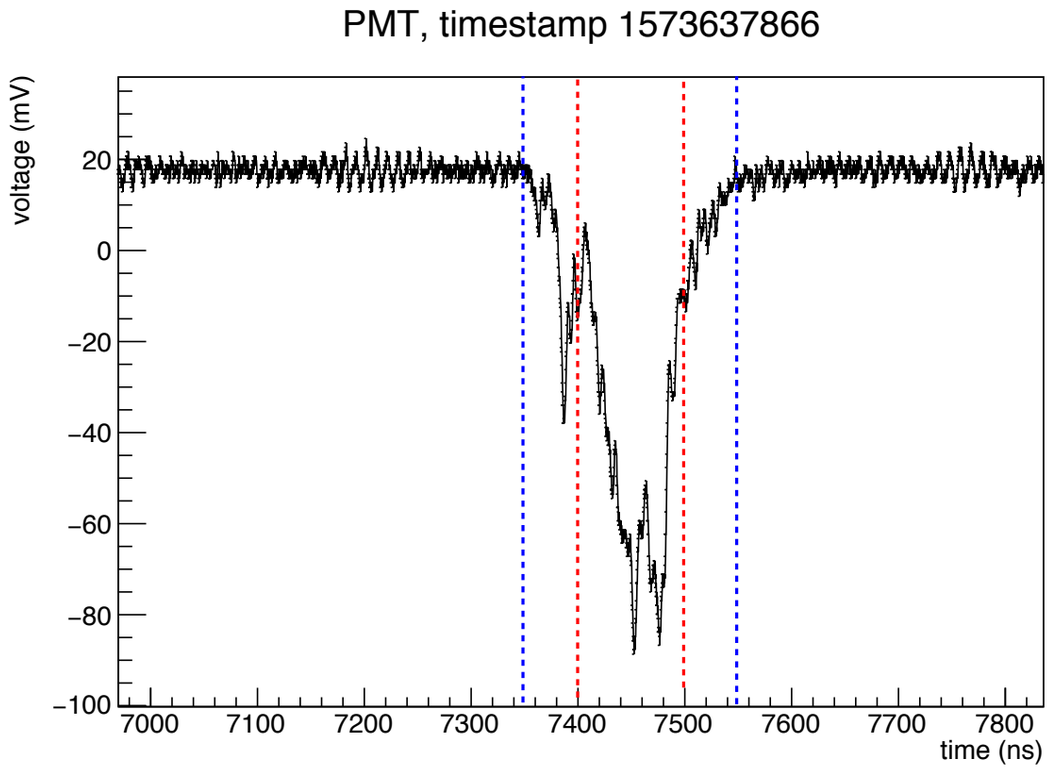
- Pedestal below 17 mV are discarded
- Funny waveforms are discarded



# New signal regions



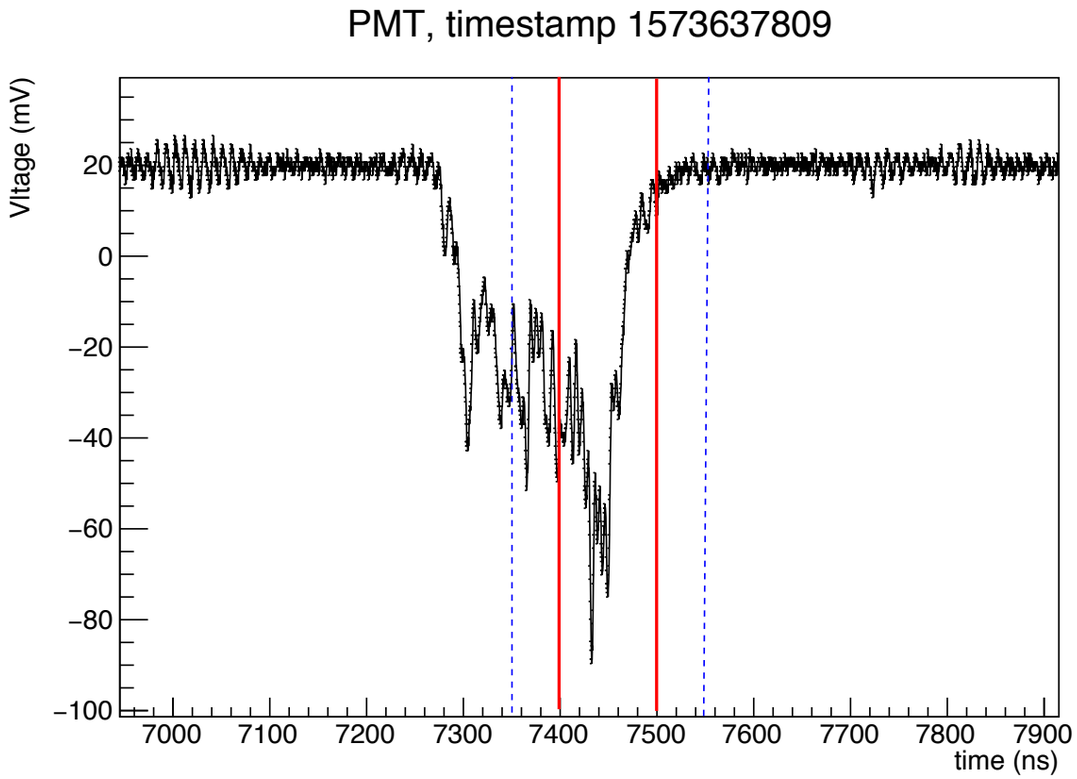




**Time window divided in three regions:**

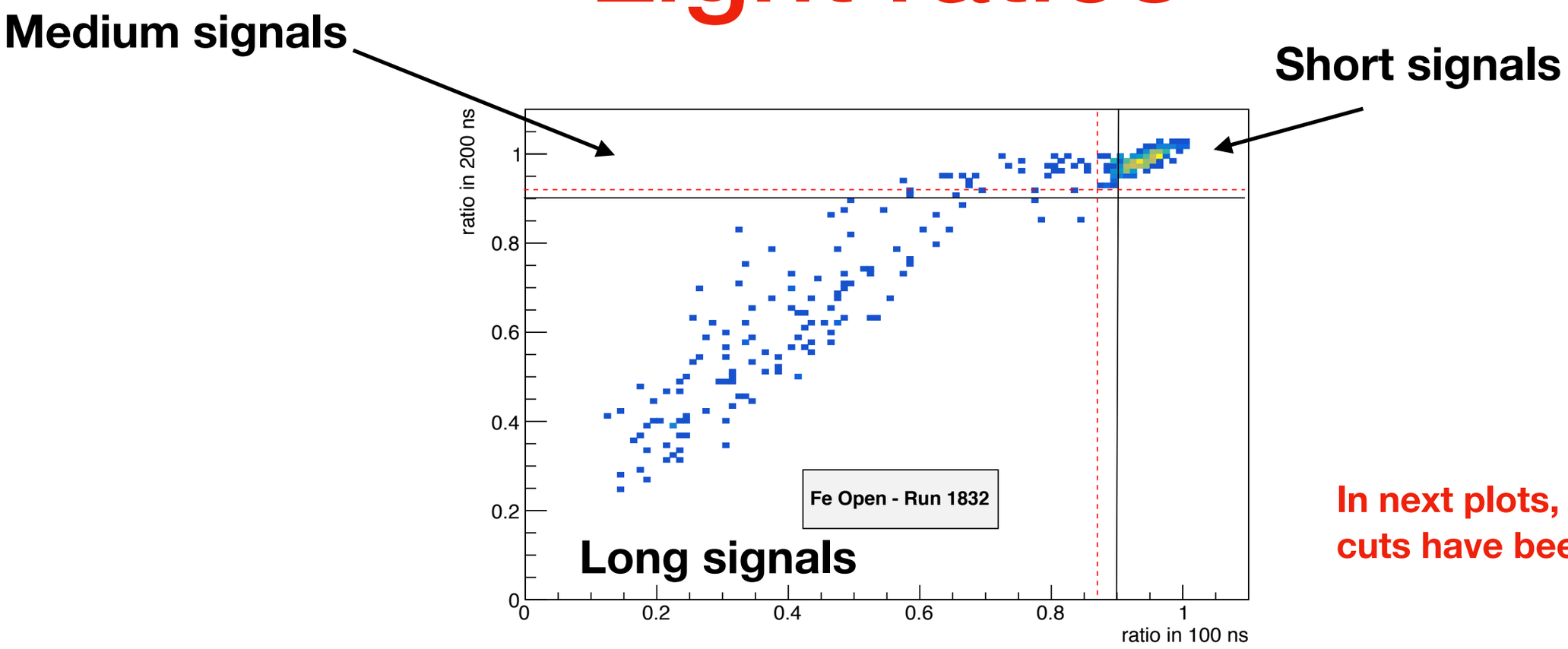
**100 ns** around trigger **short region**
**200 ns** around trigger **medium region**
**800 ns** around trigger **long region**

**In each region the light integral is evaluated**

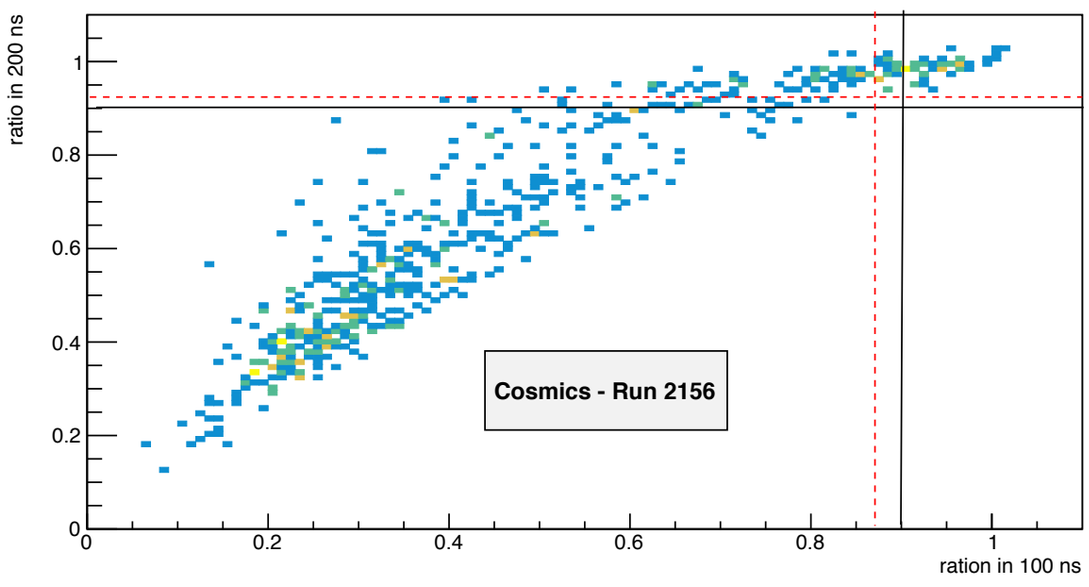
**ratio100ns = (light in short region)/(light in long region)**
**ratio200ns = (light in medium region)/(light in long region)**

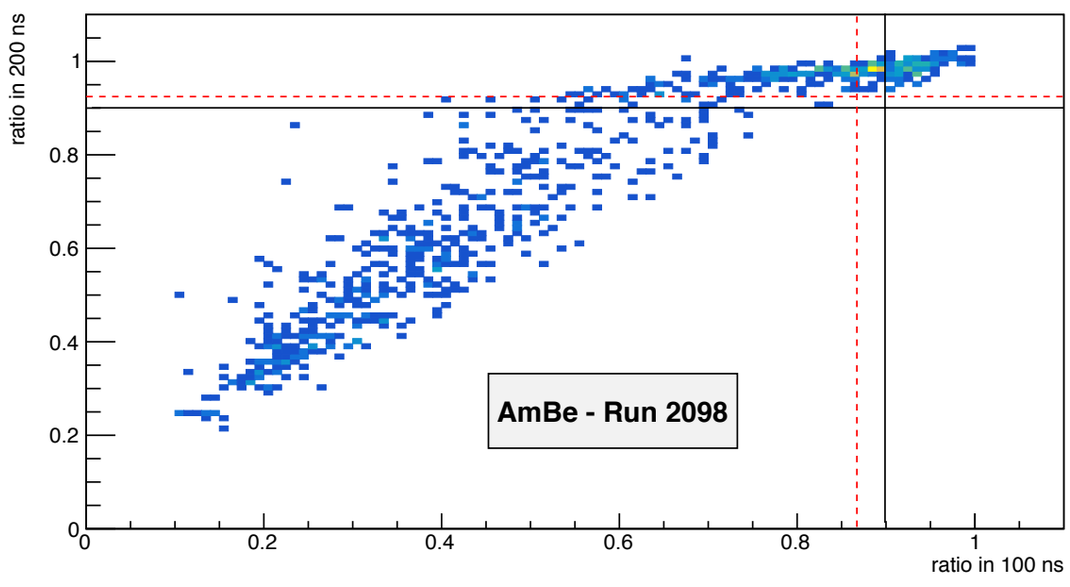


# Light ratios

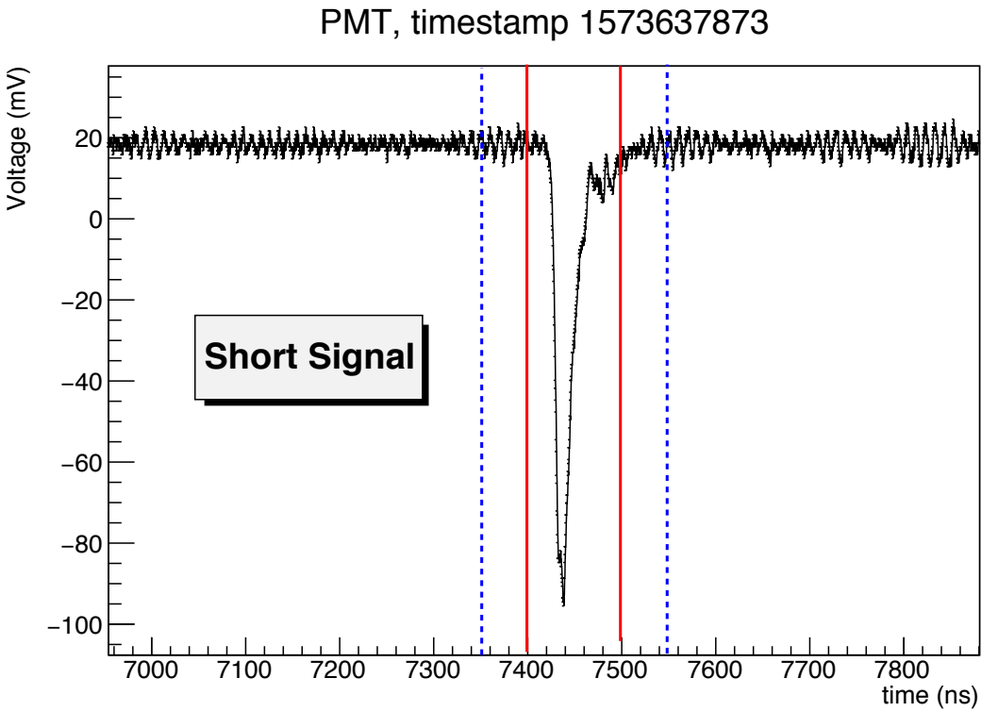


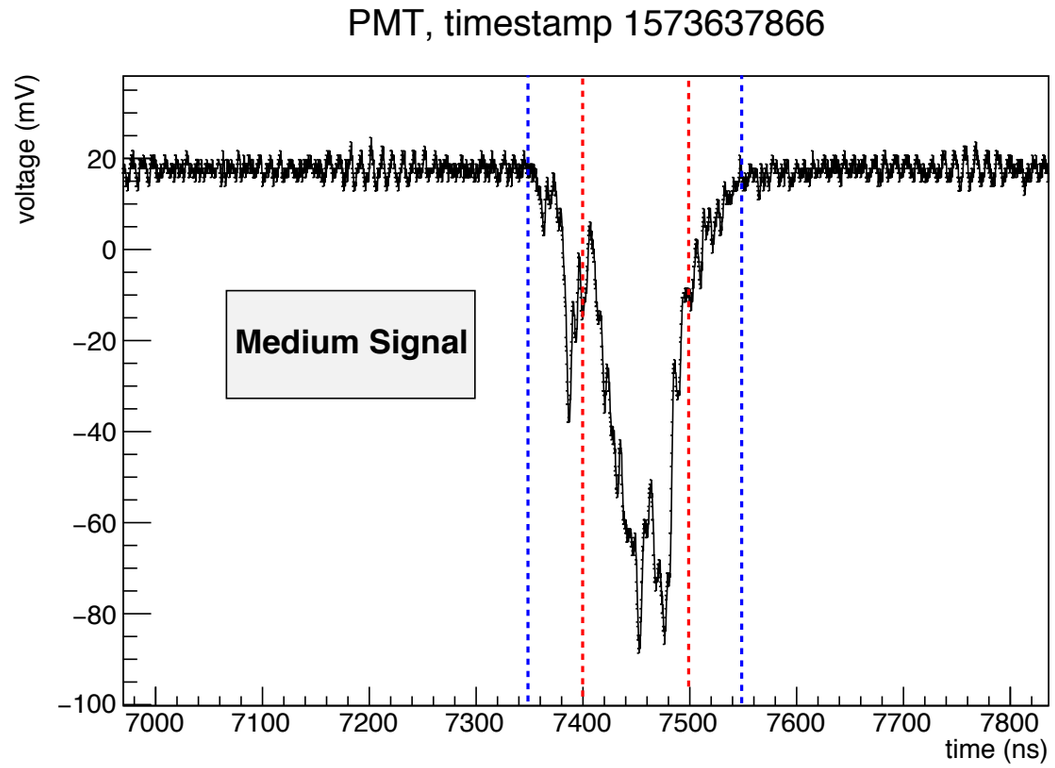

**In next plots, red dashed lines cuts have been used**



# New signal definition based on ratio 200 ns vs 100 ns

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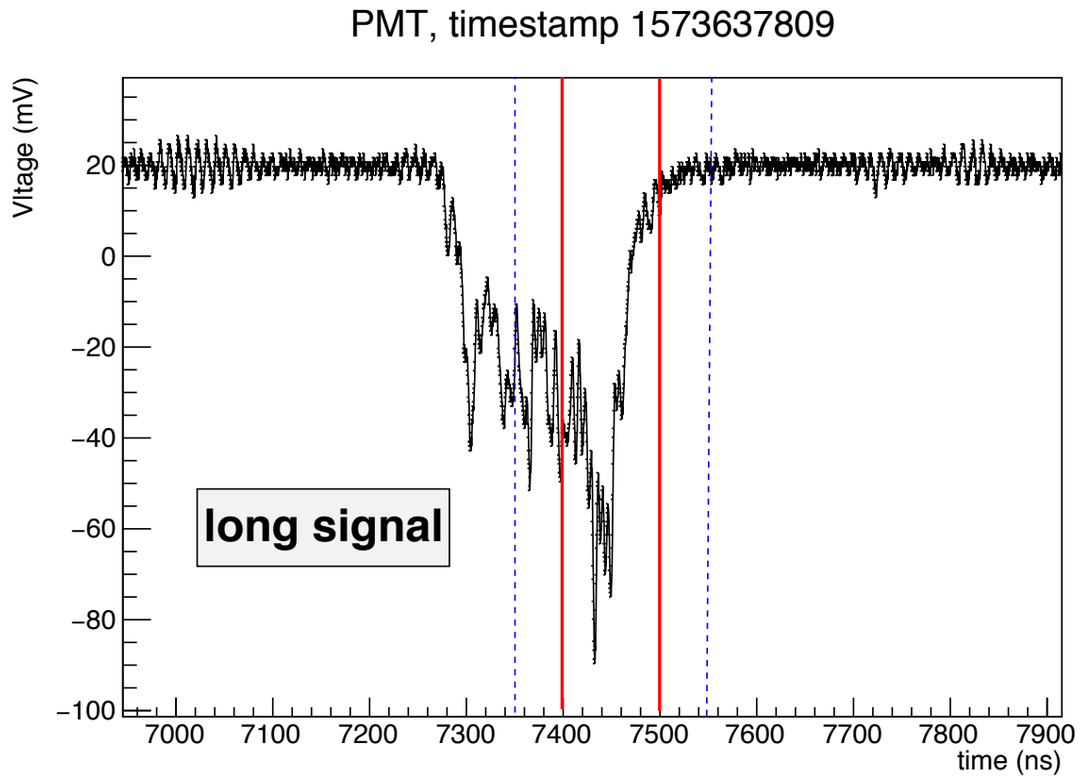
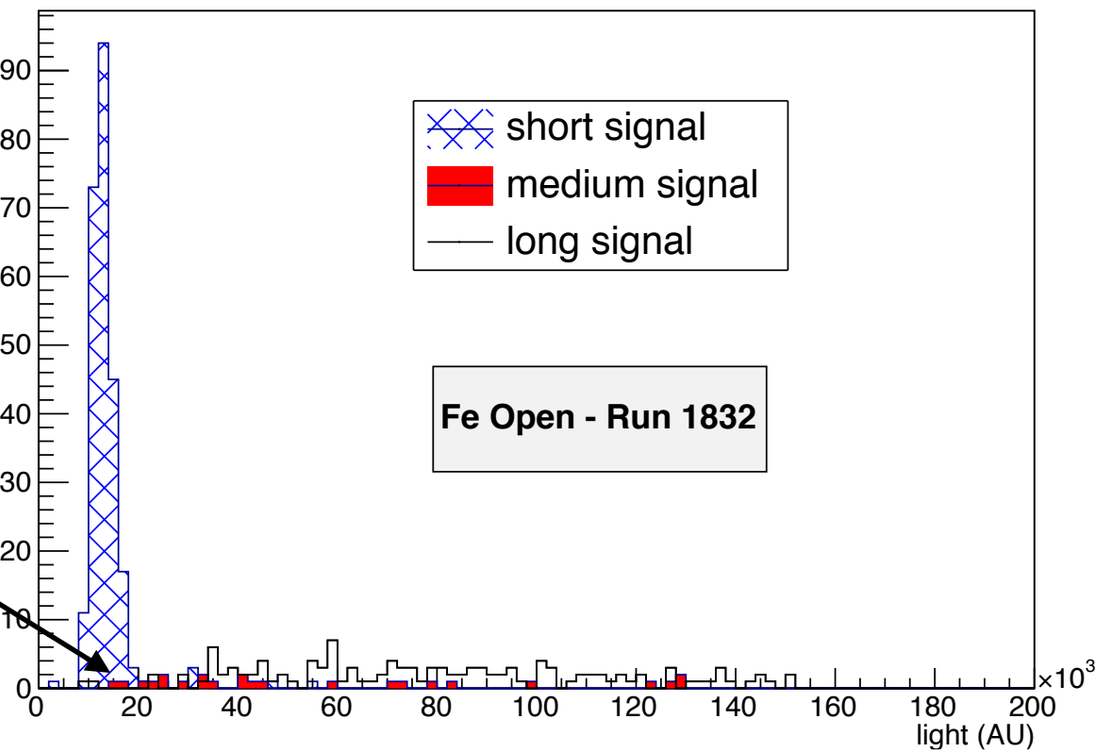
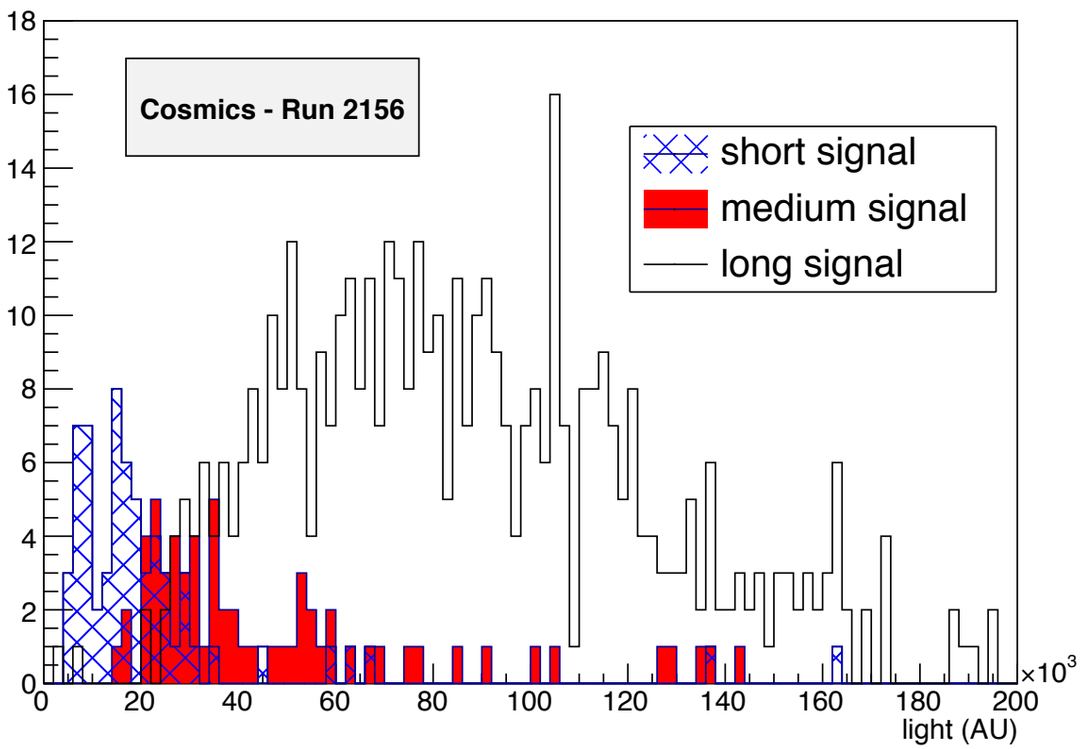
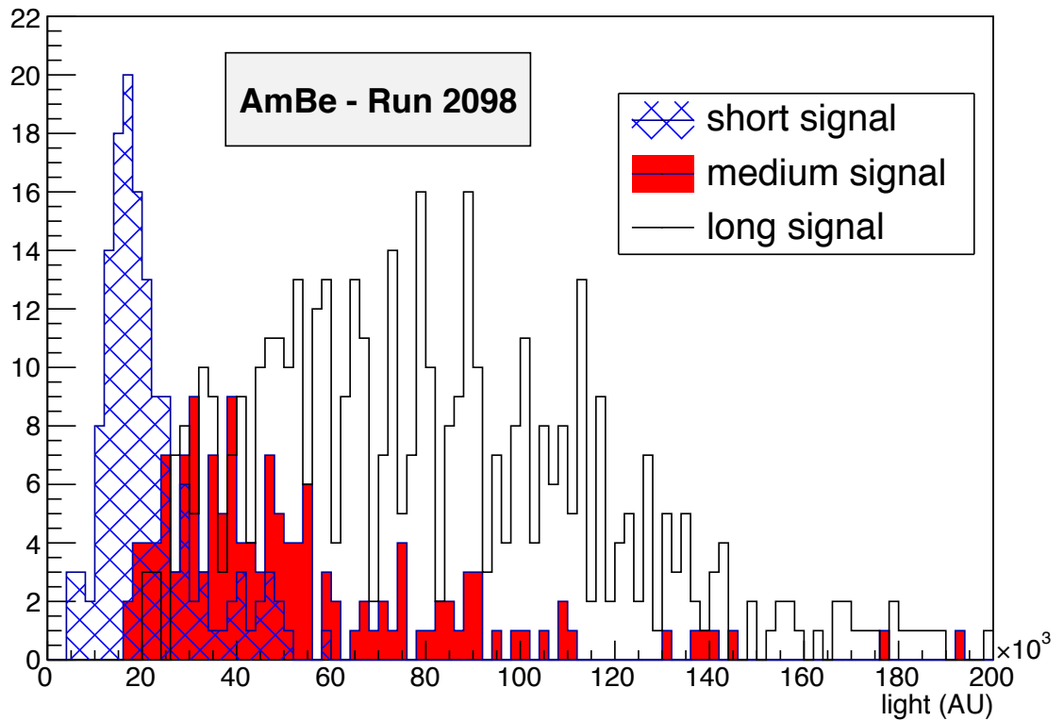


# Light Integral

**Iron peak (AU)** $12900 \pm 100$

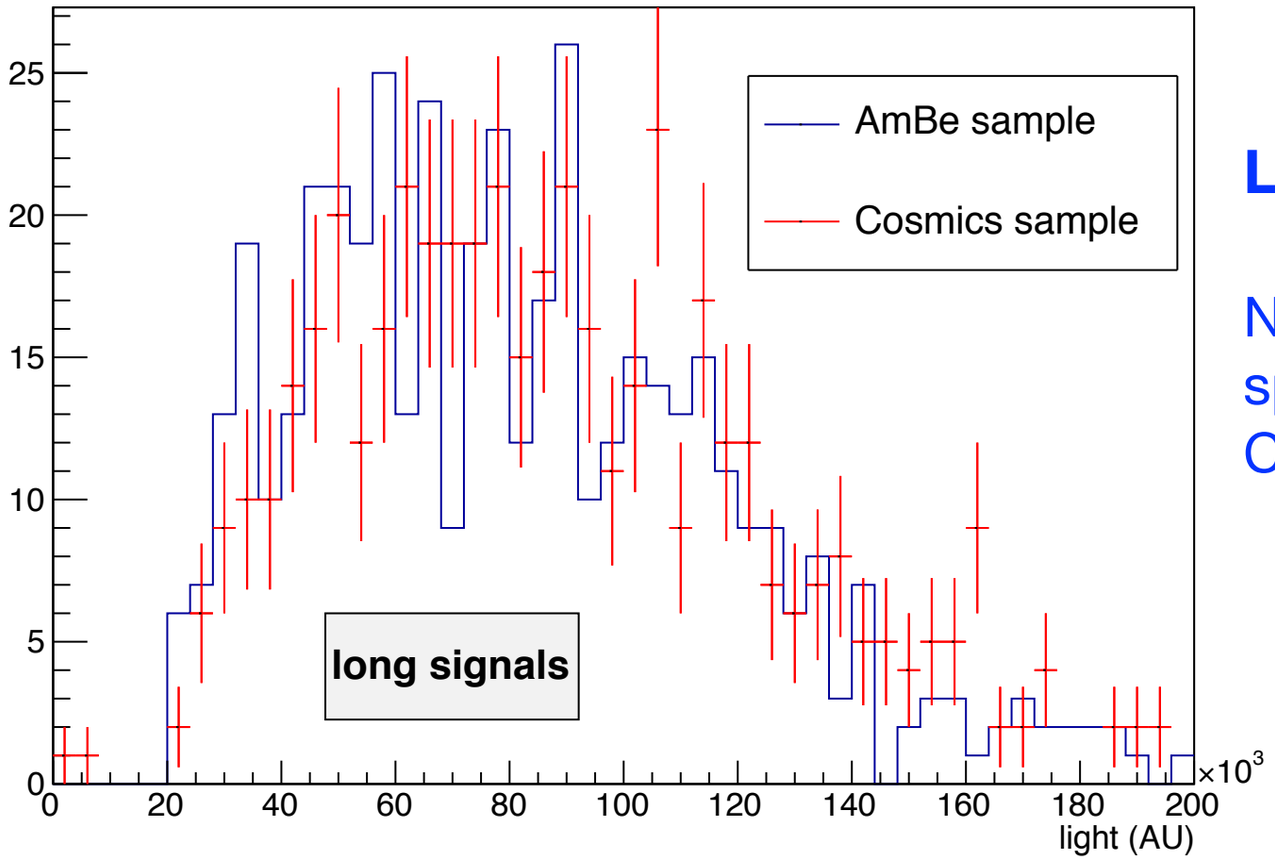


# Long signal comparison

## *Cosmic normalization*




**Long signals related to Cosmics.**

Normalized distributions of long signal spectra shape are similar in Cosmic and AmBe samples

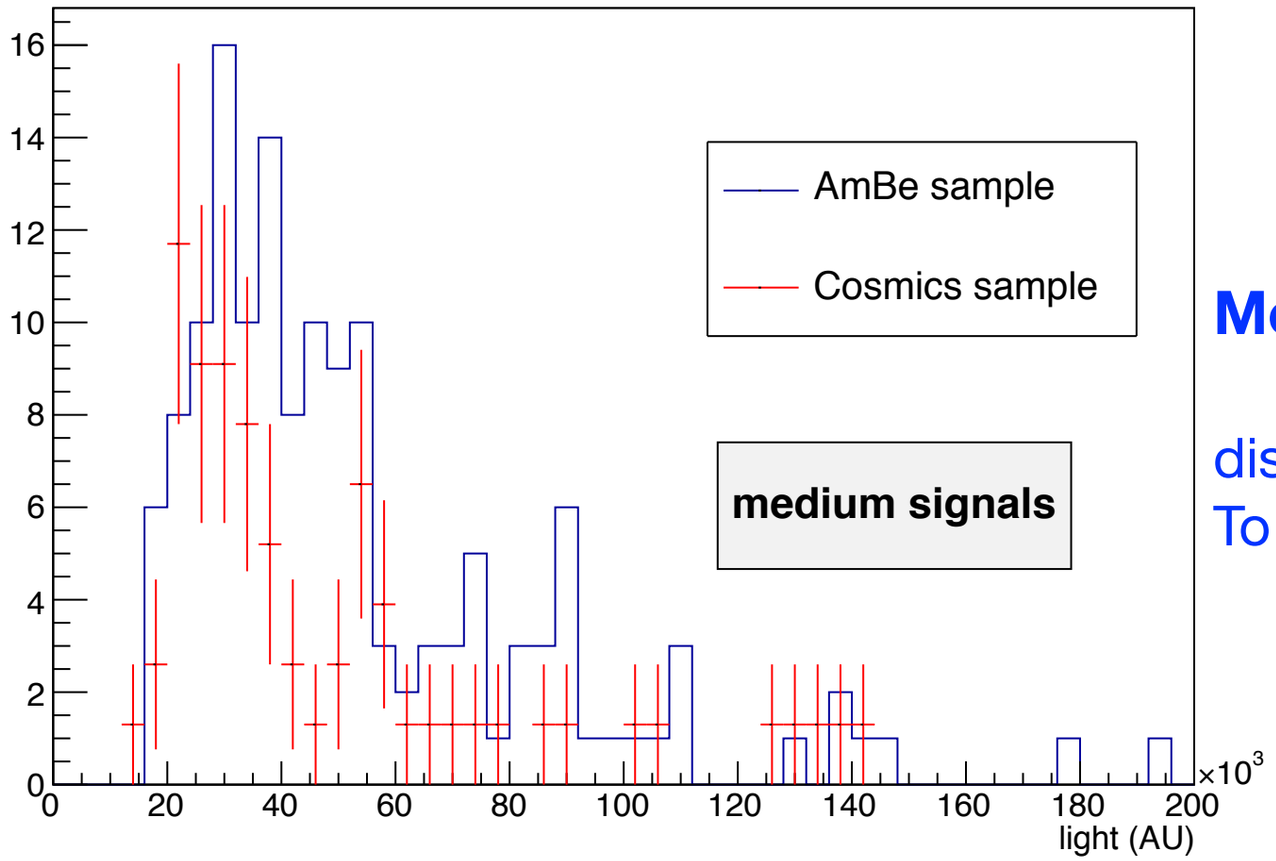
Comparison of long signal fractions
**Cosmic sample: 79 %** of long signals
**AmBe sample: 62 %** of long signals
**Fe Open sample: 31 %** of long signals

**Ratio of comics in AmBe vs Cosmic sample 78 %**
**Ratio of comics in Fe Open vs Cosmic sample 39 %**

**CAVEAT**

During selection events with bad pedestal are removed. They seem to be mostly comics.
78 % -> 80 % (work in progress)

# Medium signal comparison




**Medium signals**

distributions of medium signal normalized
To the different DAQ efficiency

Comparison of medium signal fractions
**Cosmic sample: 11 %** of medium signals
**AmBe sample: 19 %** of medium signals
**Fe Open sample: 6 %** of medium signals

**CAVEAT**
During selection events with bad pedestal are removed.
Fractions could change (work in progress)

More statistic needed to check if peaks are present in AmBe (work in progress)