

T3B SiPM & Tile Tests with UV Leds



Max-Planck-Institut für Physik
(Werner-Heisenberg-Institut)

Tungsten Timing

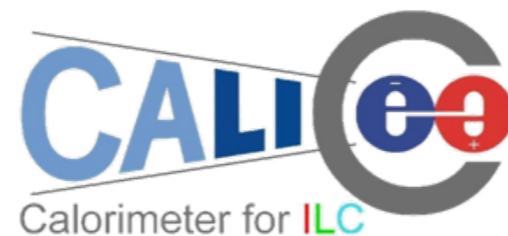


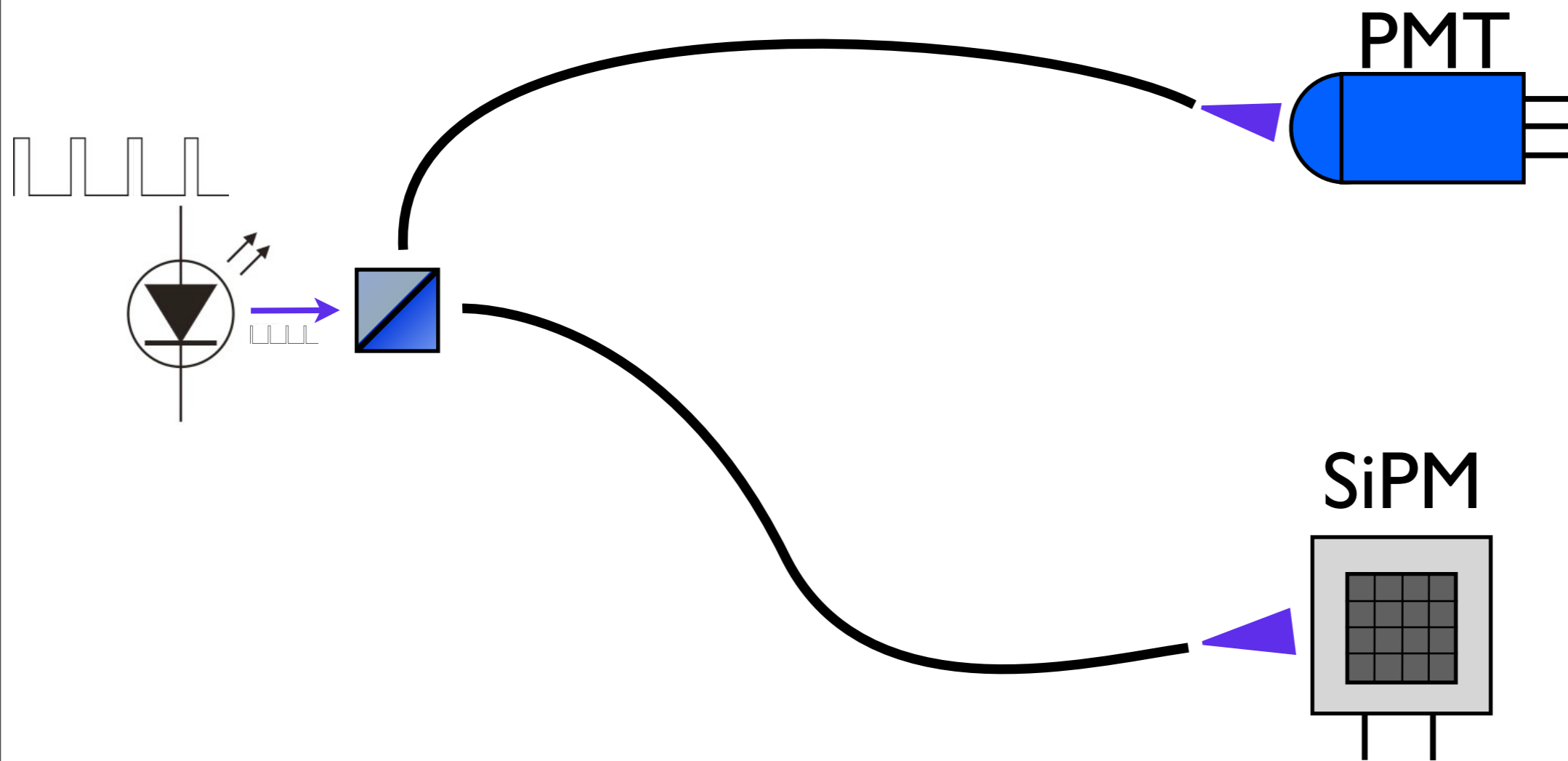
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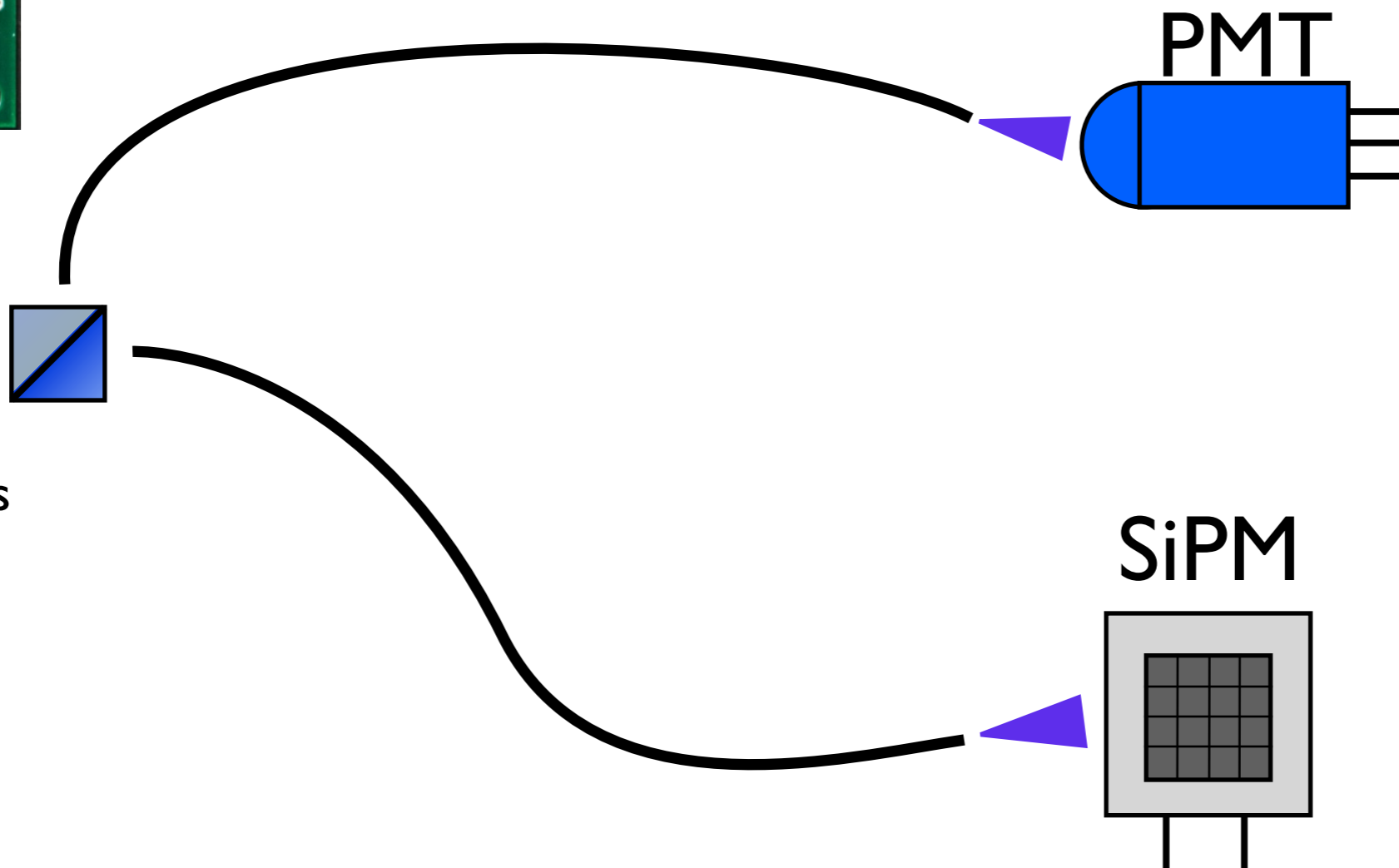
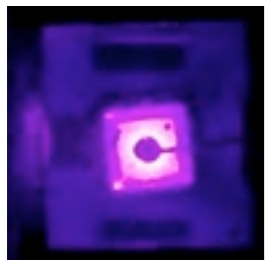
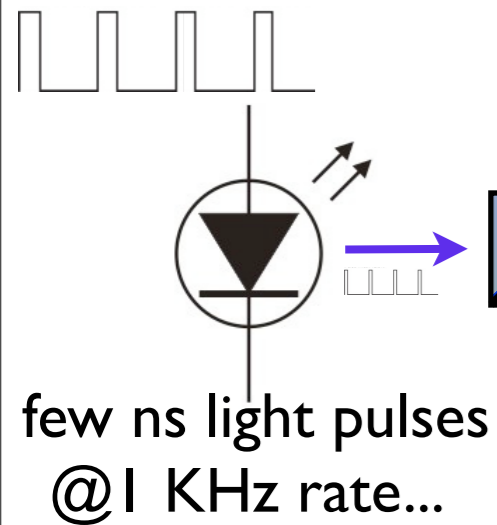
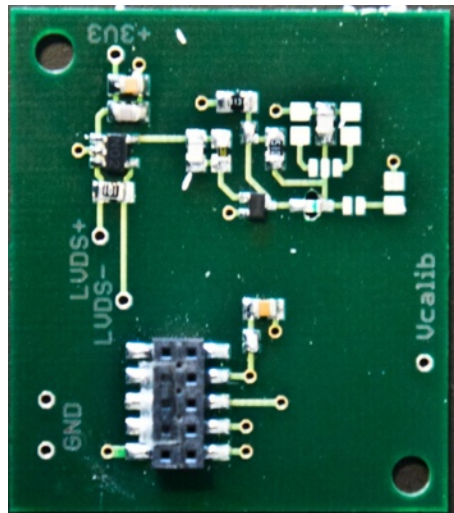
Introduction

- Understand the saturation behavior of a tile-coupled SiPM
- Investigate the time structure of the signal
- Saturation Calibration for the T3B experiment

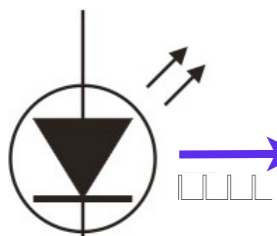
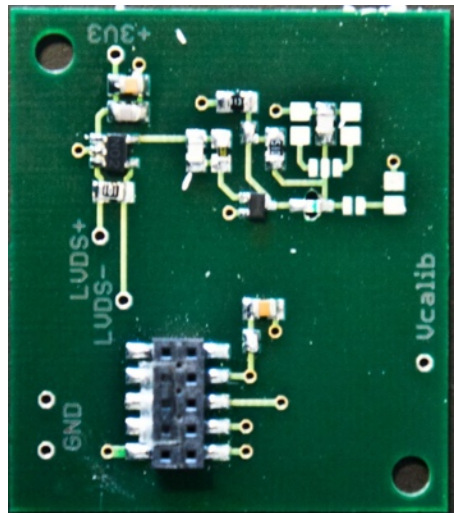
The Experimental Setup



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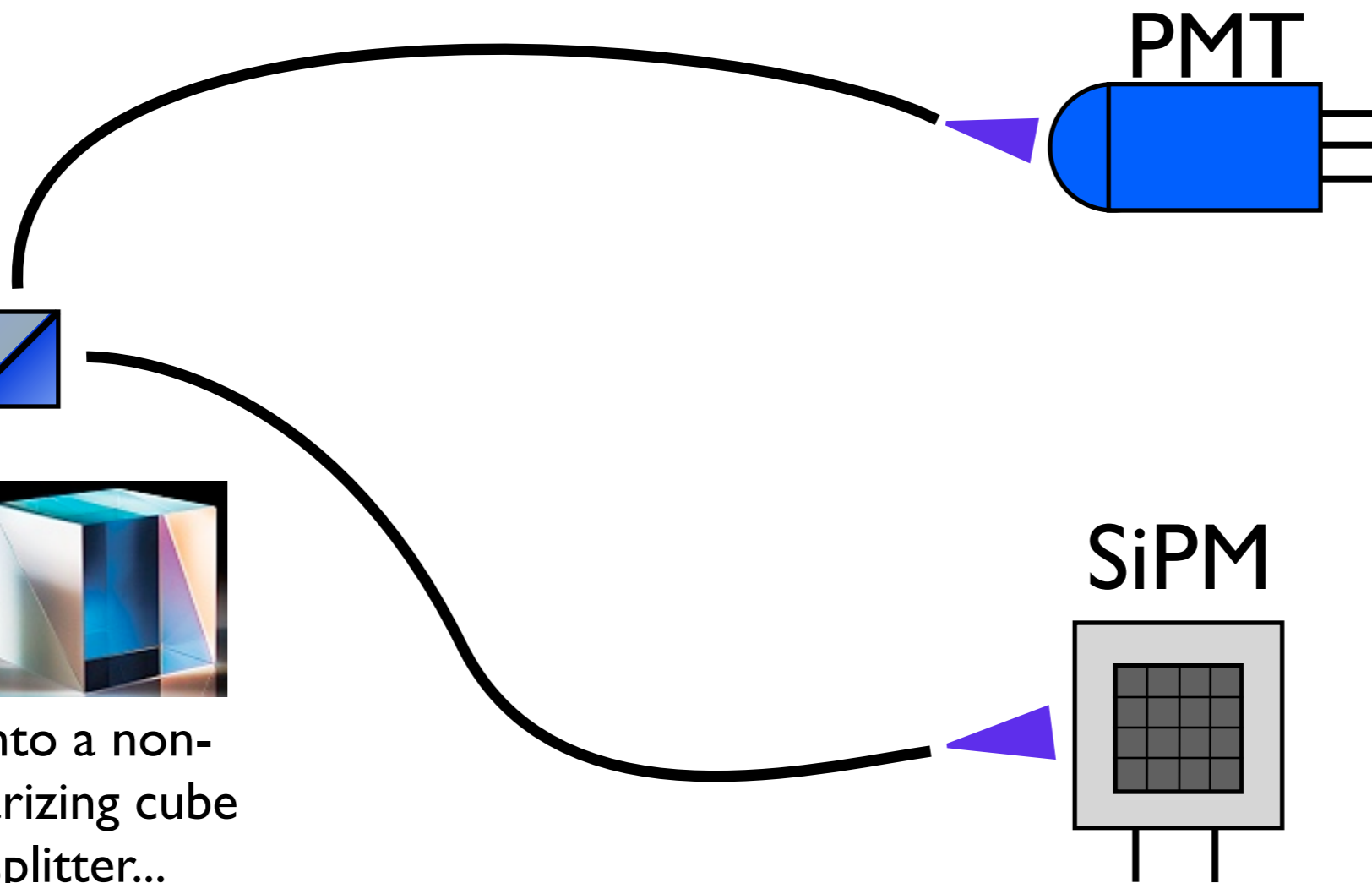
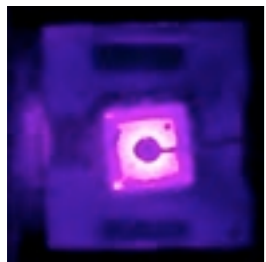
The Experimental Setup



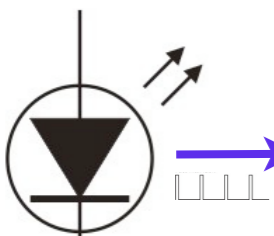
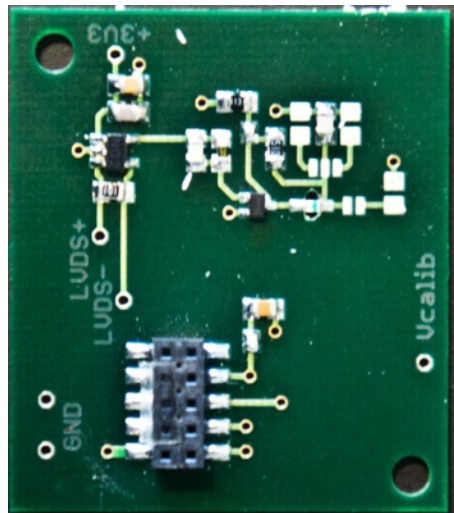
few ns light pulses
@1 KHz rate...



...into a non-polarizing cube splitter...



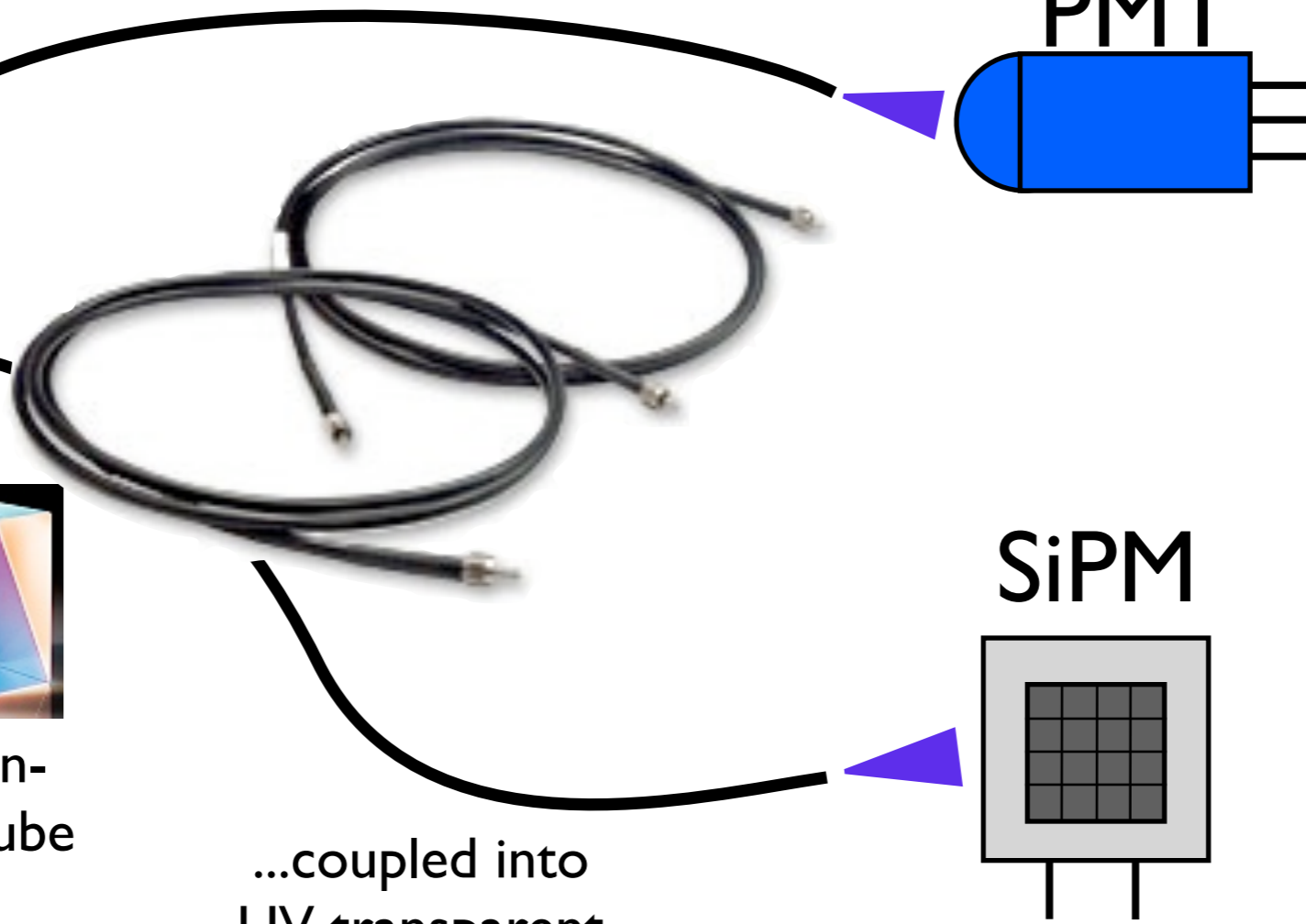
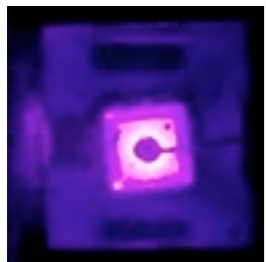
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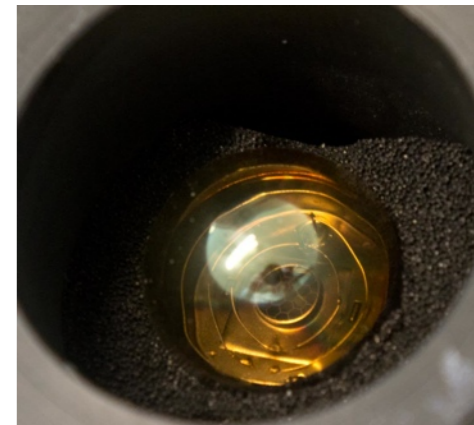
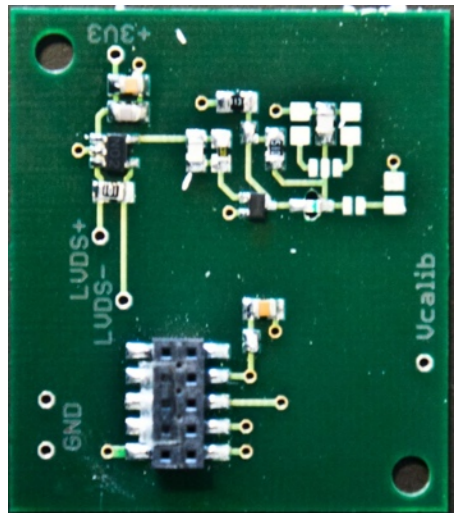


...into a non-polarizing cube splitter...



...coupled into
UV transparent
fiber optics...

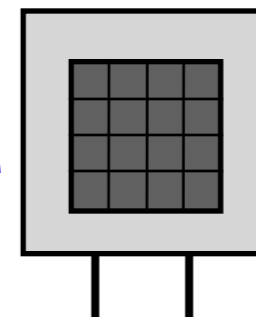
The Experimental Setup



PMT

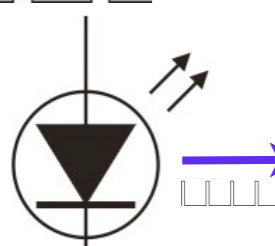
...shines on a PMT from the MAGIC group...

SiPM

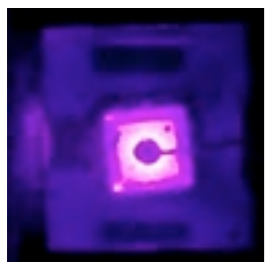


...coupled into UV transparent fiber optics...

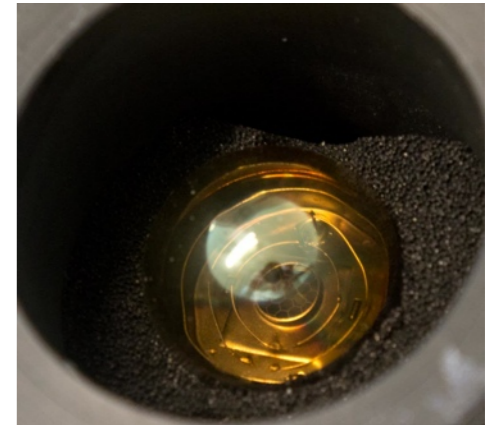
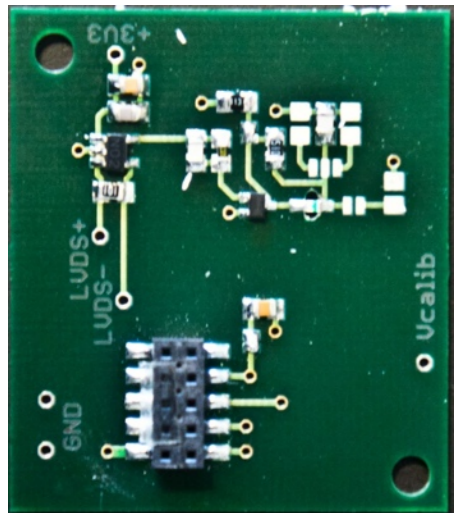
...into a non-polarizing cube splitter...



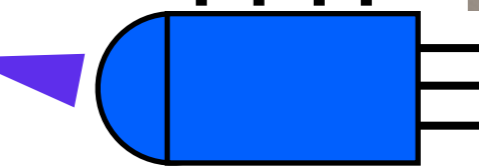
few ns light pulses @ 1 KHz rate...



The Experimental Setup

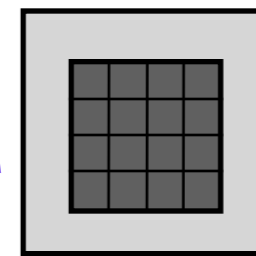


PMT

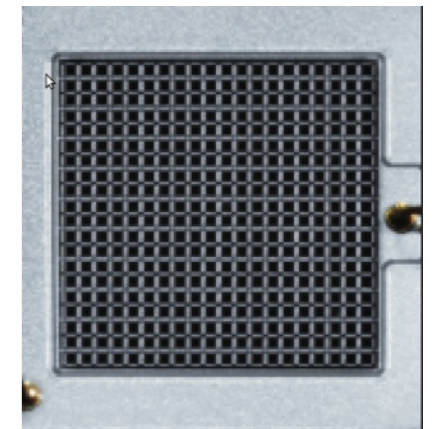


...shines on a PMT from the MAGIC group...

SiPM



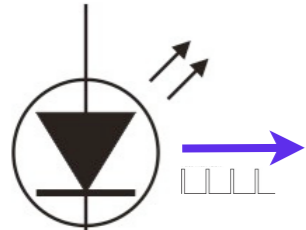
...and an Hamamatsu SiPM



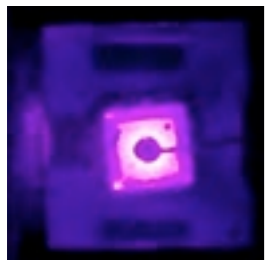
...coupled into UV transparent fiber optics...



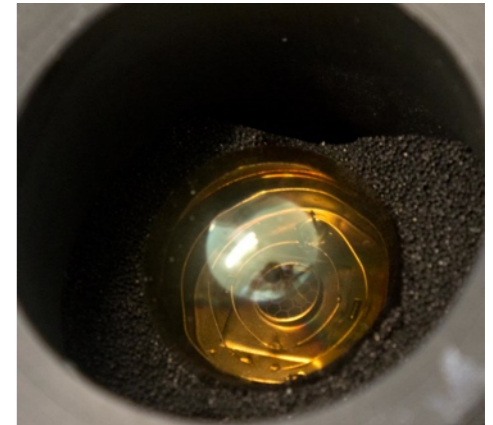
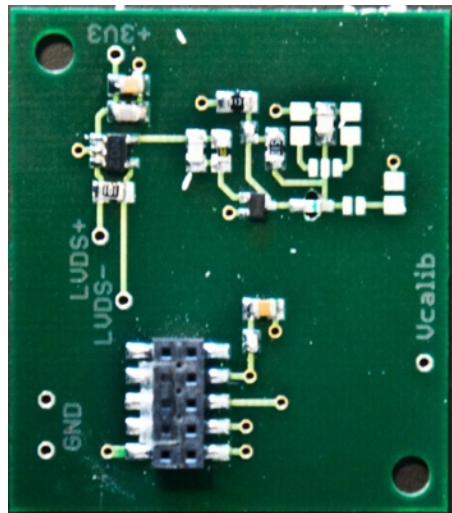
...into a non-polarizing cube splitter...



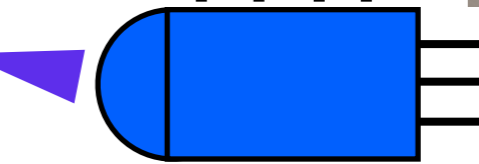
few ns light pulses @ 1 KHz rate...



The Experimental Setup



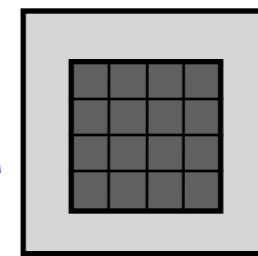
PMT



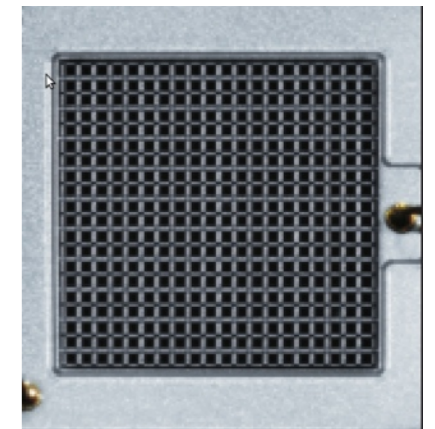
...shines on a PMT from the MAGIC group...

Everything is read out with the T3B DAQ

SiPM



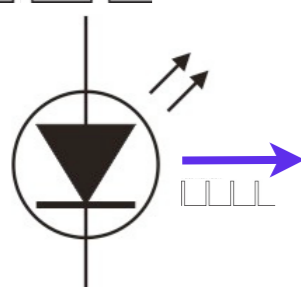
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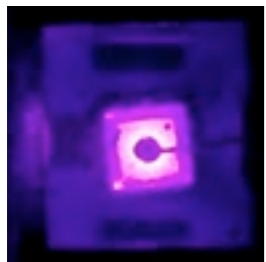
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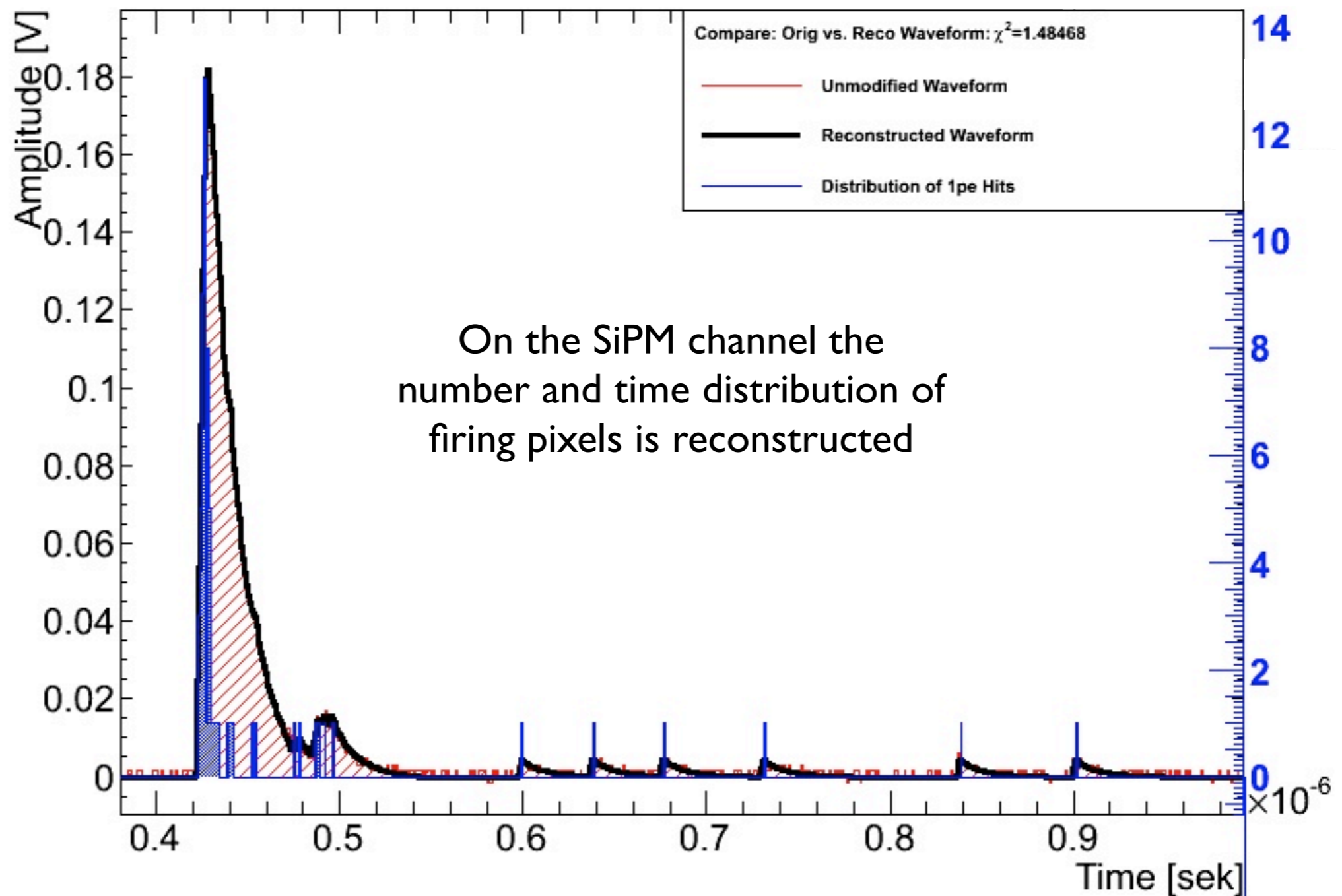
...into a non-polarizing cube splitter...



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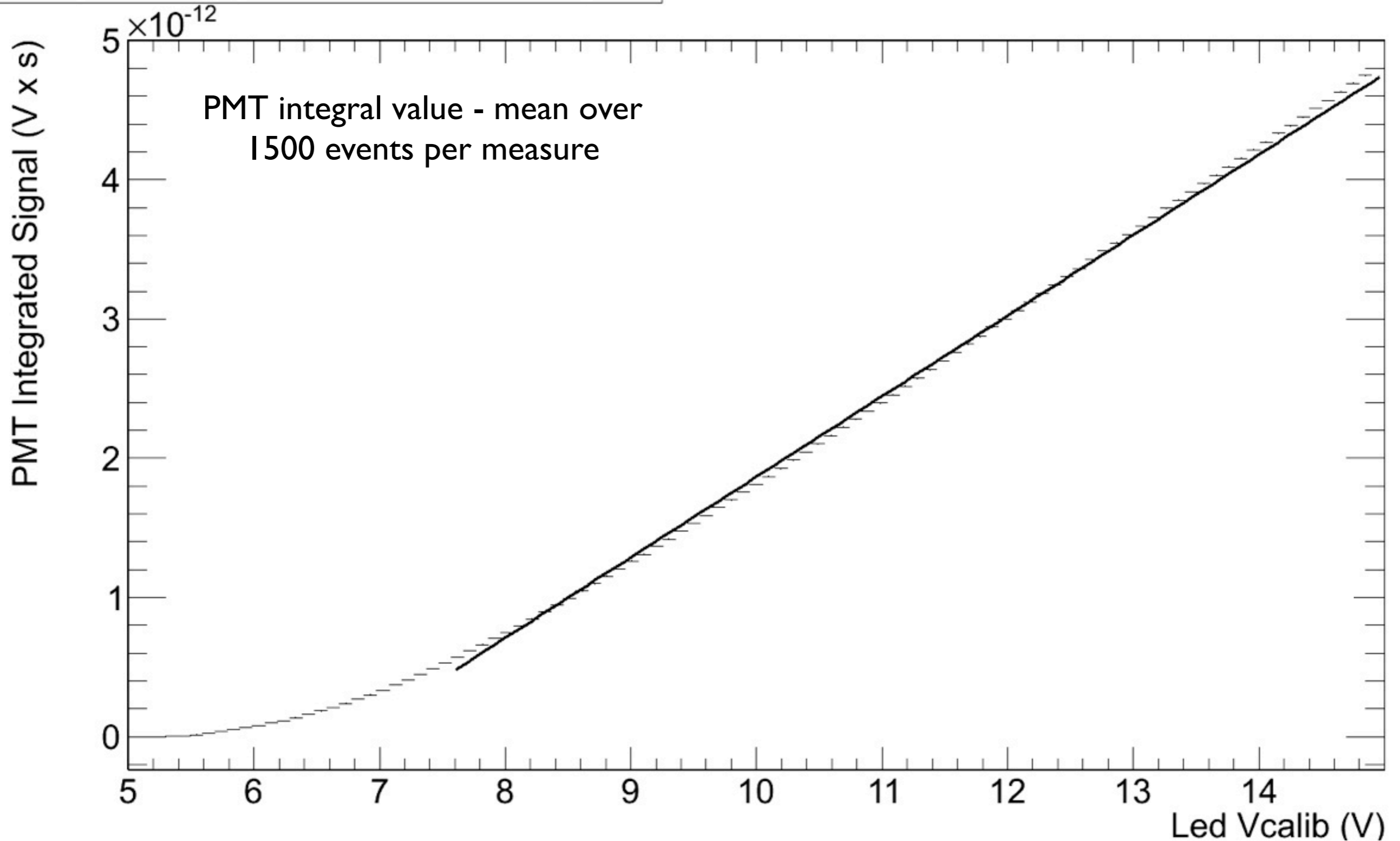


WaveForm Decomposition



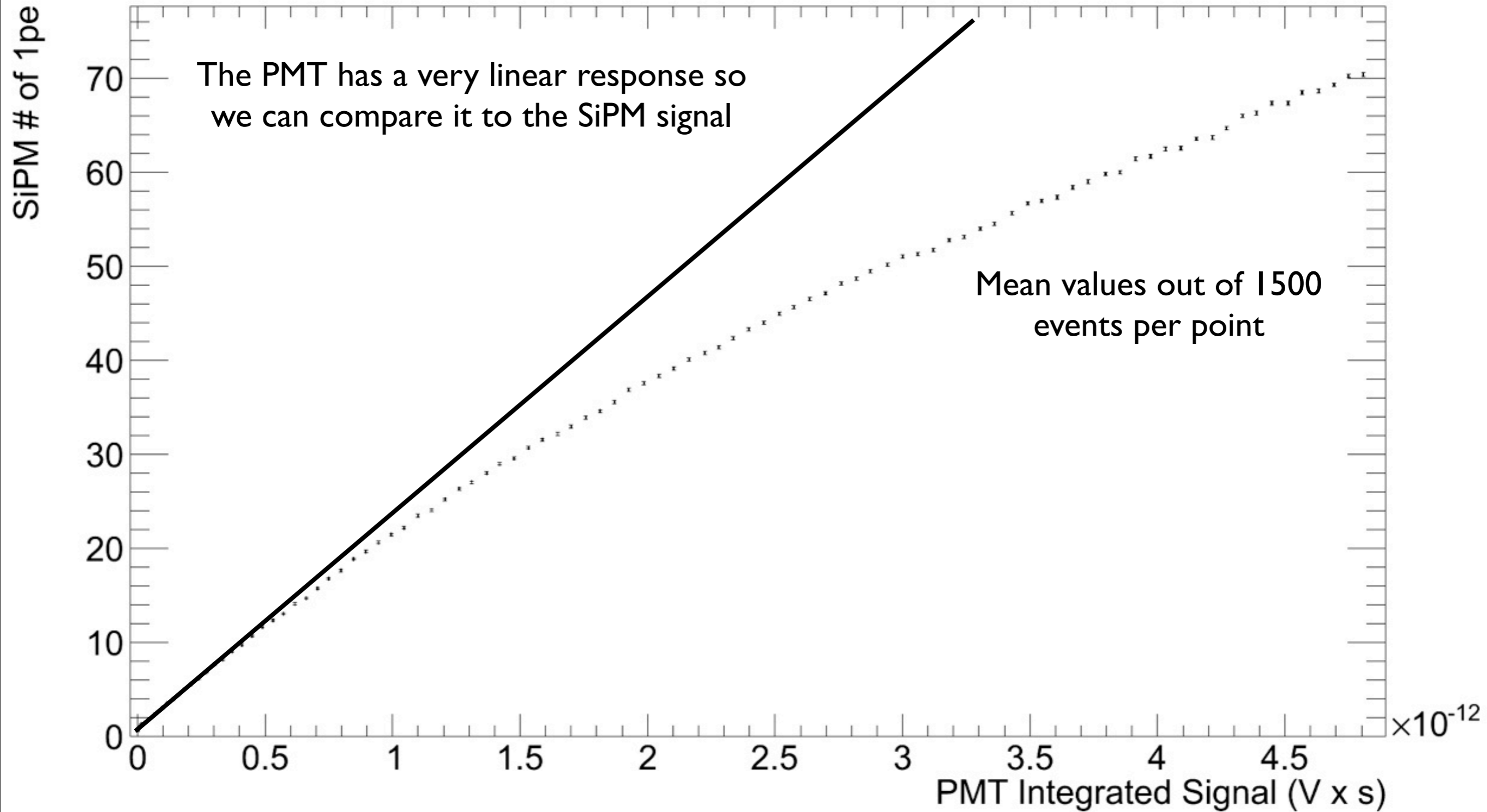
Led Emission Linearity

Signal Integral vs Led Intensity-



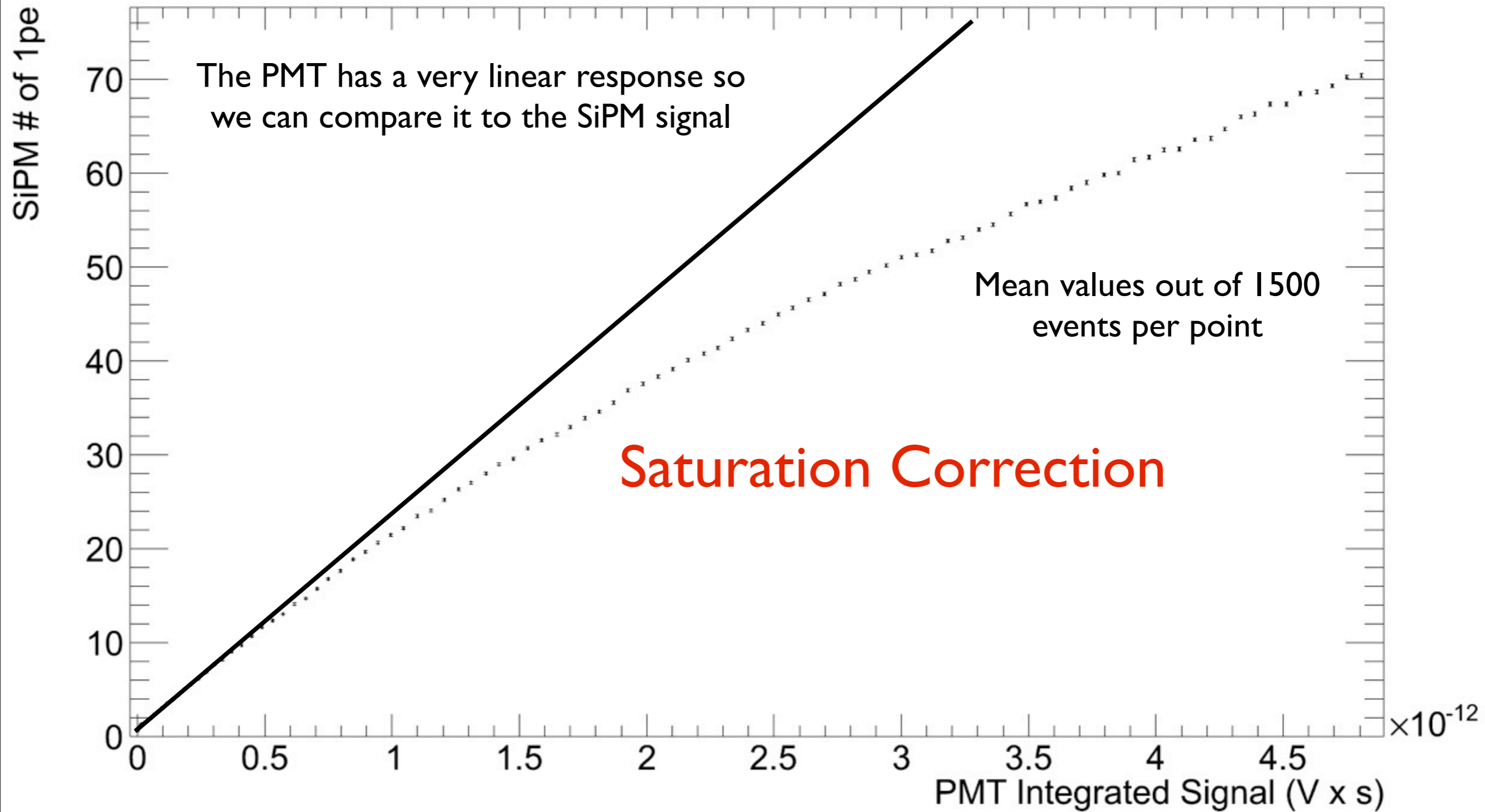
Saturation

Pmt vs SiPM



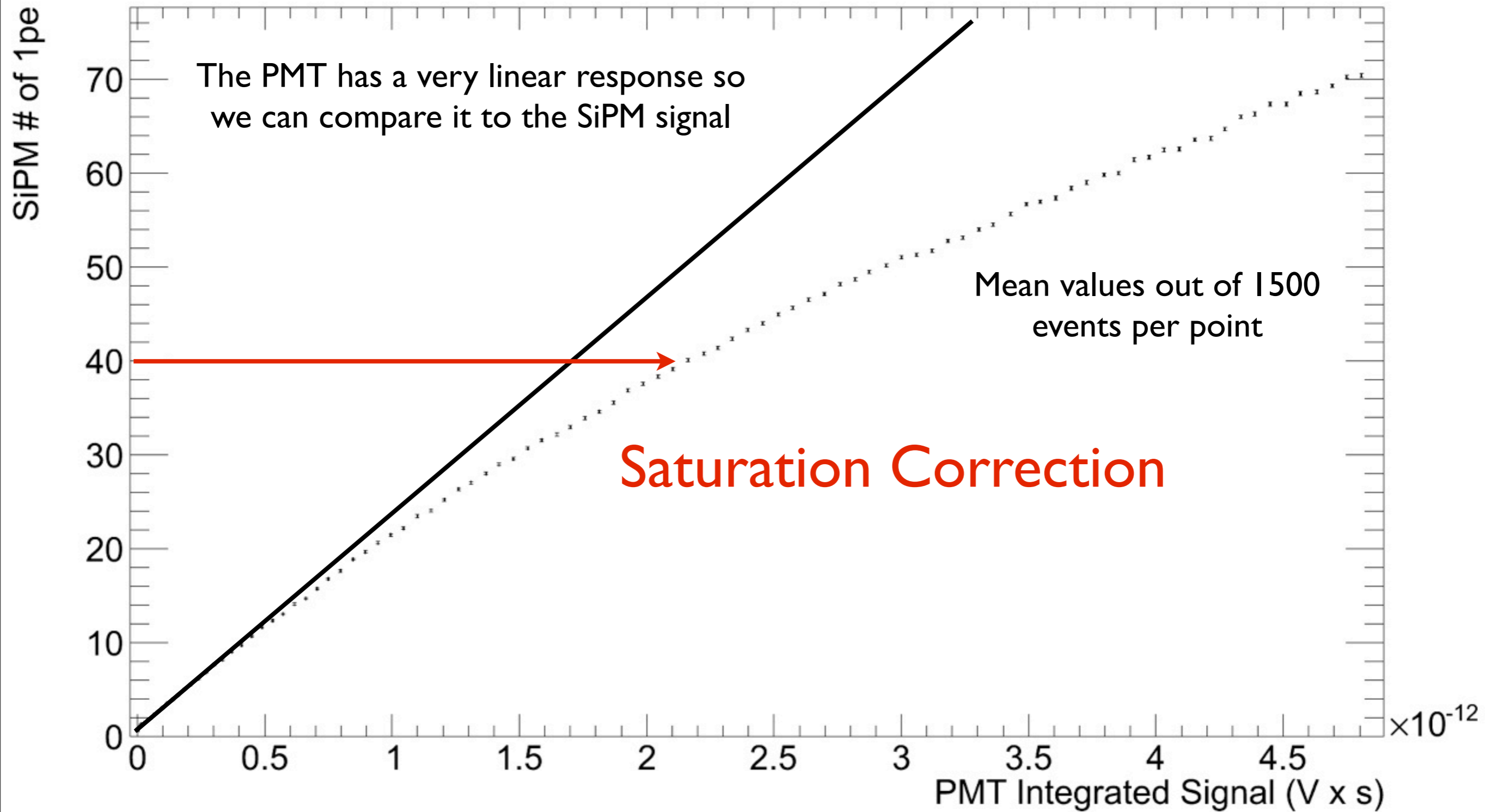
Saturation

Pmt vs SiPM



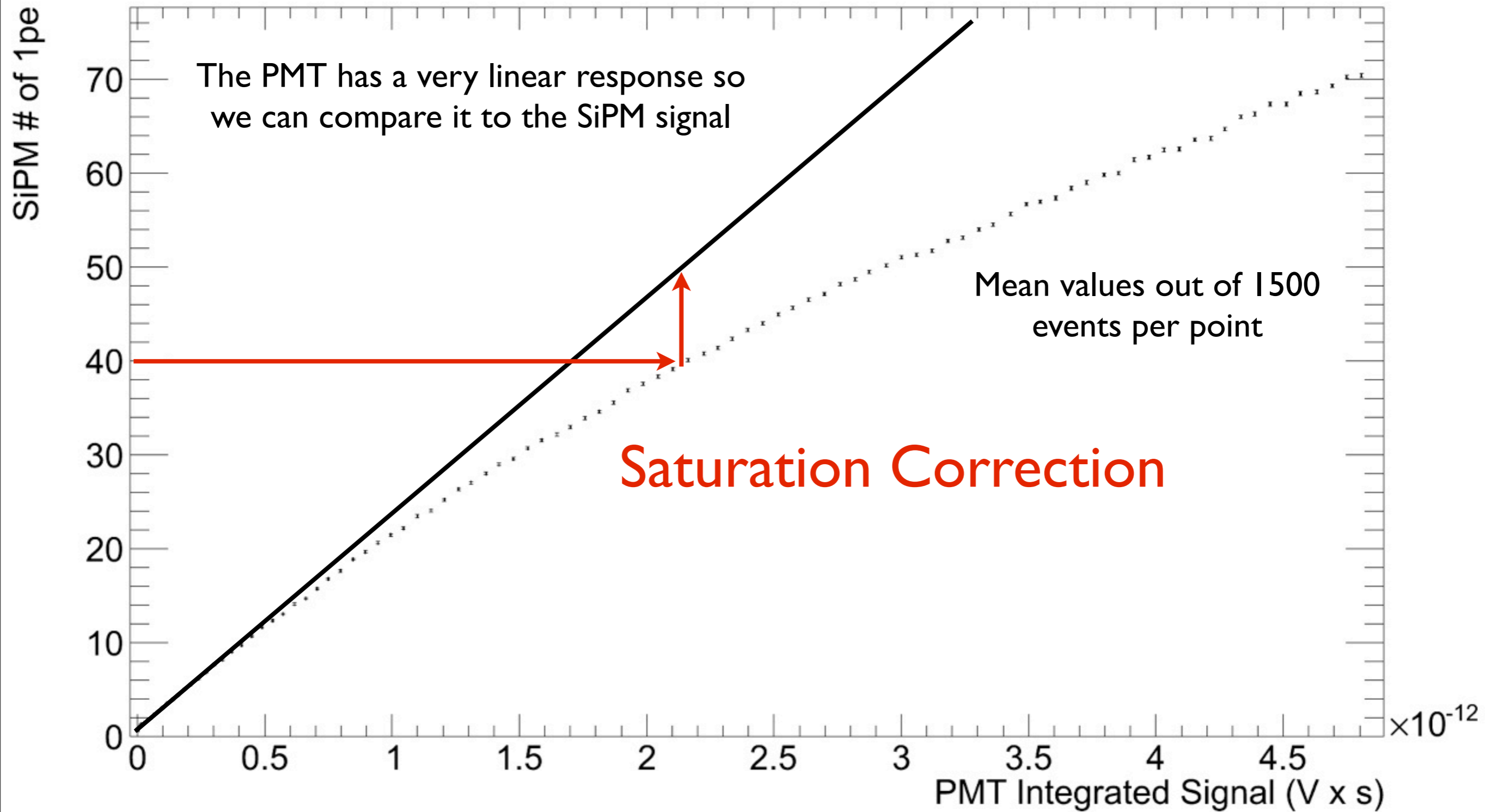
Saturation

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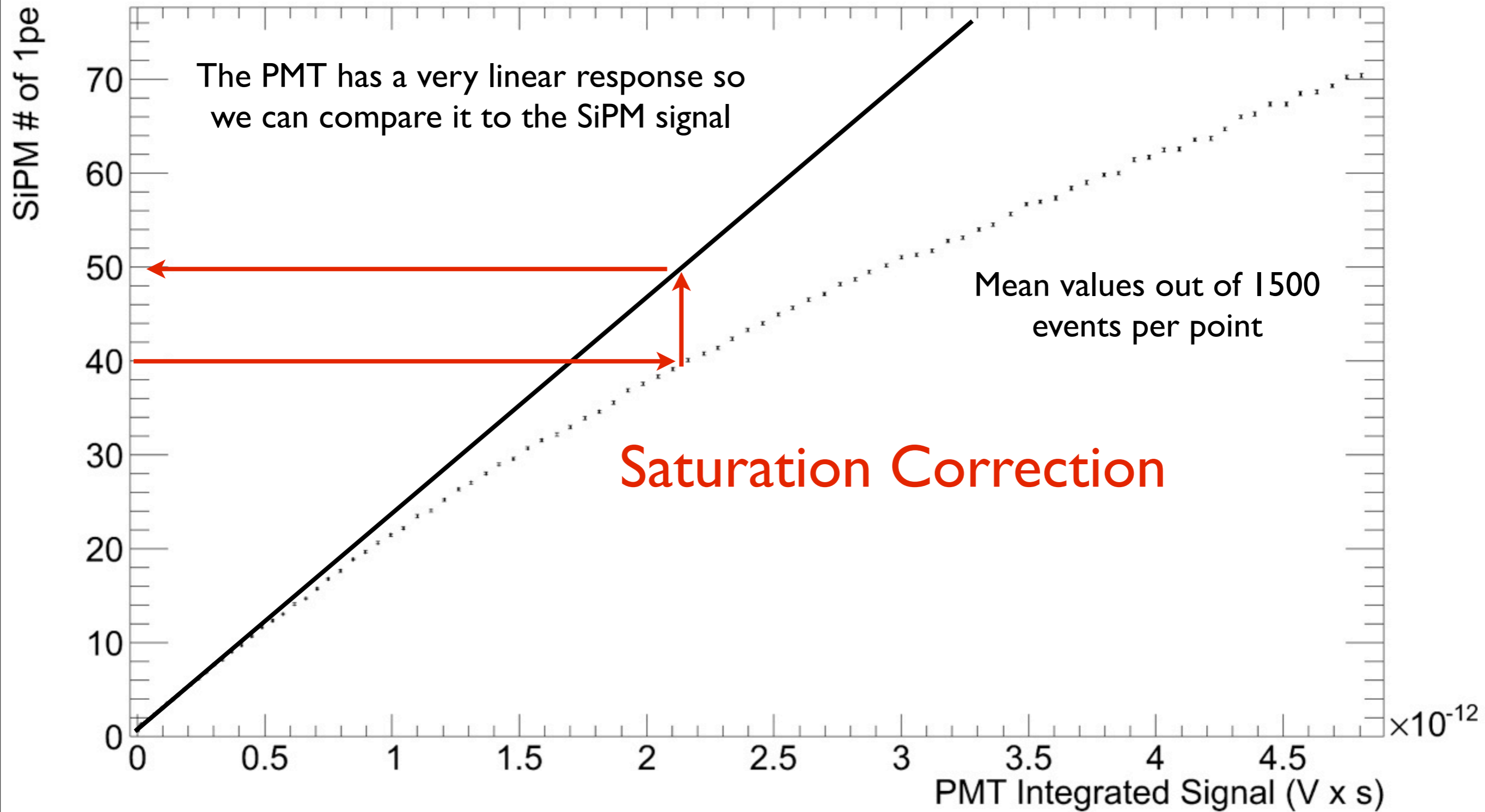
Saturation

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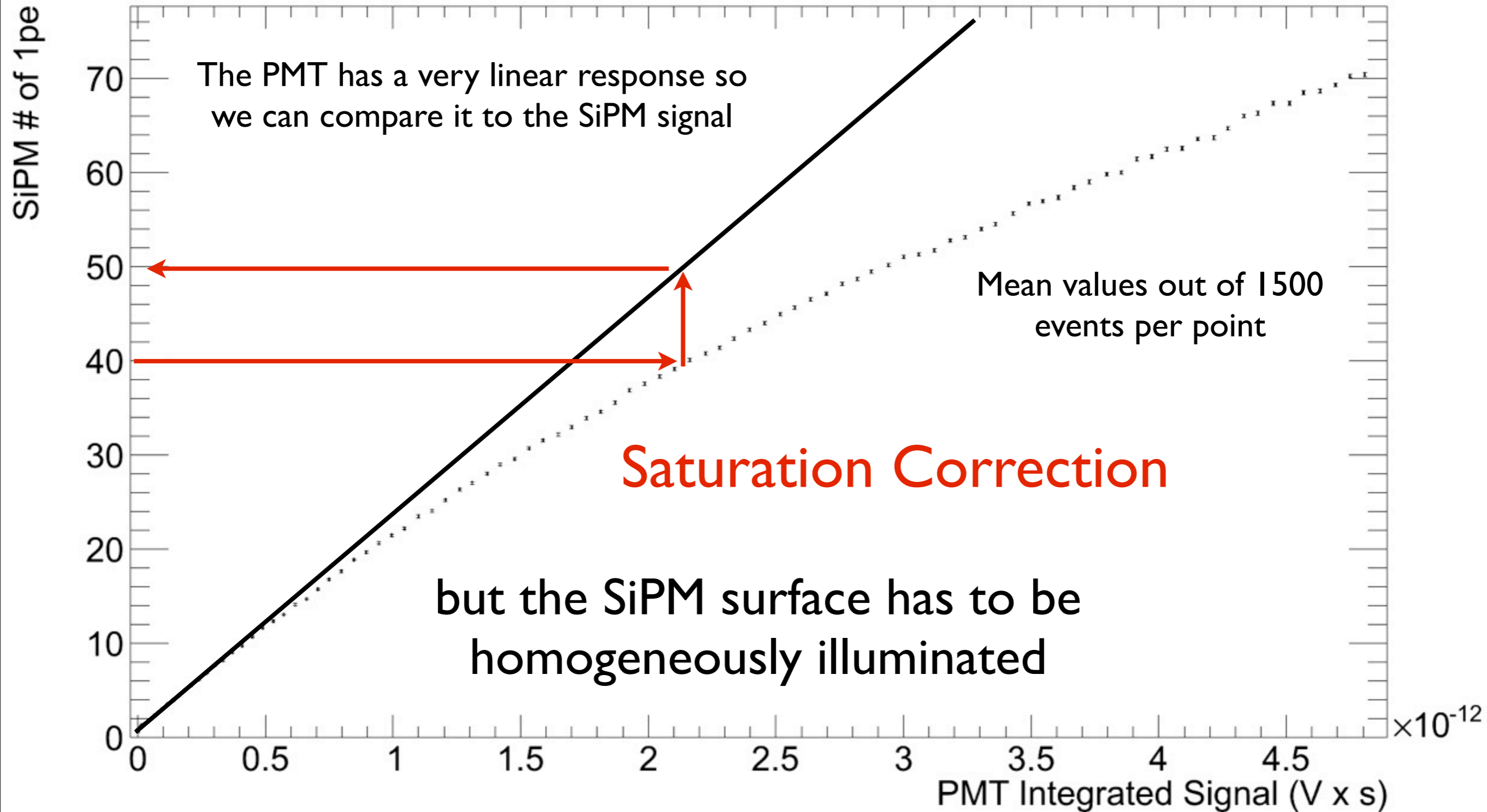
Saturation

Pmt vs SiPM

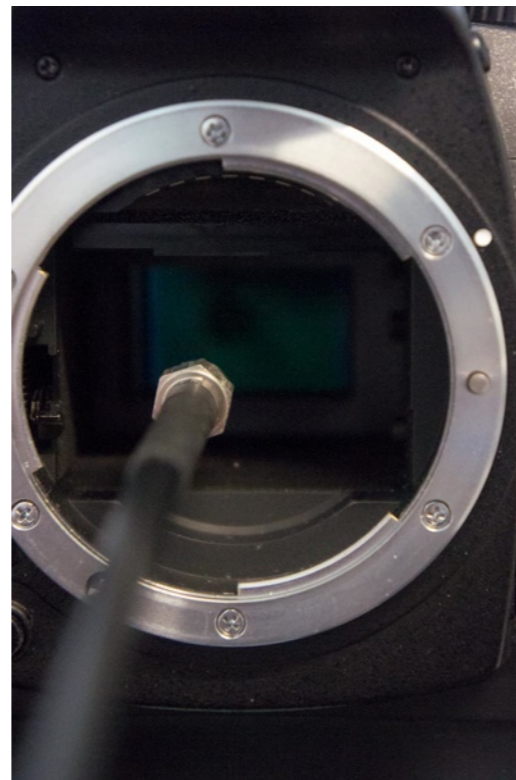
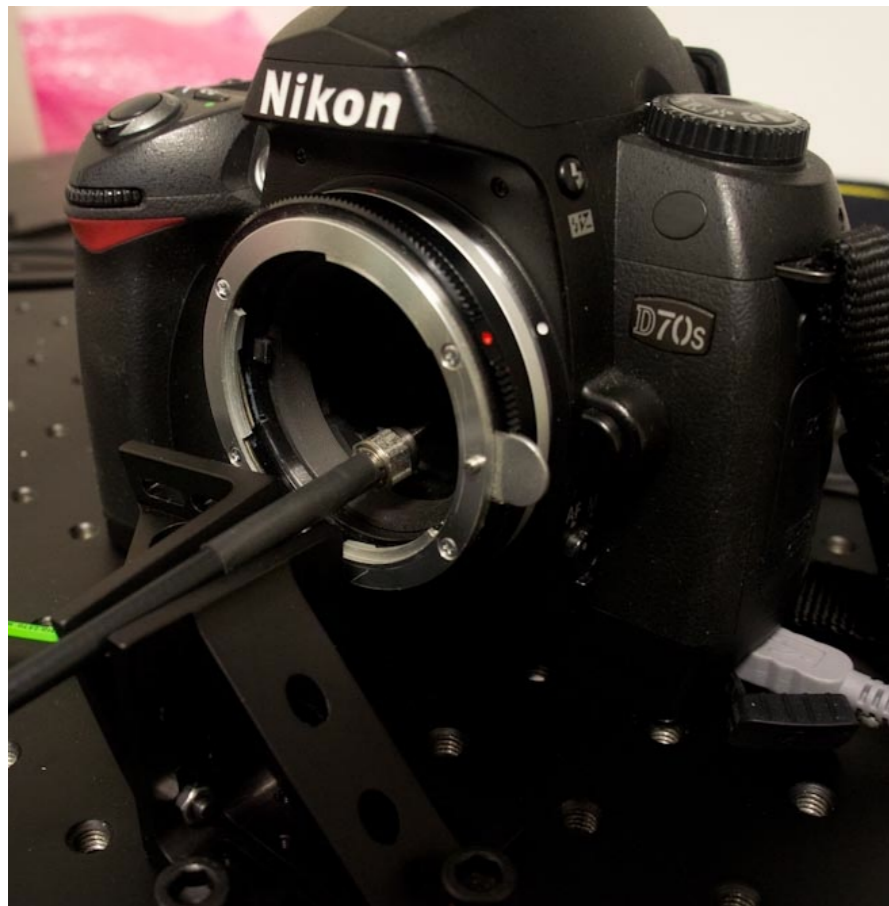


Saturation

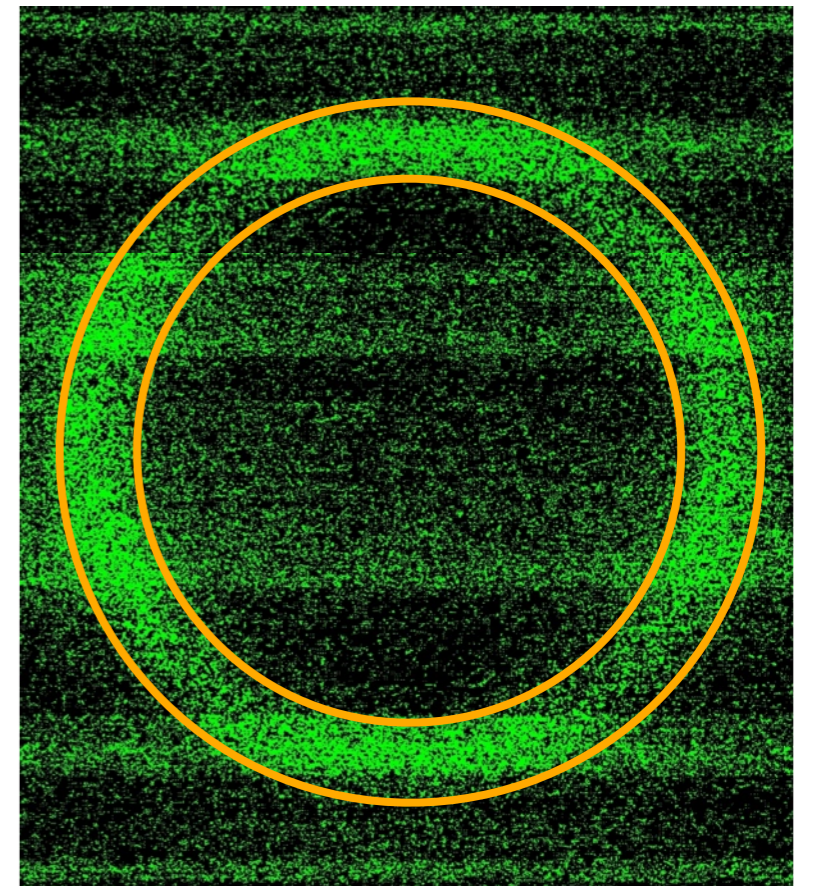
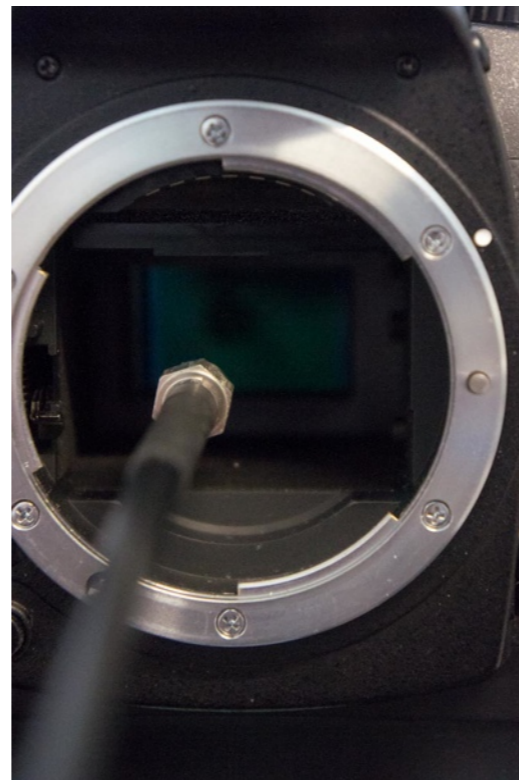
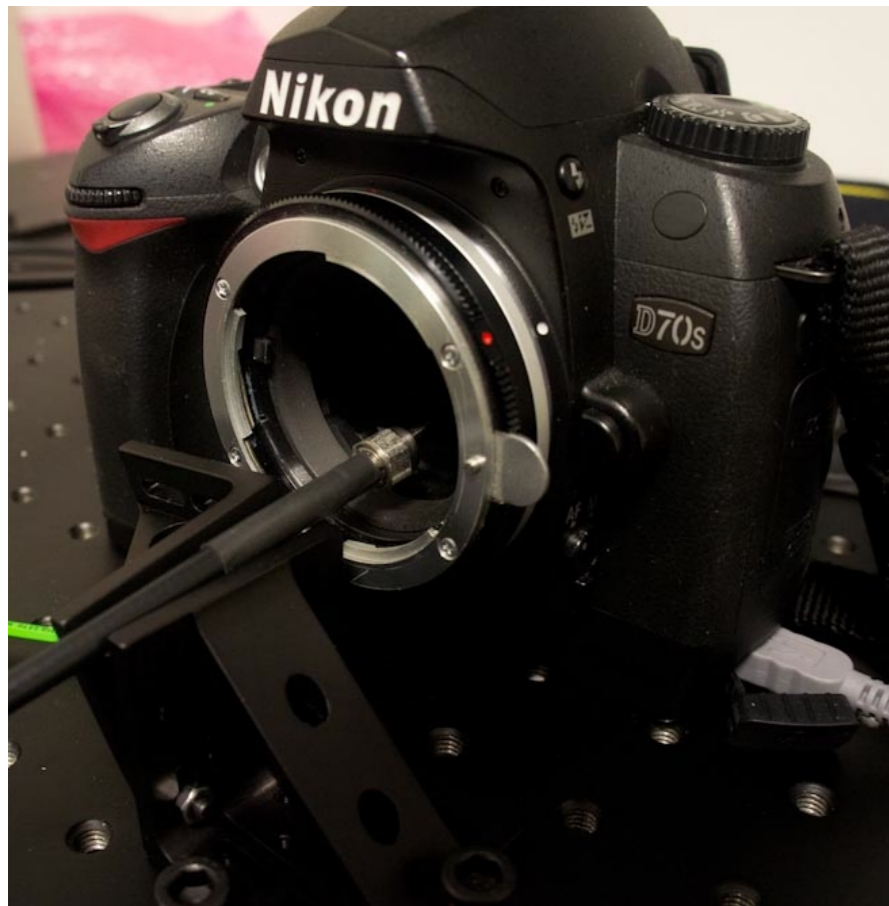
Pmt vs SiPM



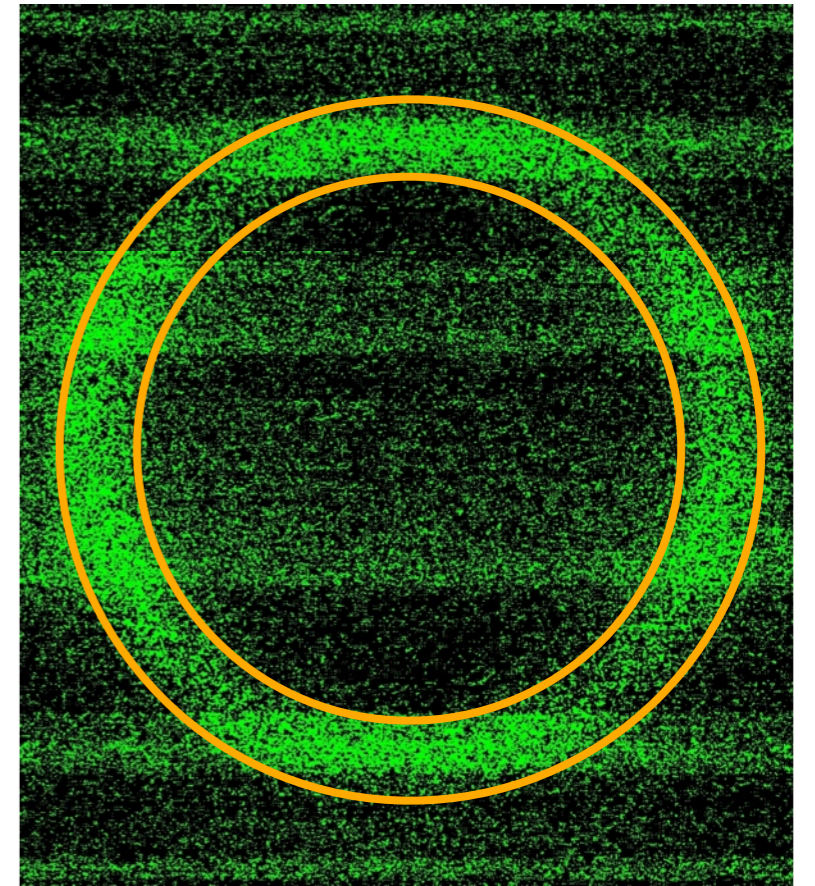
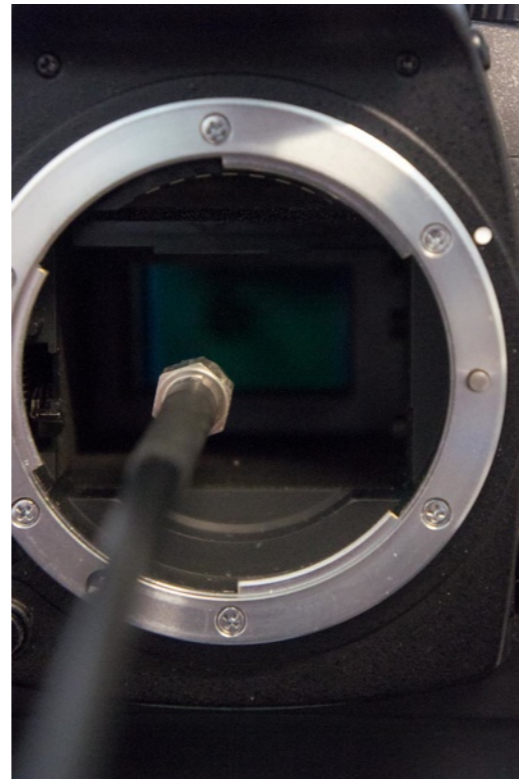
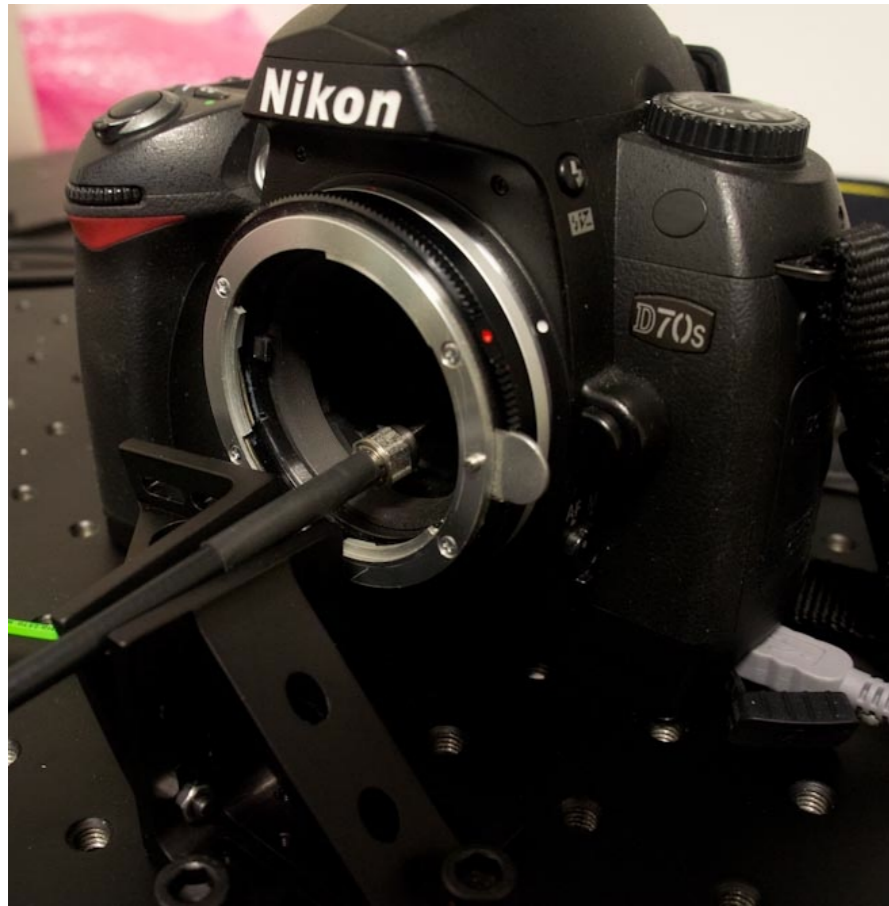
Light Homogeneity



Light Homogeneity

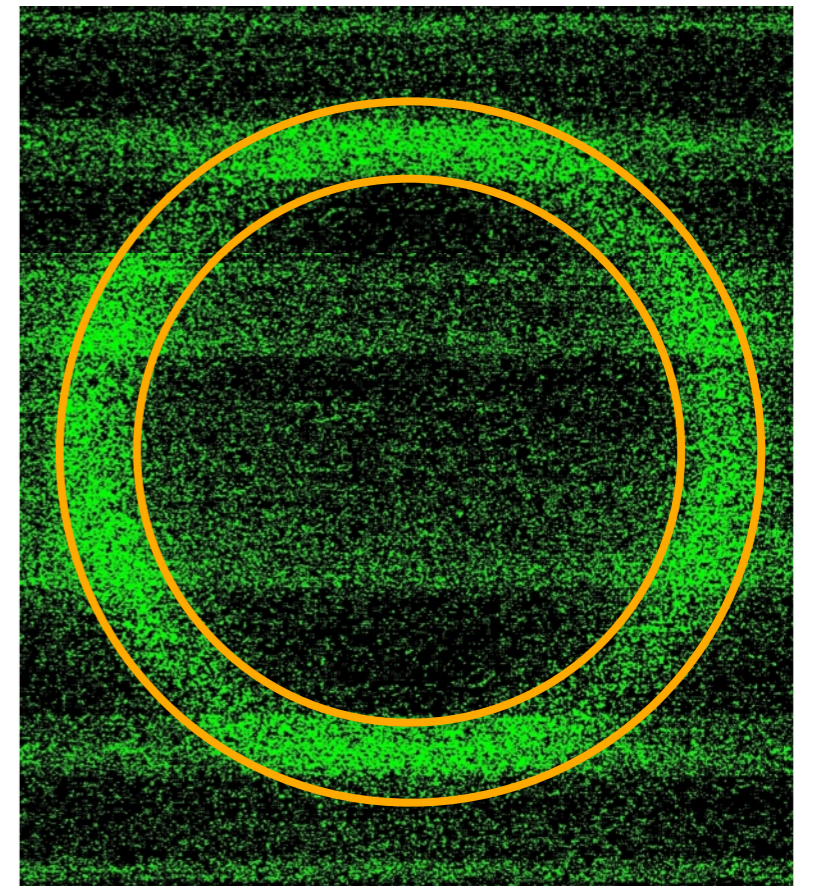
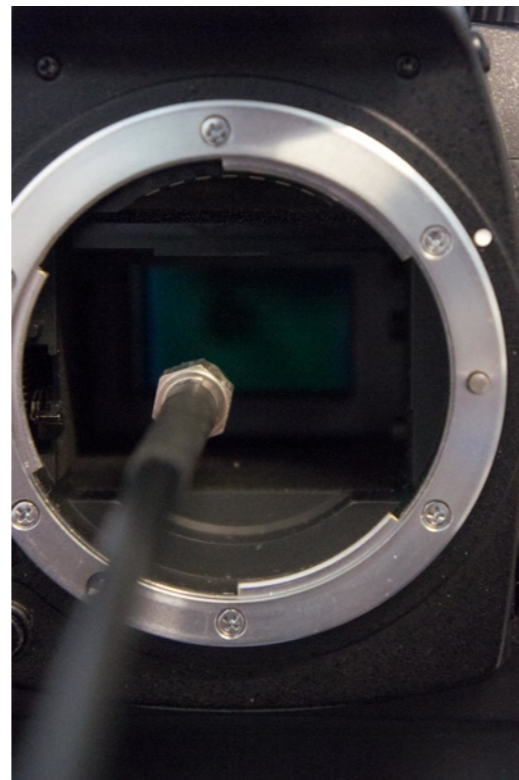
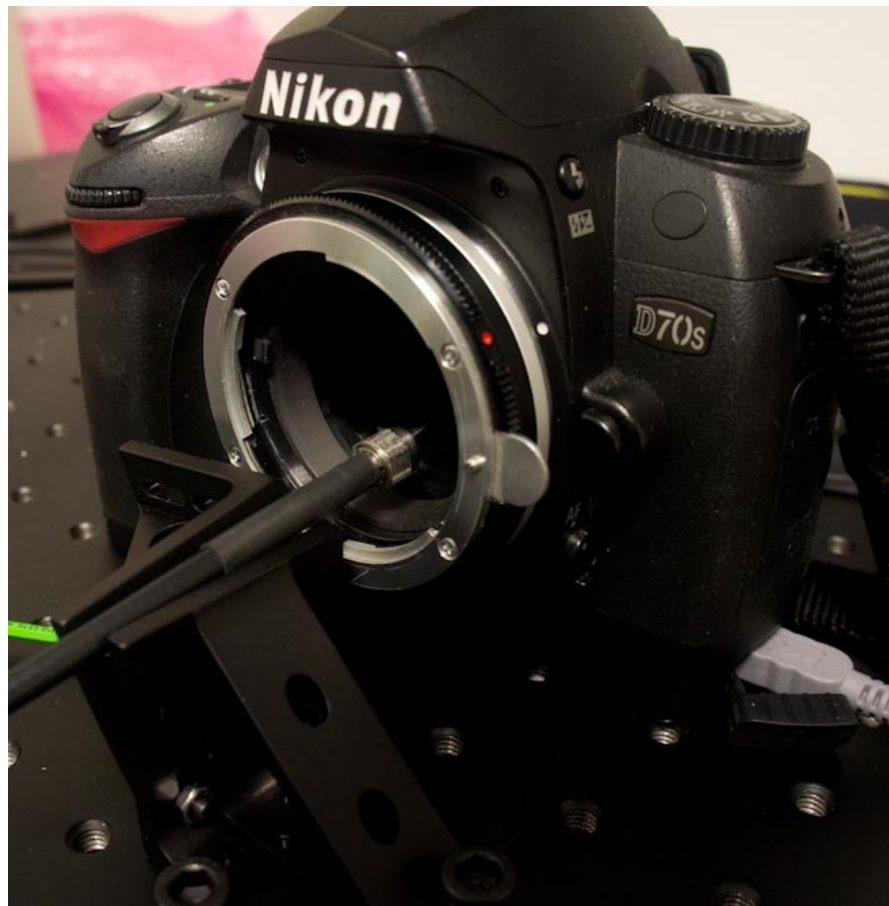


Light Homogeneity



The light emitted from the fibers is not homogeneous!

Light Homogeneity

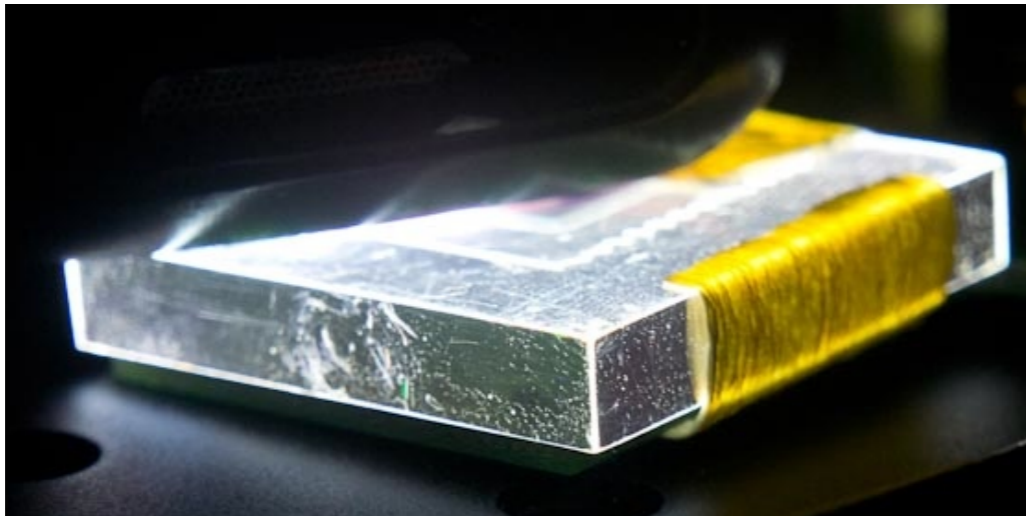


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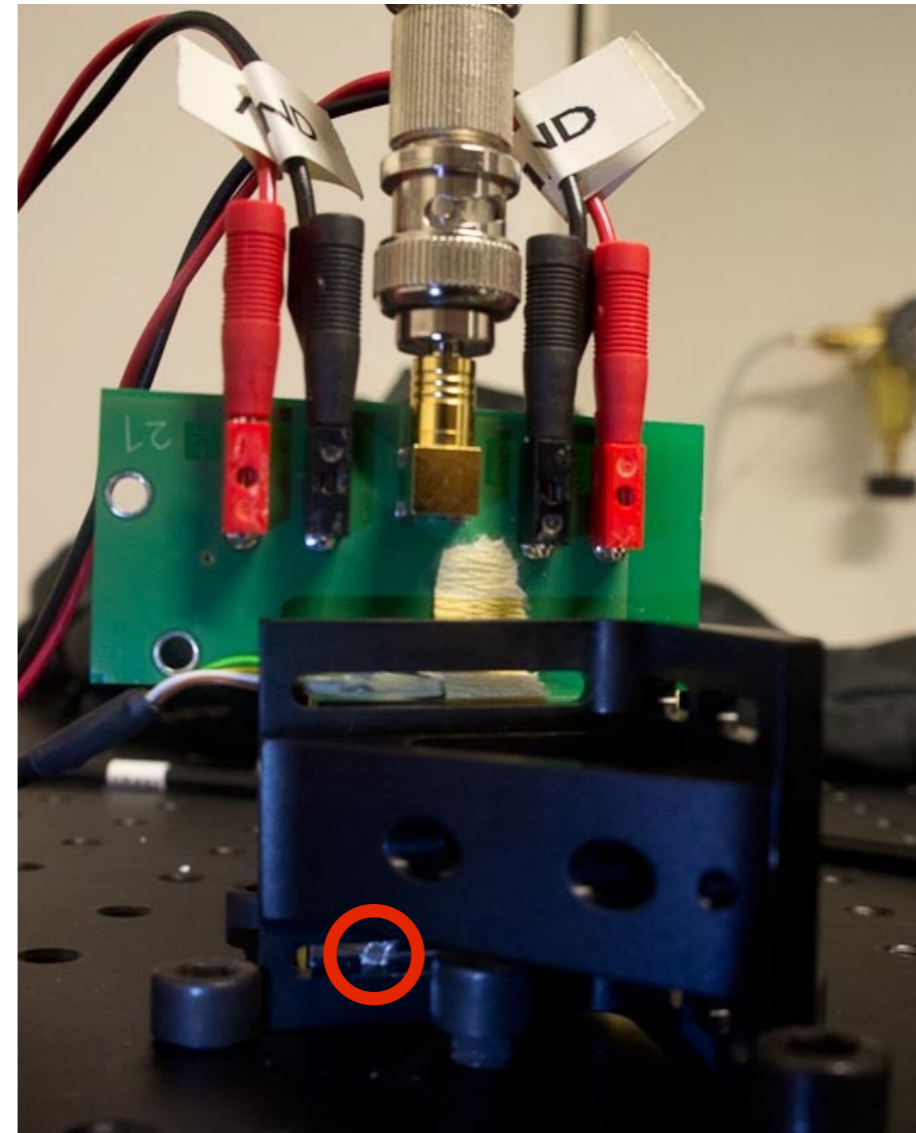
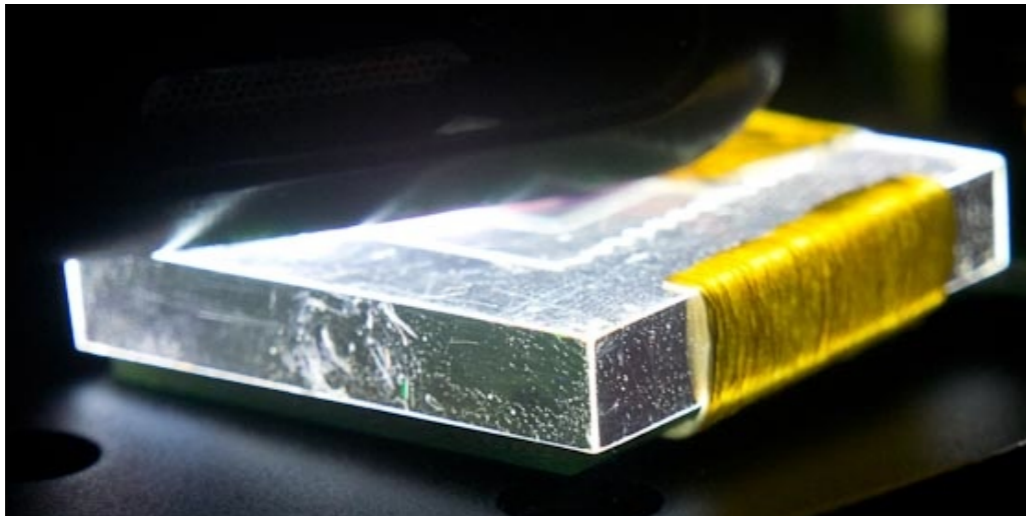
... we could try to diffuse the light with an opaline layer

Coupling a T3B Tile

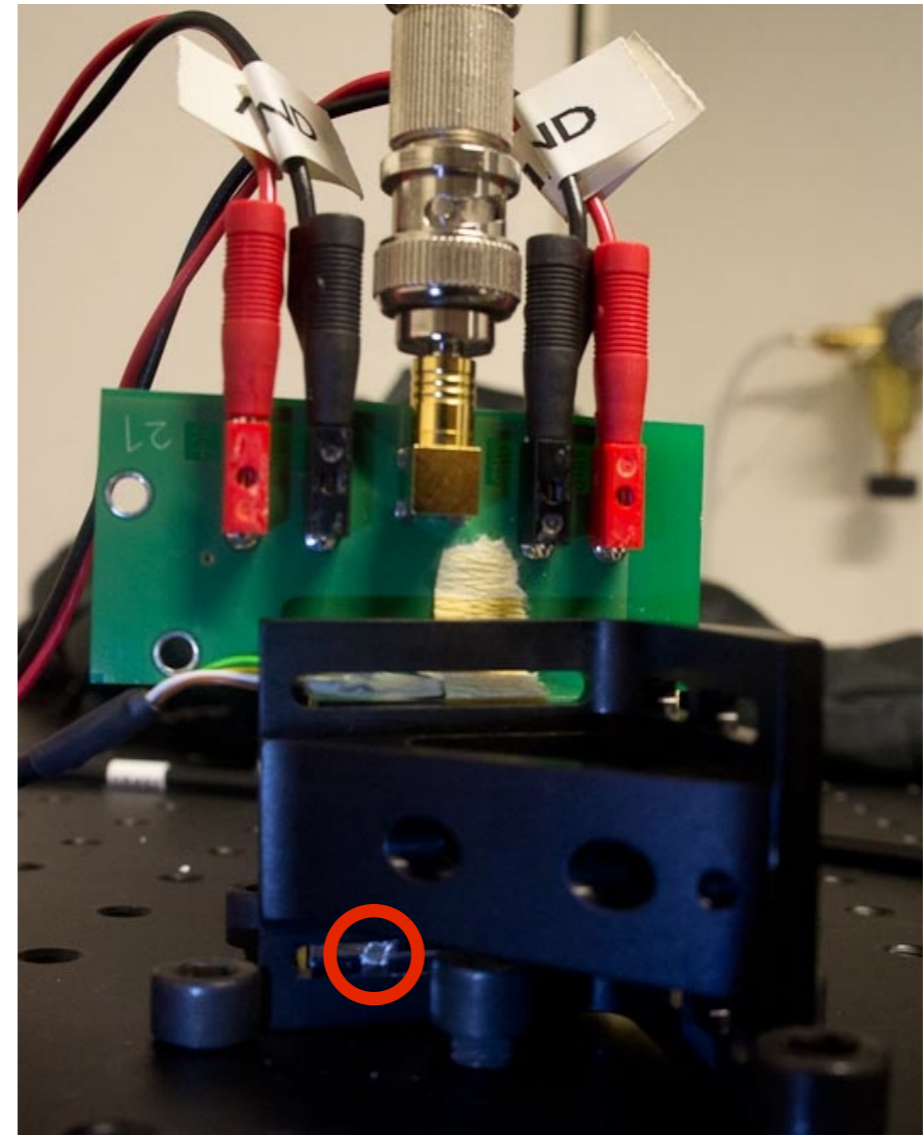
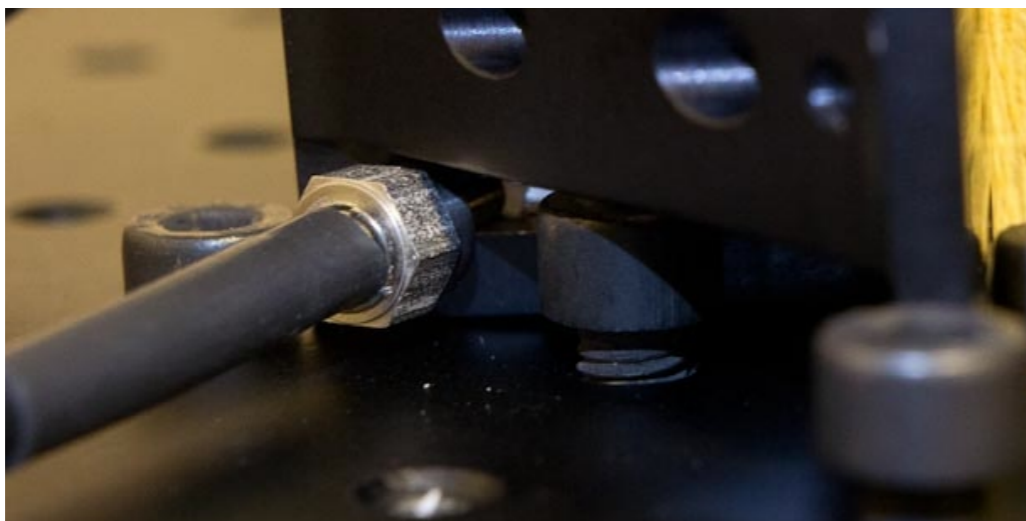
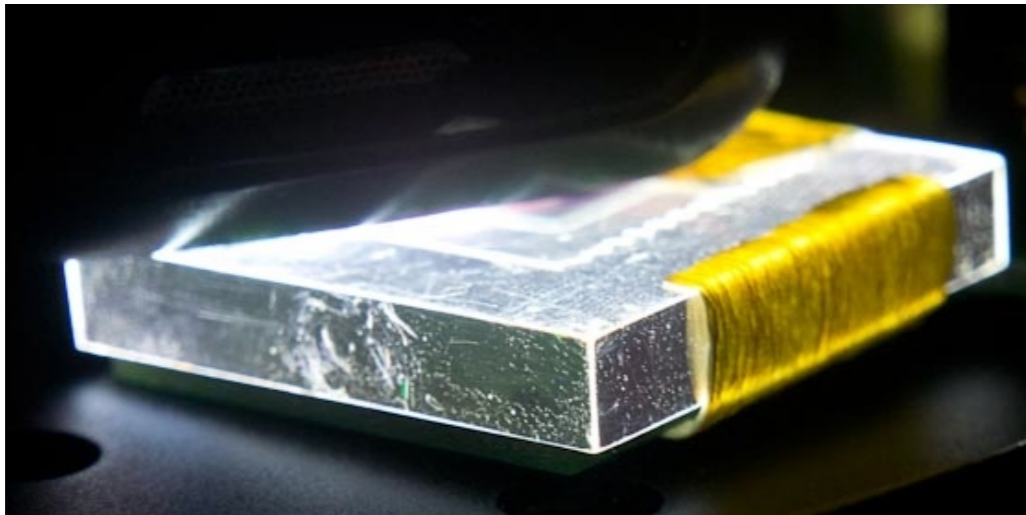
Coupling a T3B Tile



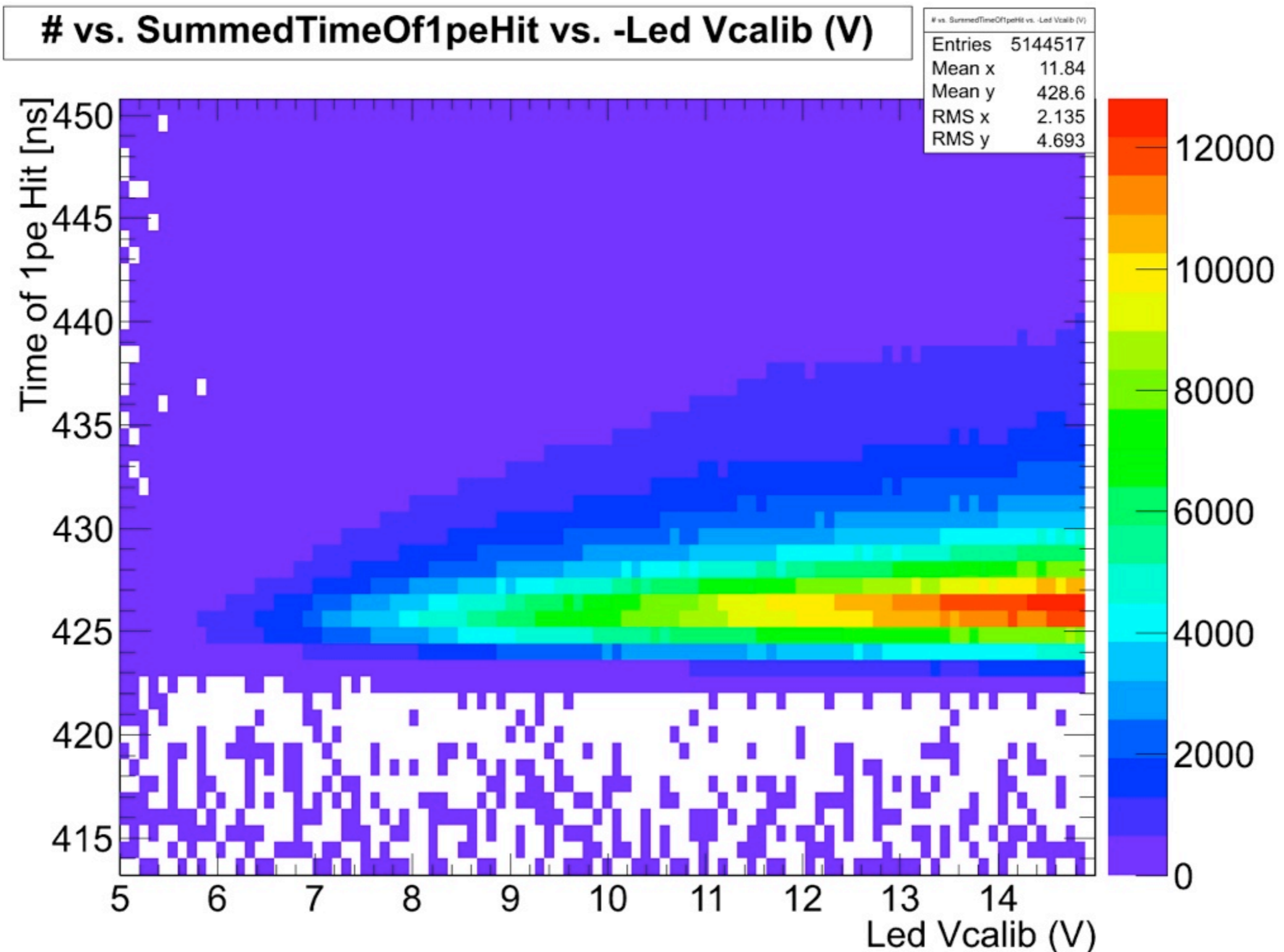
Coupling a T3B Tile



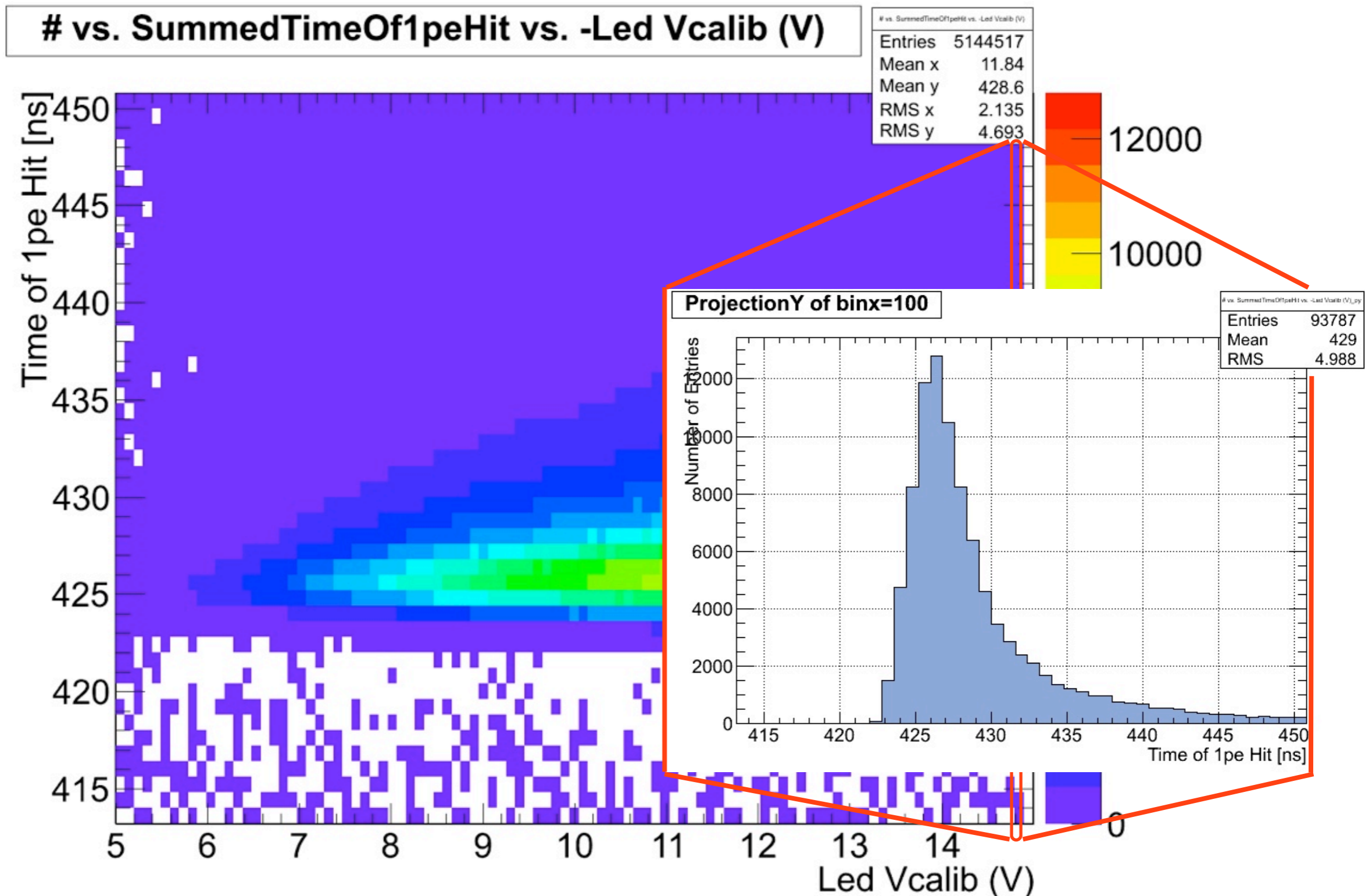
Coupling a T3B Tile



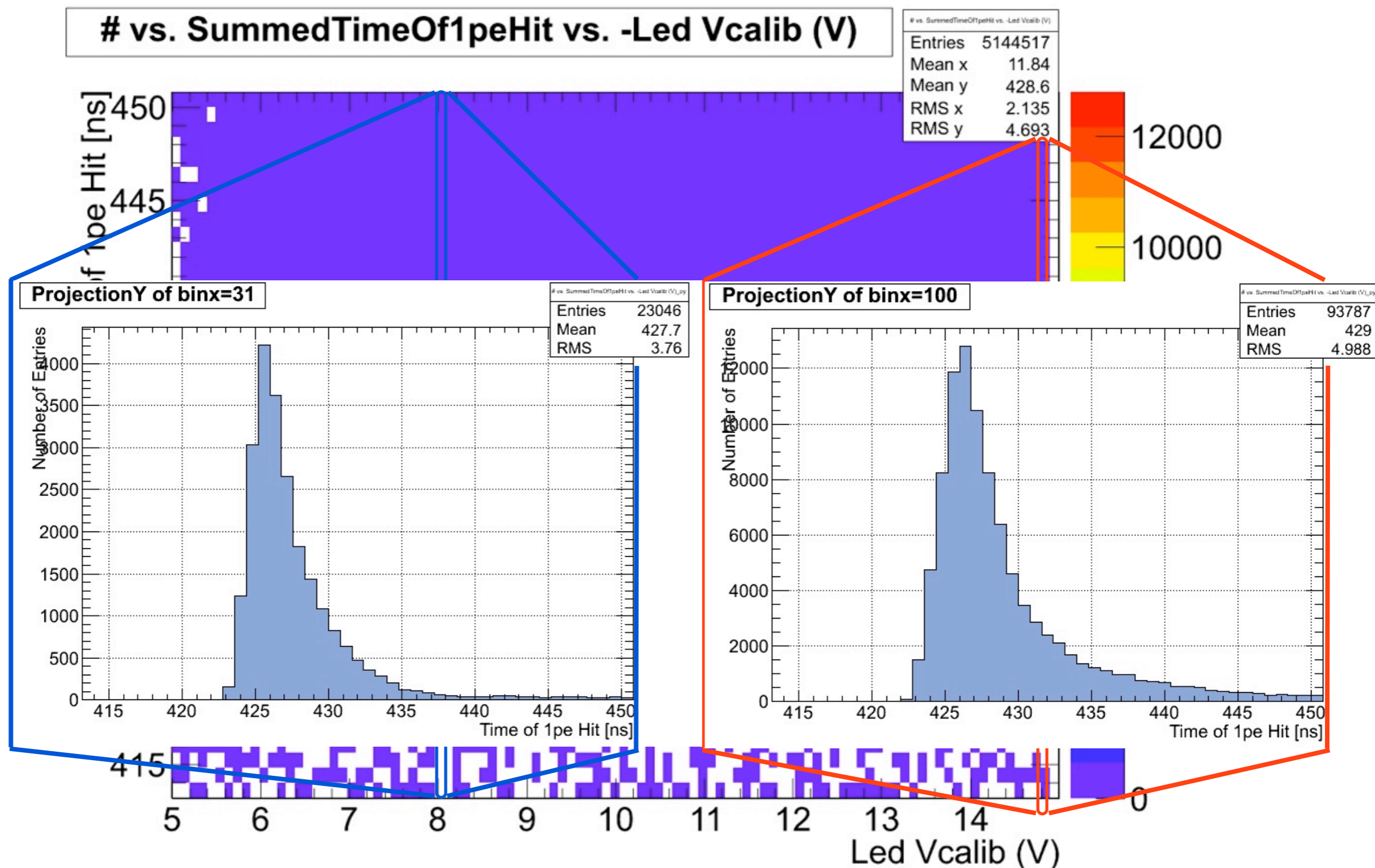
Time Distribution - No Tile



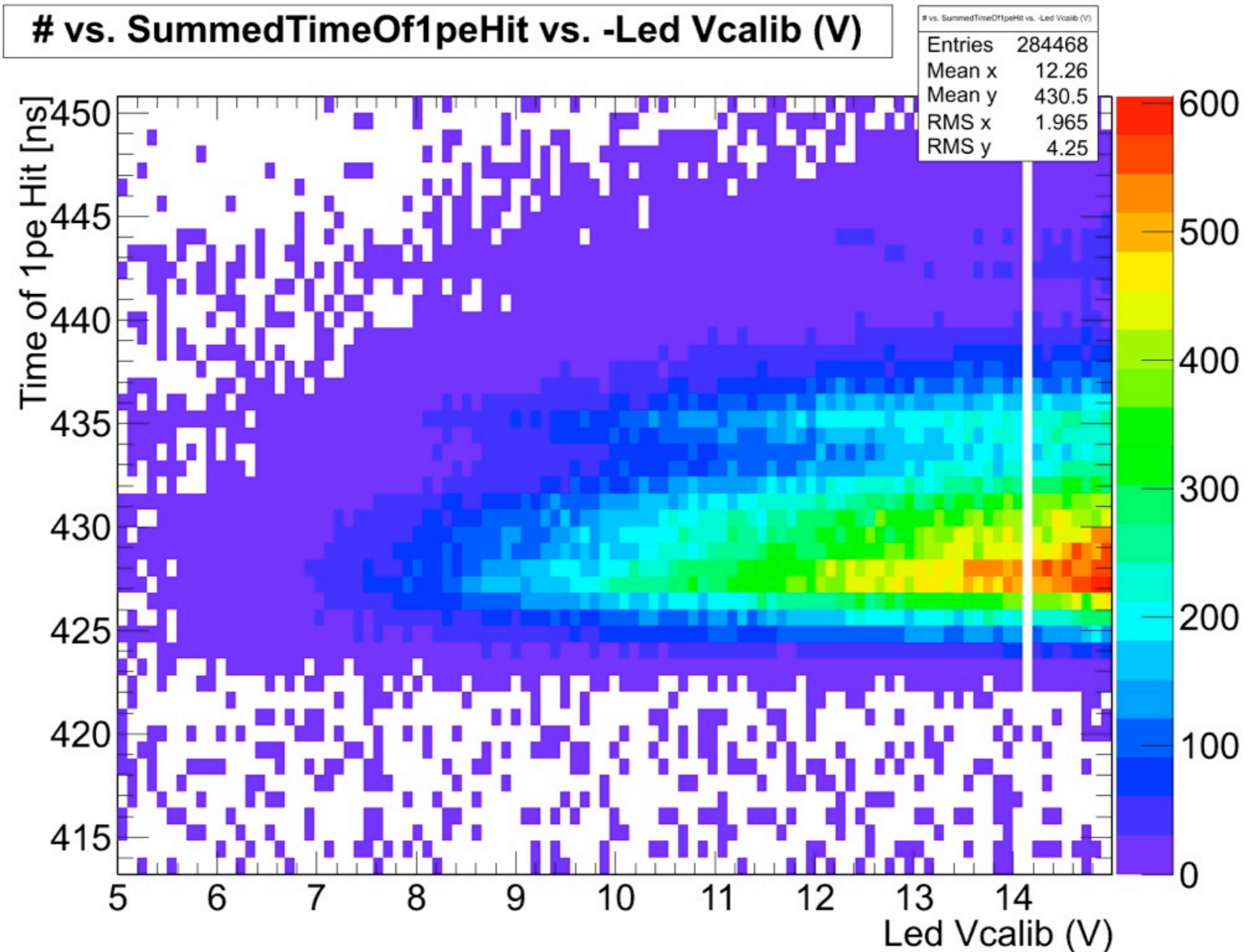
Time Distribution - No Tile



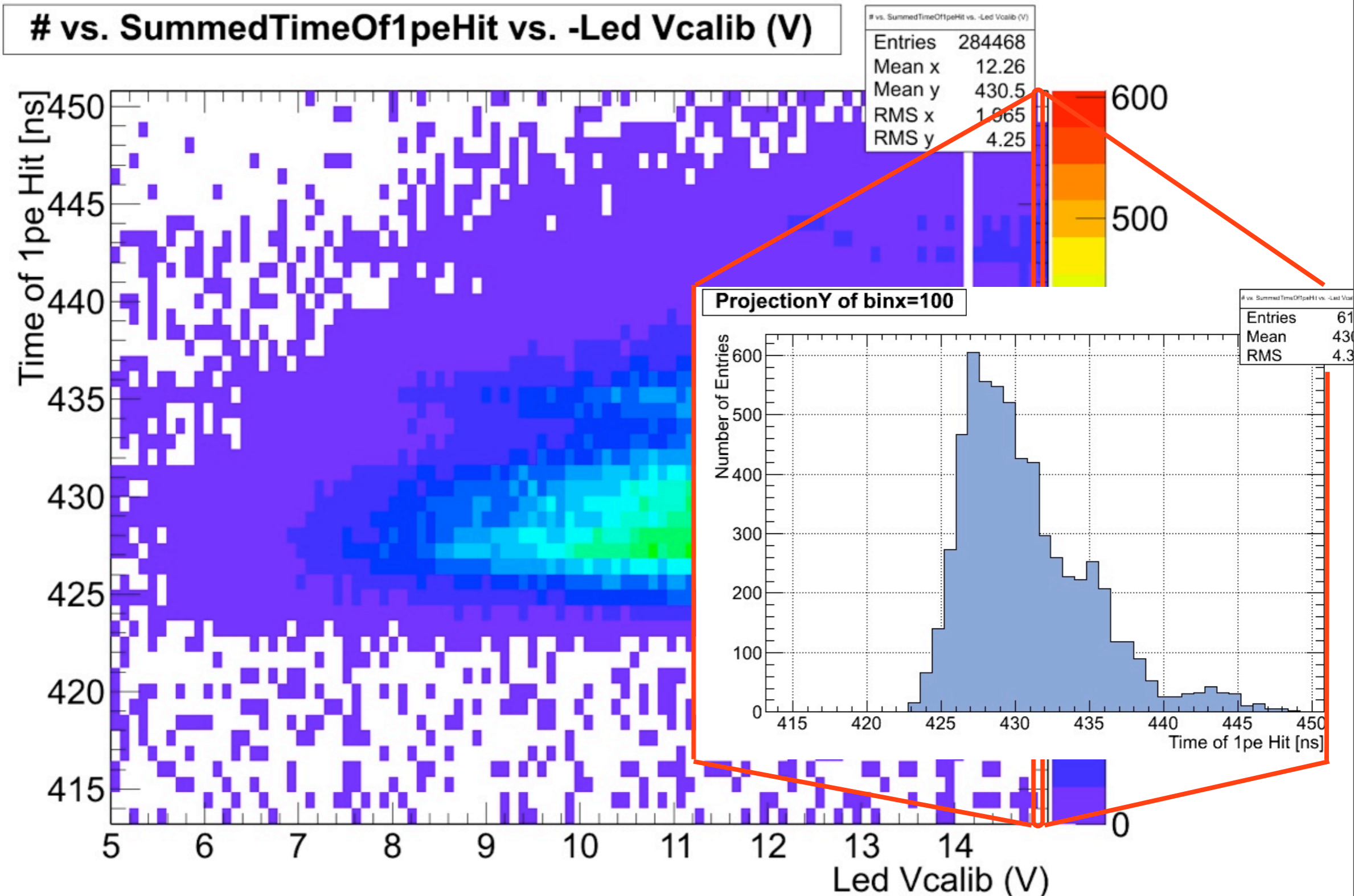
Time Distribution - No Tile



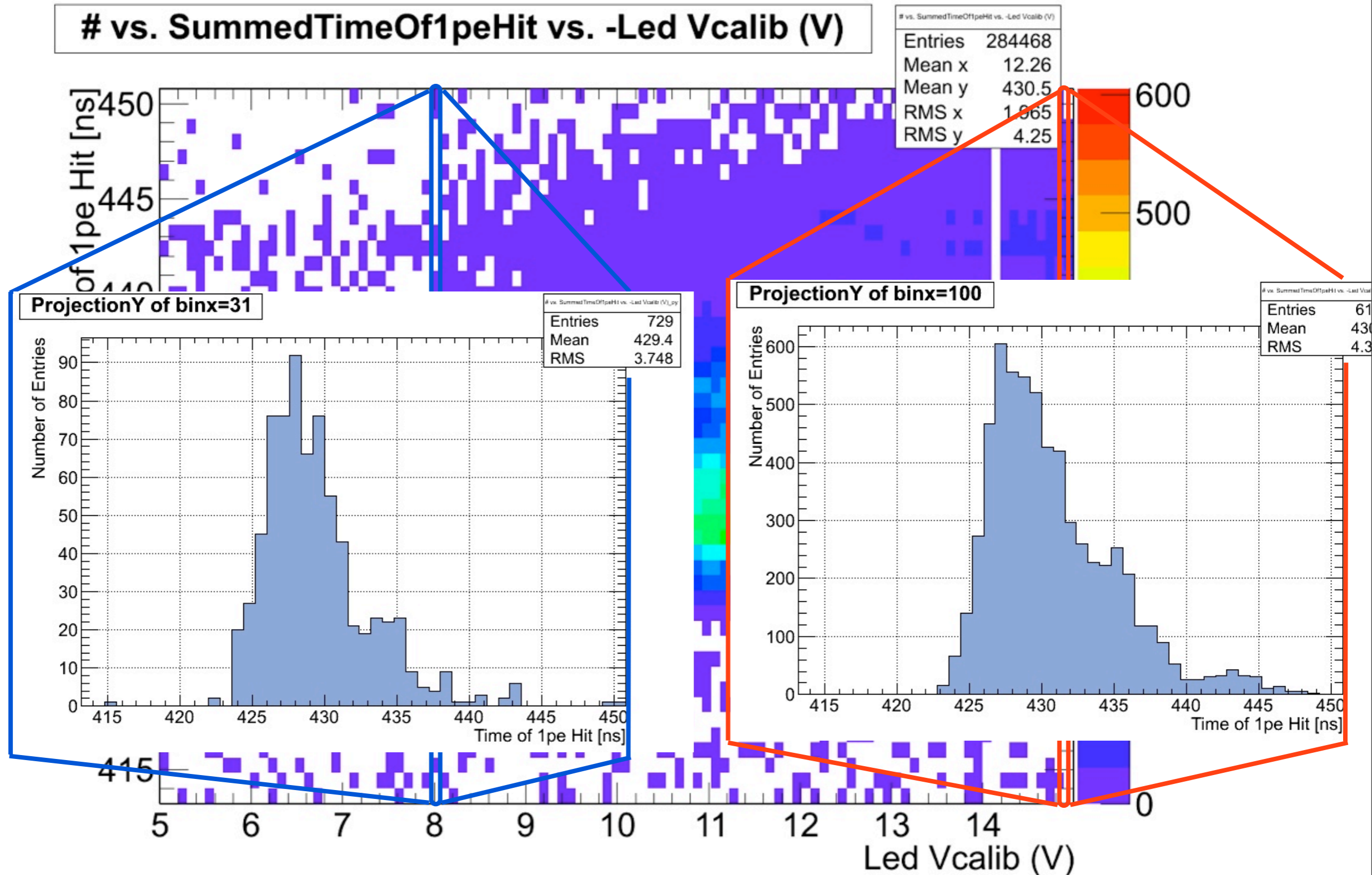
Time Distribution - With Tile



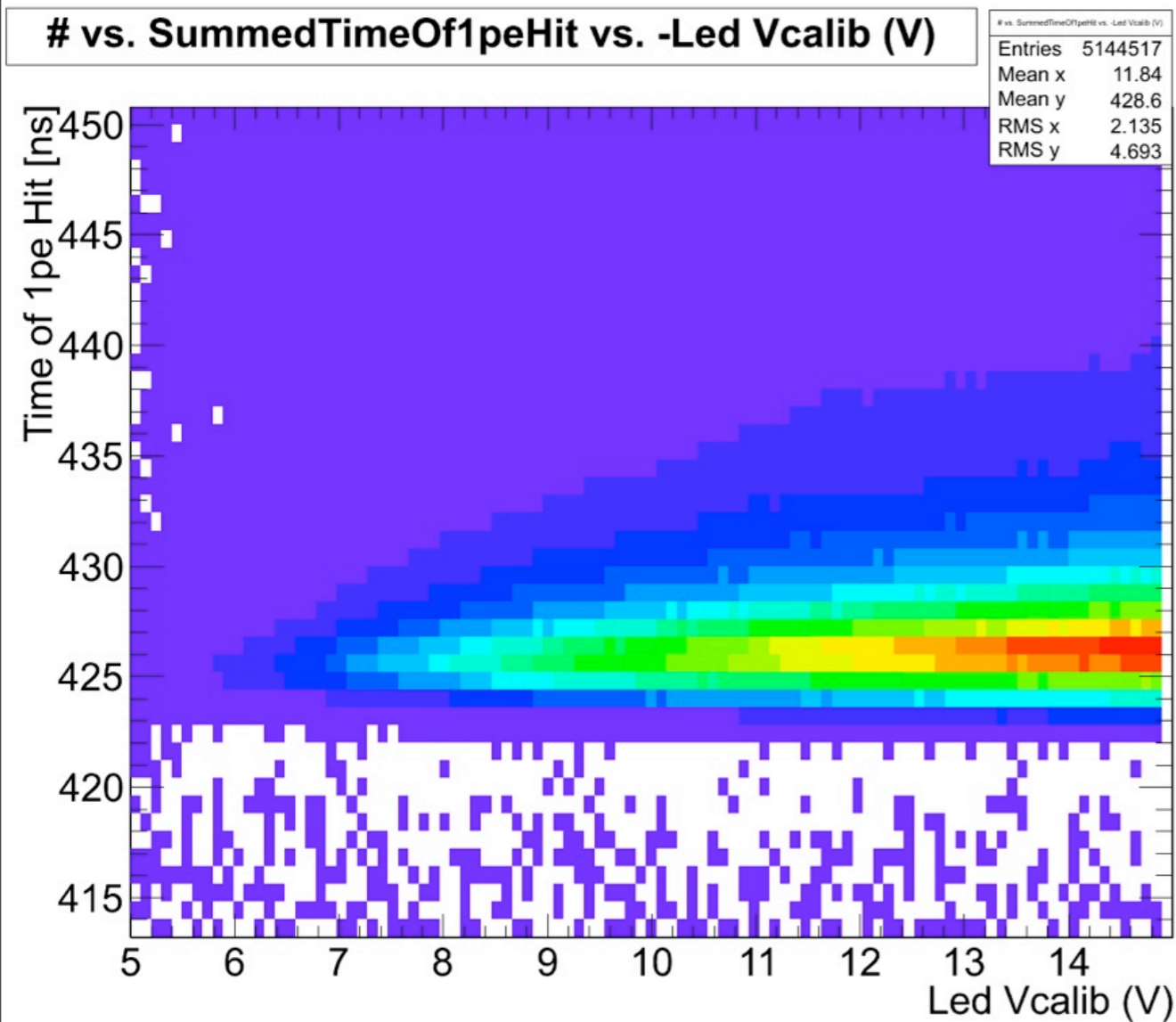
Time Distribution - With Tile



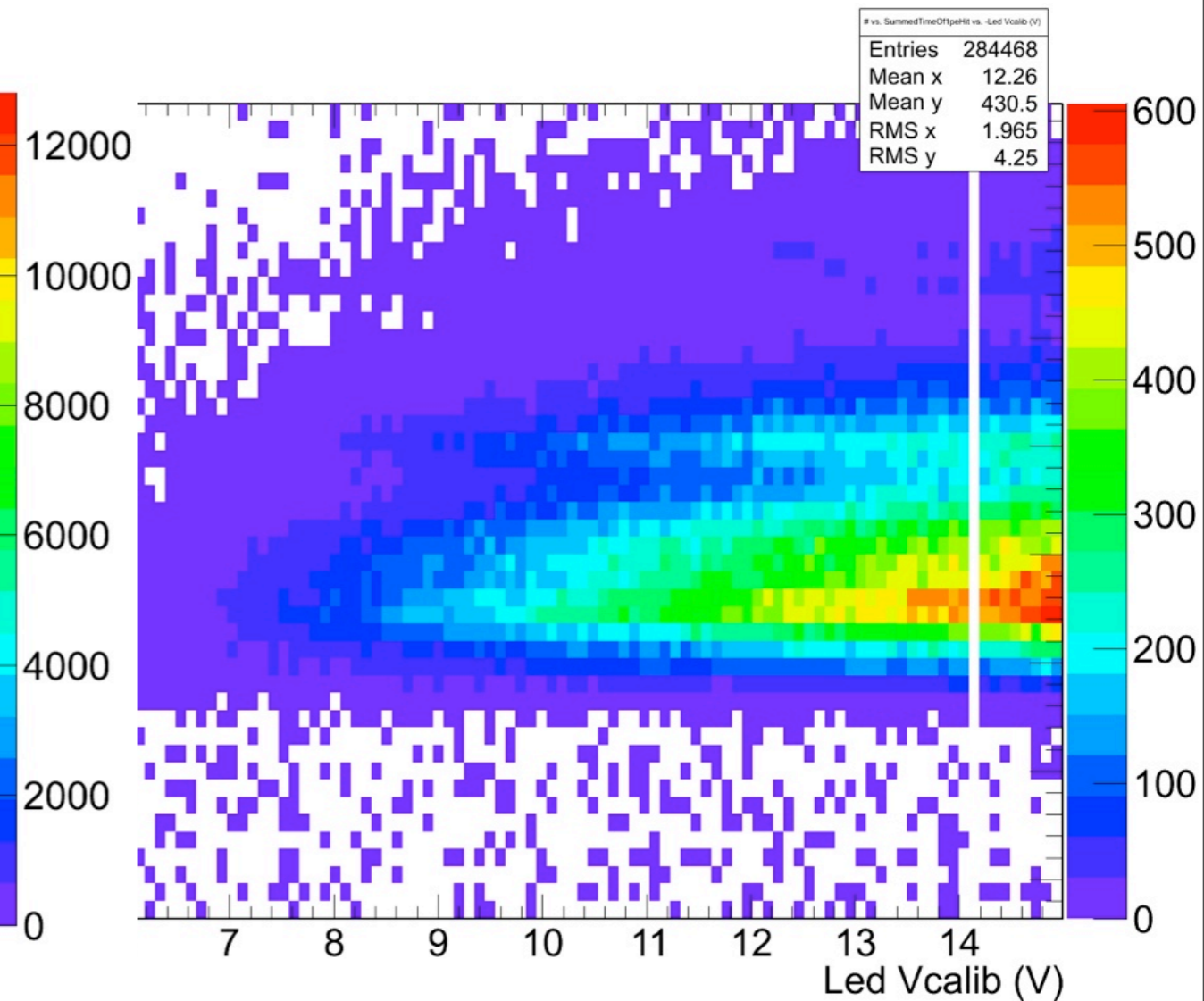
Time Distribution - With Tile



Comparison



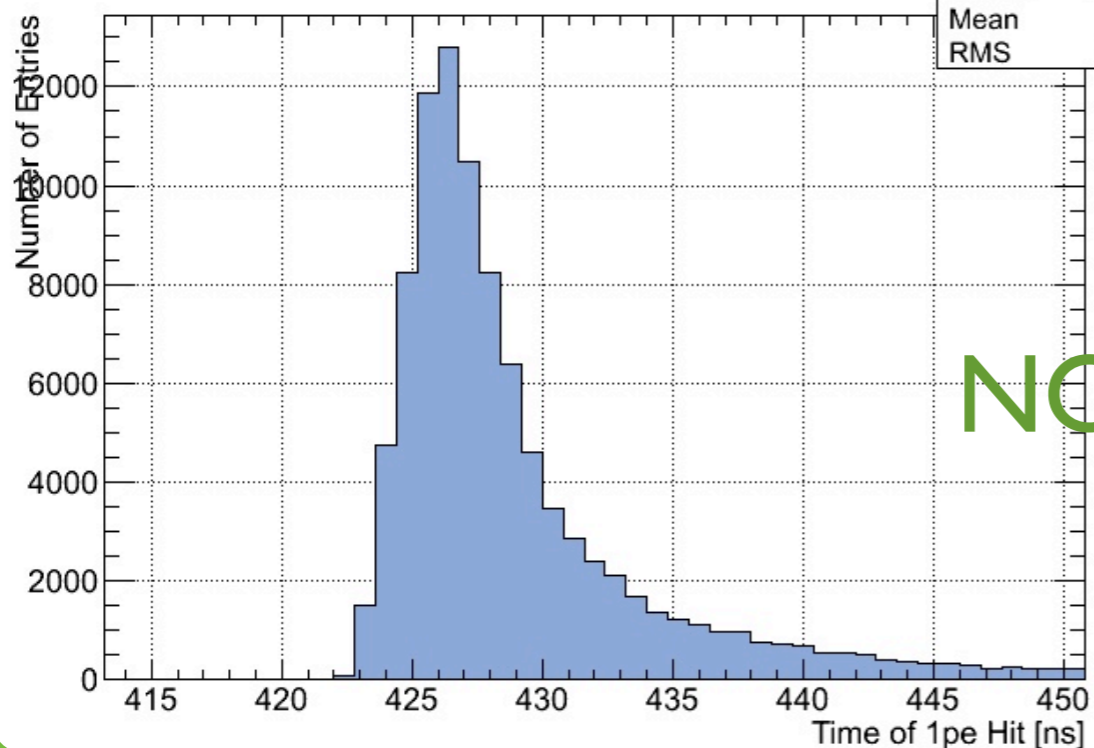
Without Tile



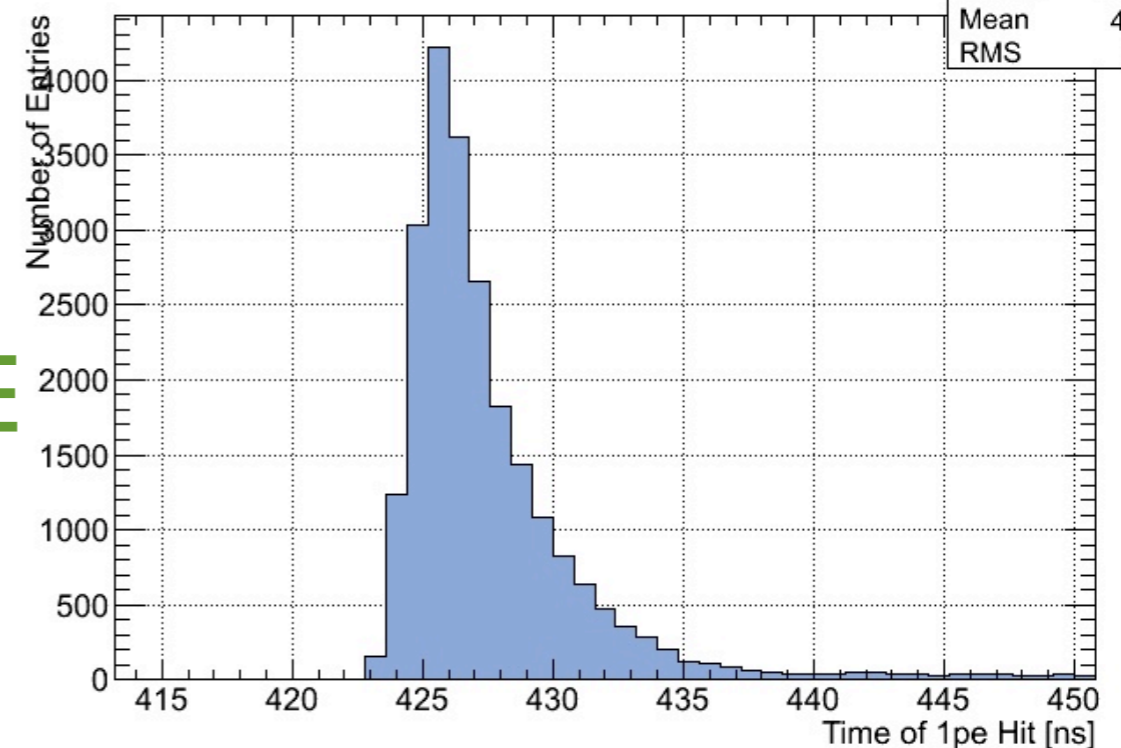
With Tile

1a

ProjectionY of binx=100

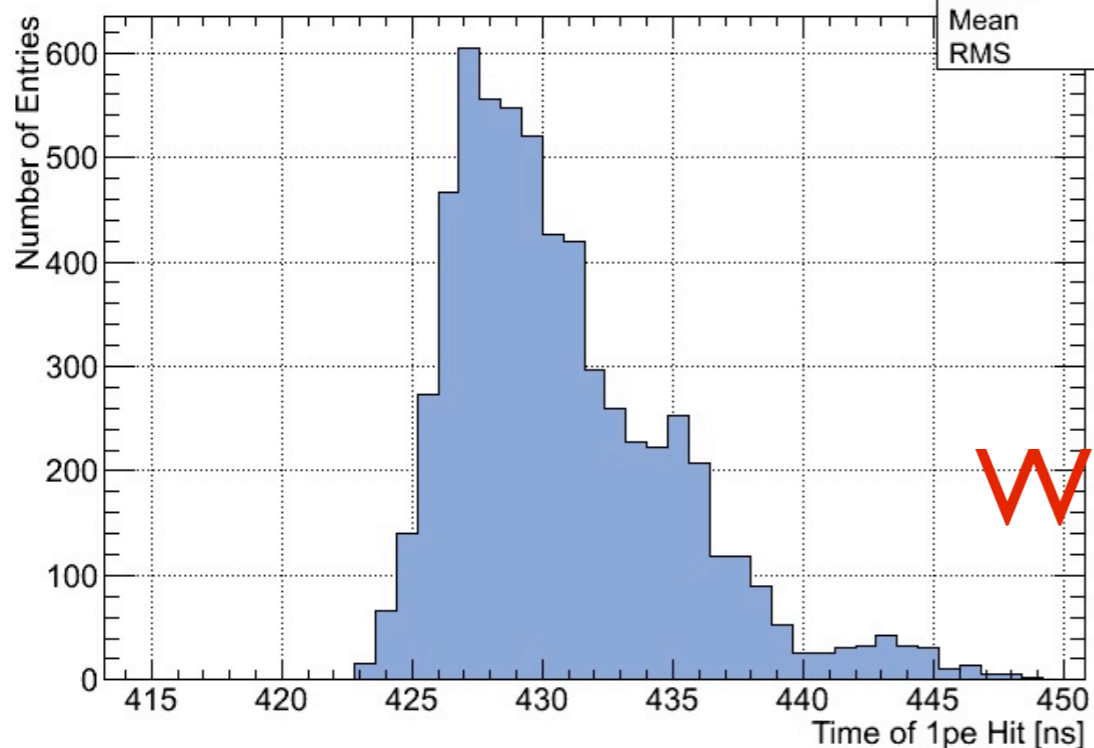


ProjectionY of binx=31

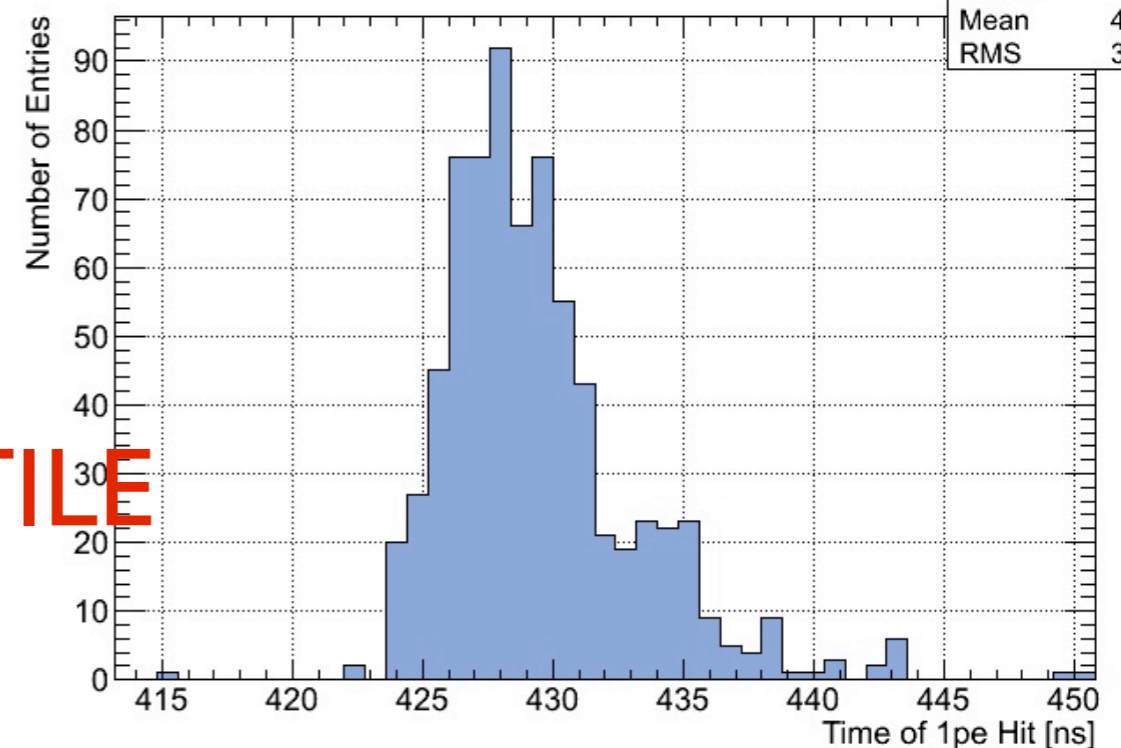


NO TILE

ProjectionY of binx=101



ProjectionY of binx=31



WITH TILE

High Light Intensity

Low Light Intensity

Steps for the Future

- Repeat the runs with the tile coupled to get rid of possible systematics
- Implement a saturation calibration step for T3B data
- Compare the LED results with the muon data
- Investigate late components like e.g. afterpulses