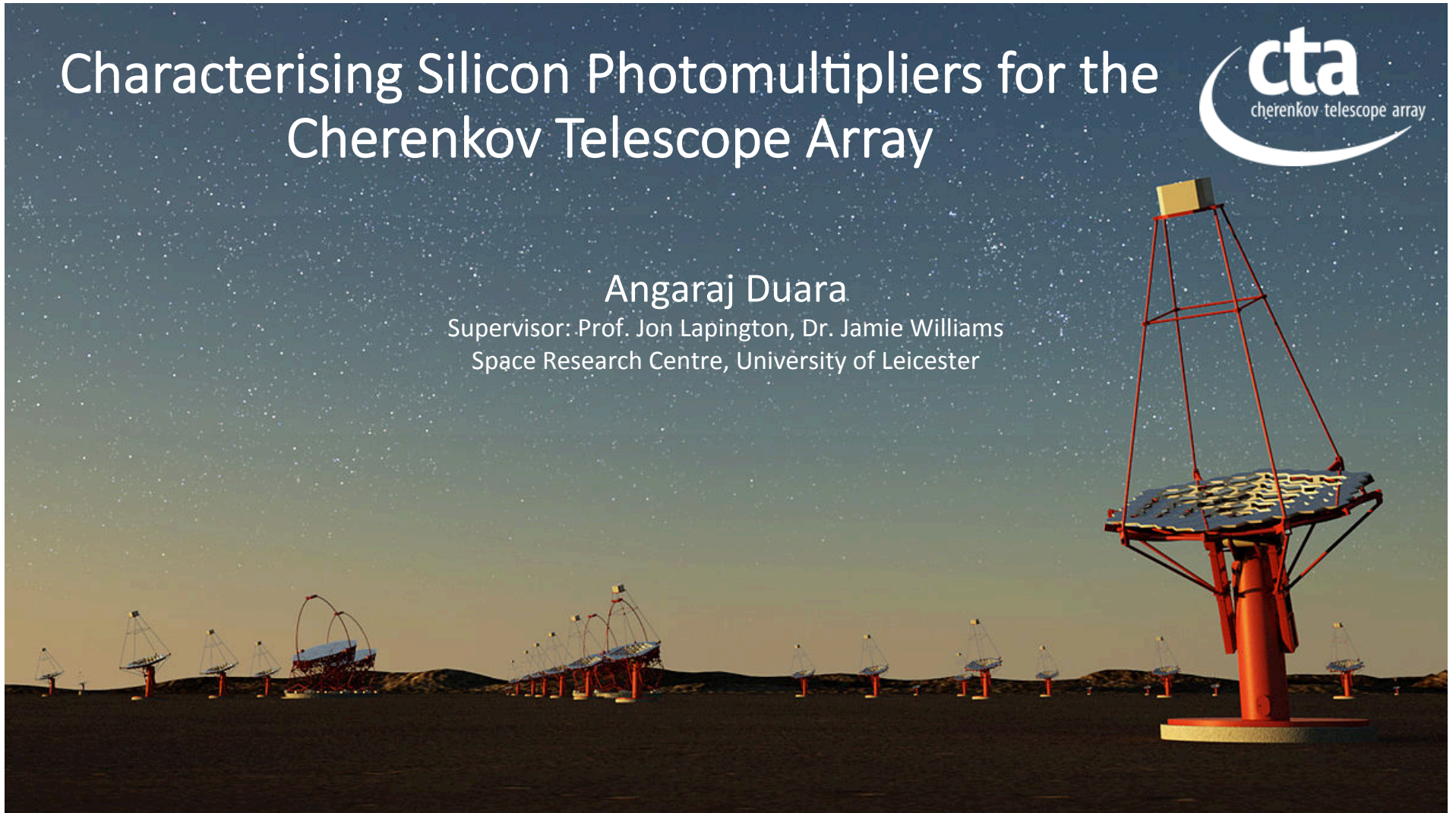


Characterising Silicon Photomultipliers for the Cherenkov Telescope Array

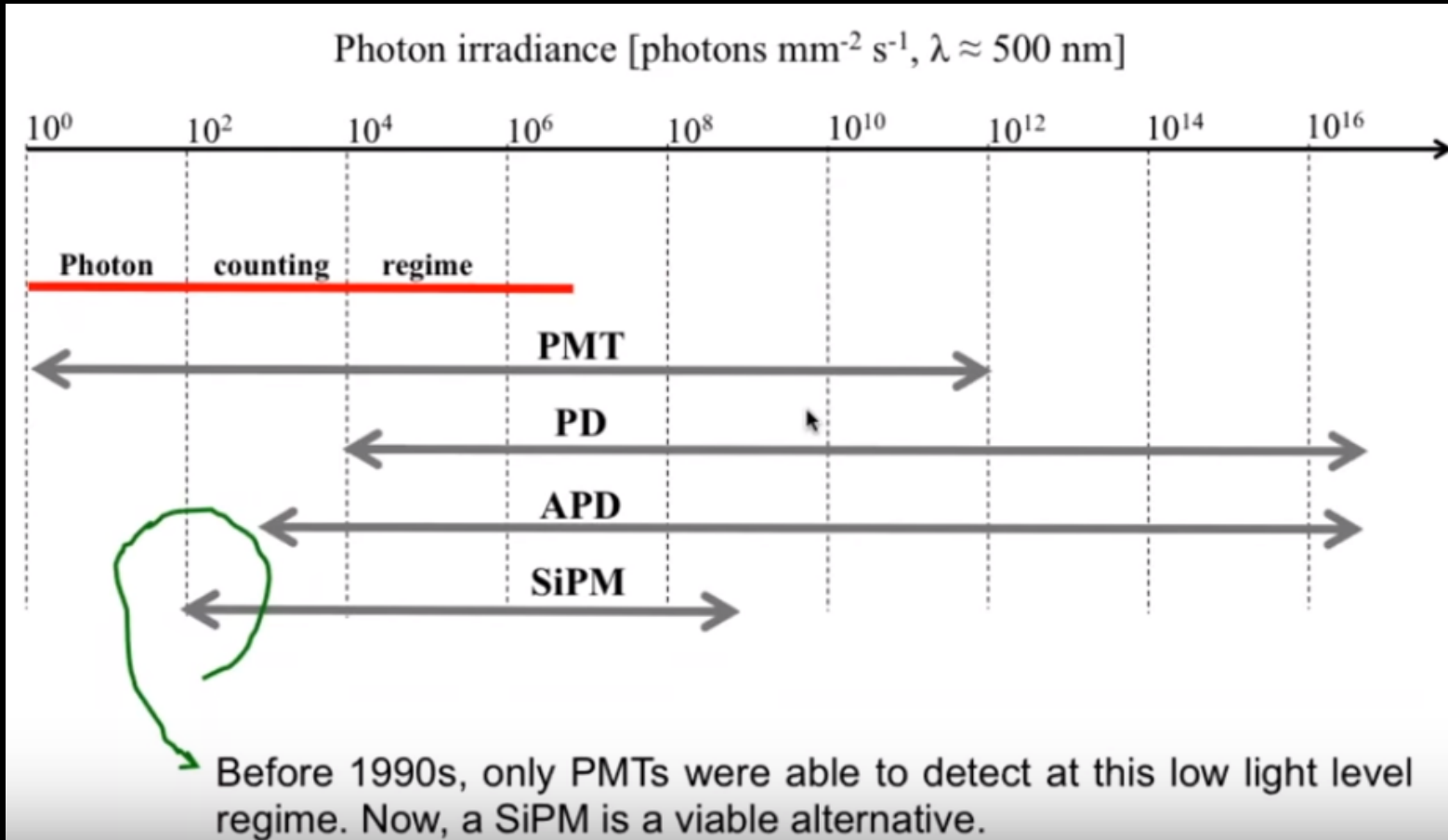


Angaraj Duara

Supervisor: Prof. Jon Lapington, Dr. Jamie Williams
Space Research Centre, University of Leicester

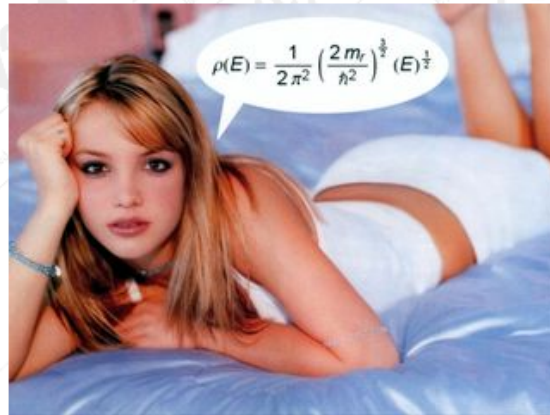


Photodetectors



Britney Spears' Guide to Semiconductor Physics

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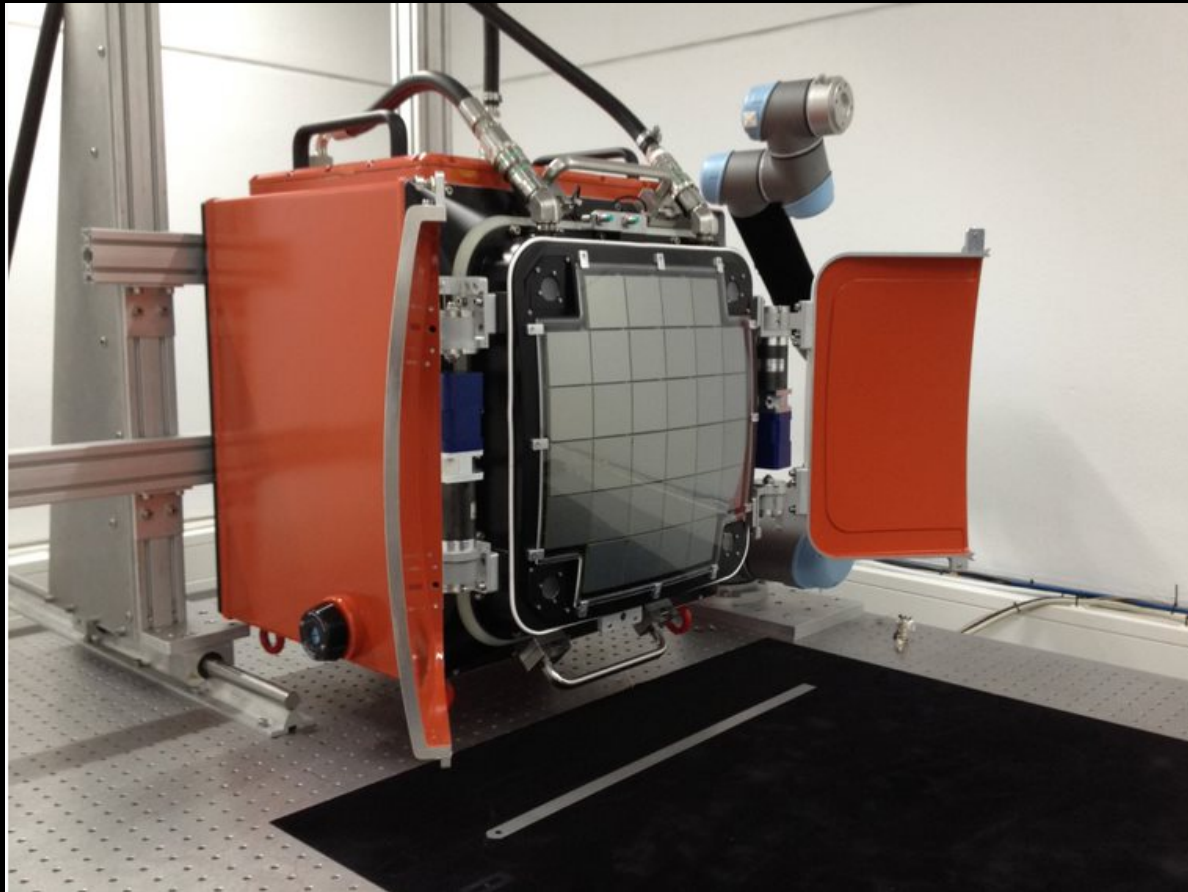


<http://britneyspears.ac/lasers.htm>

It is a little known fact, that Ms Spears is an expert in semiconductor physics. Not content with just singing and acting, in the following pages, she will guide you in the fundamentals of the vital semiconductor laser components that have made it possible to hear her super music in a digital format.

- * [Introduction](#)
- * [The Basics of Semiconductors](#)
- * [Semiconductor Crystal Structures](#)
- * [Semiconductor Junctions](#)
- * [Finite Barrier Quantum Well](#)
- * [Vertical Cavity Surface Emitting Lasers \(VCSELs\)](#)
- * [Photonic Crystals](#)
- * [Crystal Growth, Fabrication and Processing](#)
- * [Photolithography](#)

Compact High Energy Camera CHEC

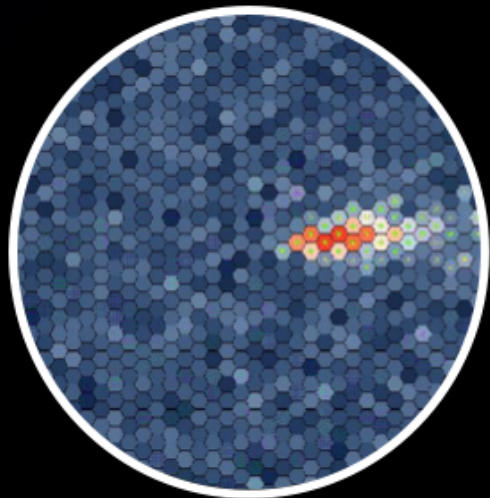




Leicester CTA Team Sending CHEC to Germany

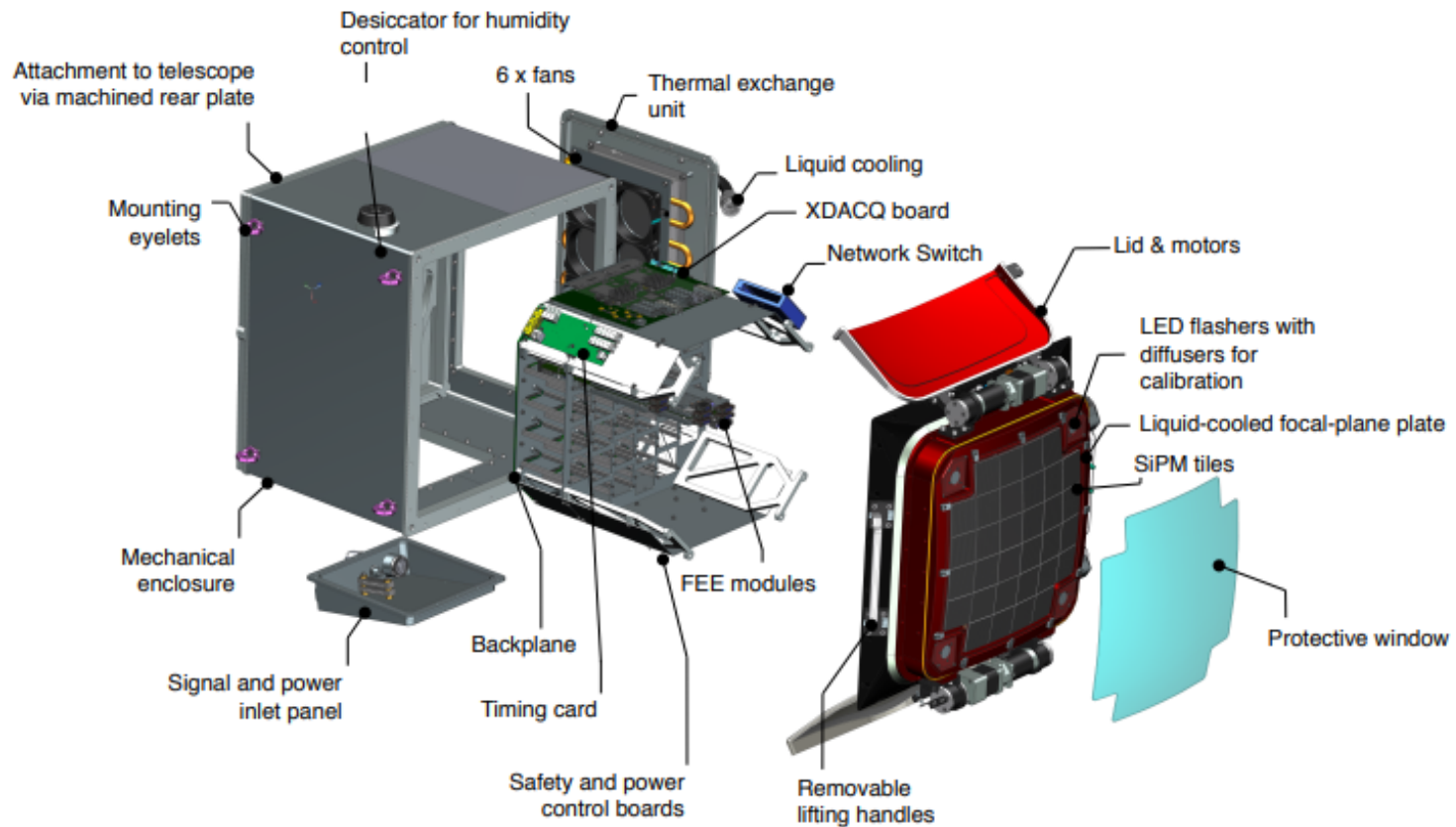
IOP Institute of Physics
Instrument Science
and Technology Group

Cherenkov Light

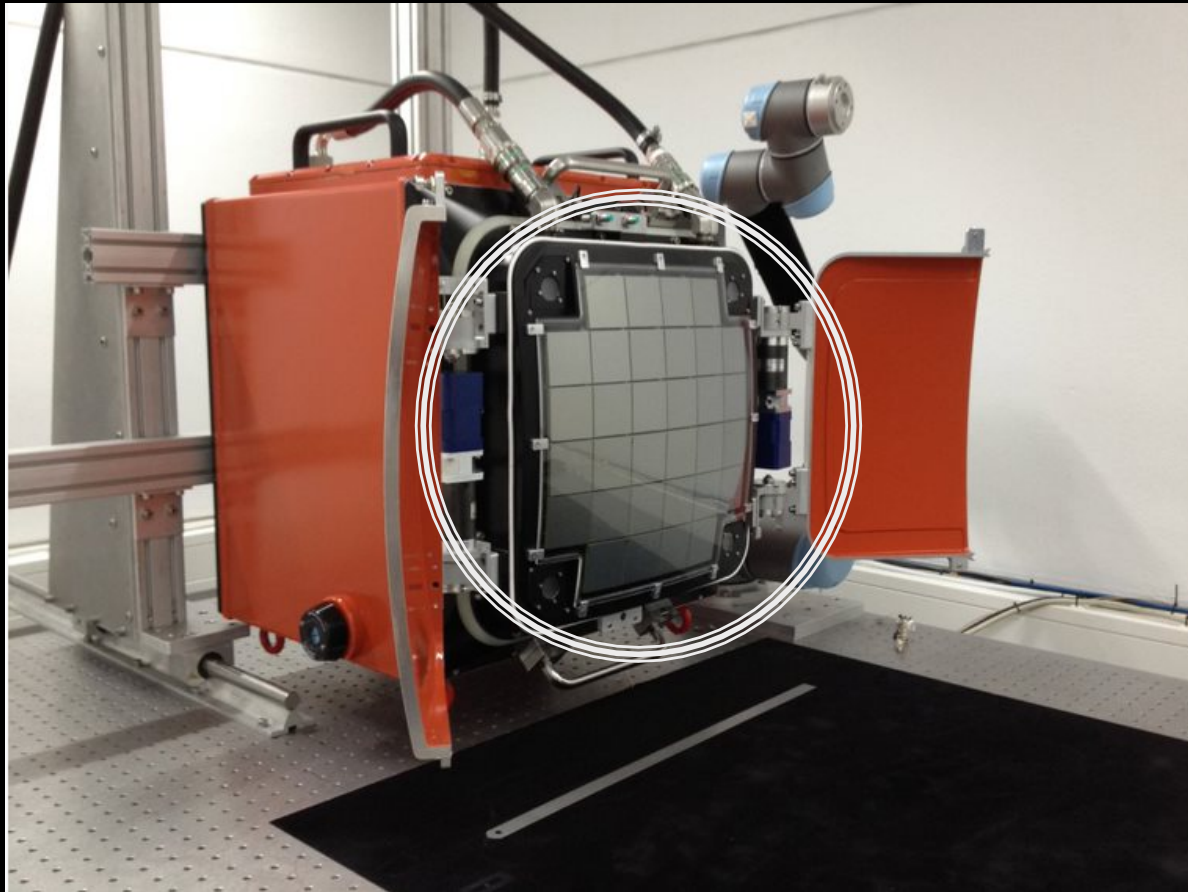


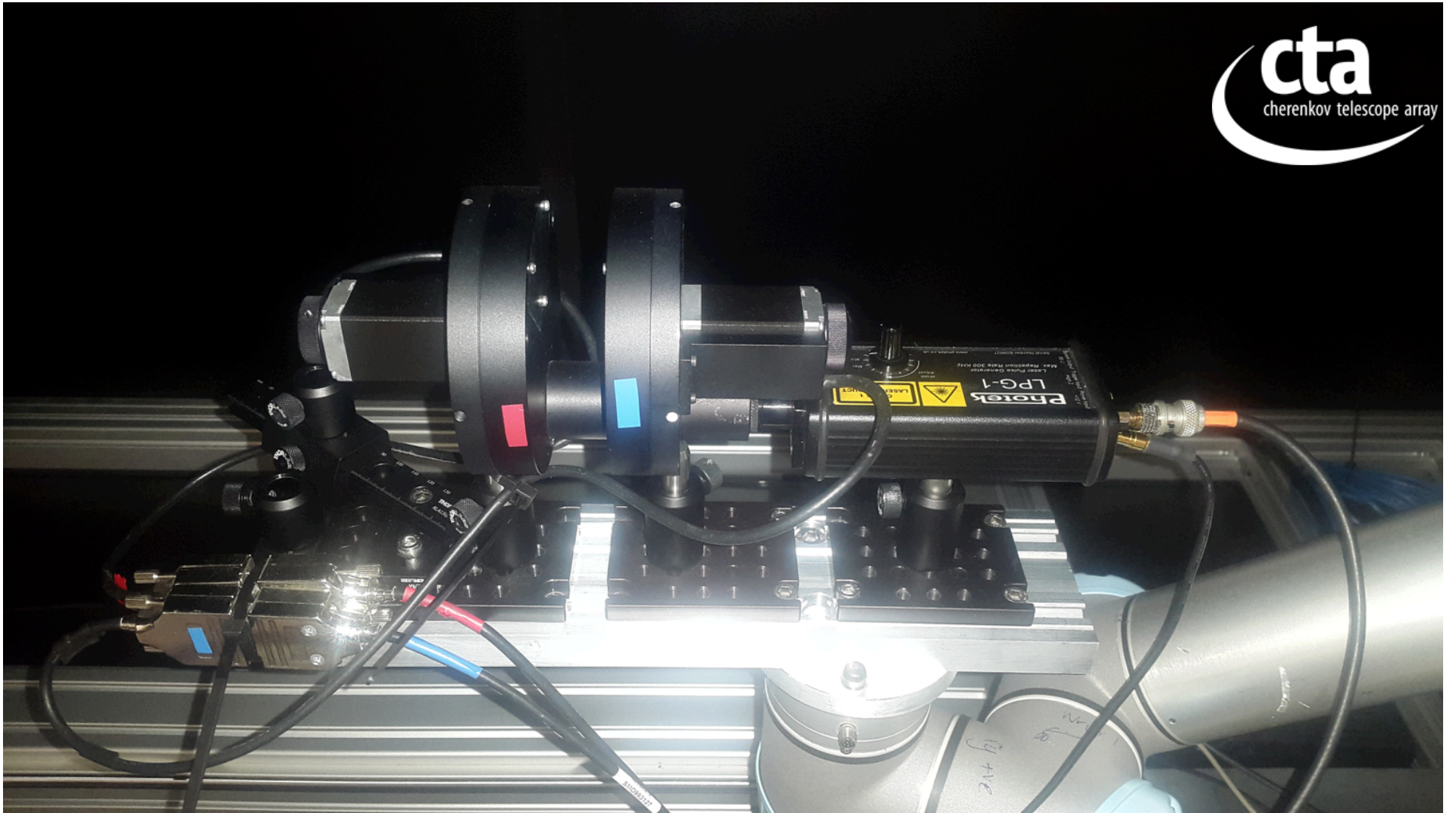
Compact High Energy Camera

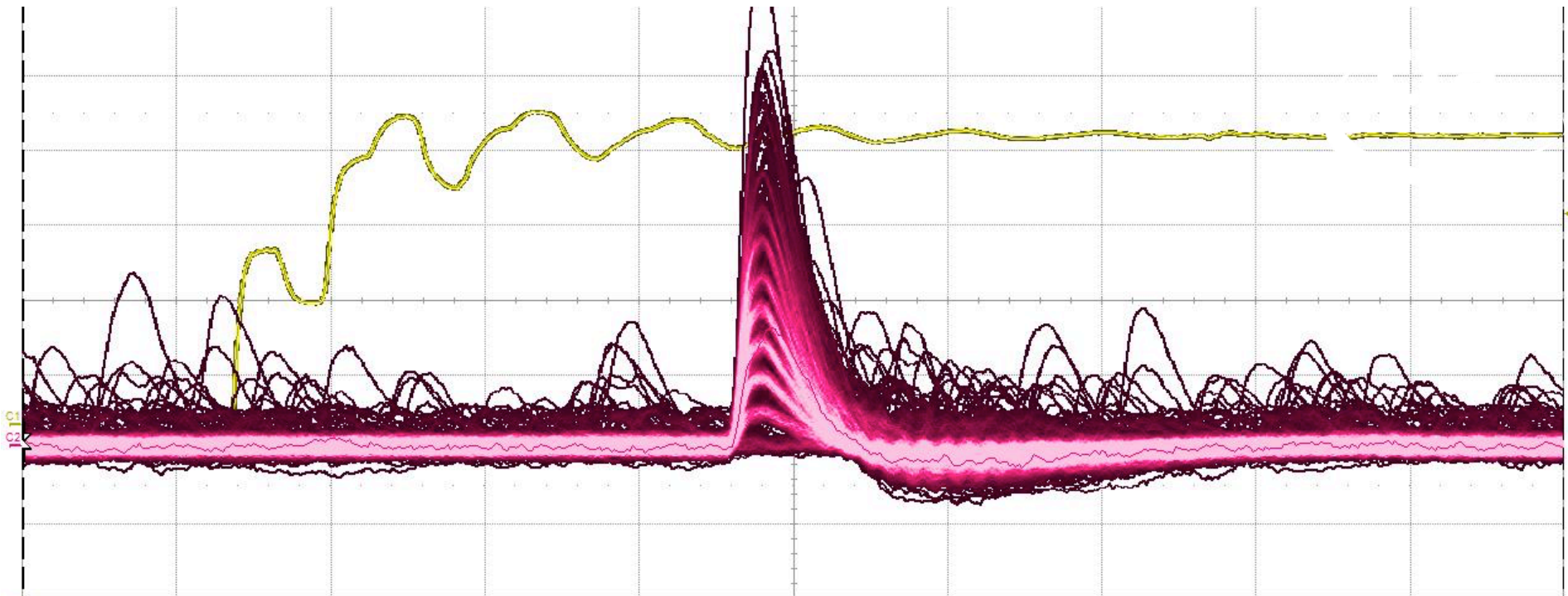
(White, 2017)



Compact High Energy Camera CHEC







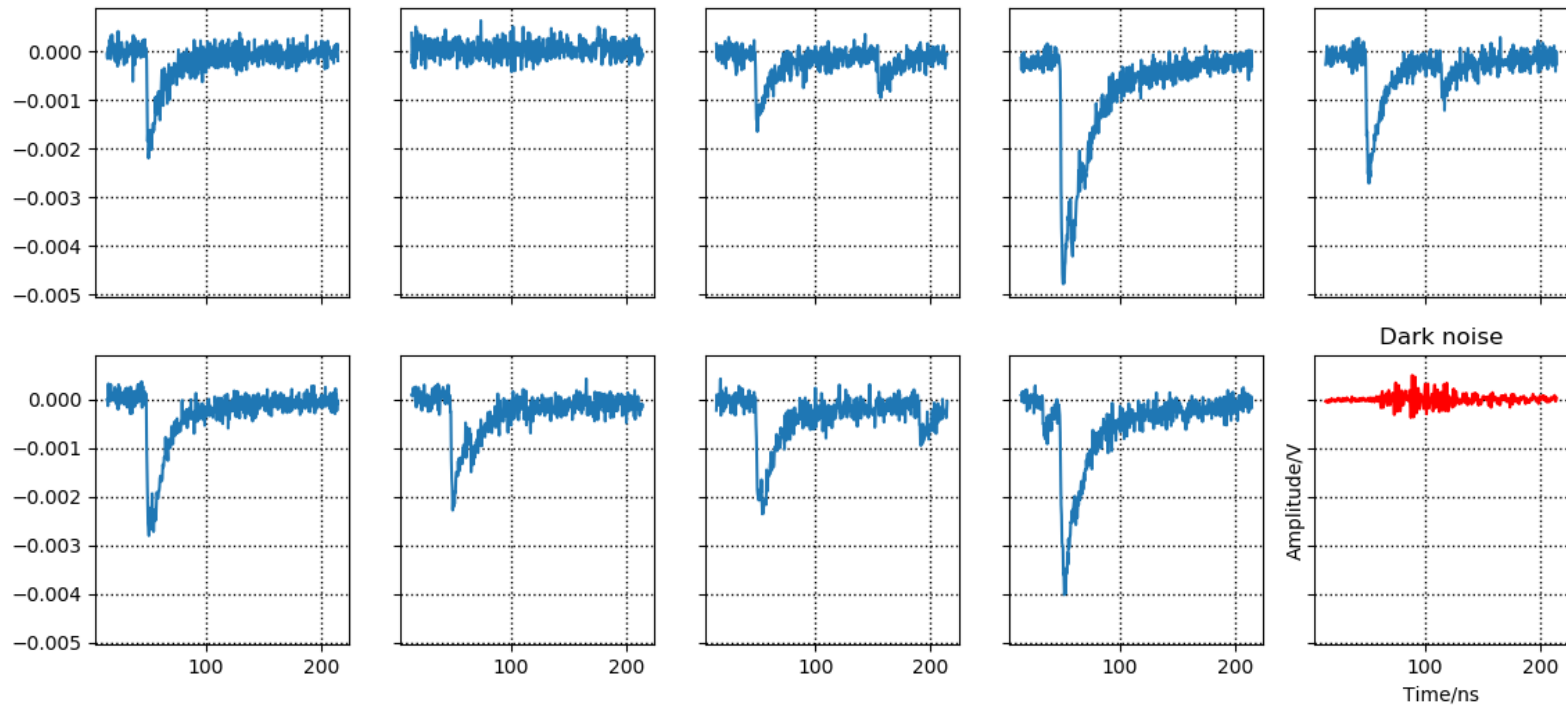
Measure	P1:max(C2)	P2:pkpk(C2)	P3:freq(C2)	P4:width(C2)	P5:rise(C2)	P6:fall(C2)	P7:area(C2)	P8:---
value	15.74 mV	18.76 mV	---	9.693 ns	---	11.731 ns	44.5361 pWb	
mean	> 15.417 mV	17.87 mV	29.46 MHz	8.947 ns	< 23.71 ns	14.90 ns	108.5 pWb	
min	> -620 μV	1.74 mV	5.9366 MHz	1.879 ns	< 485 ps	1.176 ns	-413.1598 pWb	
max	> 60.54 mV	68.54 mV	134.1217 MHz	39.385 ns	< 190.690 ns	188.810 ns	612.0481 pWb	
sdev	> 9.275 mV	10.23 mV	20.74 MHz	2.233 ns	< 24.89 ns	10.02 ns	127.7 pWb	
num	12.923e+3	12.923e+3	1.896e+3	14.285e+3	11.643e+3	13.551e+3	12.923e+3	
status	✓	✓	⚠	⚠	⚠	⚠	✓	

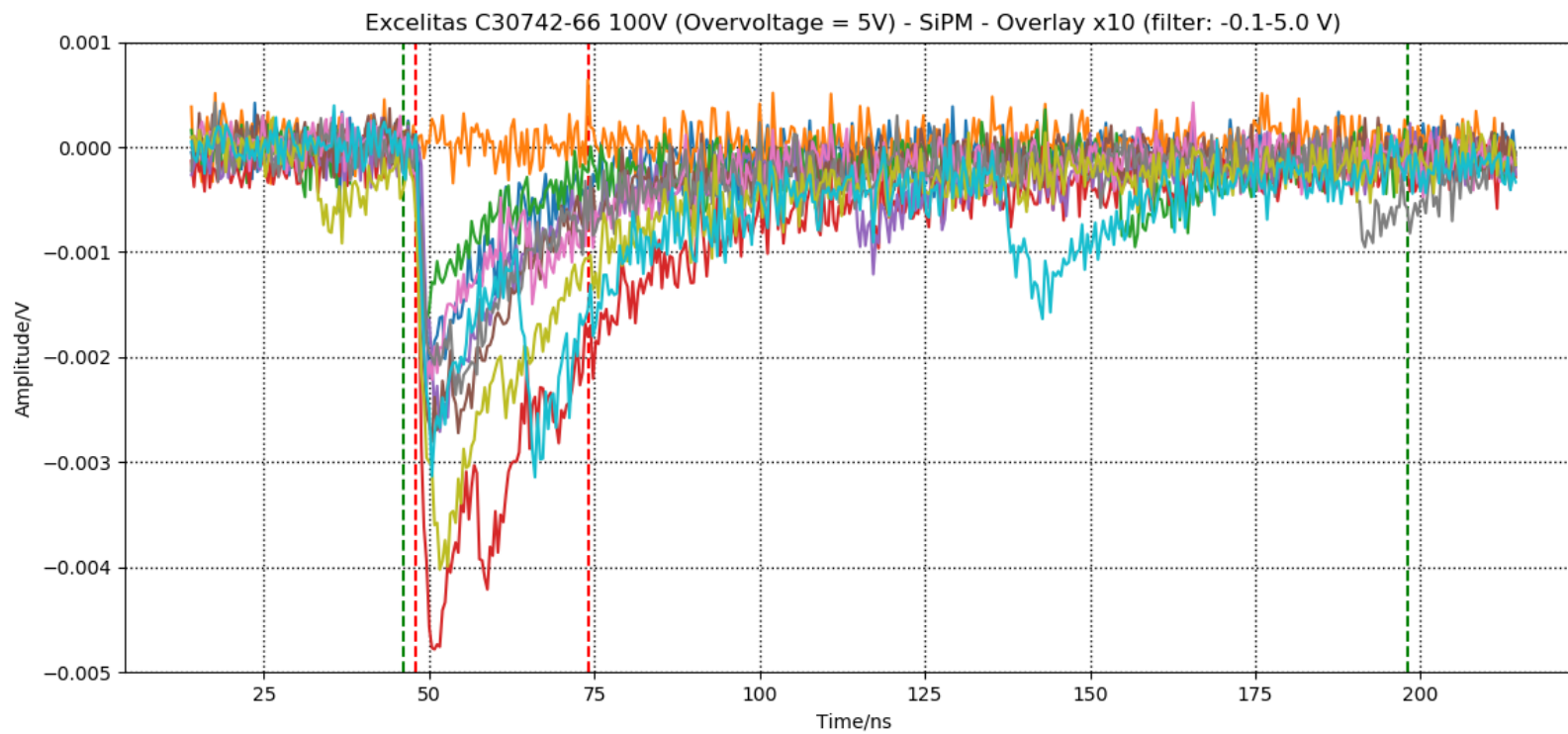


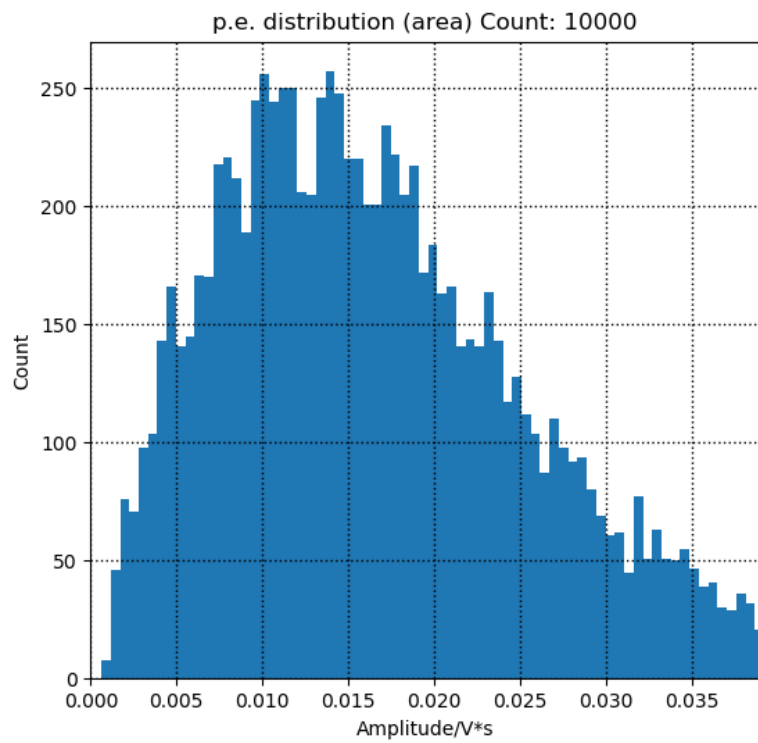
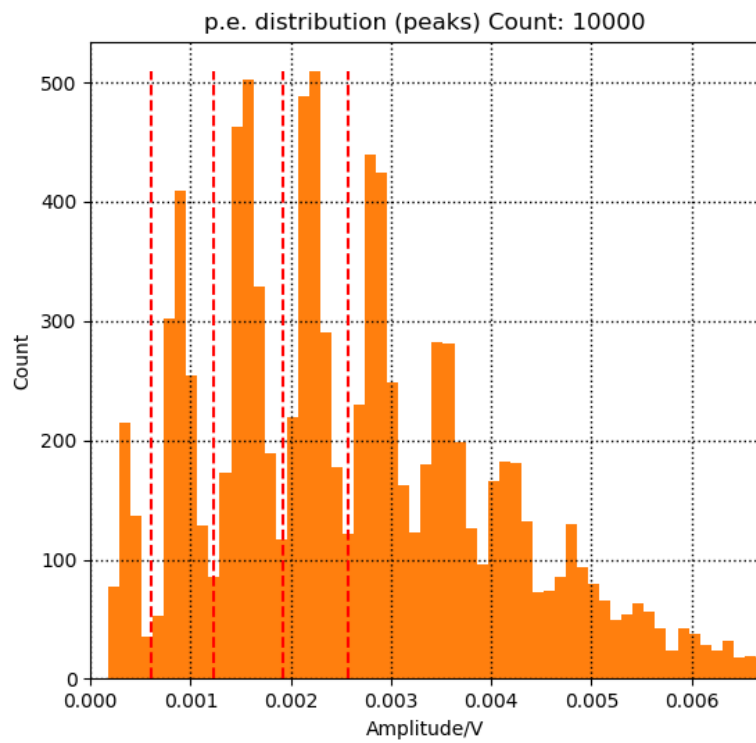
C1	DC1M	C2	DC50
1.00 V/div	10.0 mV/div	-1.6700 V	-19.600 mV
-234.5 mV	665 μV	-234.5 mV	665 μV

Tb	-175.0596 μs	Trigger	C1 DC
	20.0 ns/div	Auto	2.82 V
500 S	2.5 GS/s	Edge	Positive
X1=	174.960 μs	ΔX=	0 ns

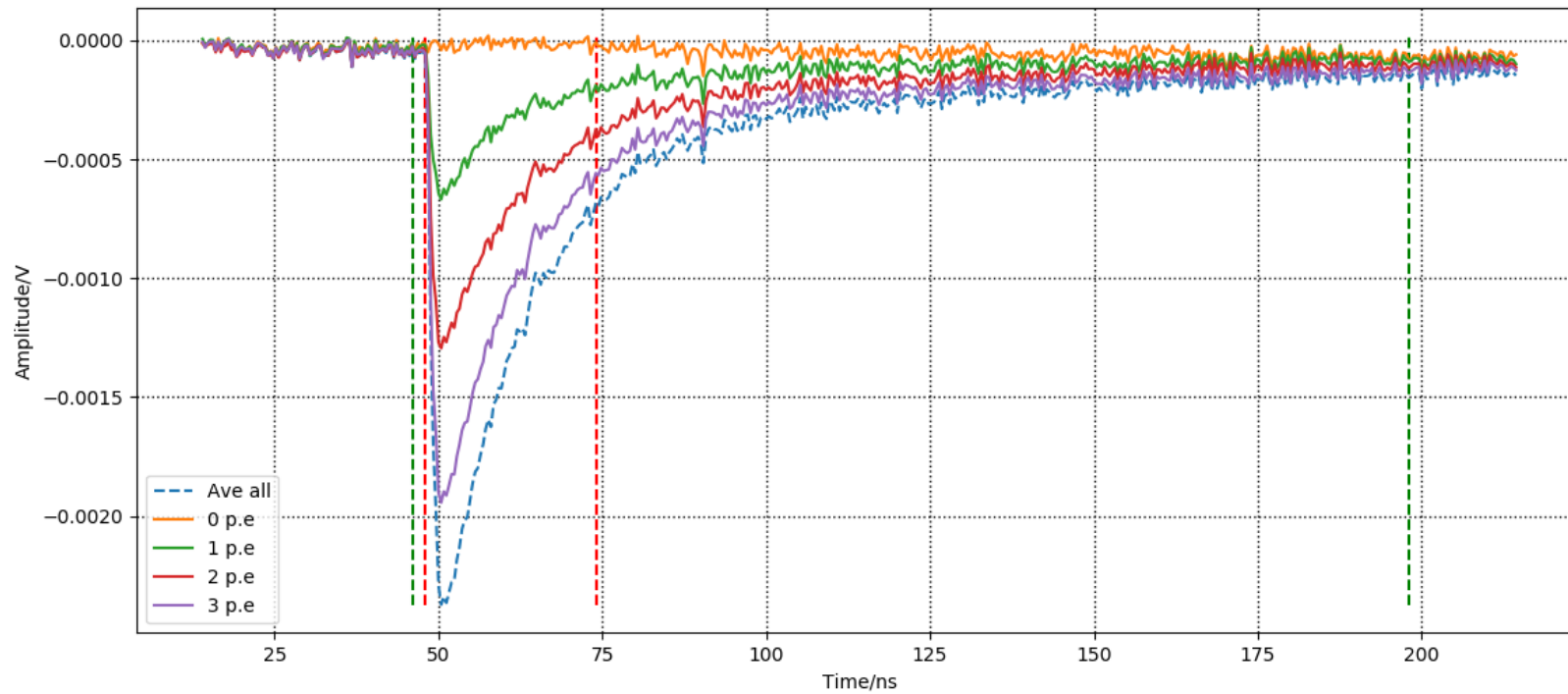
C30742-66 100V (Overvoltage = 5V) : LeCroy Waveforms, Events 1 to 9

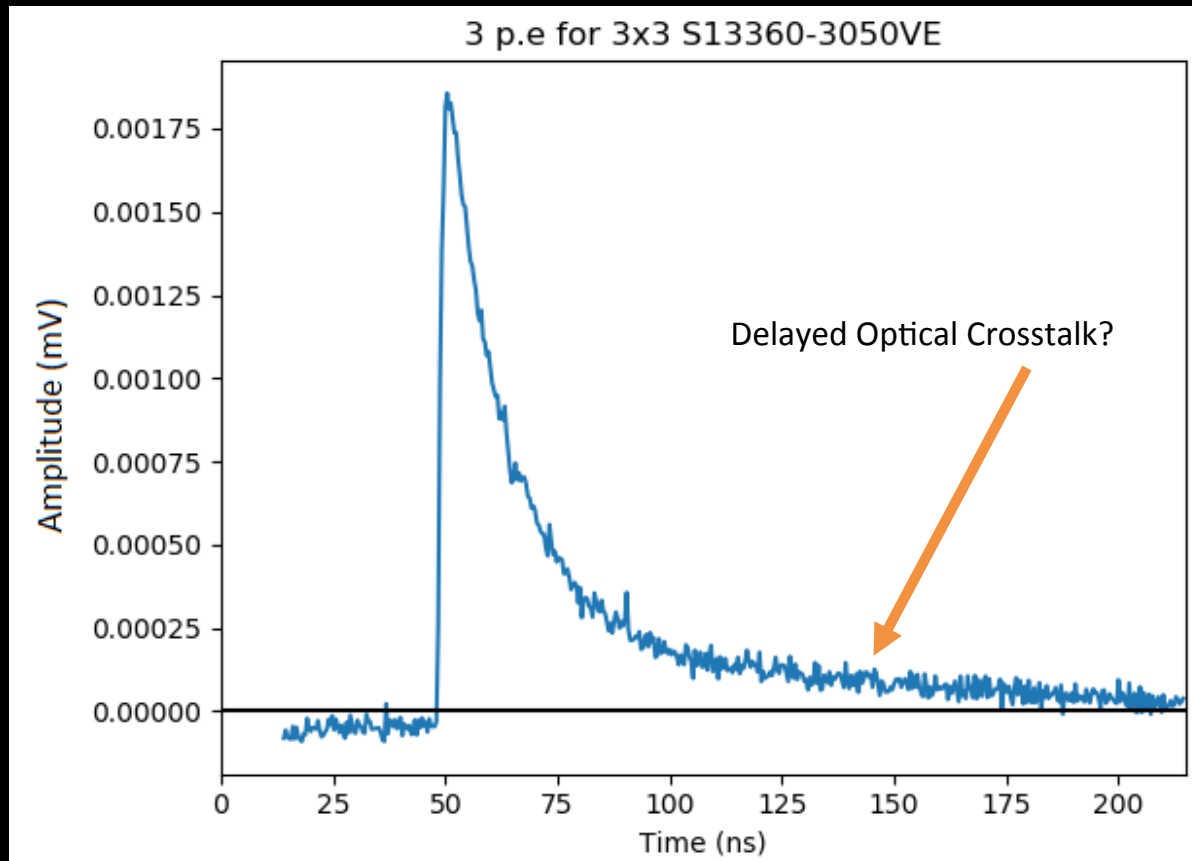




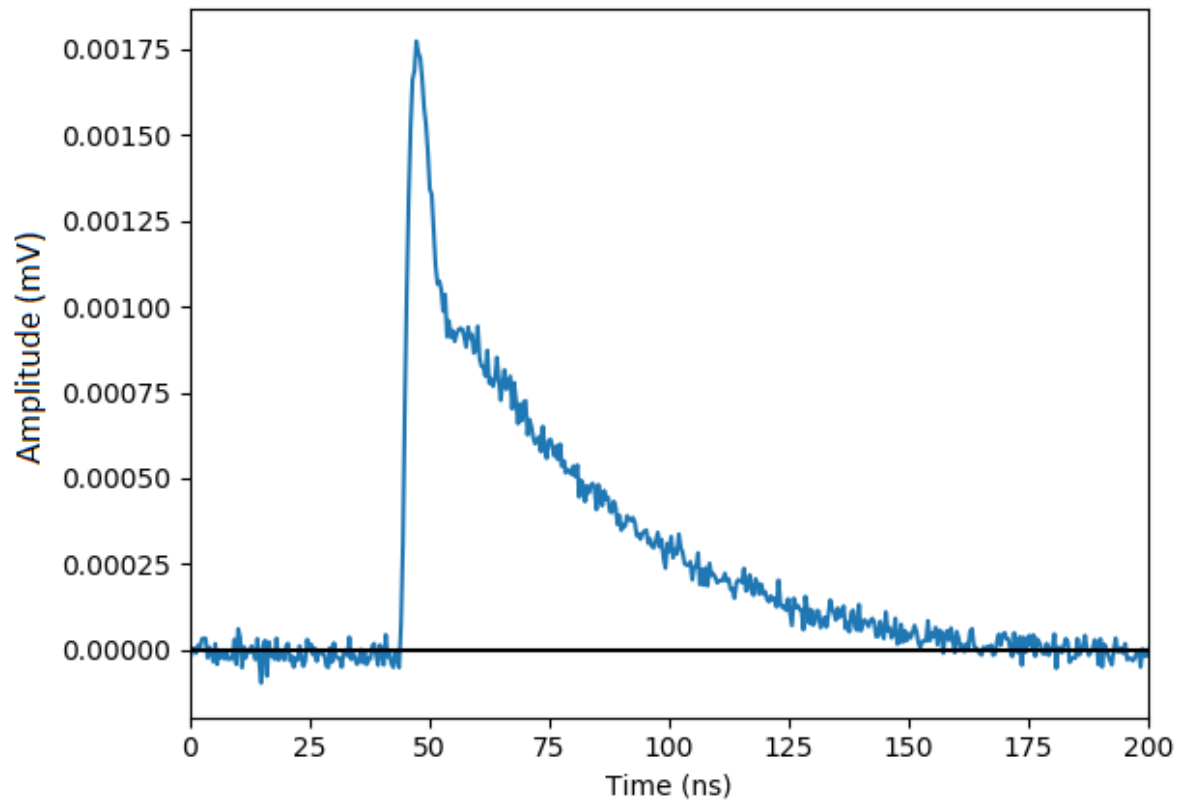


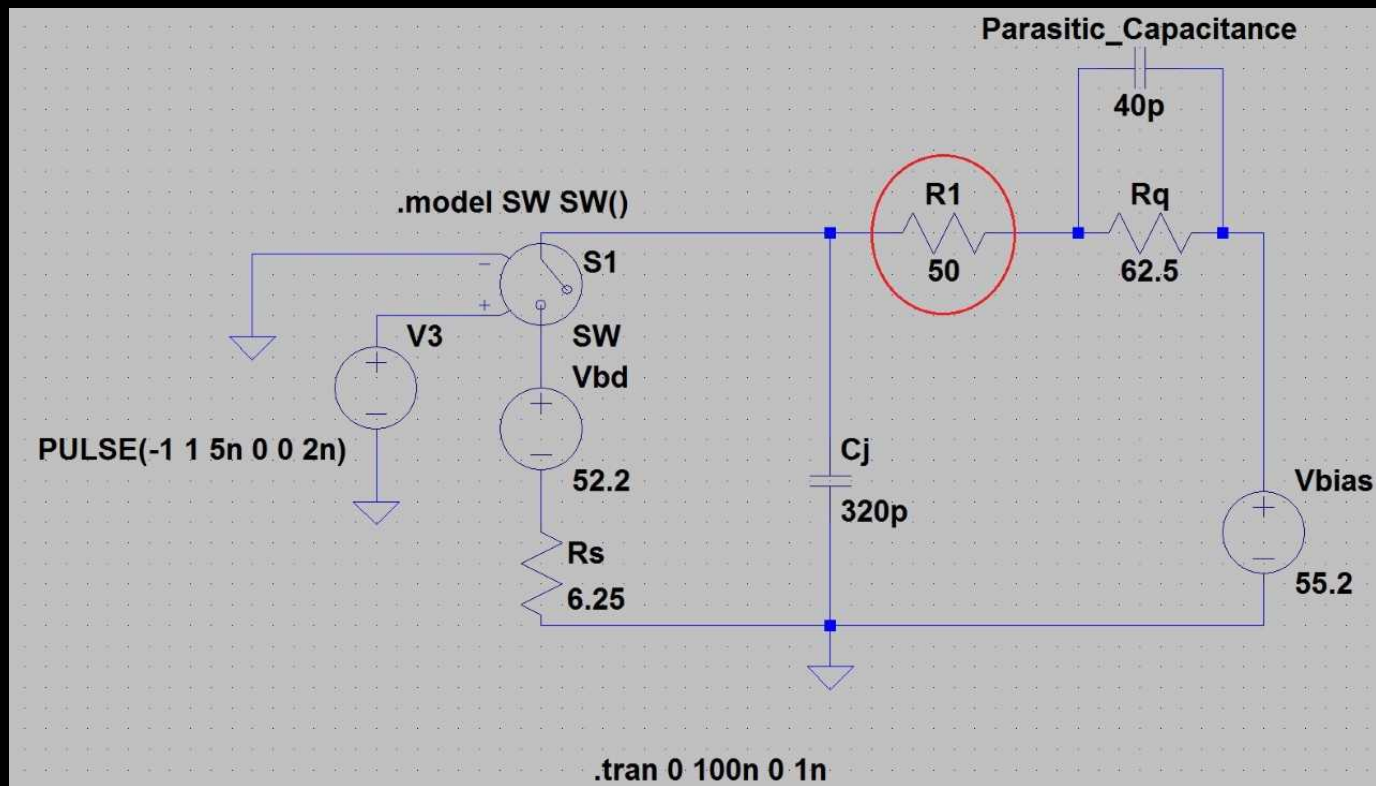
Excelitas C30742-66 100V (Overvoltage = 5V) SiPM - Averaged: 10000, 0 p.e.: 461, 1 p.e.: 1196, 2 p.e.: 1772, 3 p.e.: 1784, >3 p.e. 4787



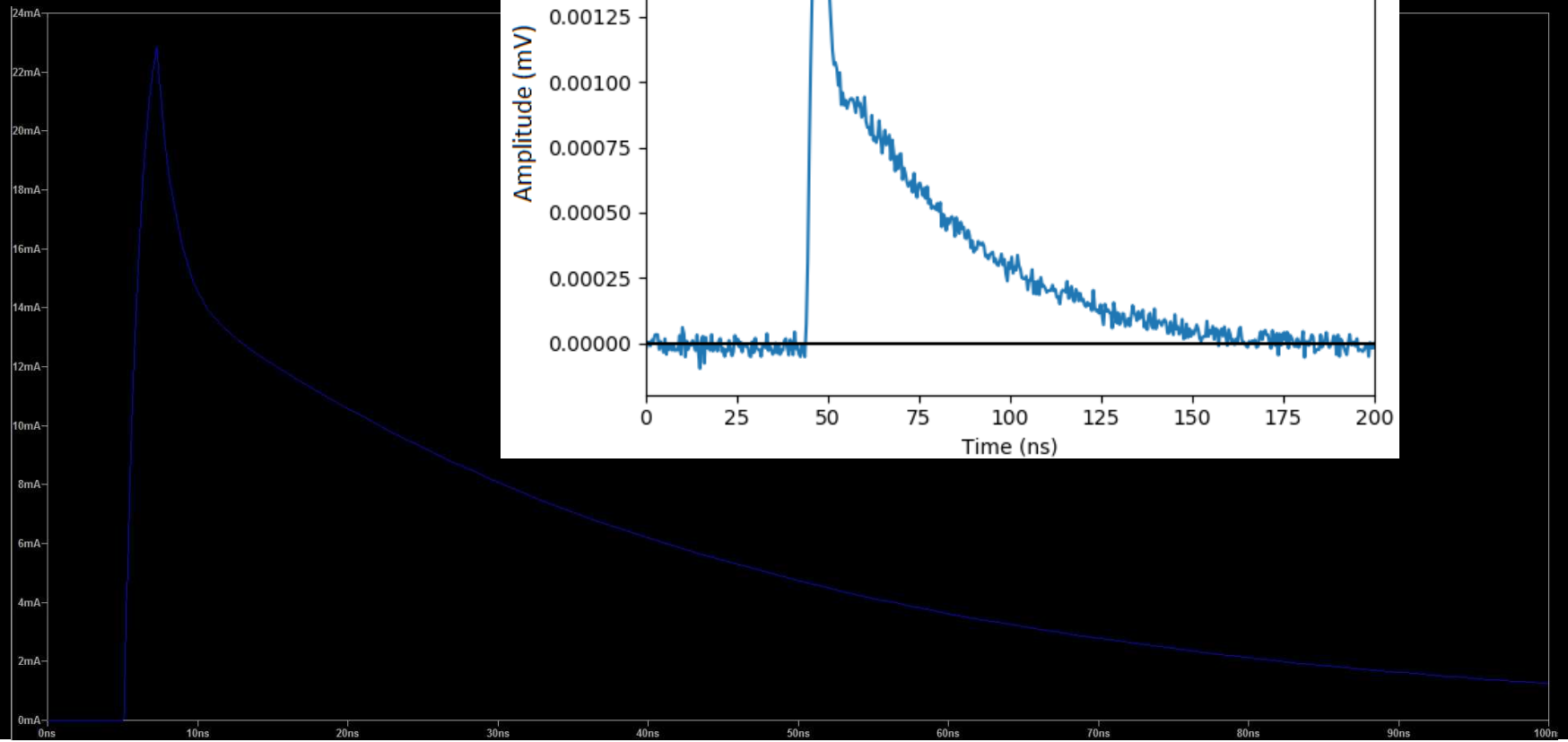
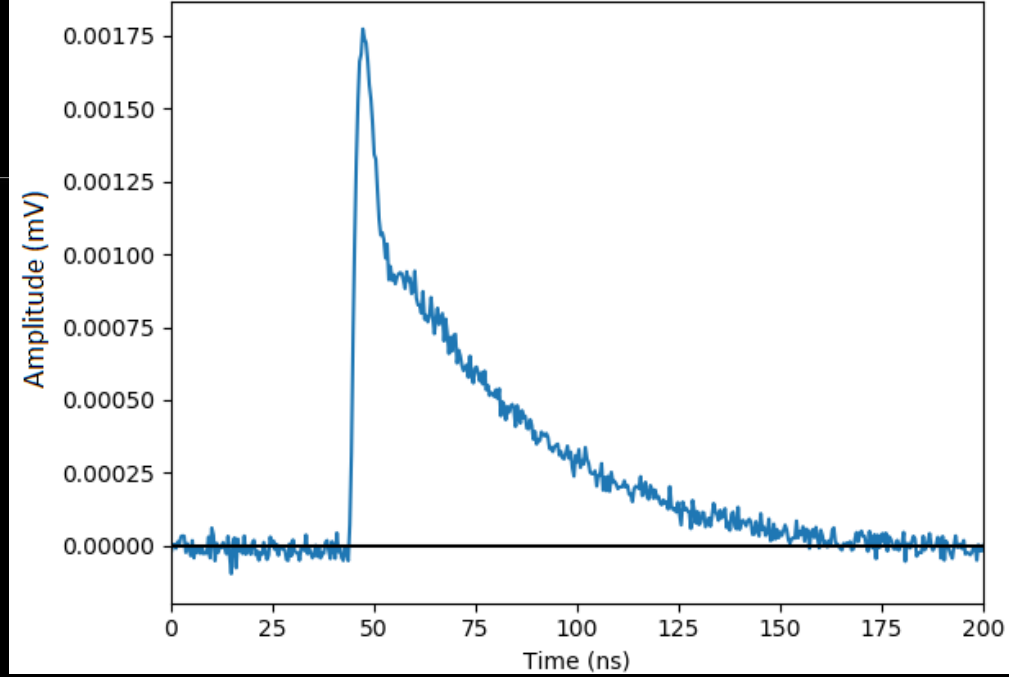


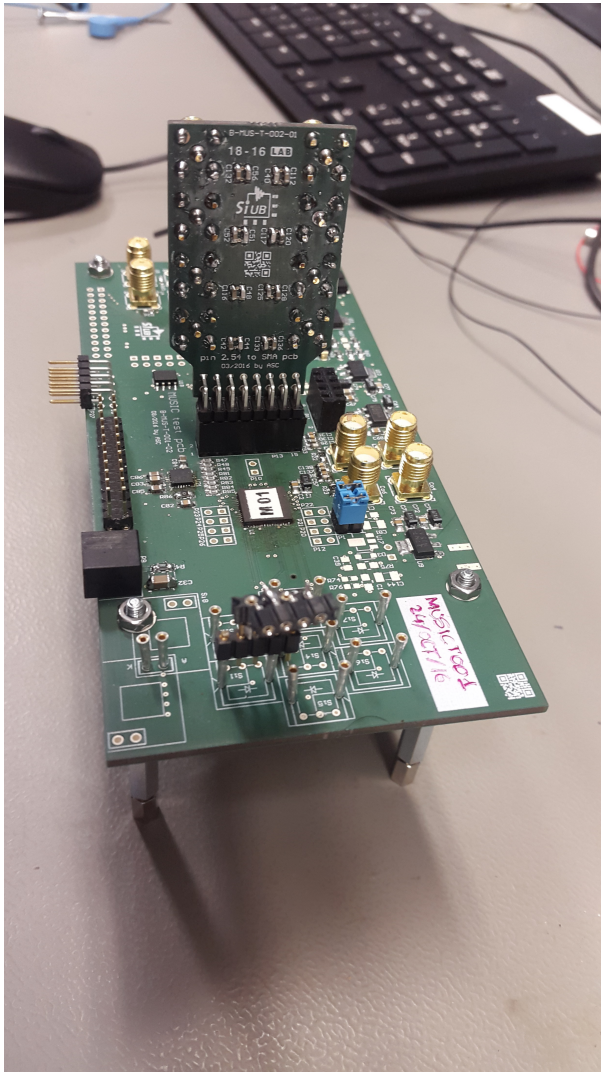
3 p.e for 3x3 S13360-3050VE at 56.2V (4V Overvoltage)





3 p.e for 3x3 S13360-3050VE at 56.2V (4V Overvoltage)





MUSIC

Multiple Use IC for SiPM anode readout

Good luck to all postgraduate researchers



THE BEST THESIS DEFENSE IS A GOOD THESIS OFFENSE.