

Laser Positioning System for DUNE

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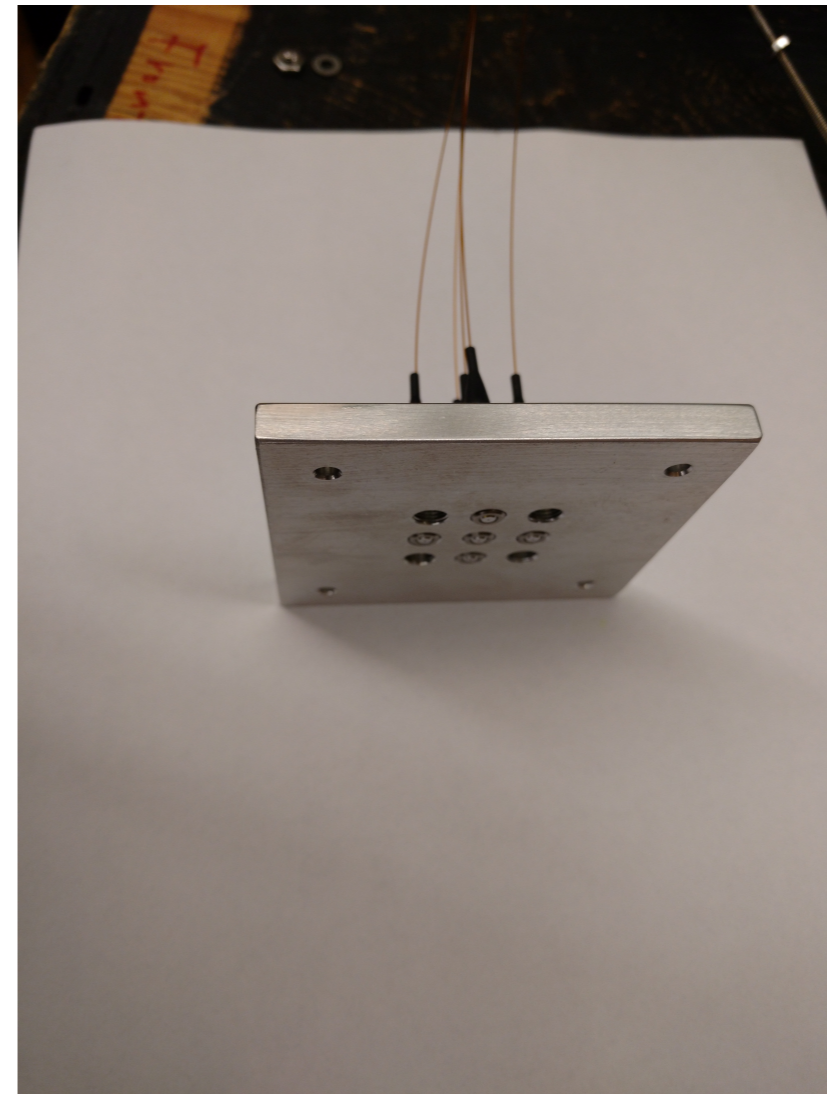
University of Hawaii

Calibration Consortium Meeting
26th April 2019

Laser positioning system for DUNE:

Determine laser direction and intensity at various locations independent of drift readout.

Passive system of fiber bundles to route light out of cryostat and readout by SiPMs

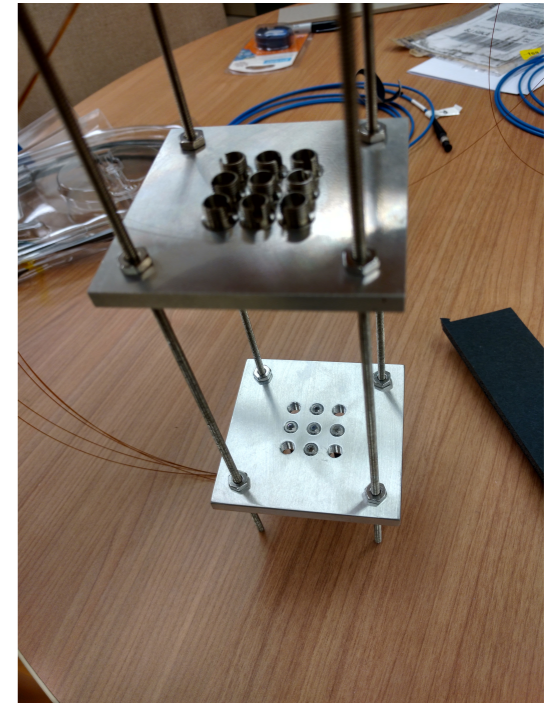
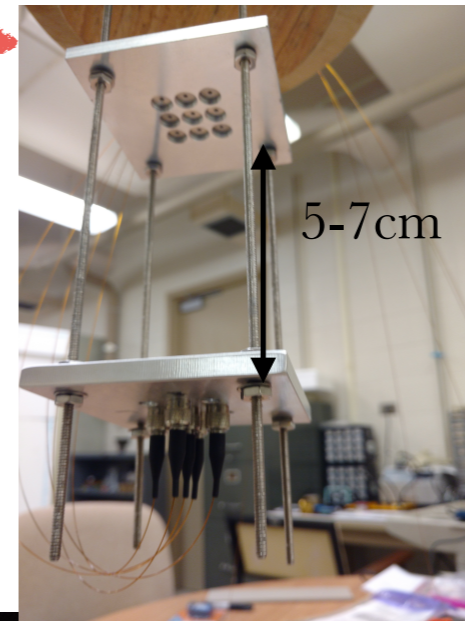


Pulsed Nd:YAG laser. $\lambda=1064$ nm, 532 nm, 266 nm

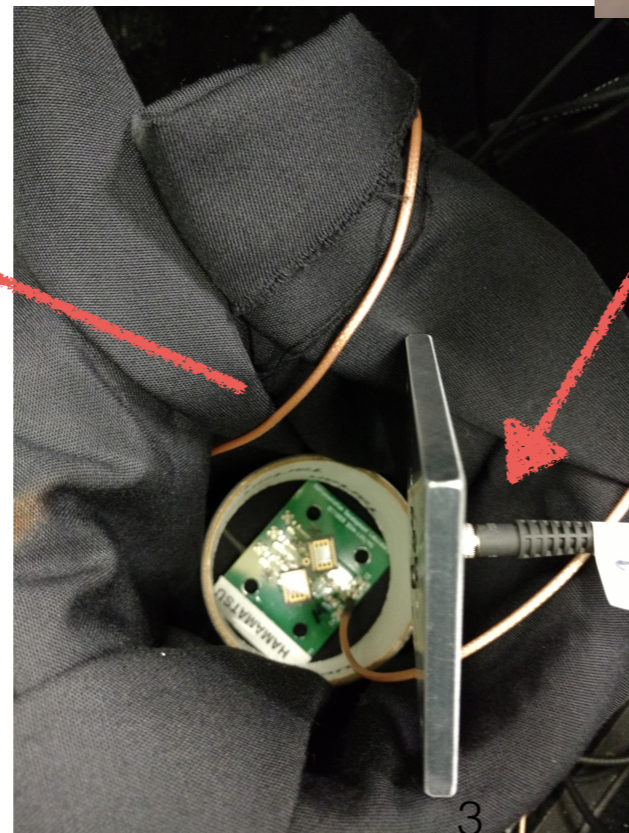
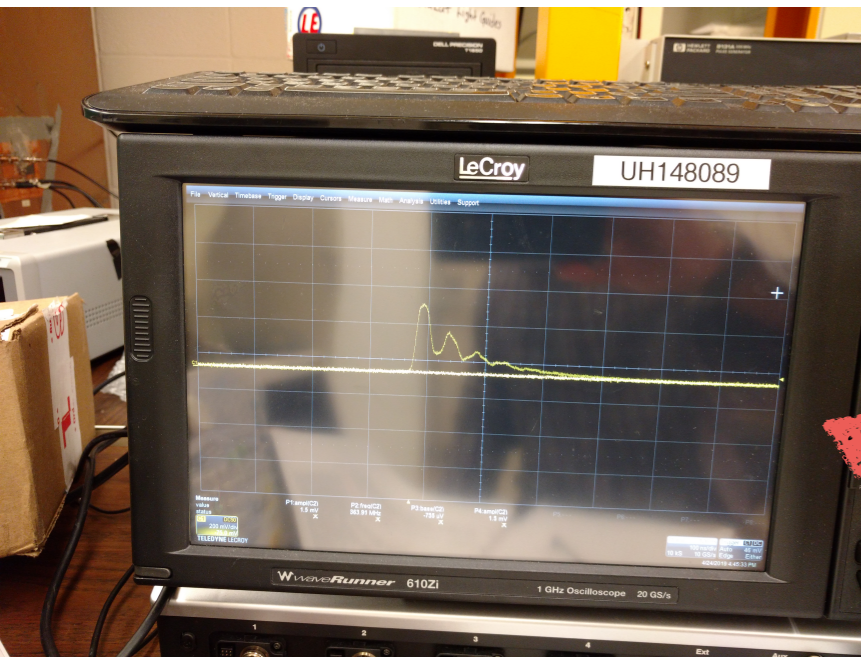


~30 ft MM fiber, $\text{Ø}=105\mu\text{m}$,
400-2400 nm

Inserted in dewar with LN2



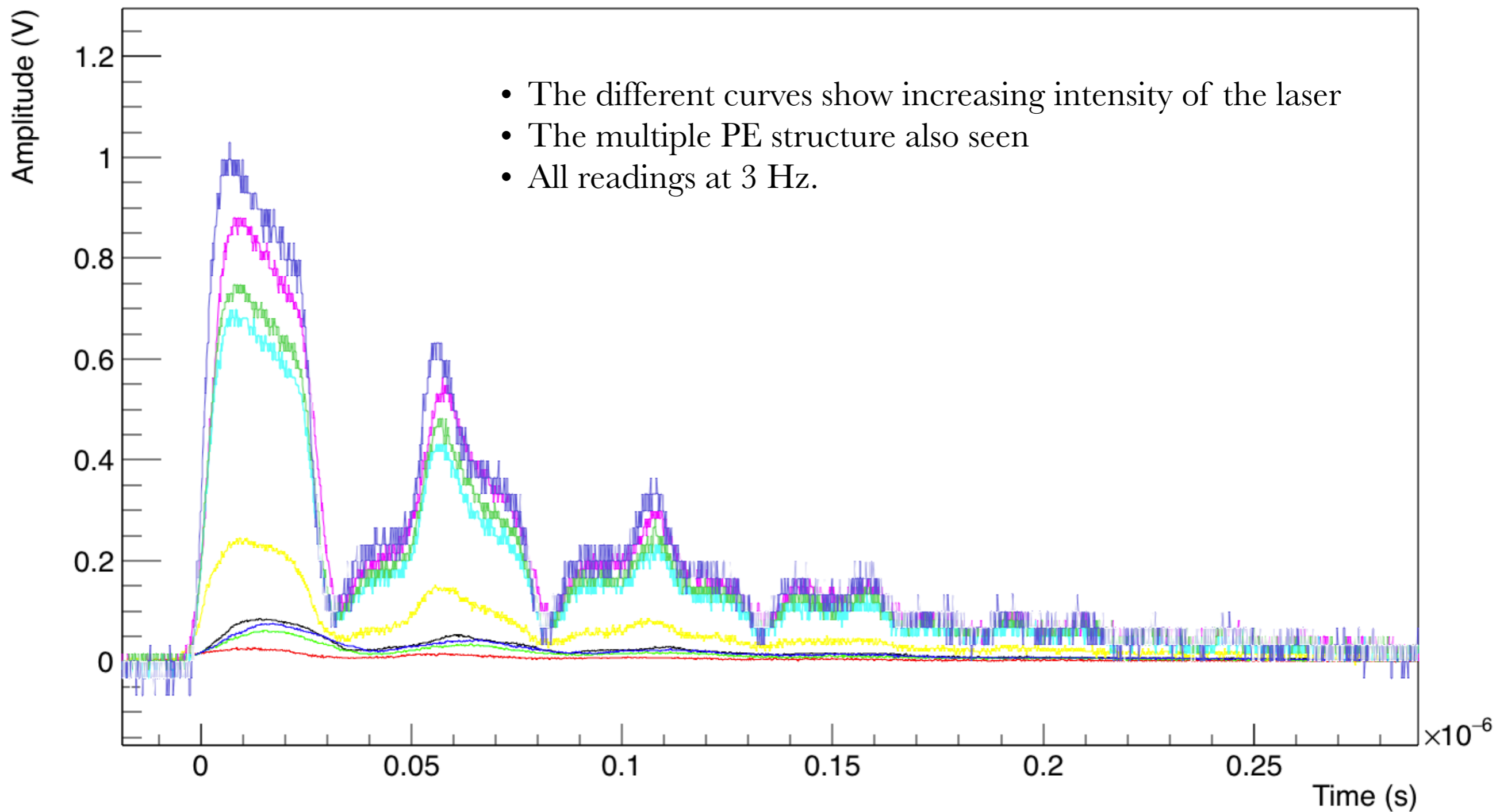
Hamamatsu MPPC



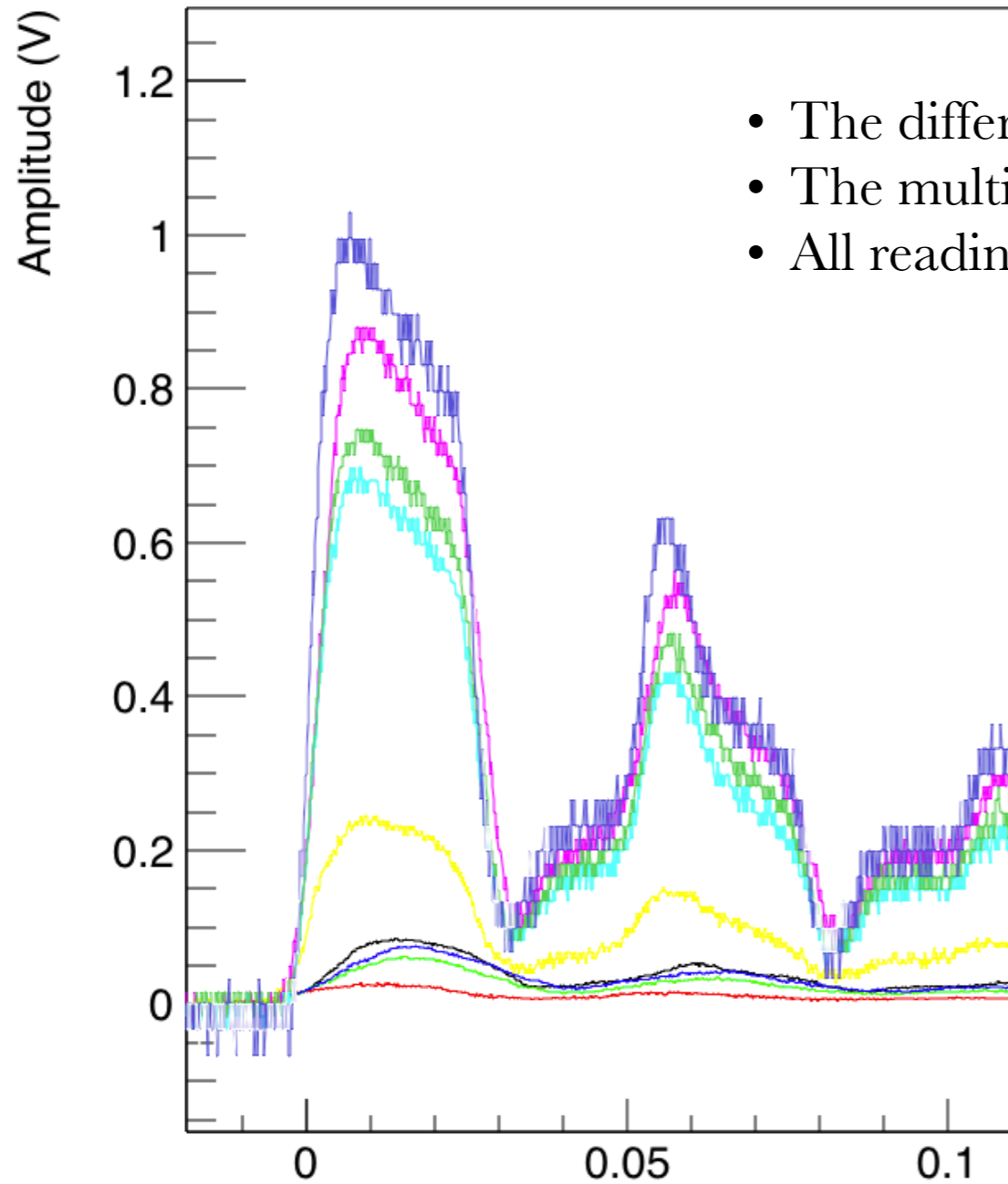
~4 m UM22-300 MM fiber
 $\text{Ø}=300\mu\text{m}$, 180-850 nm

Polymide coating (inside LN2/
LAr)

SiPM waveforms



SiPM waveforms



- The different curves show increasing intensity of the laser
- The multiple PE structure also seen
- All readings at 3 Hz.

Mode	MULTI-MODE	Output	Q-SWITCHED	Seeded	NO
Beam diameter	4mm	Intra-cavity telescope magnification	N/A		
Repetition Rate (Hz)	10				
Lens Separation (mm)	N/A				
Laser Energy Dial Setting	~Output energy (mJ) Oscillator after mixing optics				
	1064nm	532nm	355nm	266nm	213nm
1000	131	101		21	
950	129	95		20	
900	121	88		19	
800	100	71		18	
700	77	50		14	
600	55	30		8	
500	30	10		1	
-	-	-	-	-	-
Threshold					
Polarisation	HORIZ	HORIZ		VERT	

Laser positioning system for DUNE:

The system works and we see robust signals.

Next steps:

Measure attenuation in the fibers.

More waveform analysis, try get beam profile