Novel Imaging Technique for Thermal Neutrons Using a Fast Optical Camera

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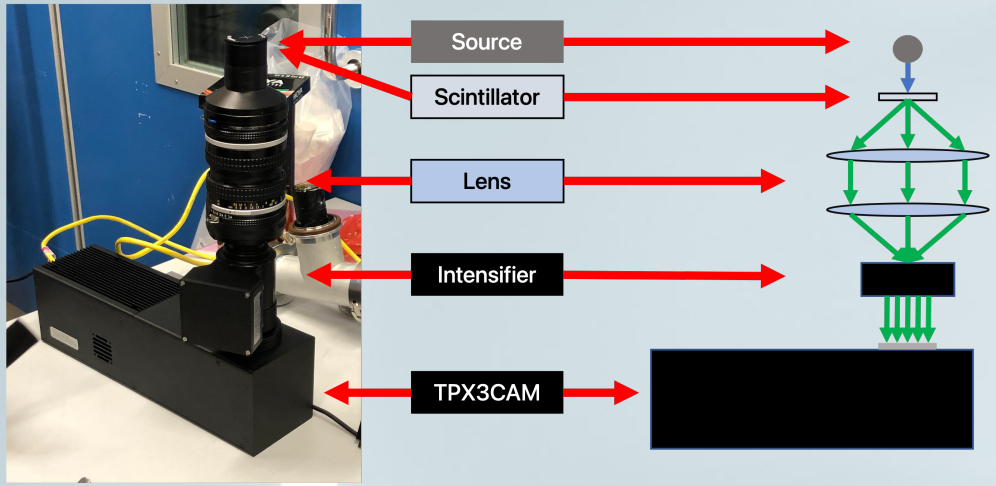
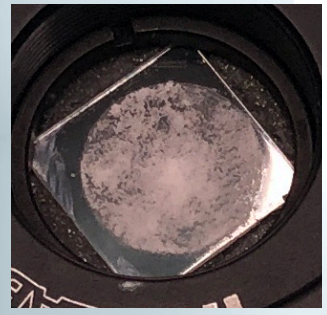
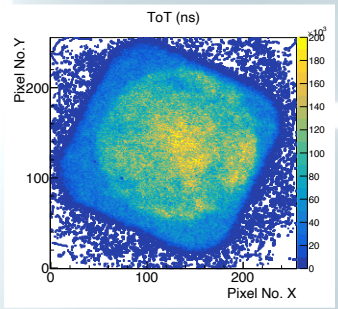
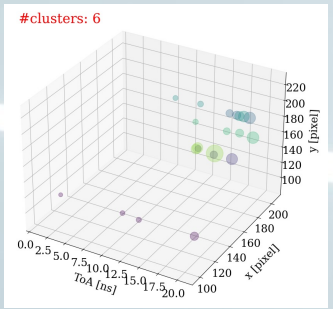


Pre-cut			
Source	Reconstructed event frequency (Hz)	Minus Background (Hz)	Ratio to maxrate
Detector background	34.2	0	-
Neutron	67.5	33.3	1
Neutron @ 0.5 rate	52.5	18.3	0.55
Neutron @ 0.25 rate	40.8	6.6	0.2
Post-cut			
Source	Reconstructed event frequency (Hz)	Minus Background (Hz)	Ratio to maxrate
Detector background	0.8	0	-
Neutron	2	1.2	1
Neutron @ 0.5 rate	1.5	0.7	0.58
Neutron @ 0.25 rate	1.1	0.3	0.25







Goal	Develop a spatial and temporal sensitive thermal neutron imager based on timepix3 camera.
Set-up	Lithium-6 rich converter painted on LYSO crystal converts thermal neutron to photons, which is then detected by the camera.
Results	Three effective cutting parameters found for the dataset: 1. Integrated event ToT 2. Hits per event 3. Clusters per event
Conclusion	The thermal neutrons were successfully detected after suppressing the background with ad-hoc data analysis and predict the reduced neutron rate. Further improvements can be made on the experiment set-up and the neutron source.