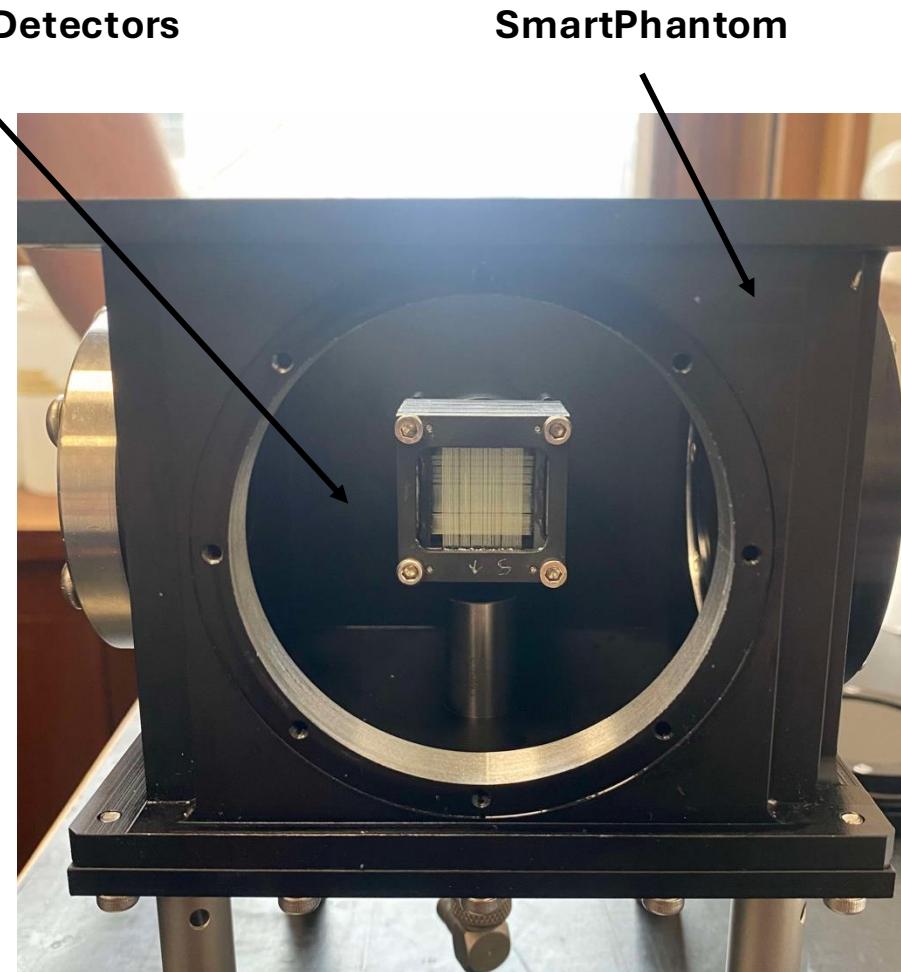
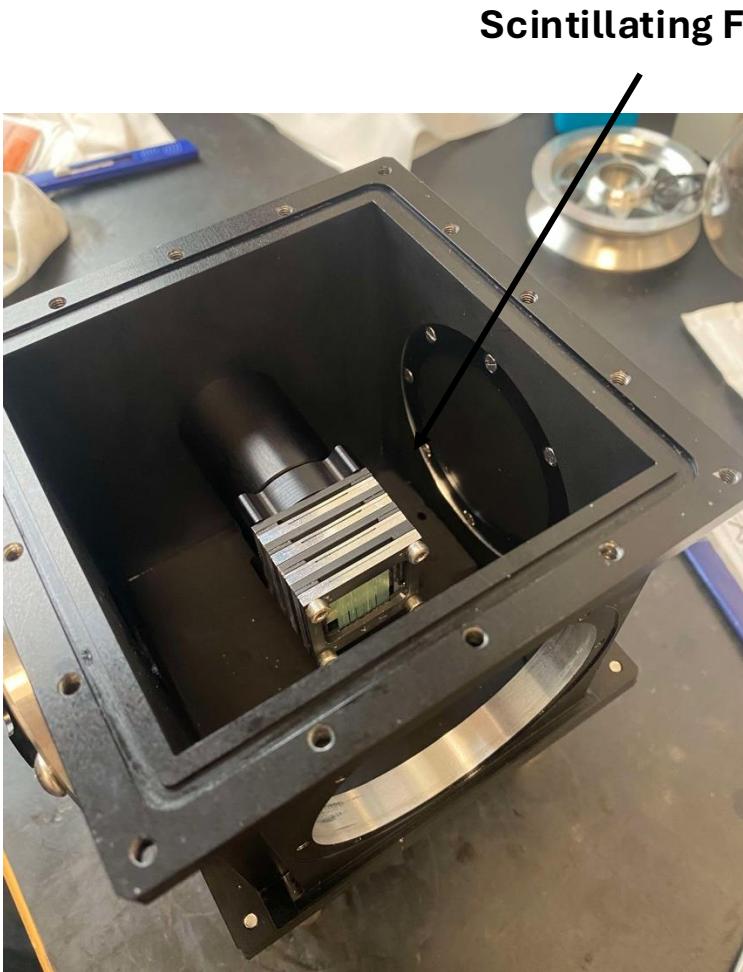


IMPERIAL

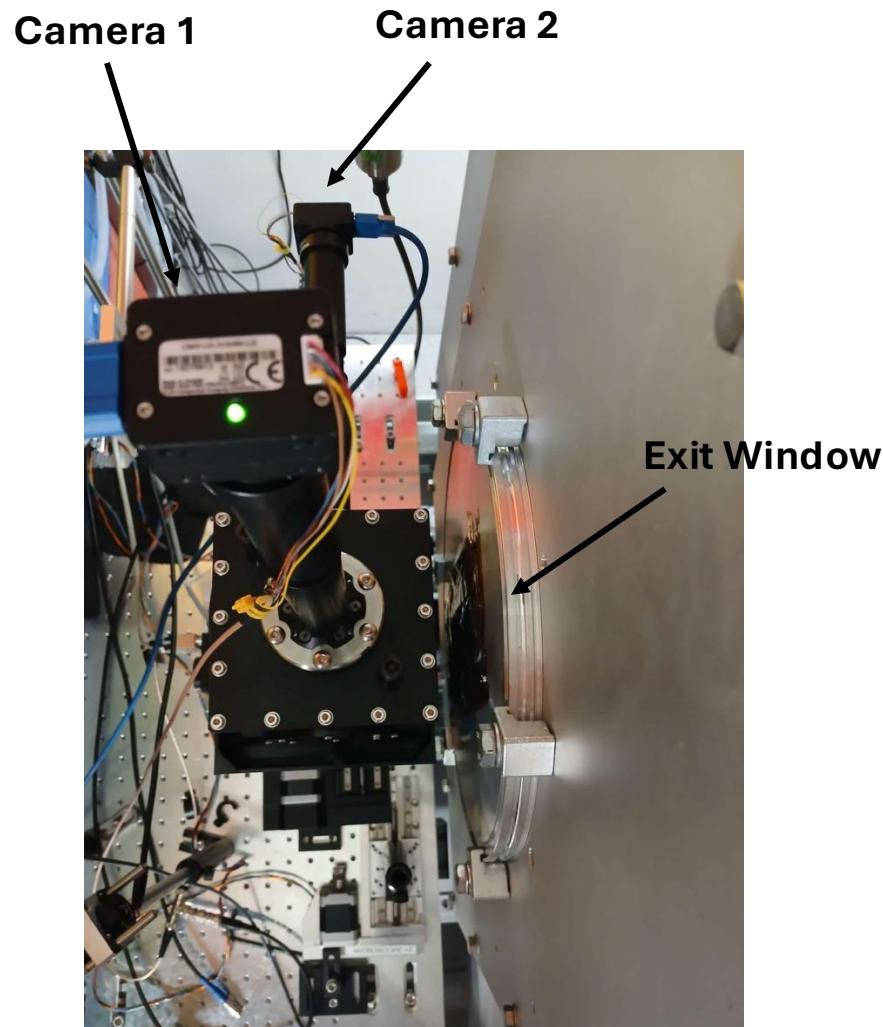
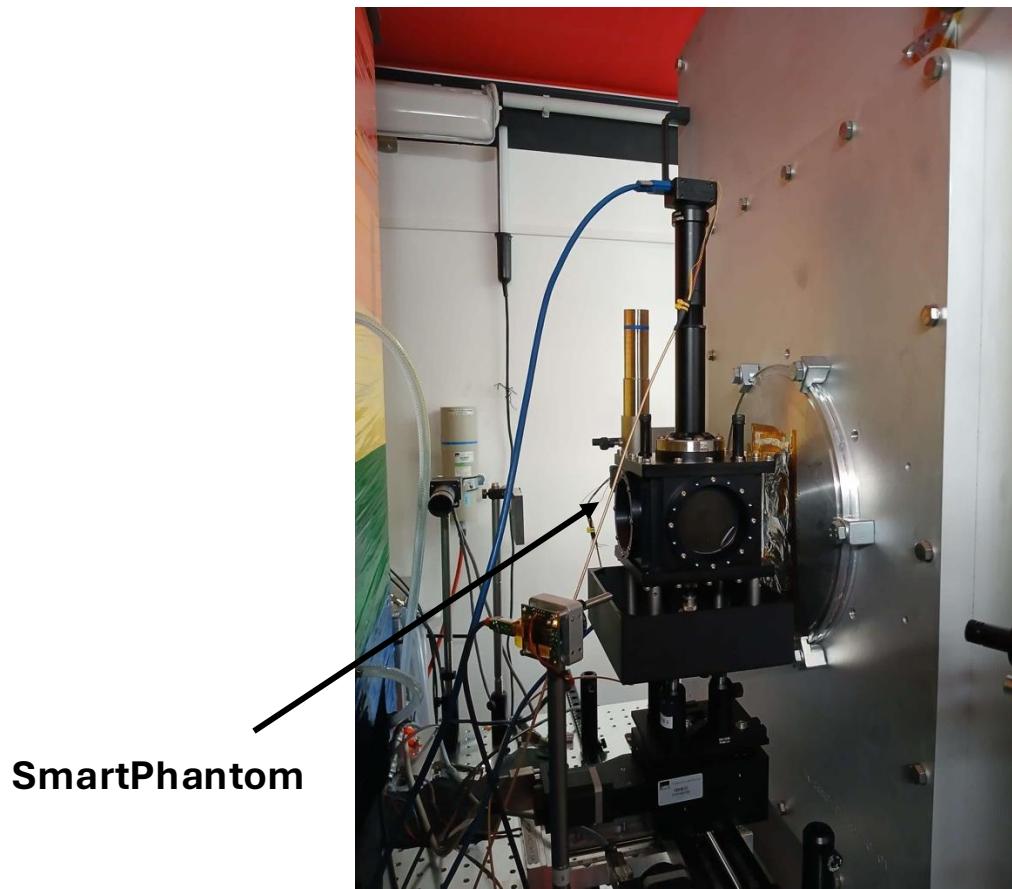
LION Beamline Experiment Data Analysis

5/11/2024

Day 1: Scintillating Fibre Detectors

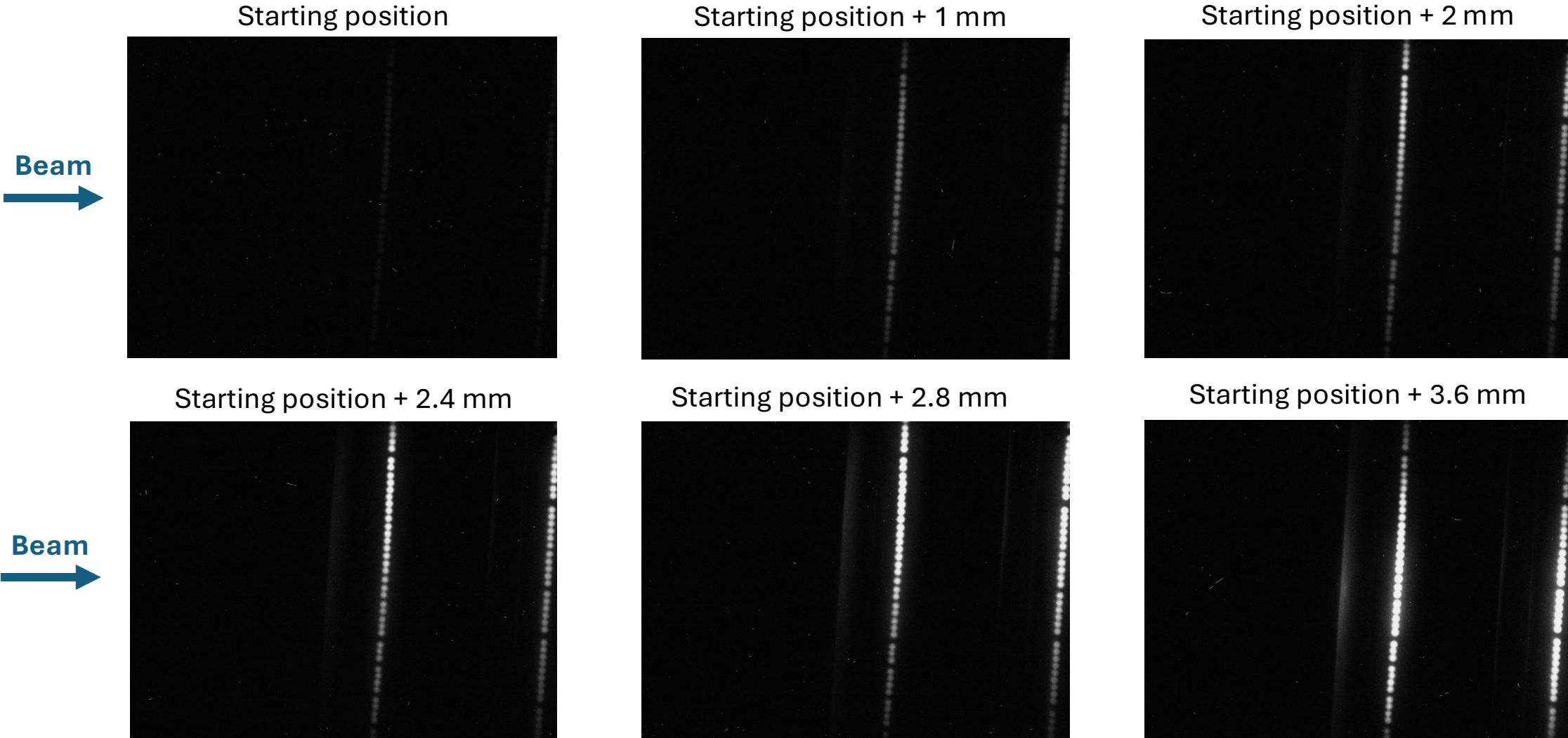


Day 1: Scintillating Fibre Detectors



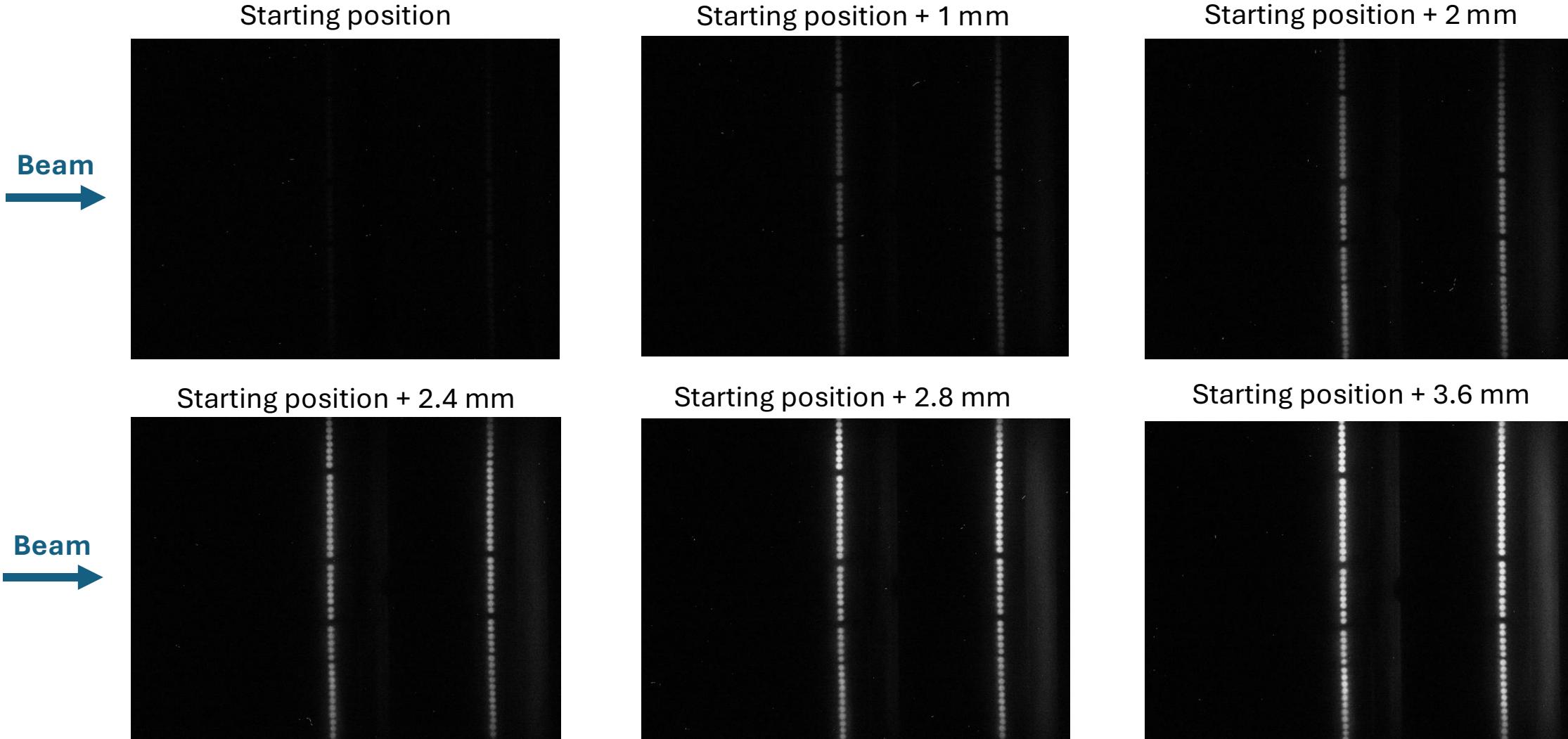
Day 1: Scintillating Fibre Detectors

20 MeV: Lateral Scan: Camera 1 (top)



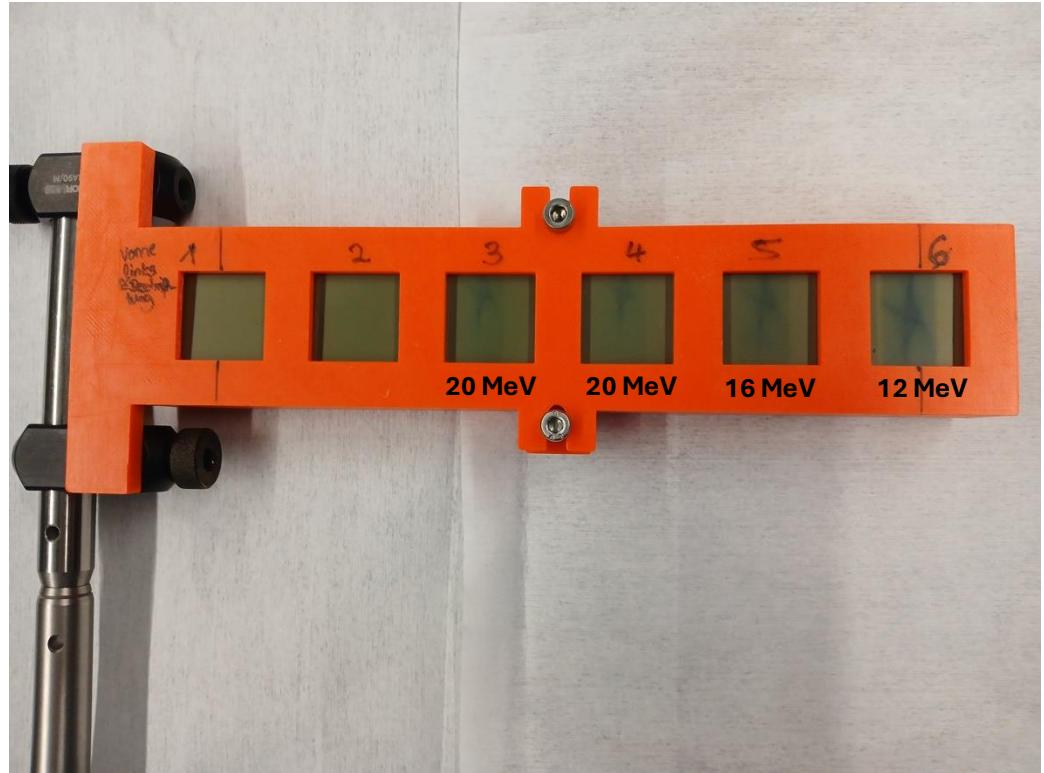
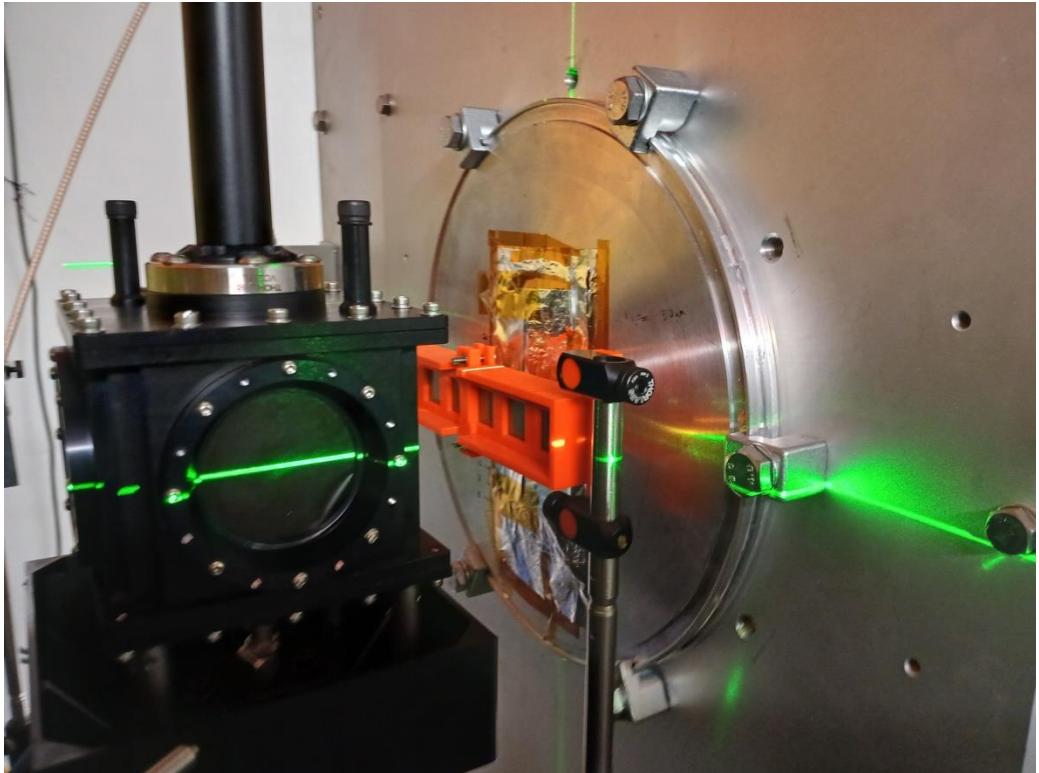
Day 1: Scintillating Fibre Detectors

20 MeV: Lateral Scan: Camera 2 (side)



Day 1: Scintillating Fibre Detectors

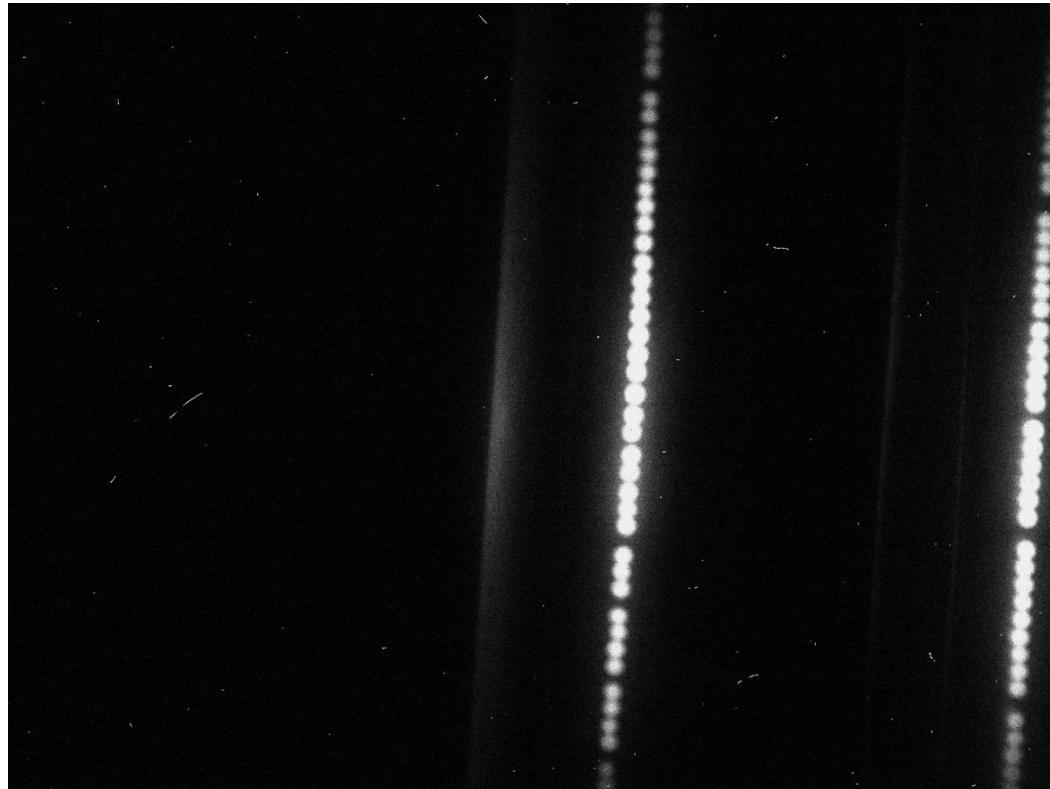
RCF Stacks



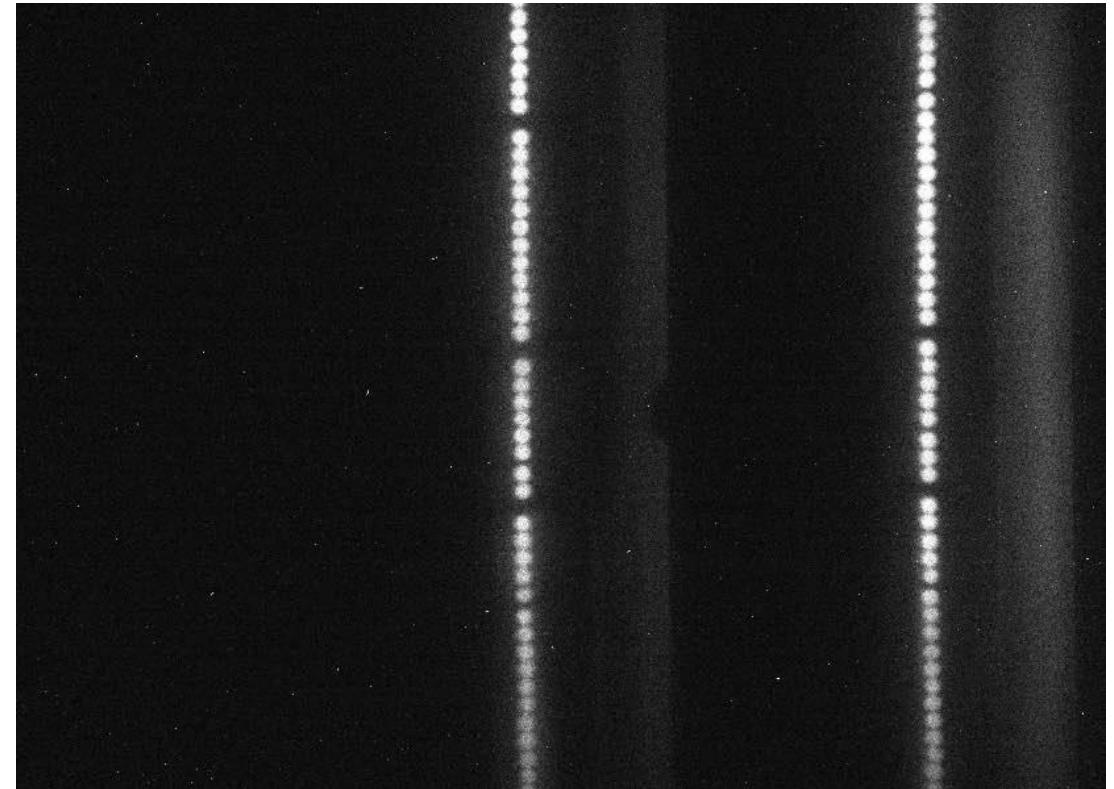
Day 1: Scintillating Fibre Detectors

Energy Scan

Camera 1: Top



Camera 2: Side

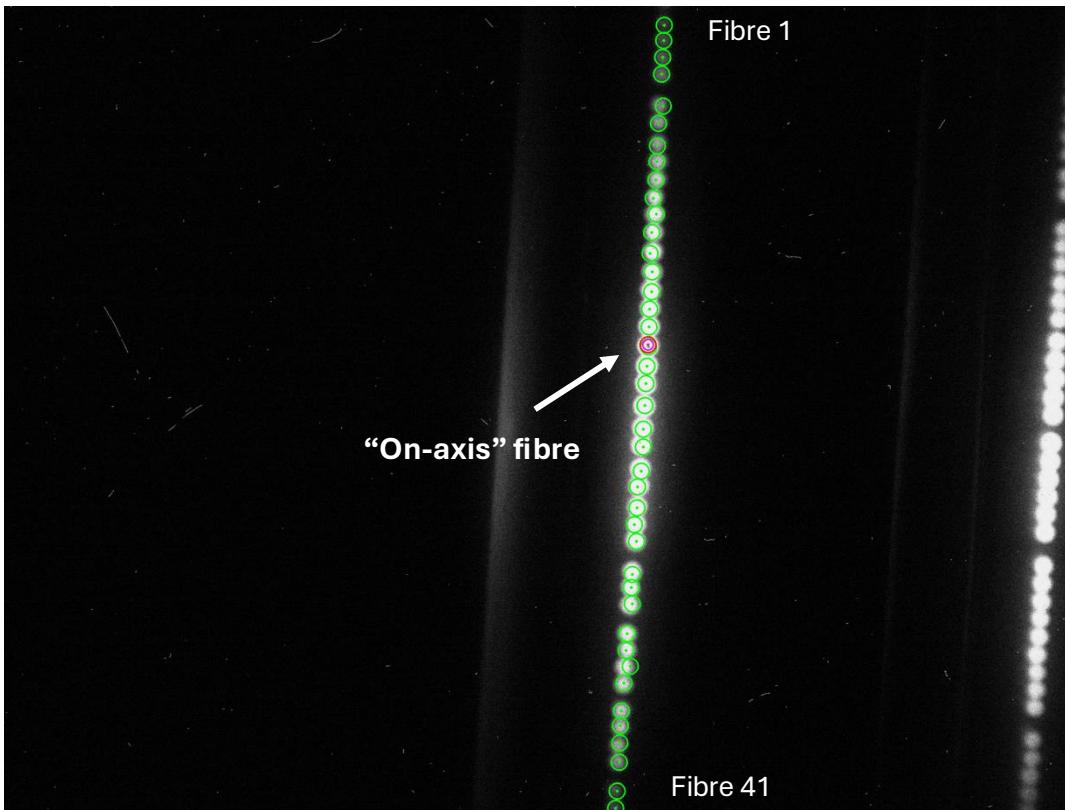


20 MeV example

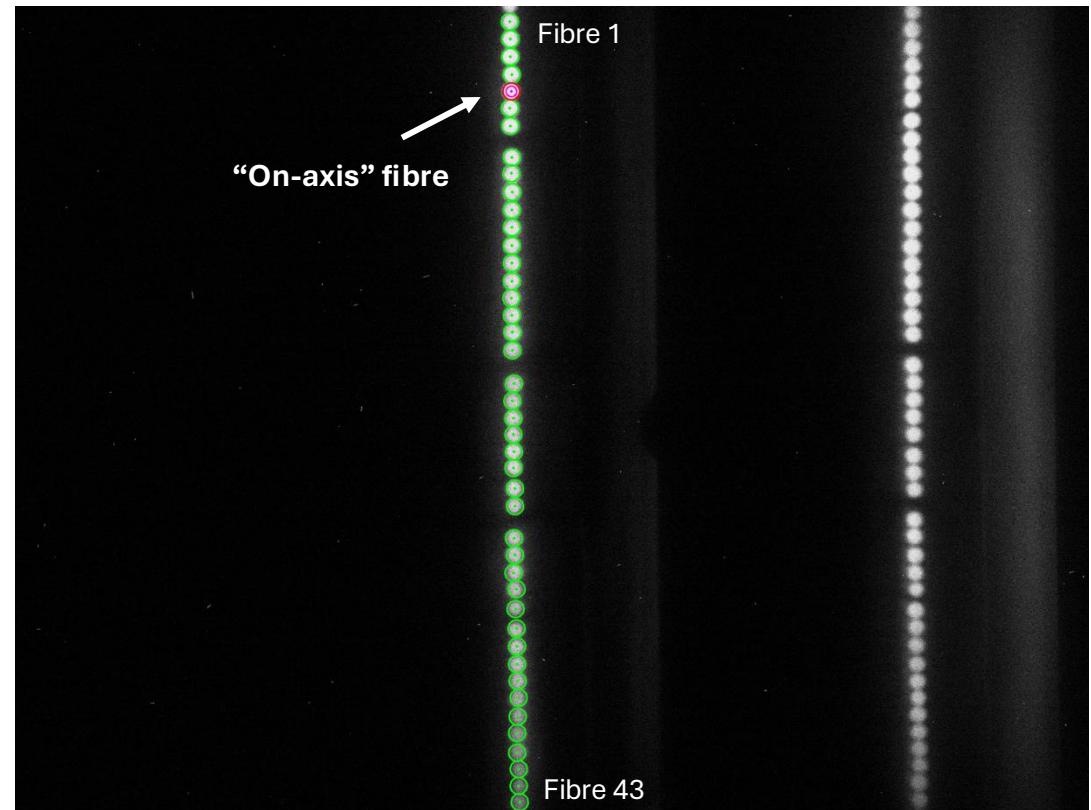
Day 1: Scintillating Fibre Detectors

Background Correction & Fibre Detection

Camera 1: Top



Camera 2: Side

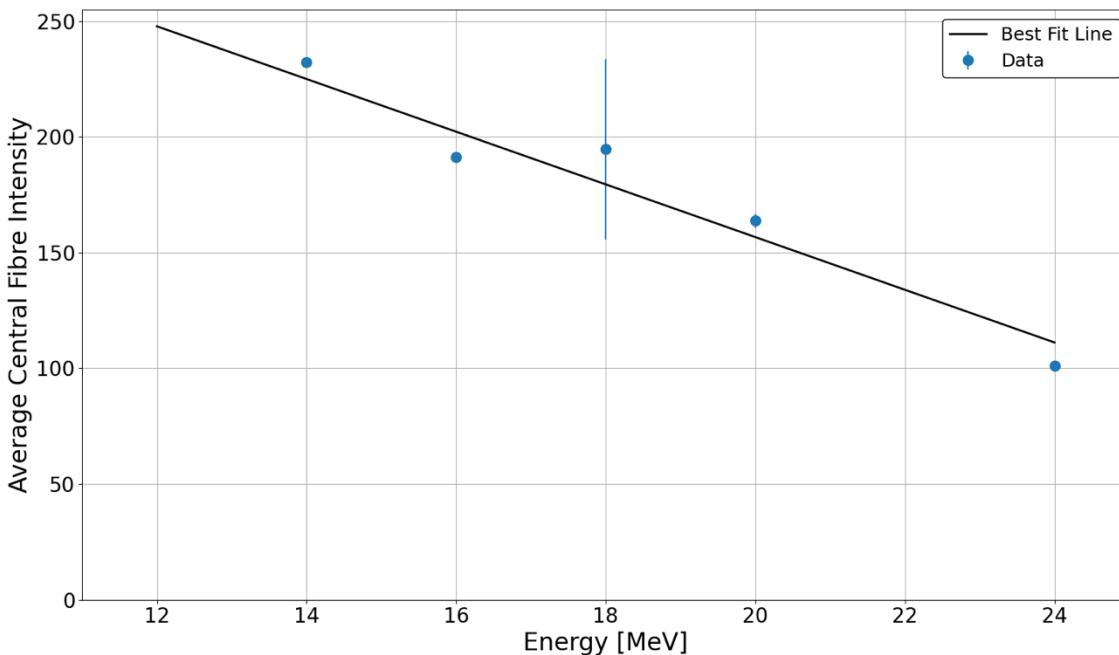


20 MeV example

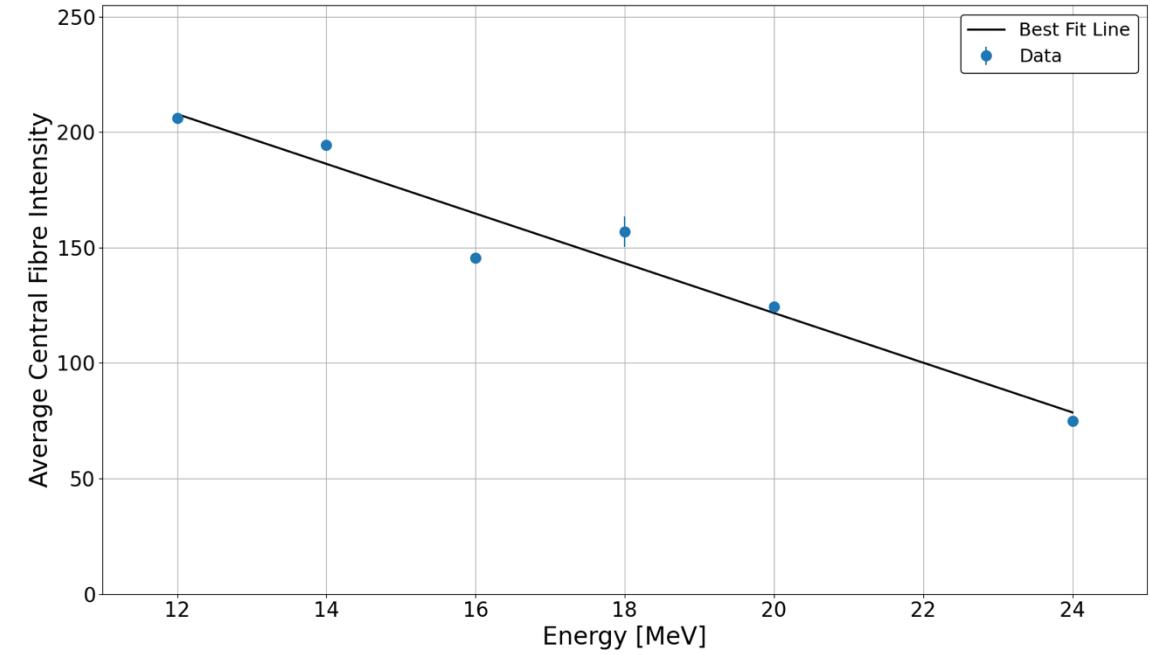
Day 1: Scintillating Fibre Detectors

Central Fibre intensities

Camera 1: Top



Camera 2: Side

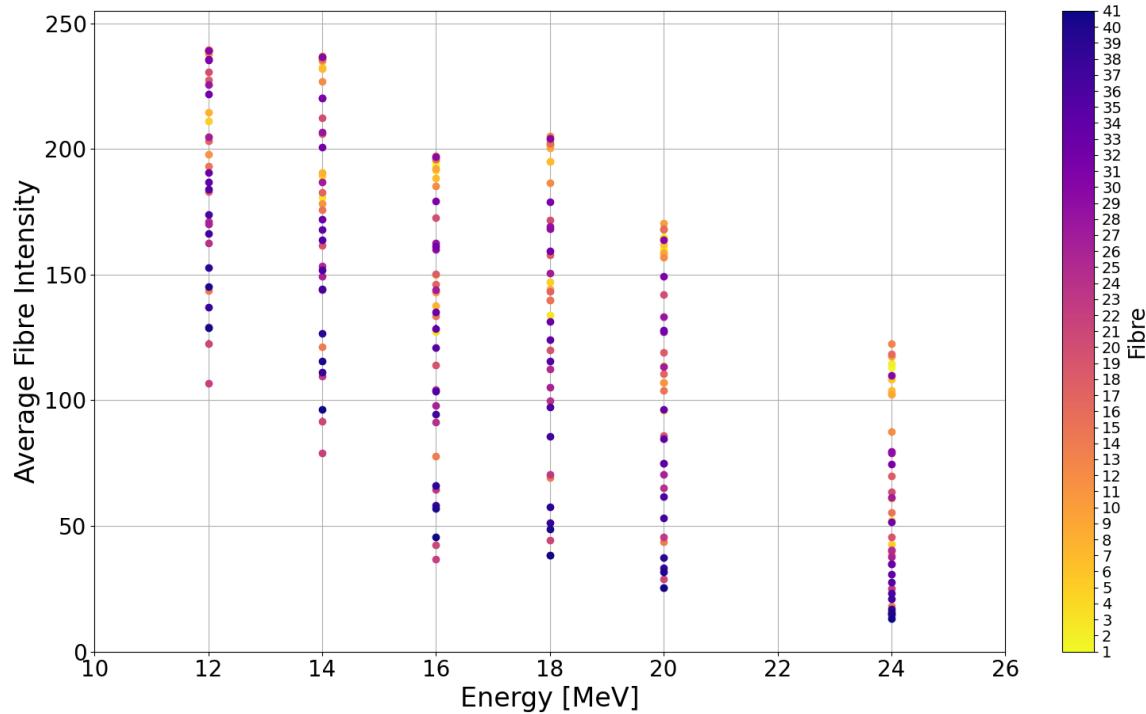


Number of particles decreases linearly with focused energy

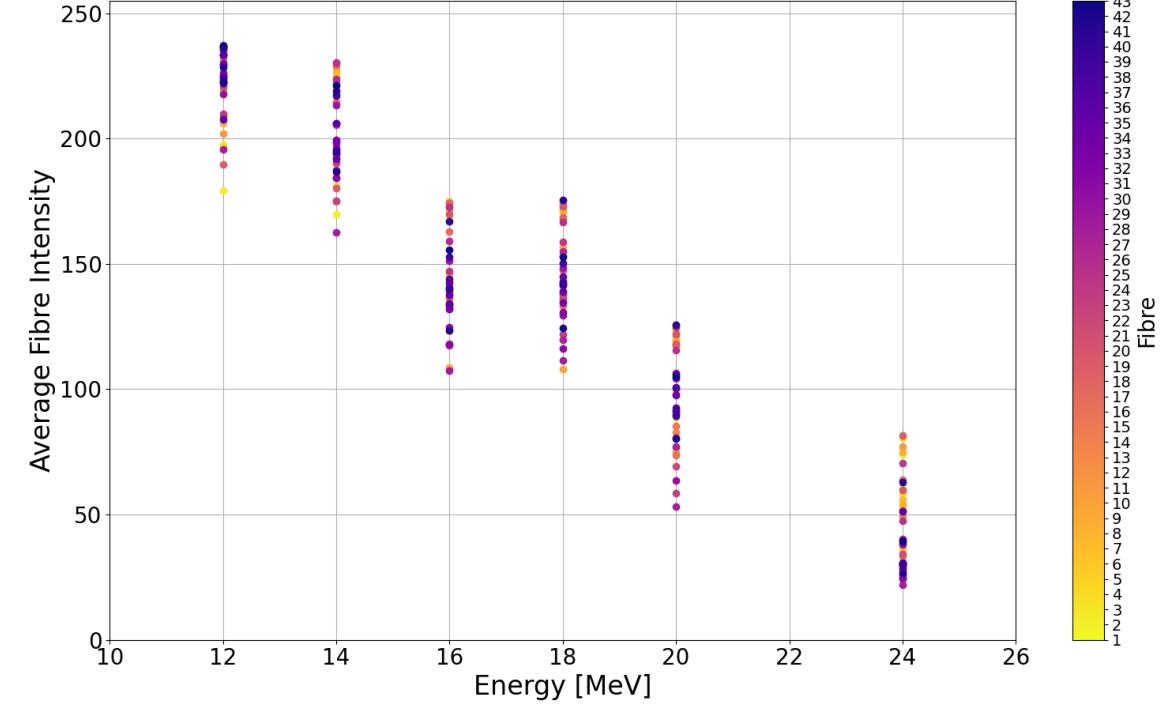
Day 1: Scintillating Fibre Detectors

All Fibre Intensities

Camera 1: Top



Camera 2: Side

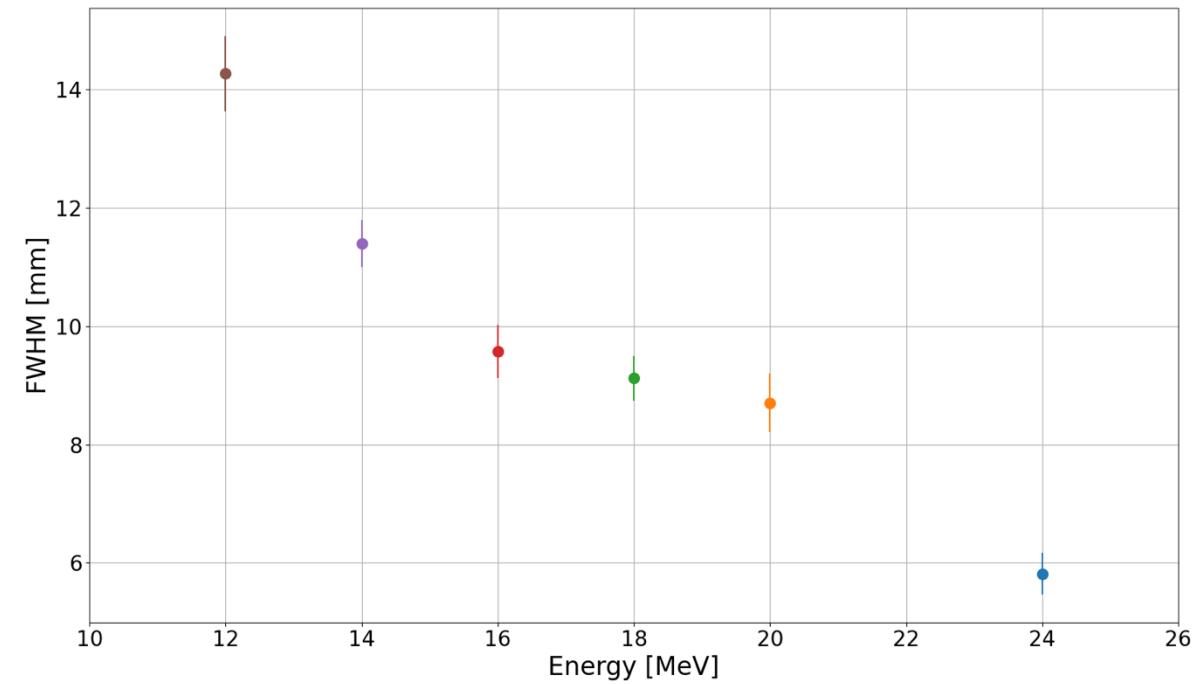
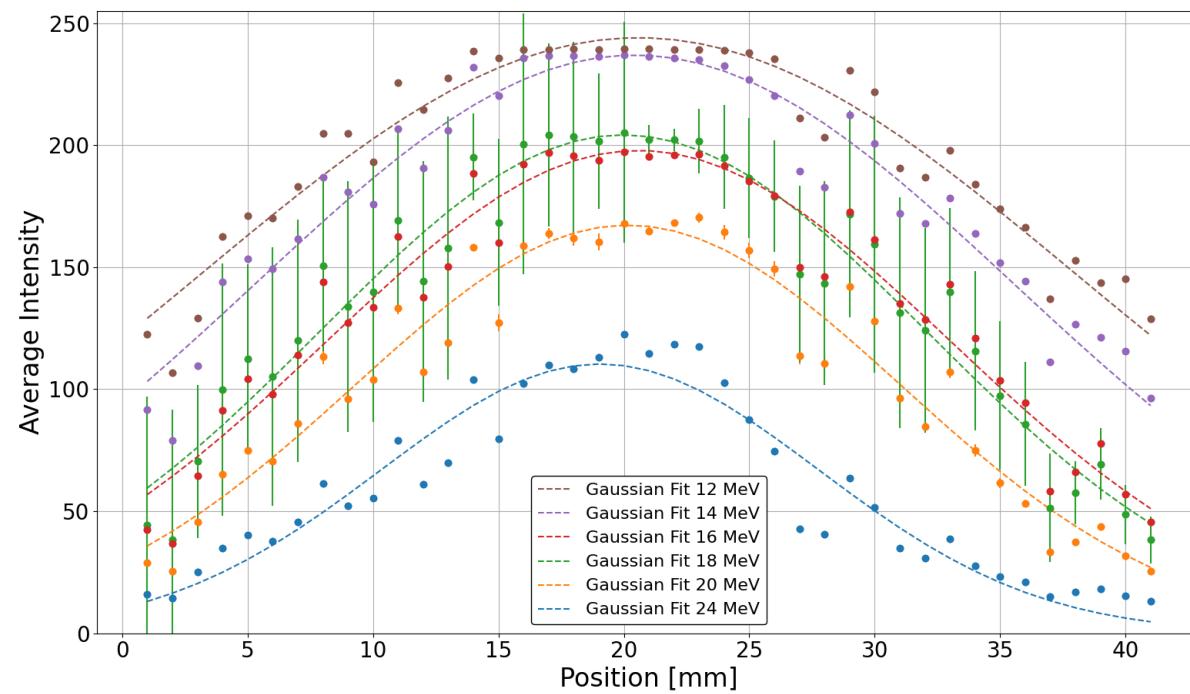


Day 1: Scintillating Fibre Detectors

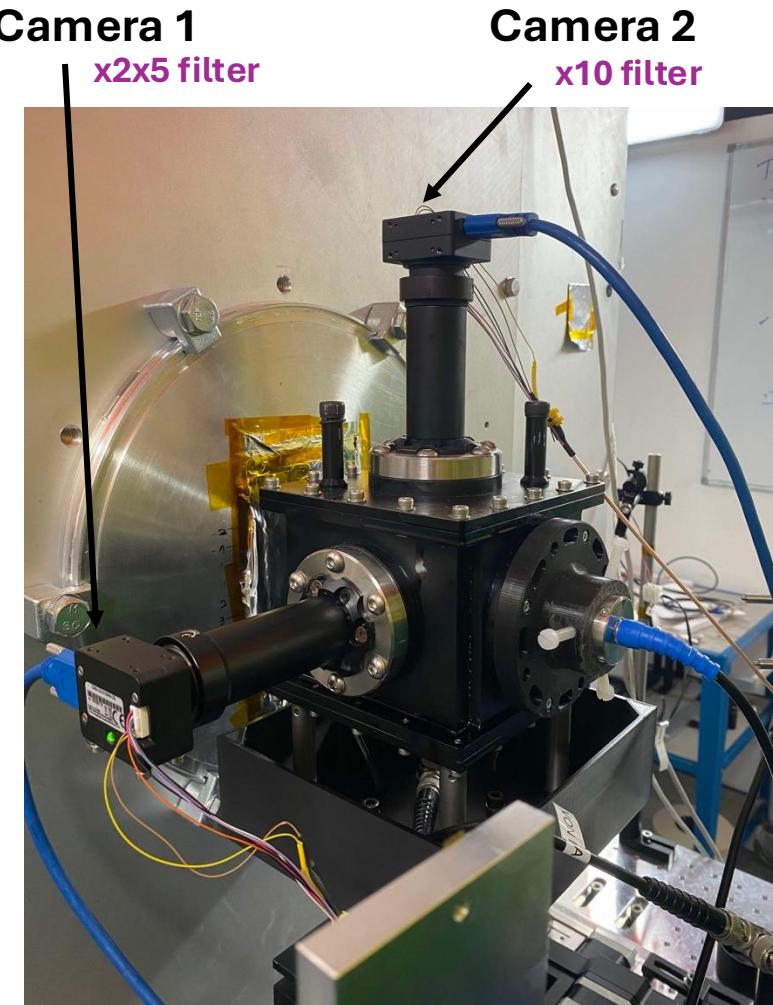
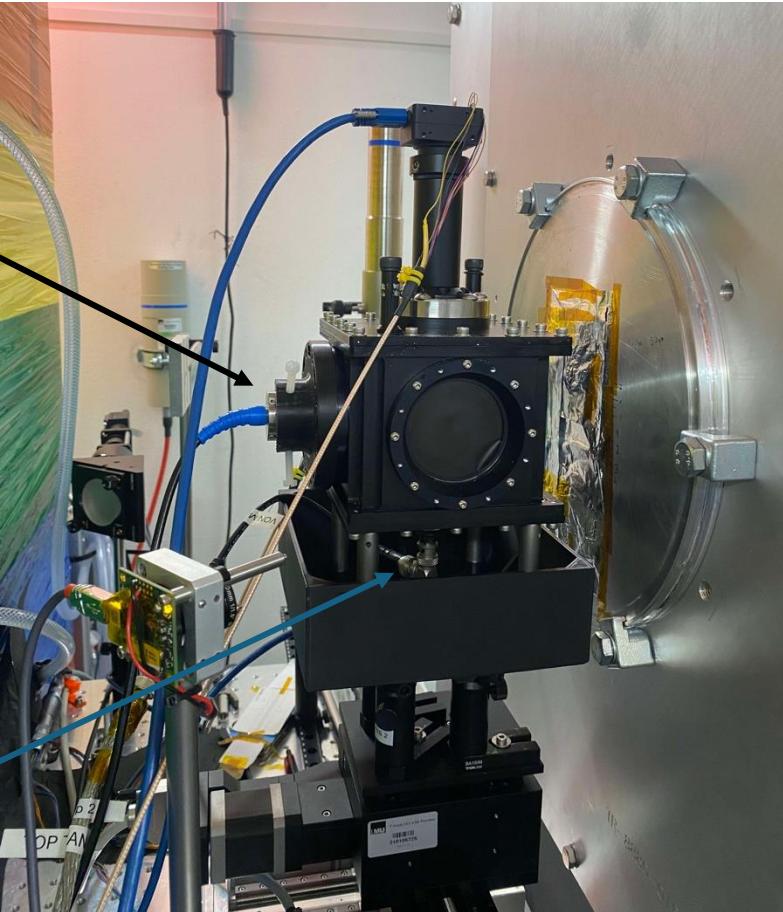
Beam Profiles: Gaussian fit & mm conversion

Camera 1: Top

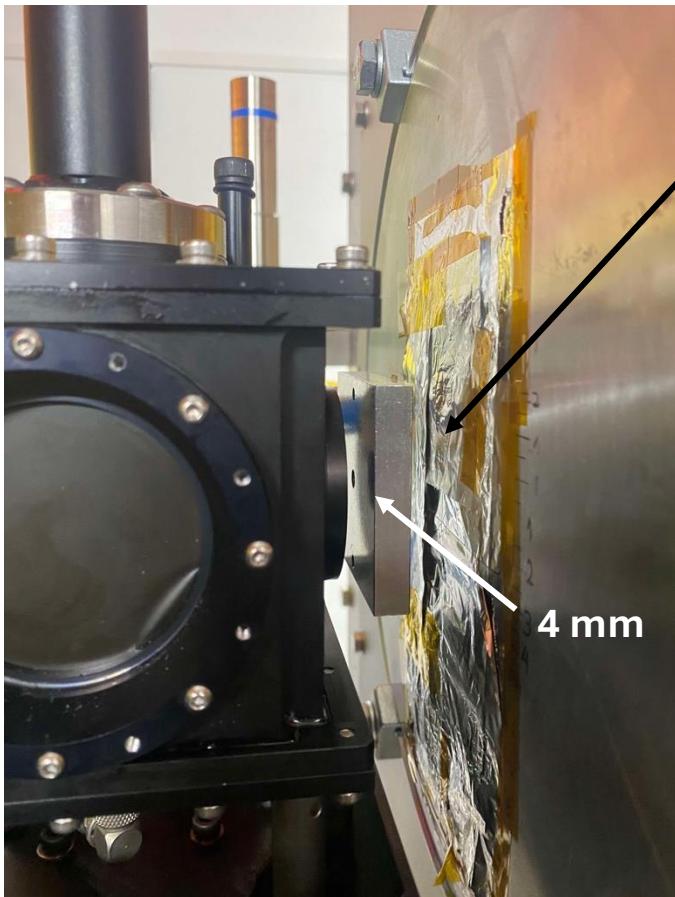
(camera 2 data are insufficient to plot a beam profile)



Day 2 & 3: Liquid Scintillator & Transducers



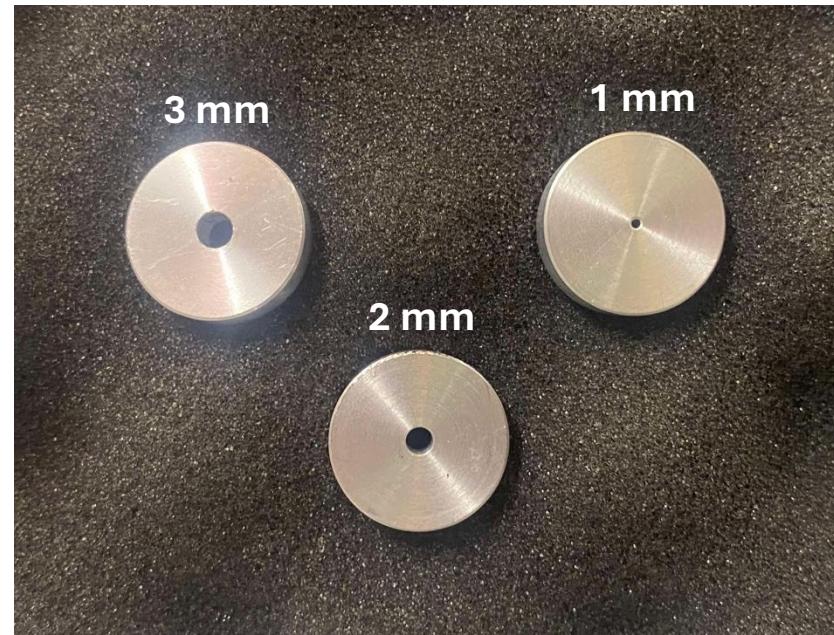
Day 2 & 3: Liquid Scintillator & Transducers Collimators



Exit window

4 mm

Collimators



3 mm

2 mm

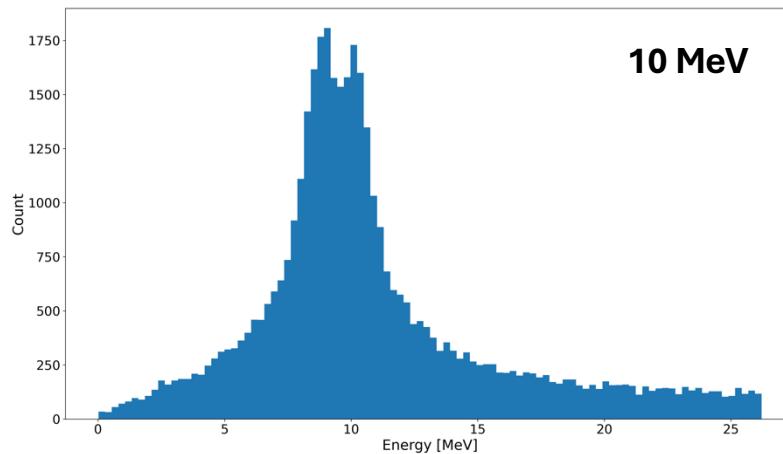
1 mm

Simulations

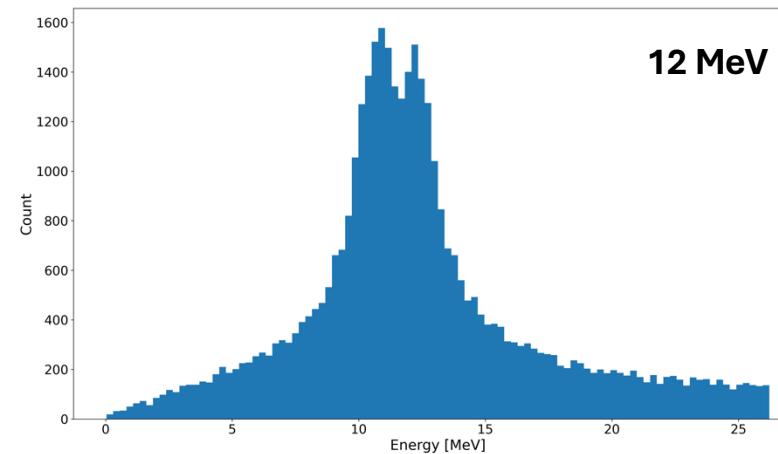
Energy [MeV]	Drift 1 [mm]	Drift 2 [mm]	Drift 3 [mm]
10	42.28	27.22	1805.20
12	46.94	32.33	1795.40
14	51.23	37.12	1865.83
16	55.23	41.65	1865.01
18	58.99	45.97	1769.74
20	62.5	50.11	1762.04



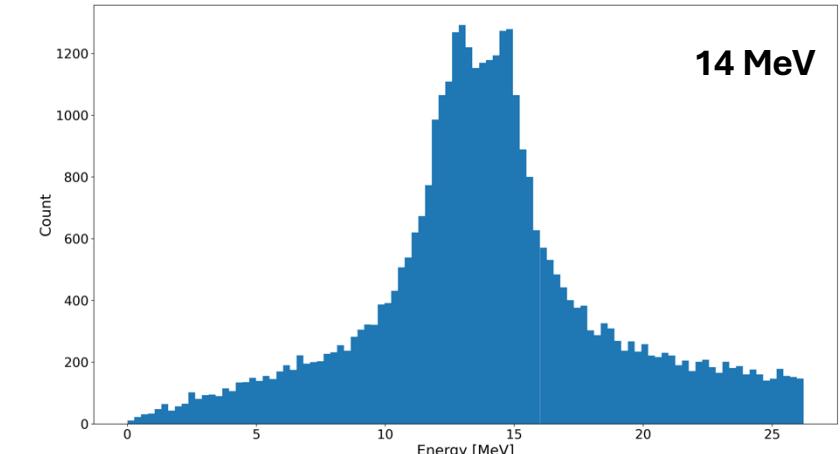
Simulations



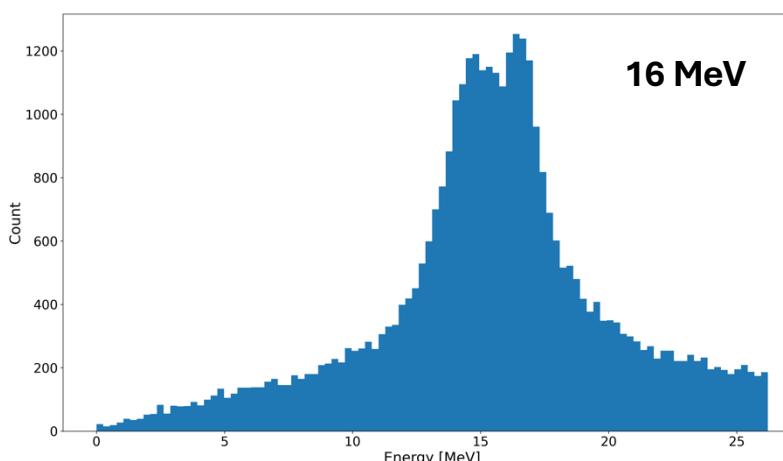
10 MeV



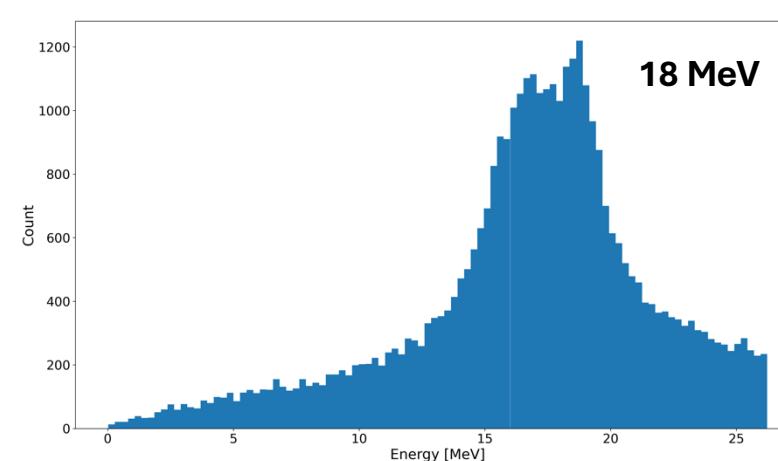
12 MeV



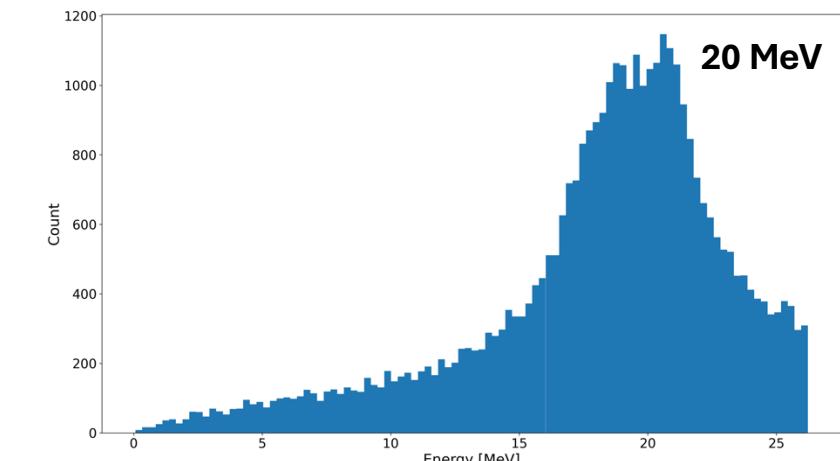
14 MeV



16 MeV



18 MeV

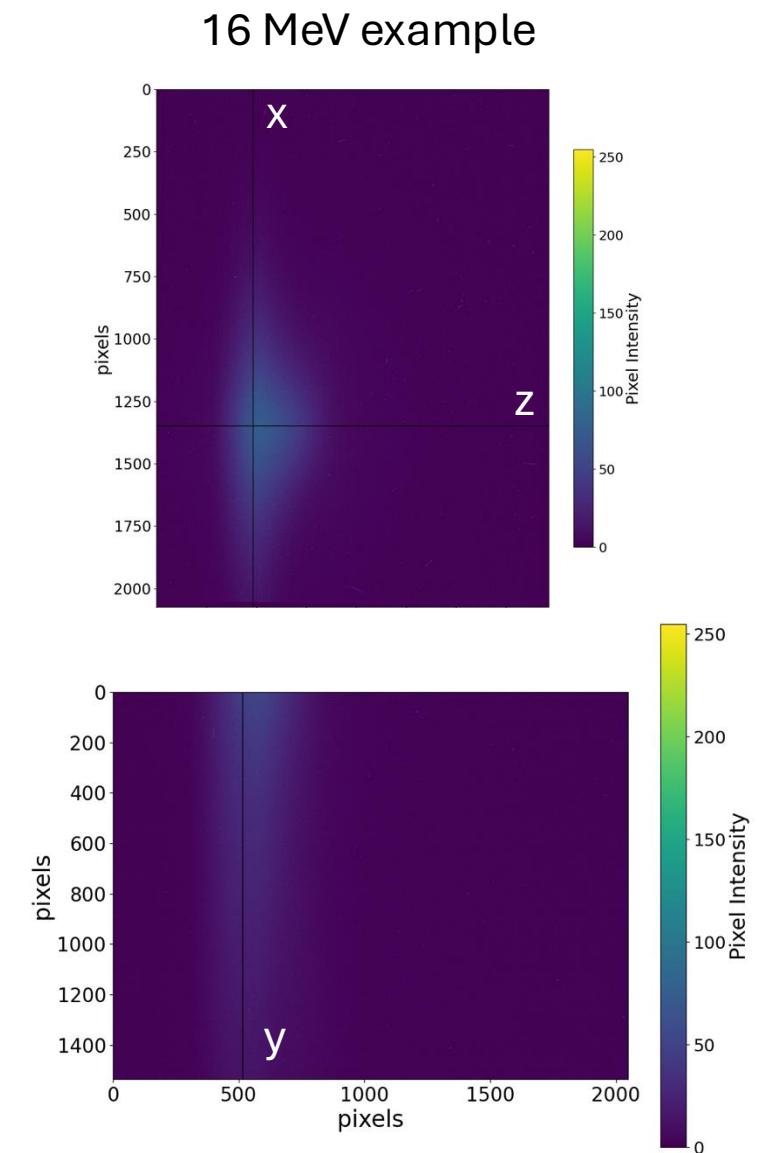
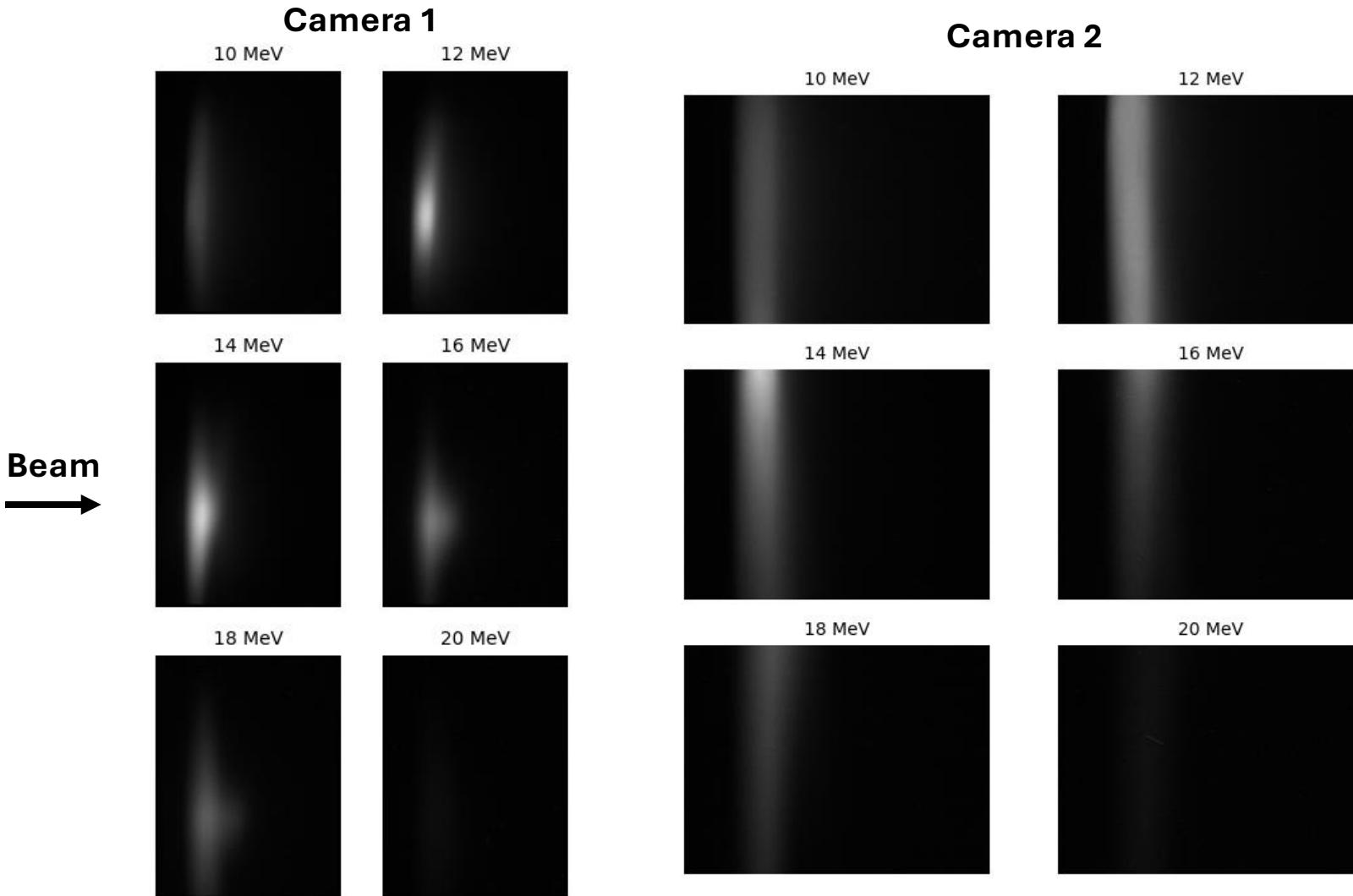


20 MeV

Day 2 & 3: Liquid Scintillator Data

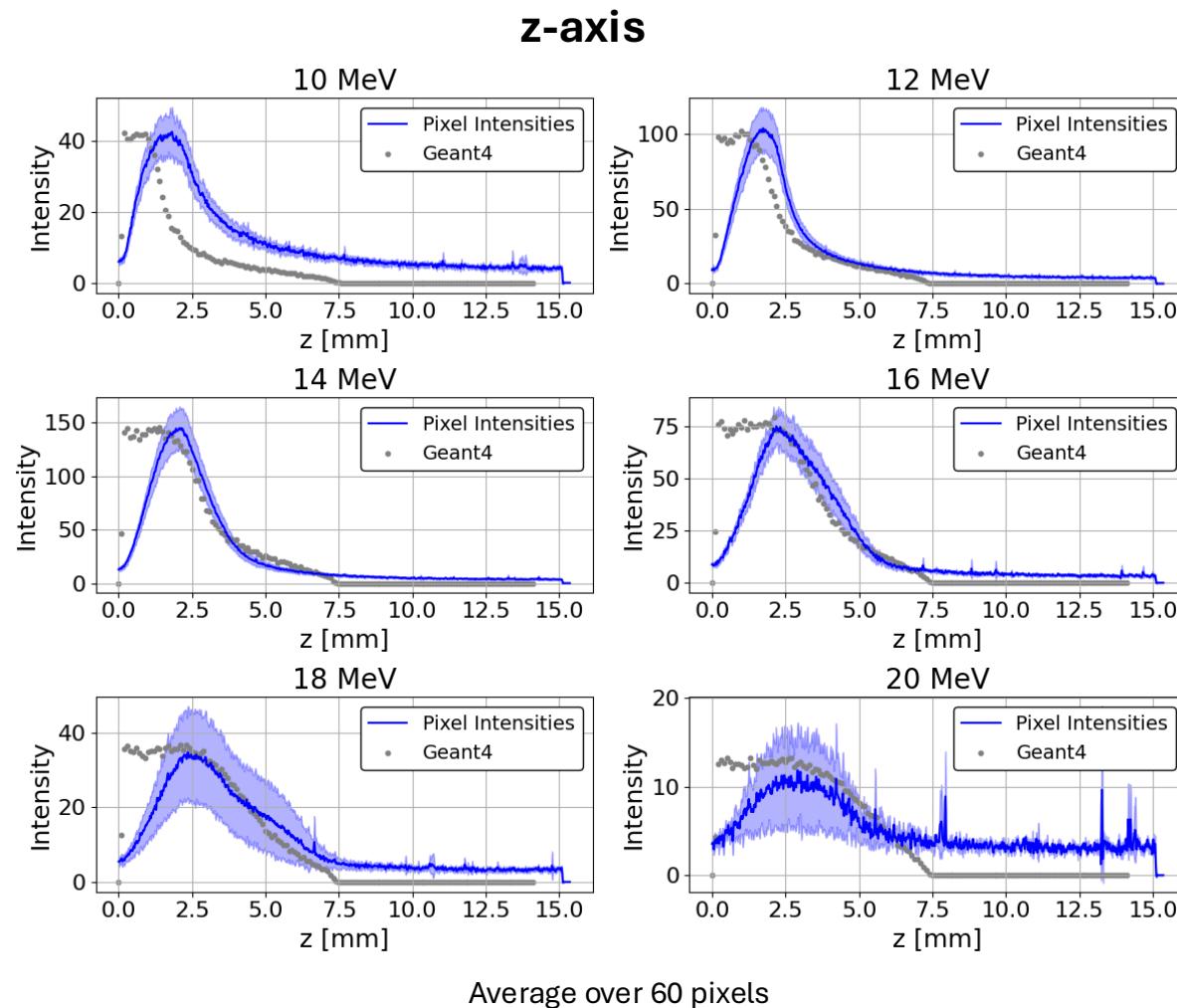
Day 2 & 3: Liquid Scintillator

Example image: No collimator



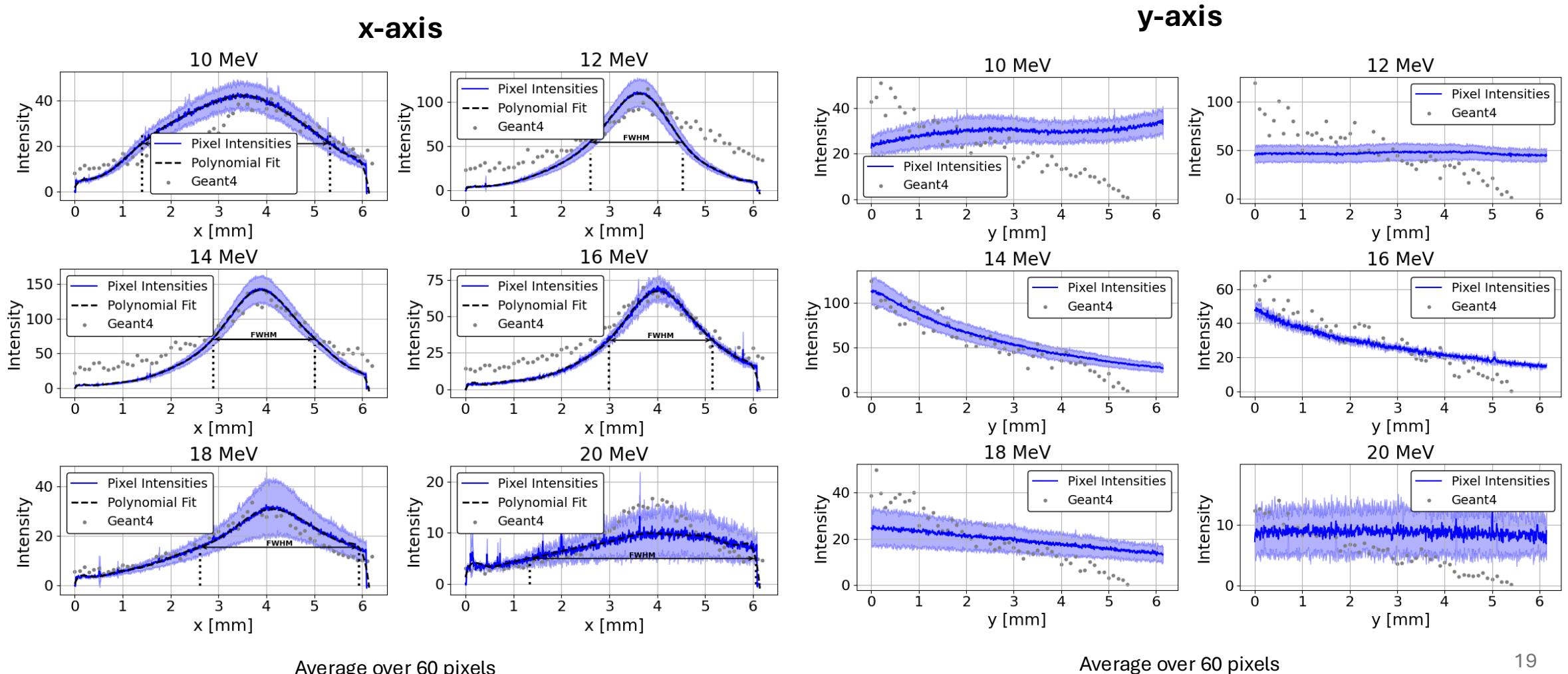
Day 2 & 3: Liquid Scintillator

Energy Scan No Collimator



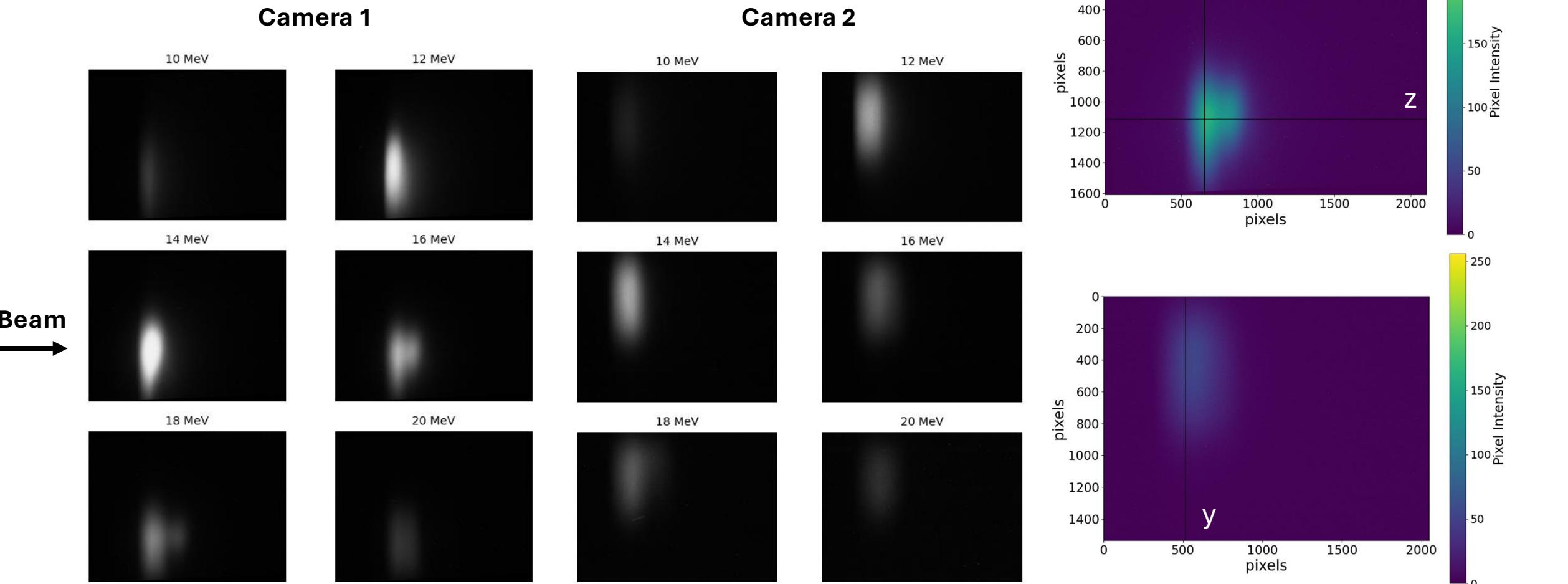
Day 2 & 3: Liquid Scintillator

Energy Scan No Collimator

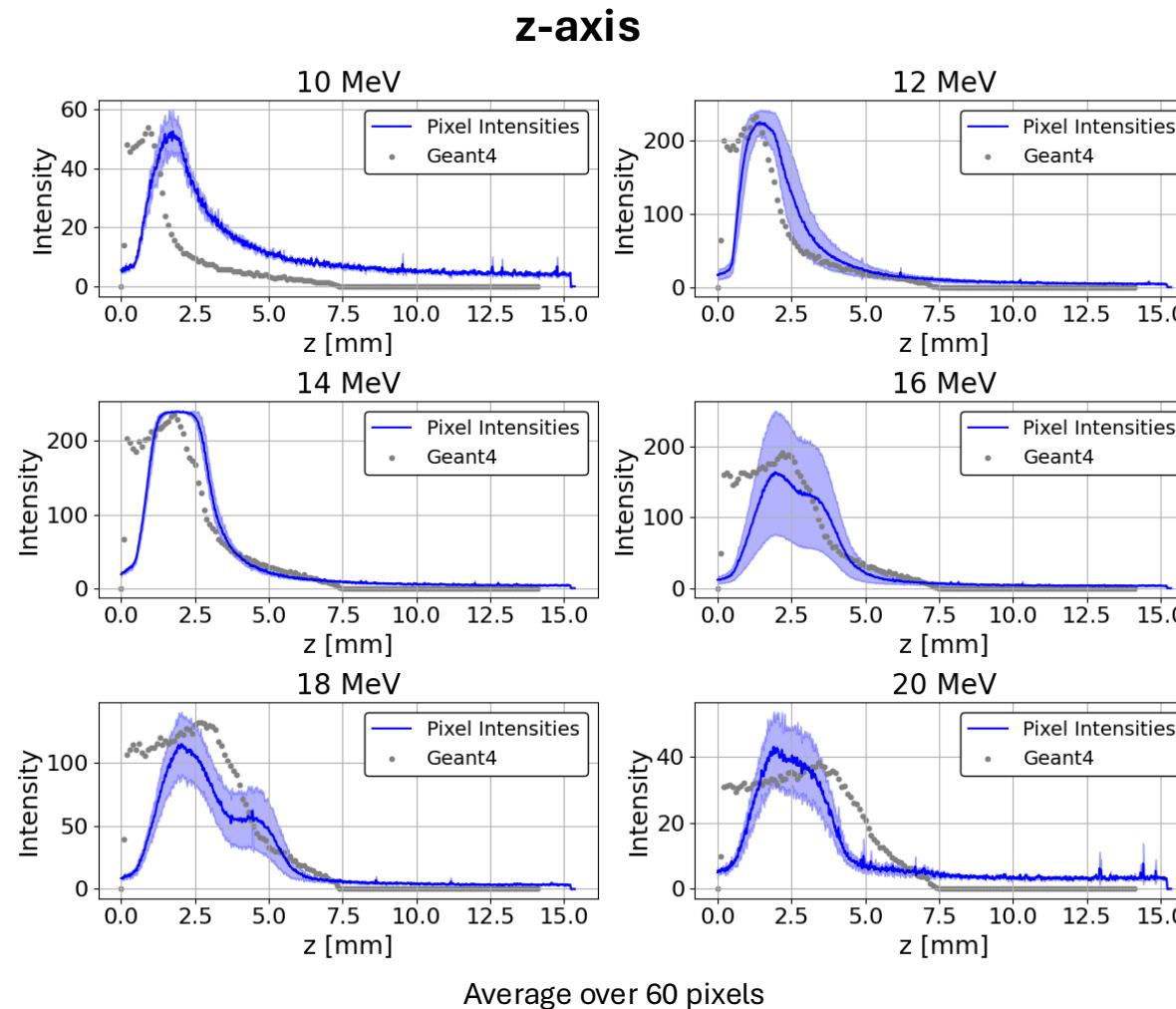


Day 2 & 3: Liquid Scintillator

Example image: 4 mm collimator

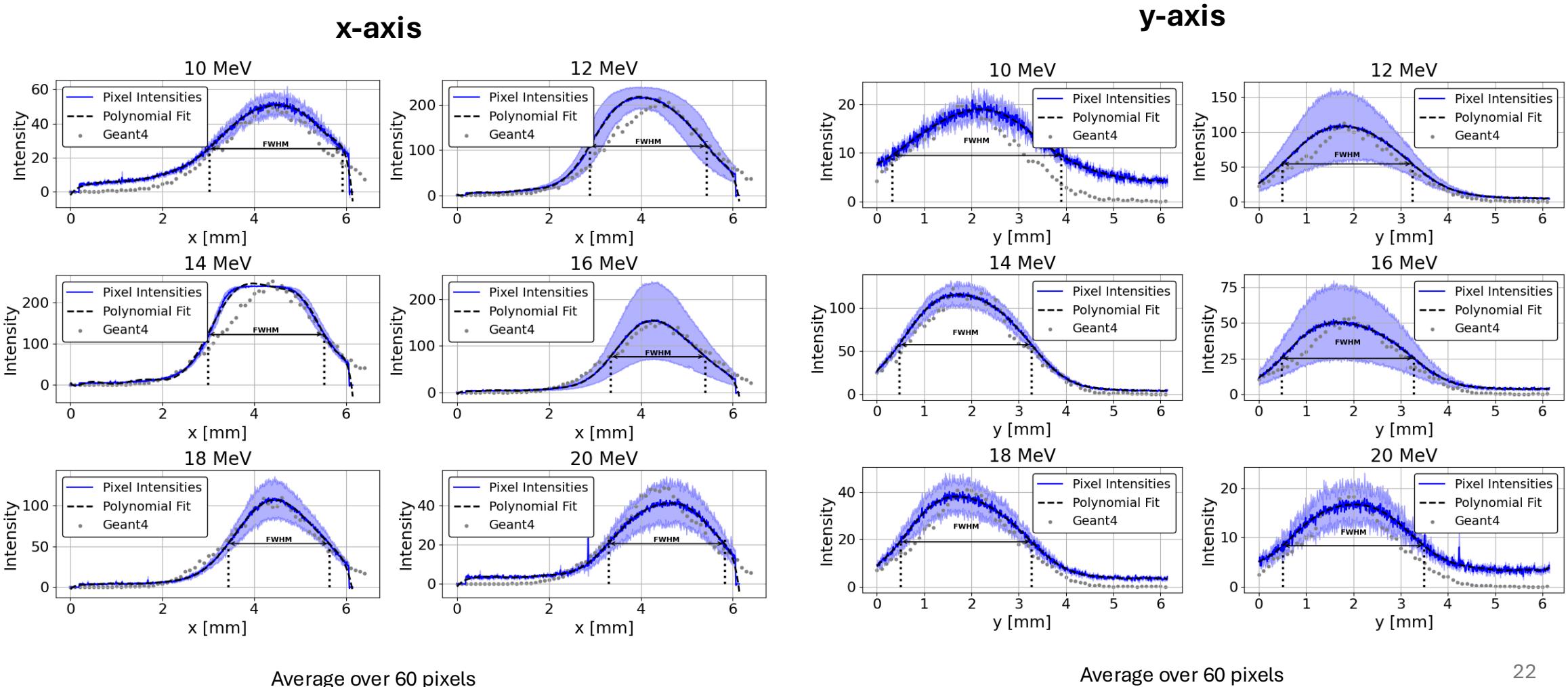


Day 2 & 3: Liquid Scintillator Energy Scan **4 mm Collimator**



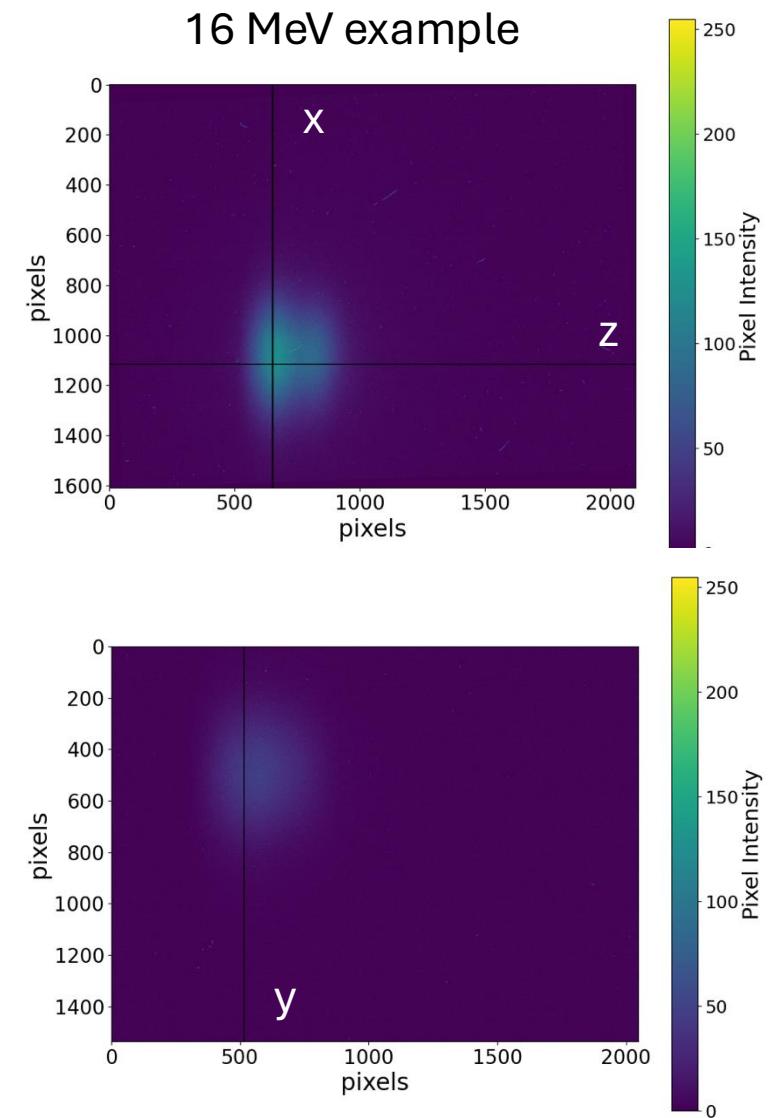
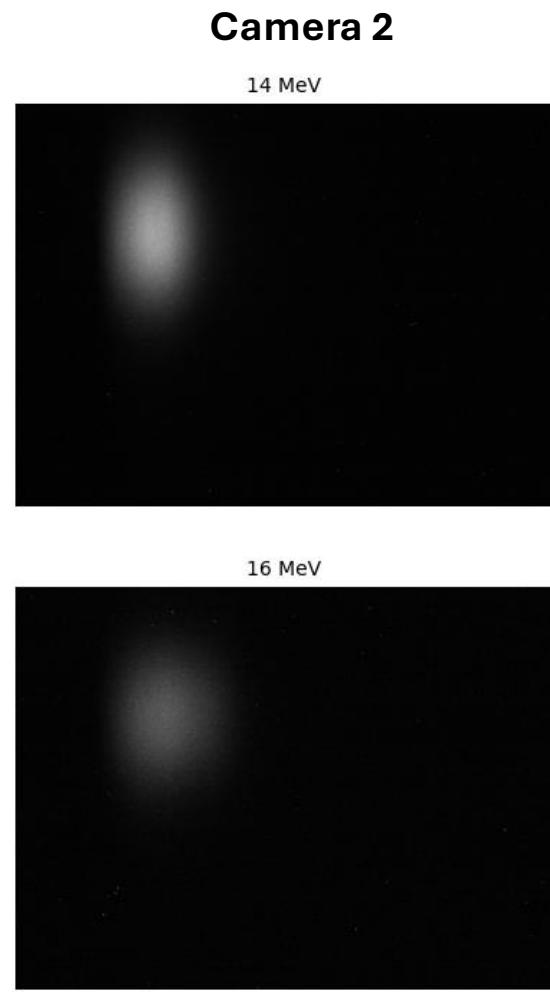
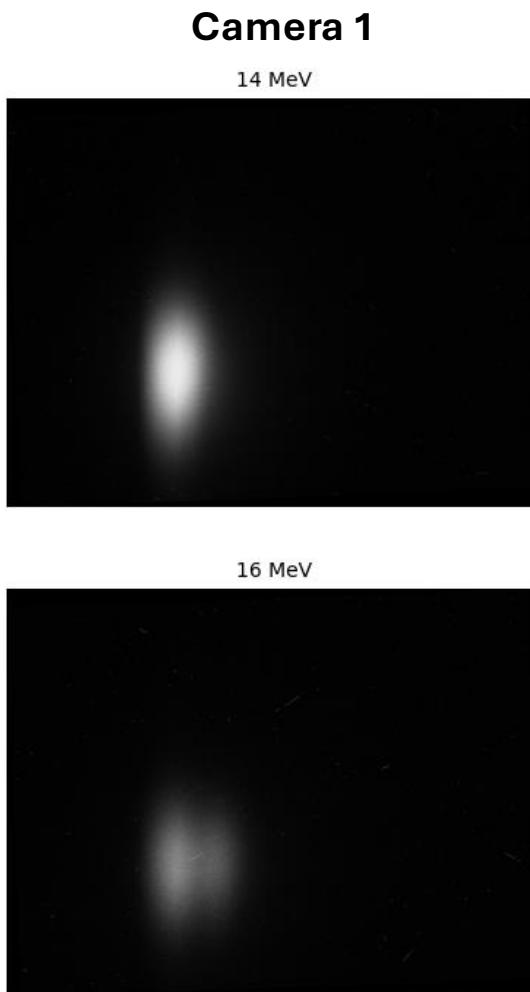
Day 2 & 3: Liquid Scintillator

Energy Scan 4 mm Collimator

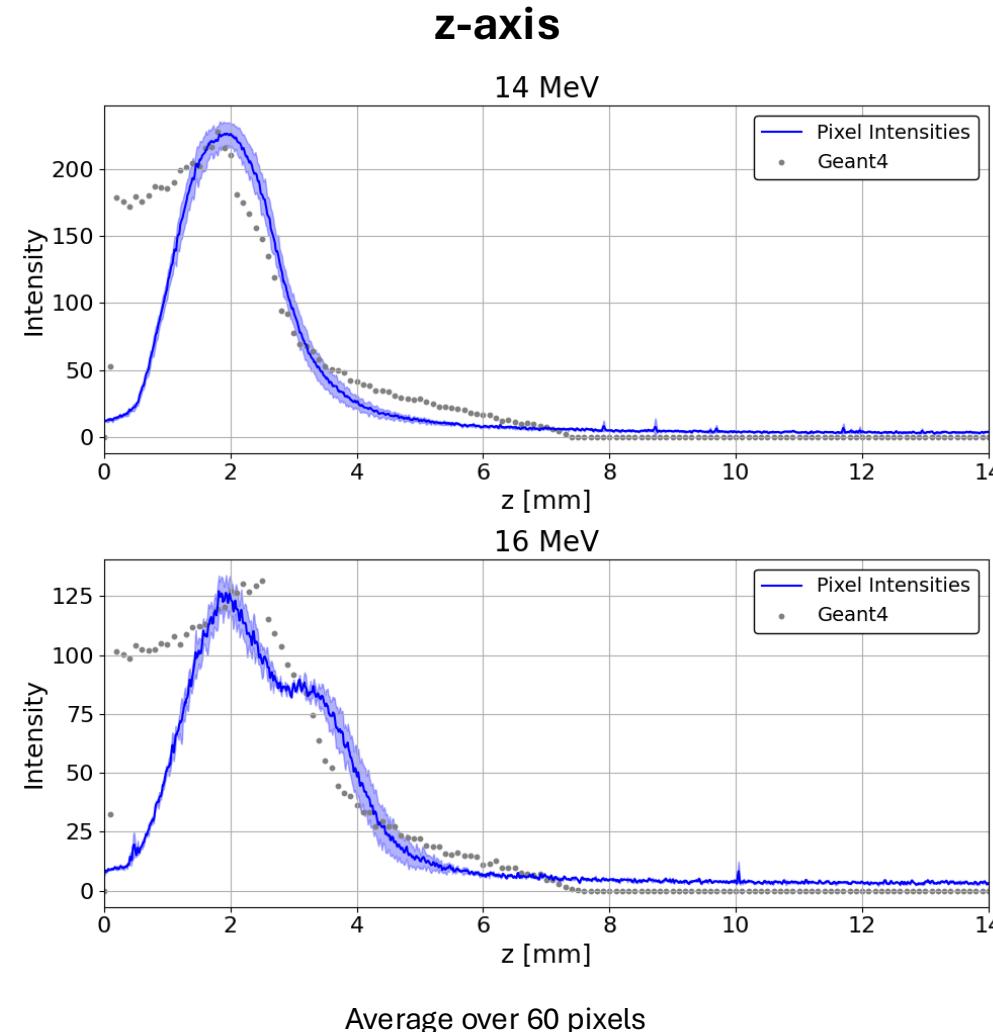


Day 2 & 3: Liquid Scintillator

Example image: 2 mm collimator

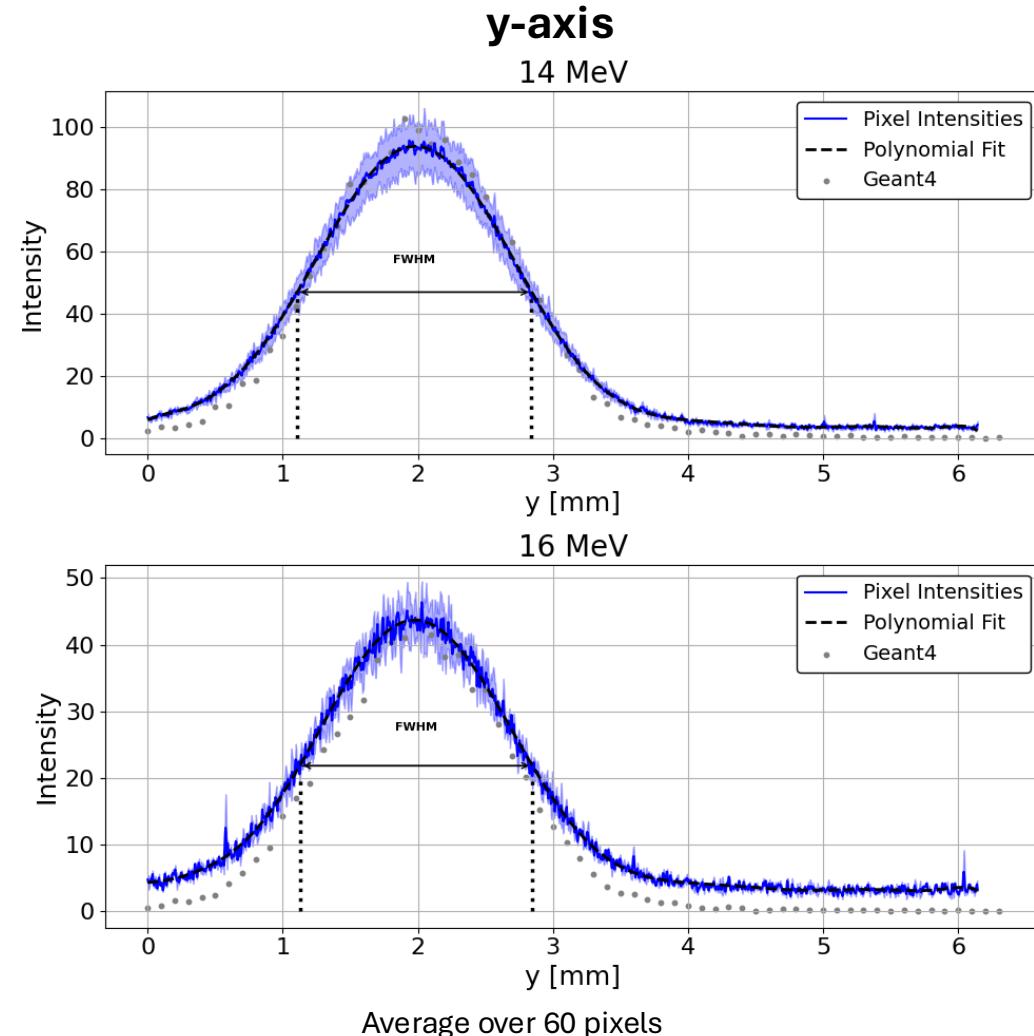
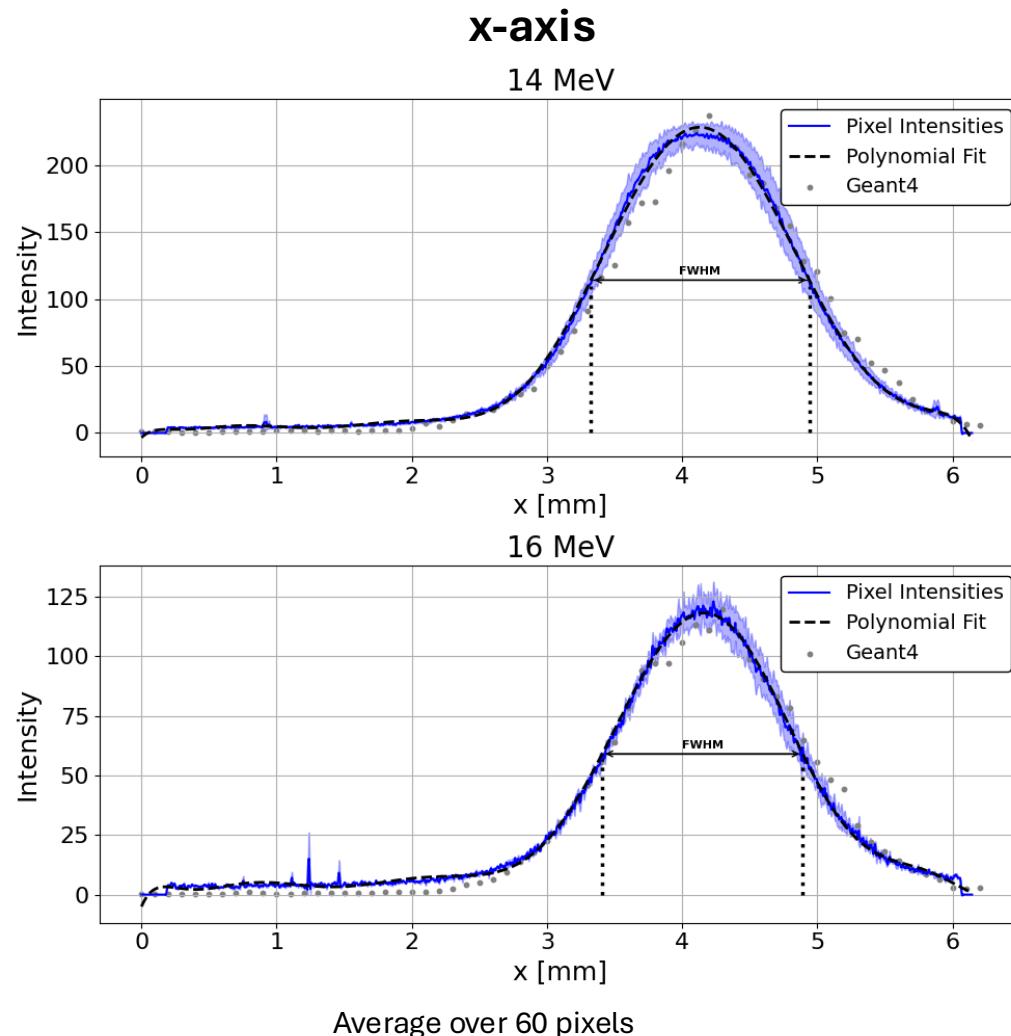


Day 2 & 3: Liquid Scintillator Energy Scan **2 mm Collimator**



Day 2 & 3: Liquid Scintillator

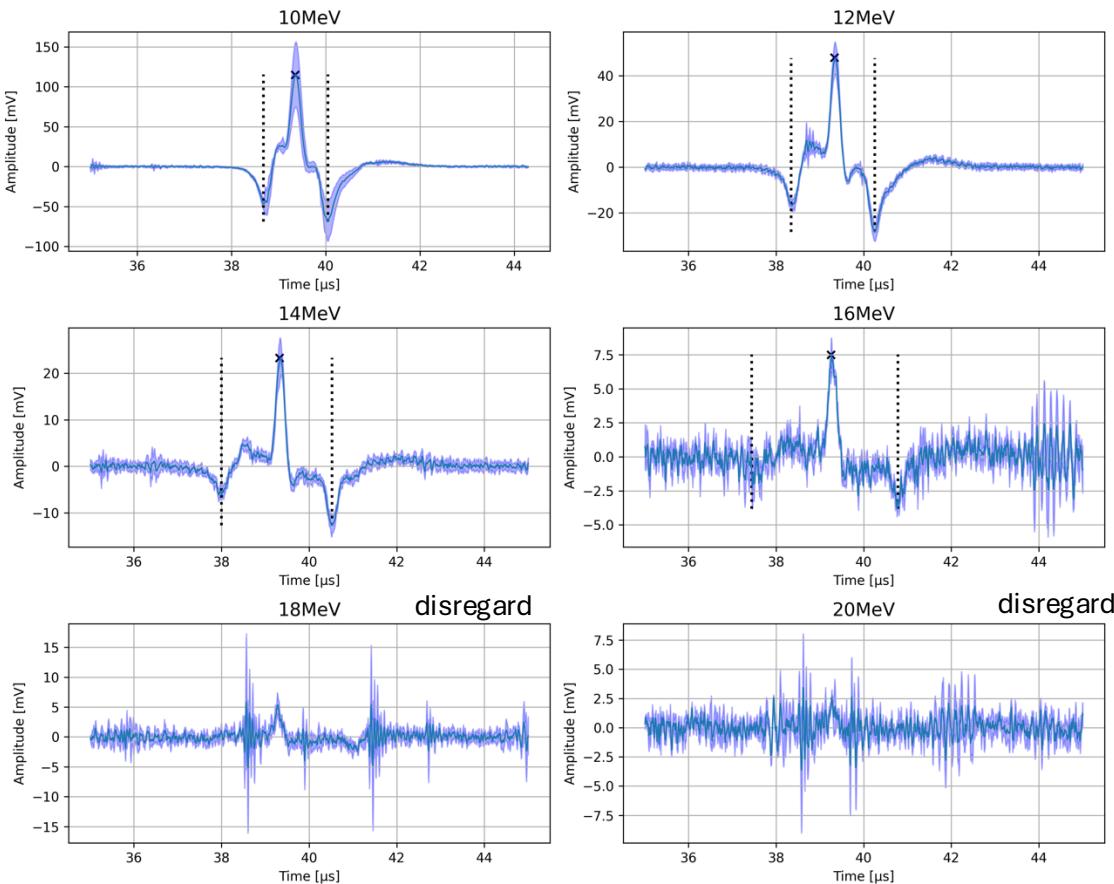
Energy Scan **2 mm Collimator**



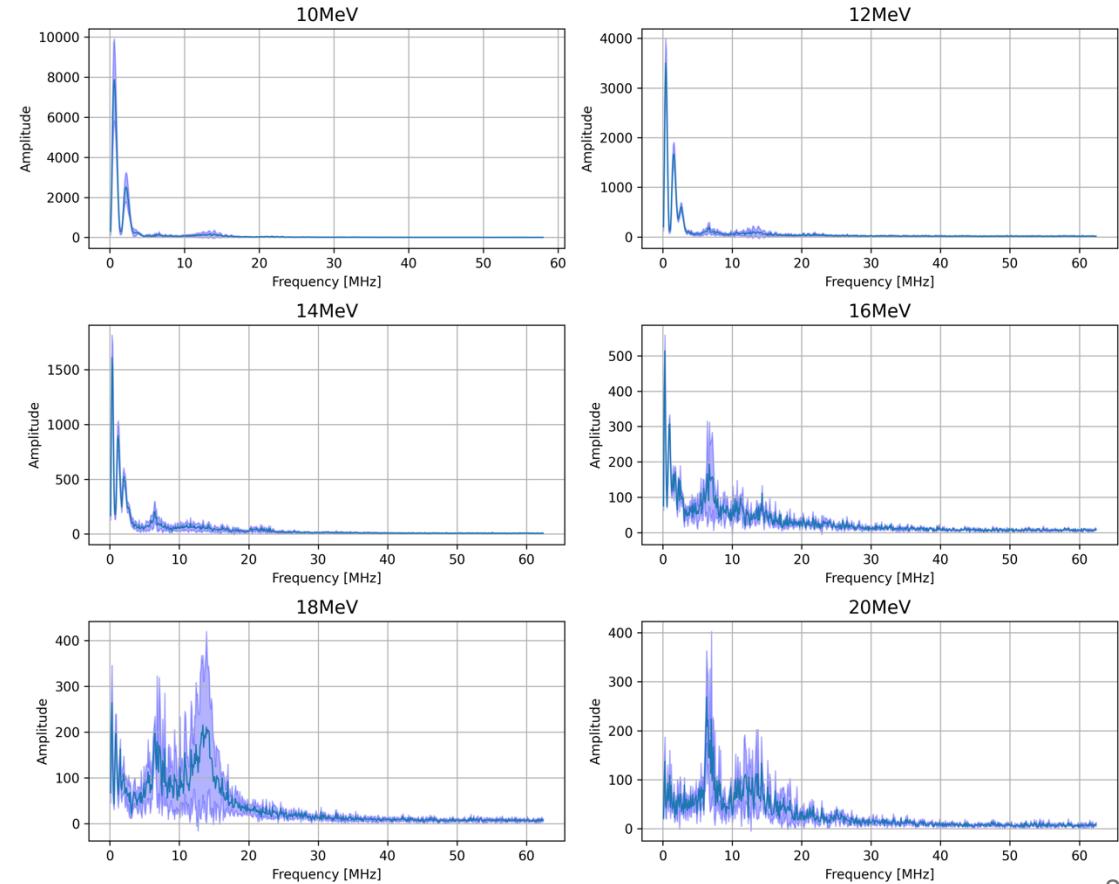
Day 2 & 3: Piston Hydrophone Data

Day 2 & 3: Piston Hydrophone Energy Scan No Collimator

Acoustic Traces

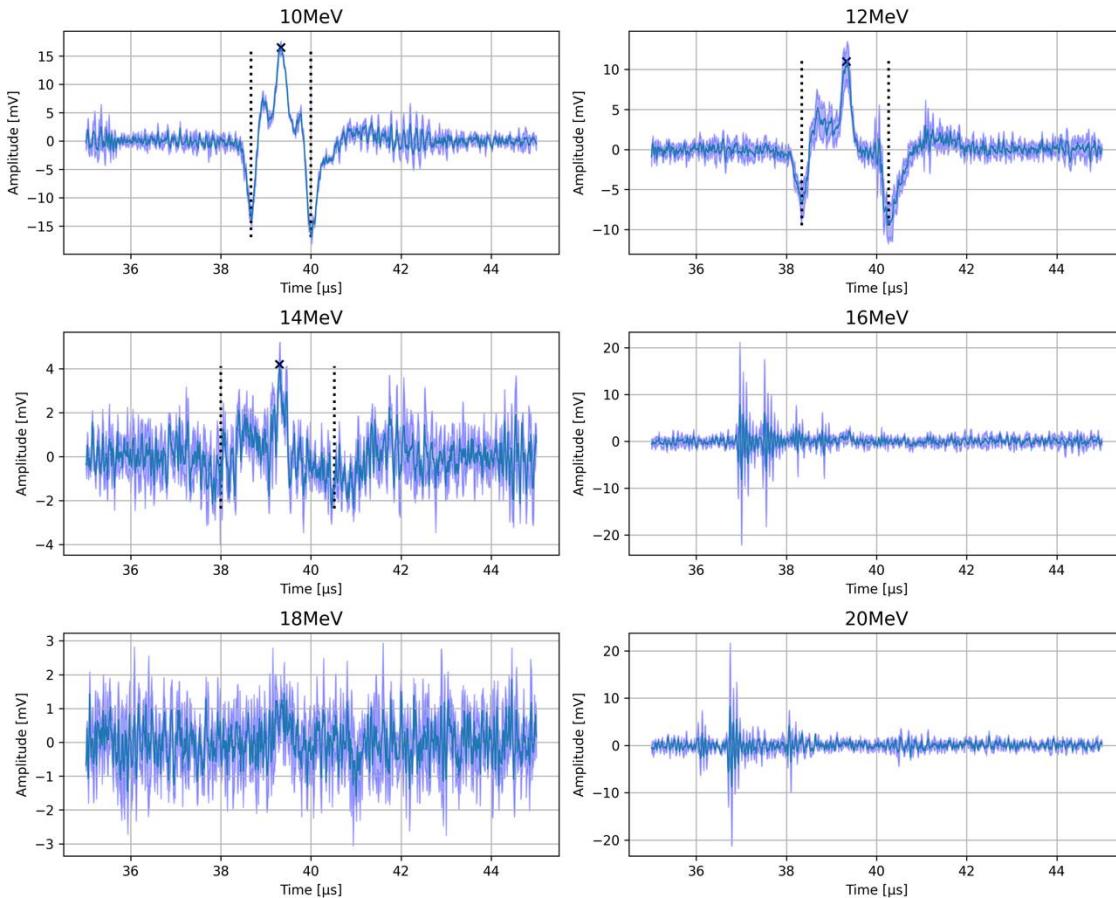


Frequency Spectra

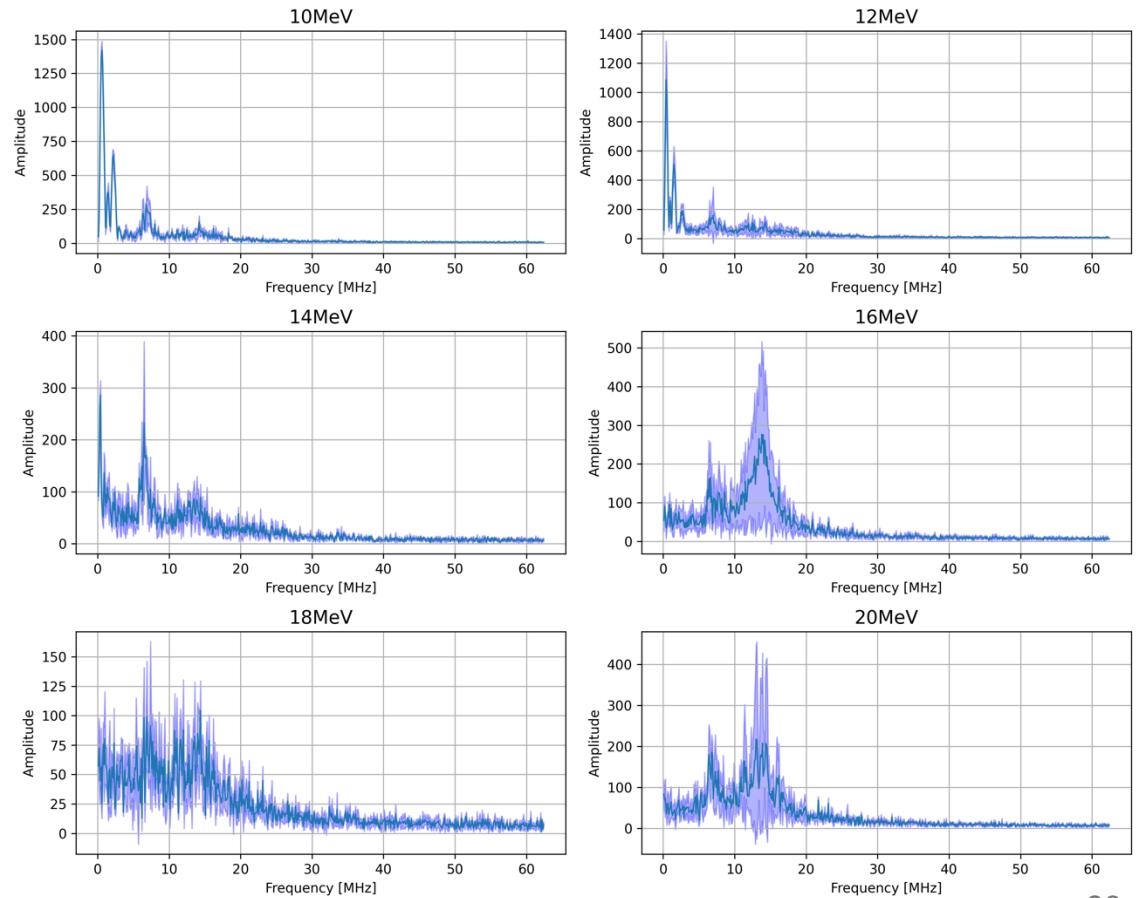


Day 2 & 3: Piston Hydrophone Energy Scan **4 mm Collimator**

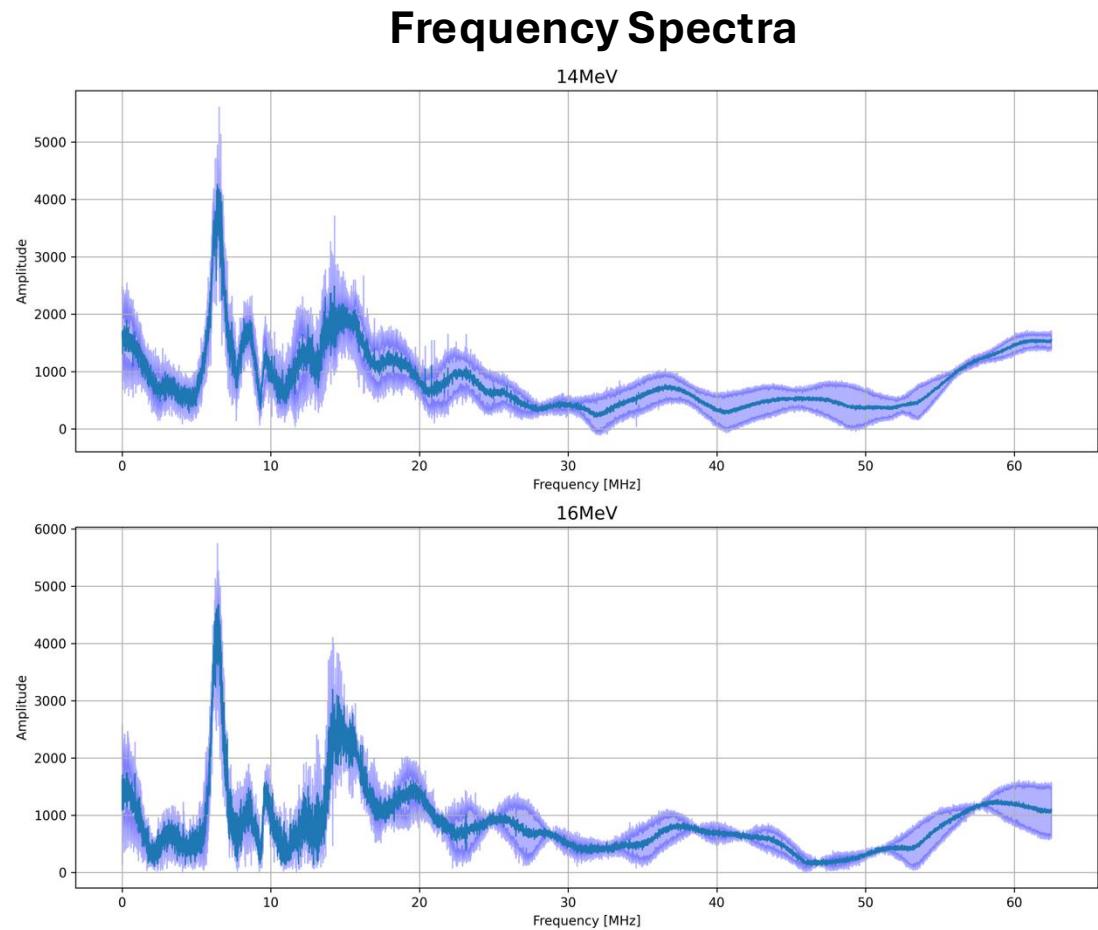
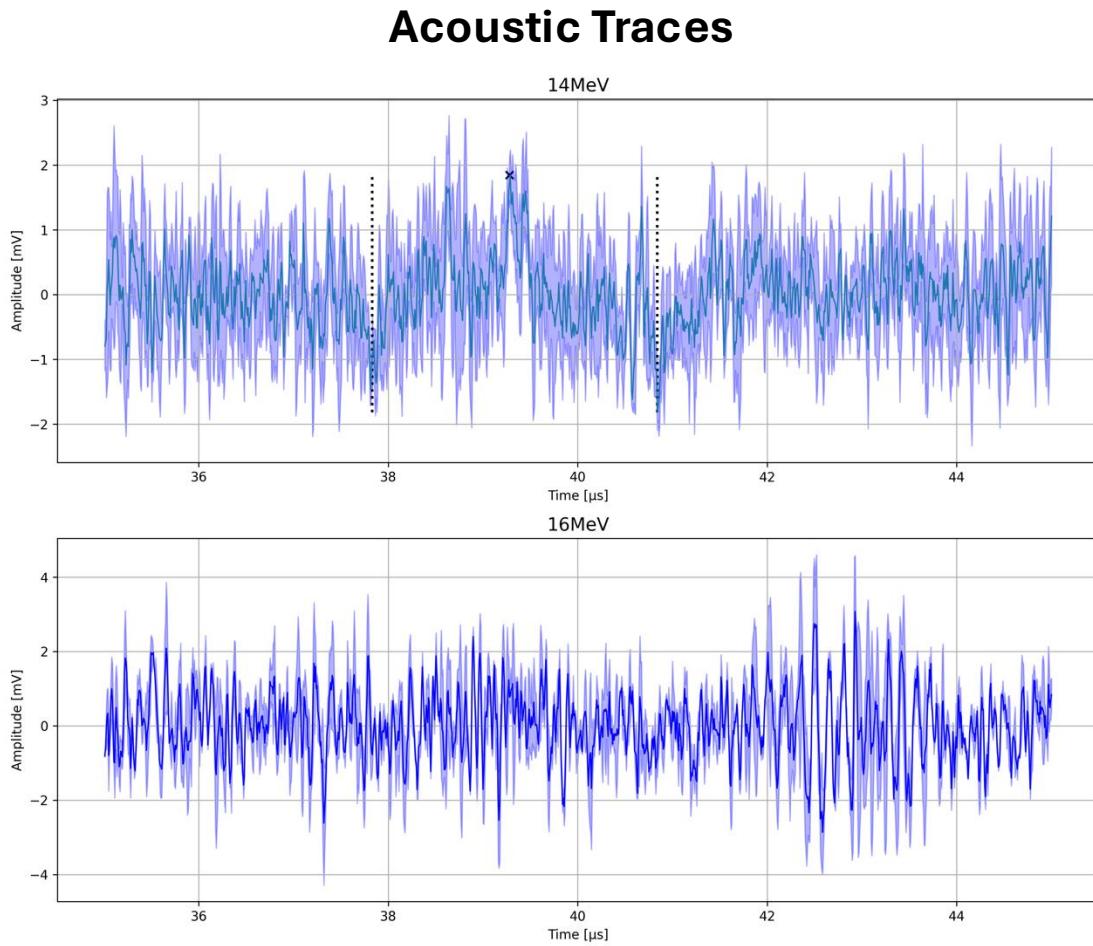
Acoustic Traces



Frequency Spectra

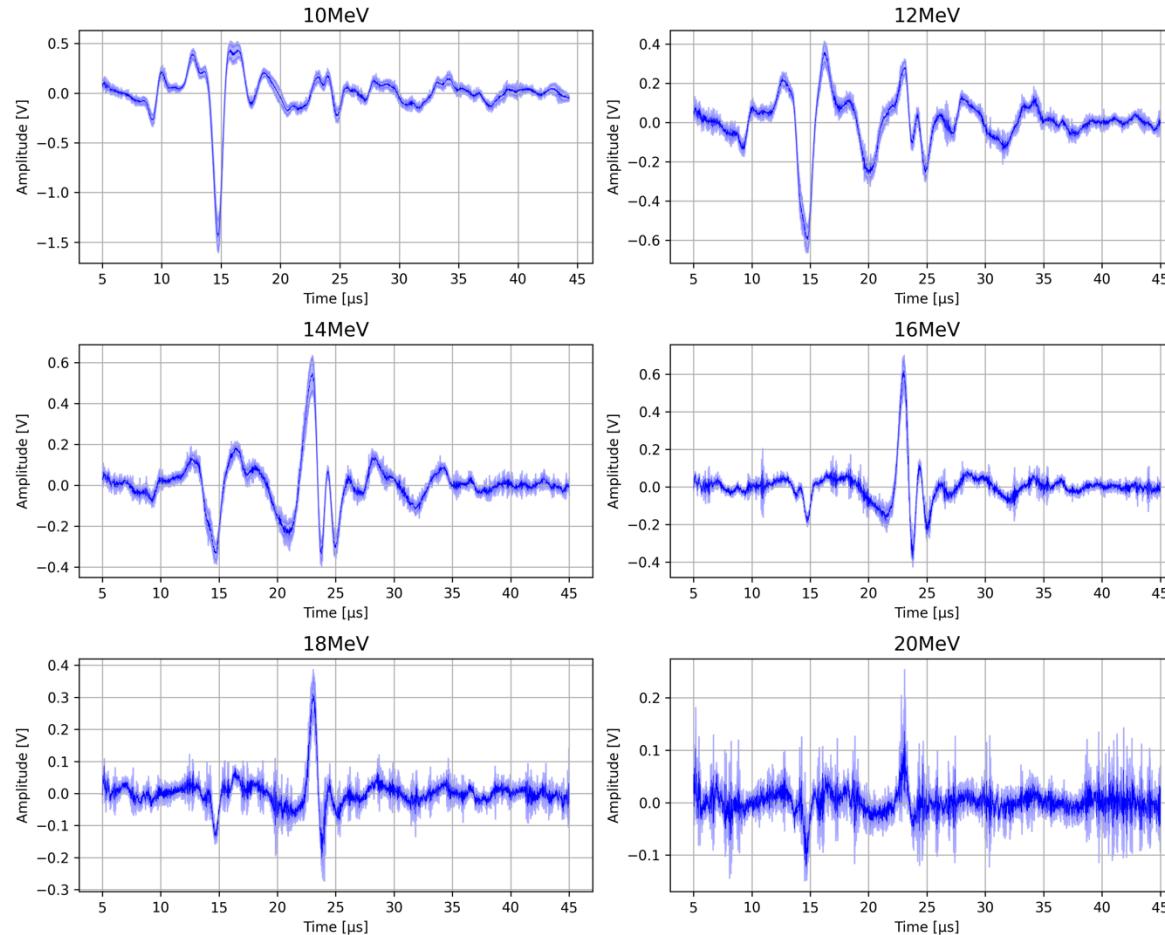


Day 2 & 3: Piston Hydrophone Energy Scan **2 mm Collimator**

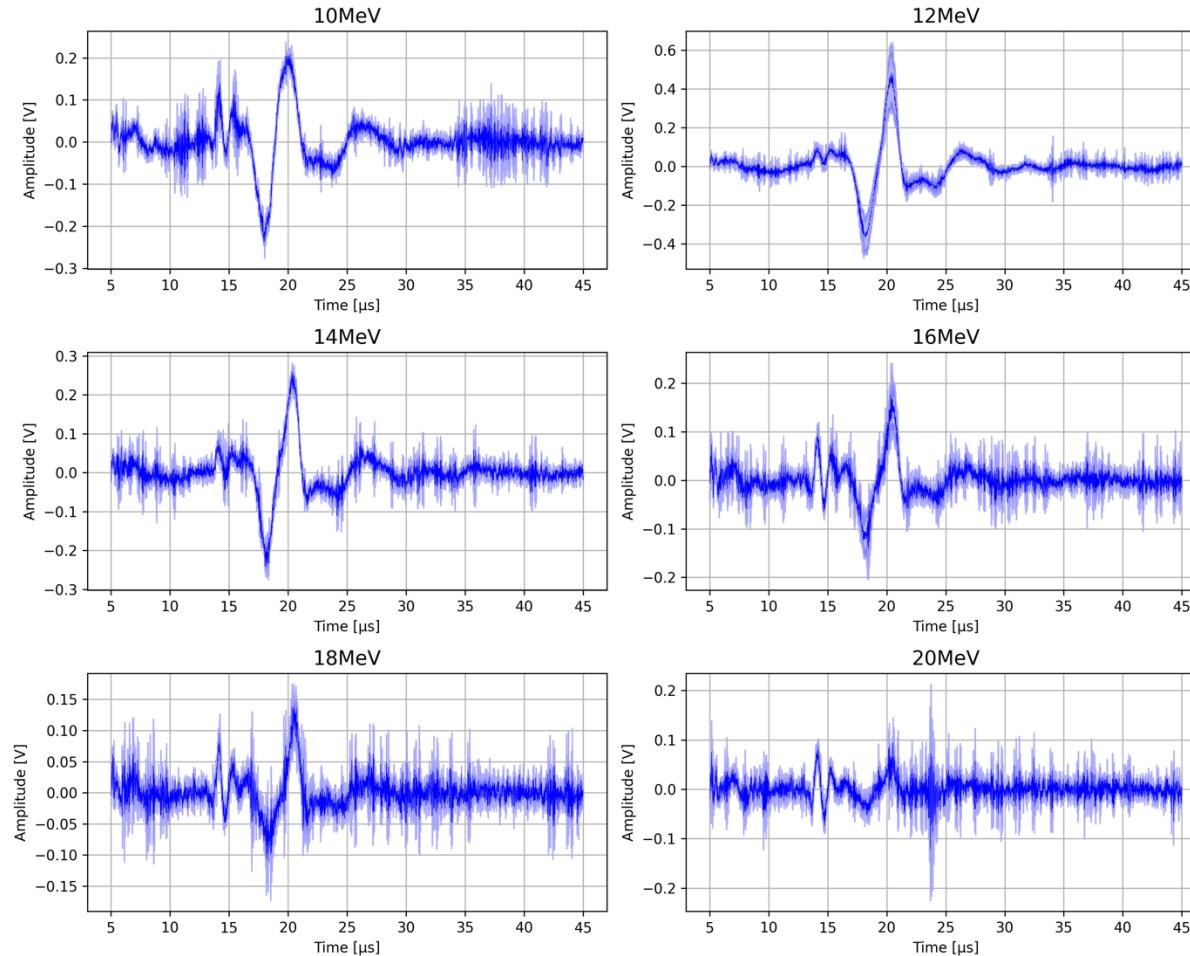


Day 2 & 3: Olympus Hydrophone Data

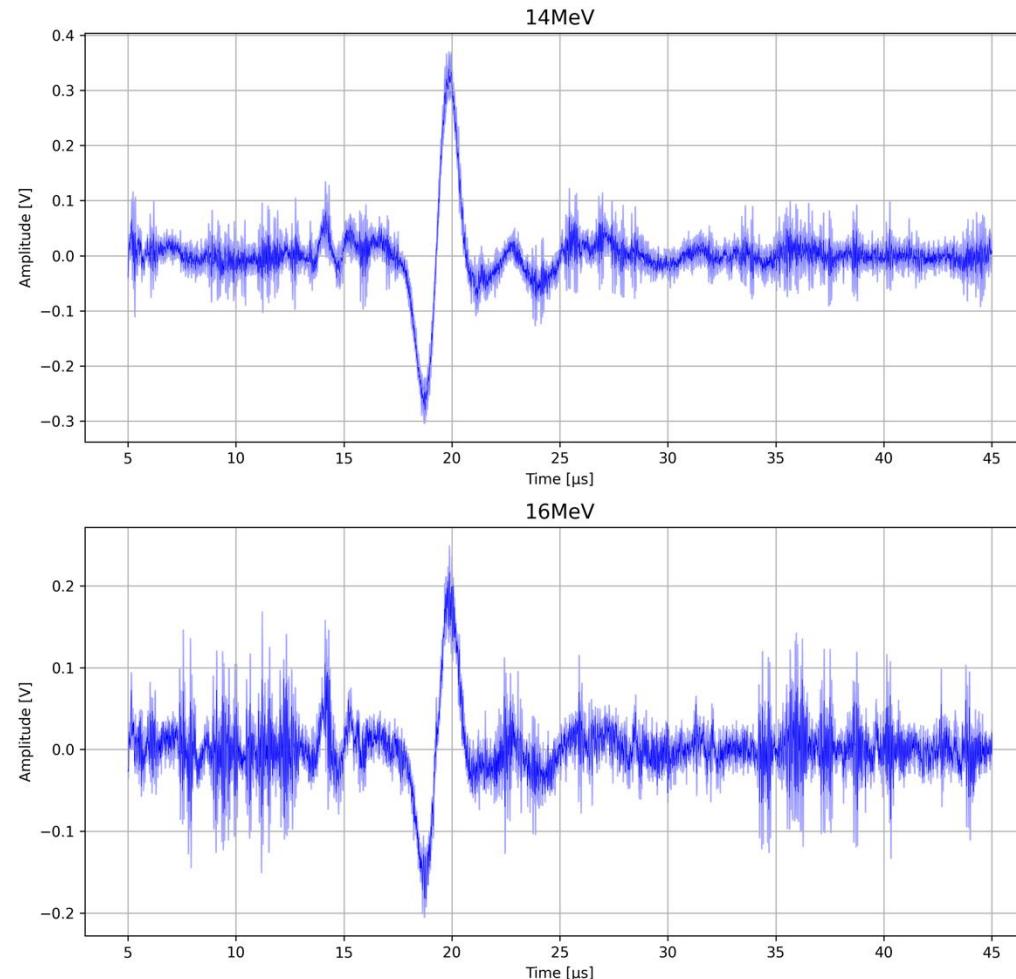
Day 2 & 3: Olympus Hydrophone Energy Scan **No Collimator**



Day 2 & 3: Olympus Hydrophone Energy Scan **4 mm Collimator**



Day 2 & 3: Olympus Hydrophone Energy Scan **2 mm Collimator**

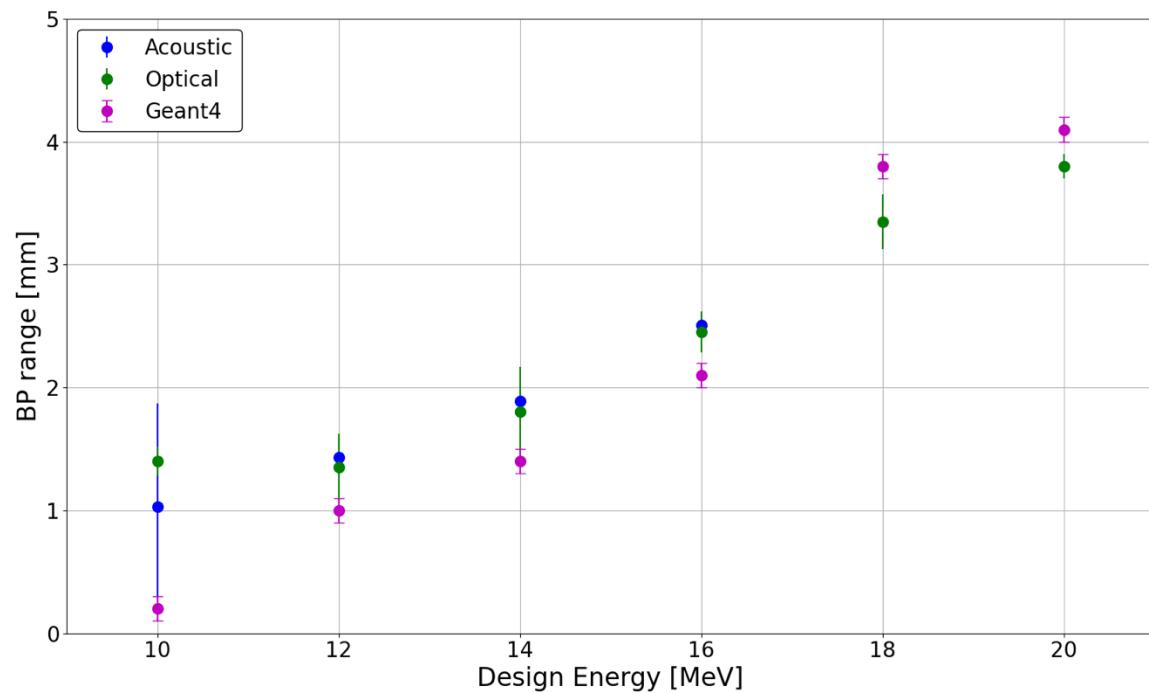


Day 2 & 3: Acoustic & Optical Comparison

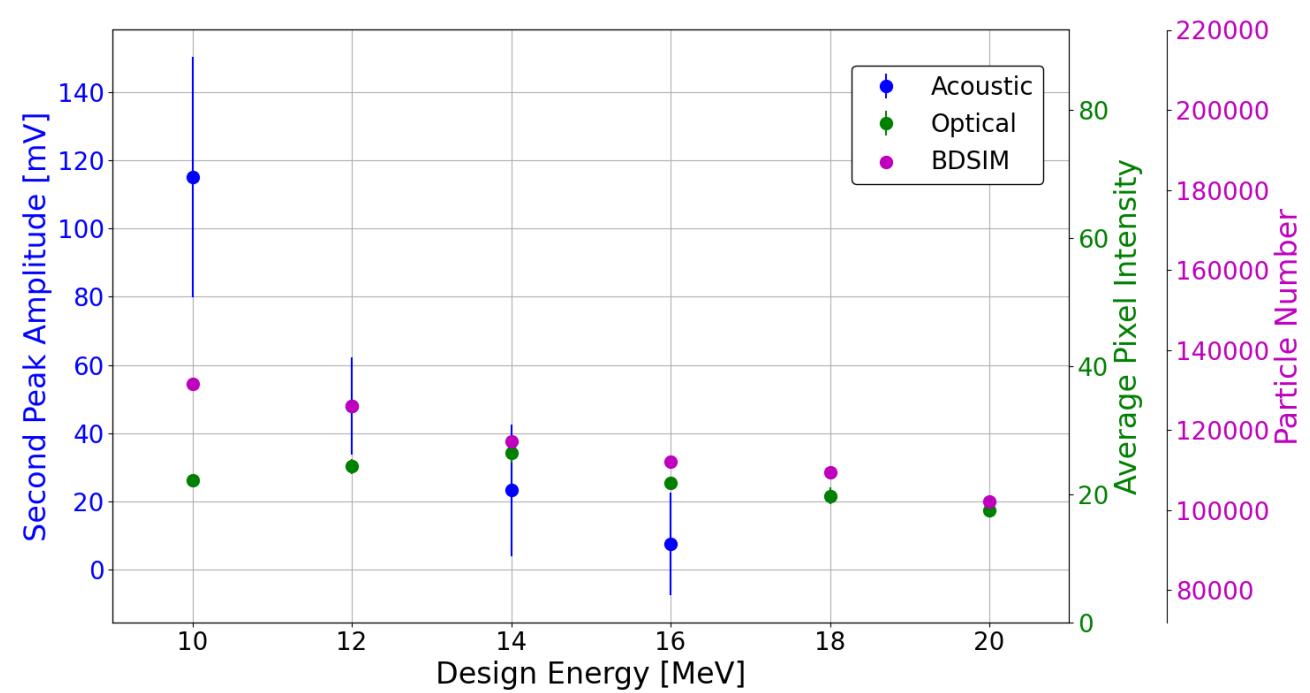
Day 2 & 3: Optical & Acoustic Comparison

Energy Scan No Collimator

BP Range

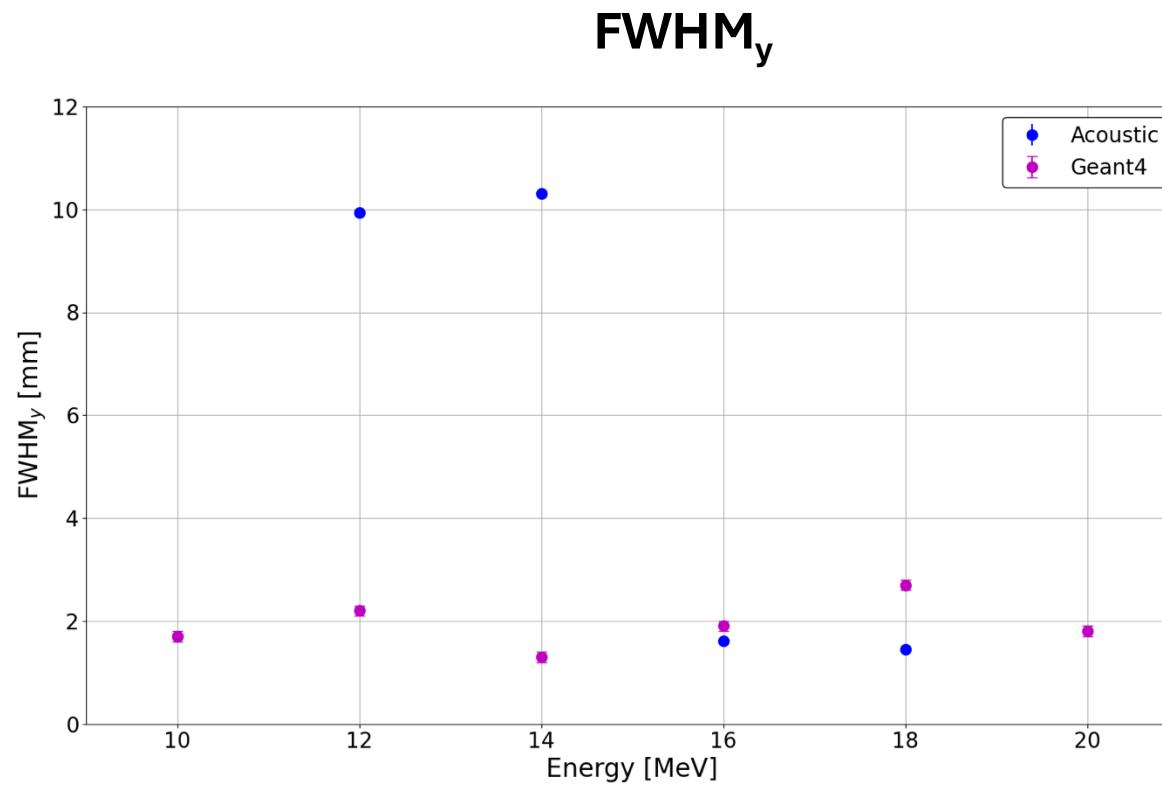


Particle Number Relation



Day 2 & 3: Optical & Acoustic Comparison

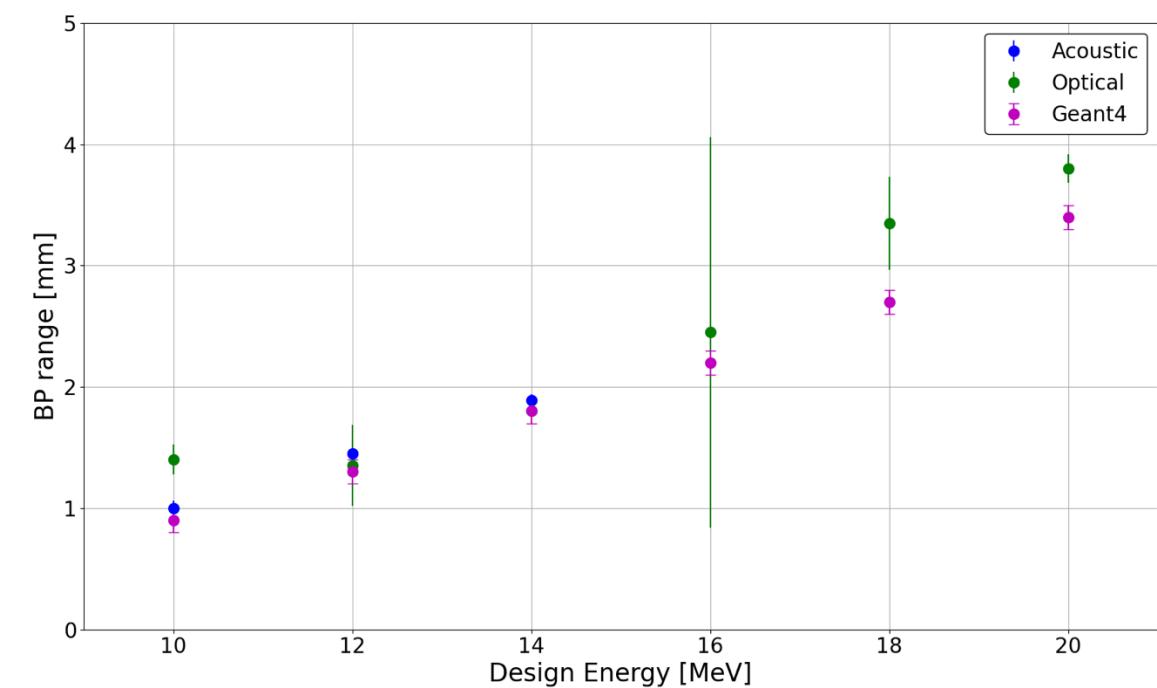
Energy Scan No Collimator



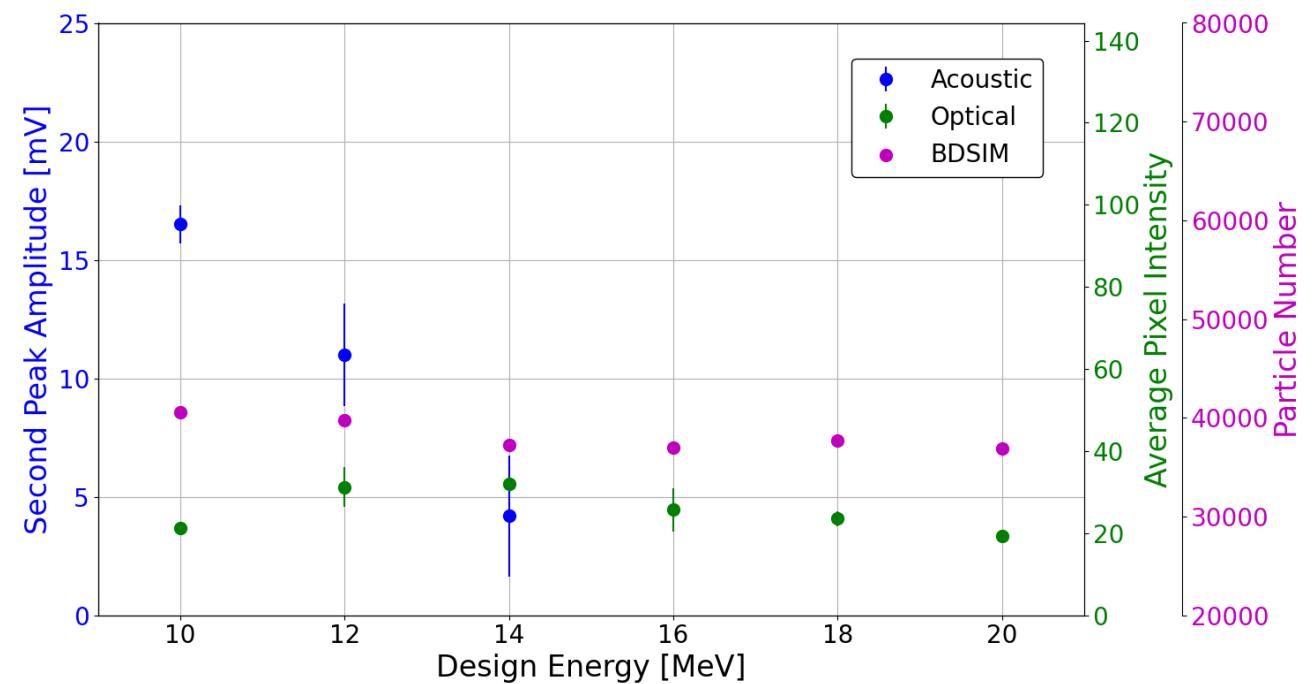
Day 2 & 3: Optical & Acoustic Comparison

Energy Scan **4 mm Collimator**

BP Range

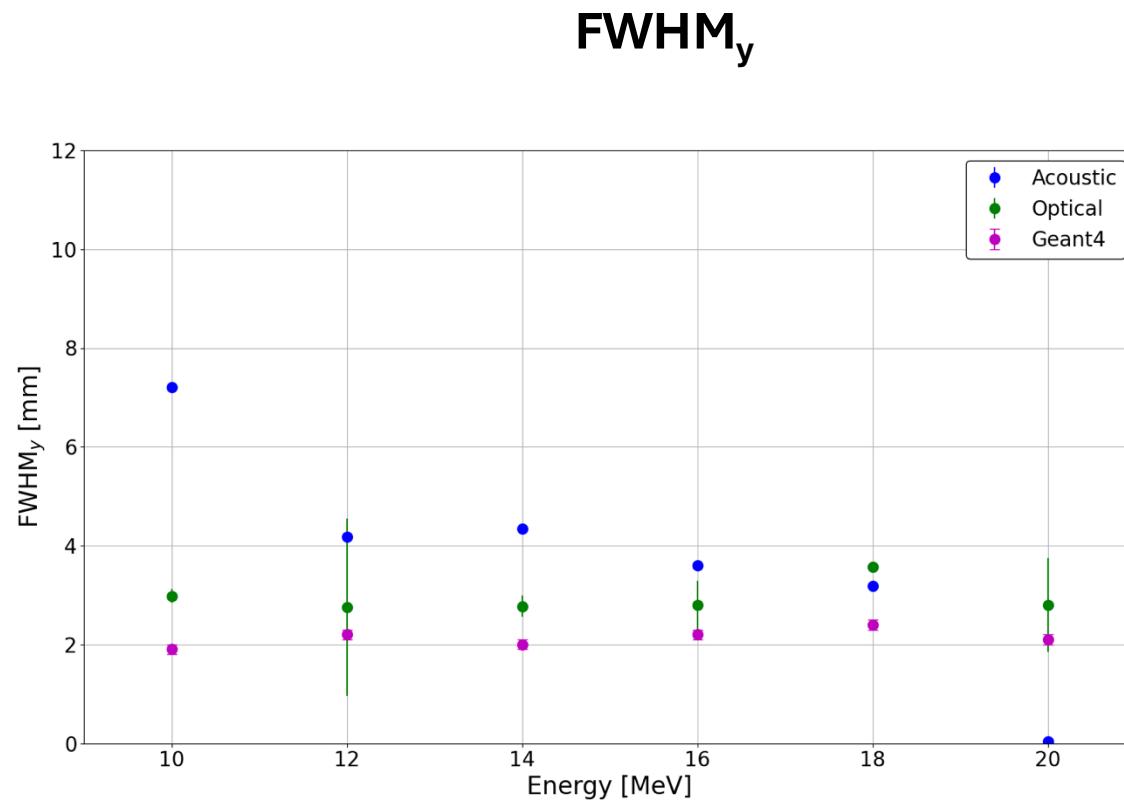


Particle Number Relation



Day 2 & 3: Optical & Acoustic Comparison

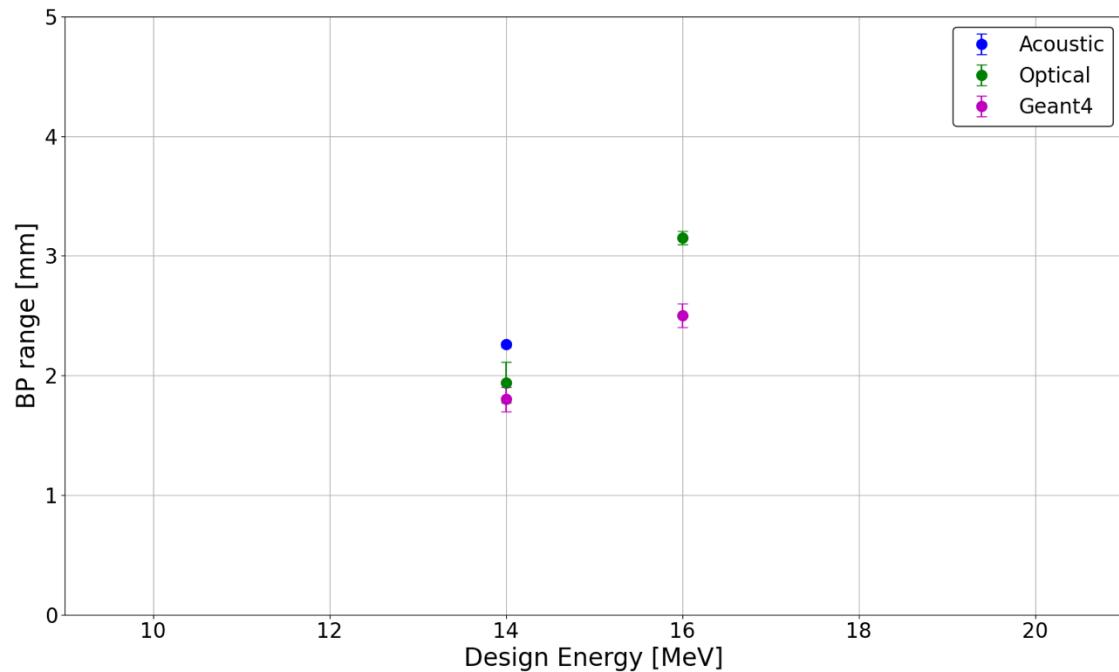
Energy Scan **4 mm Collimator**



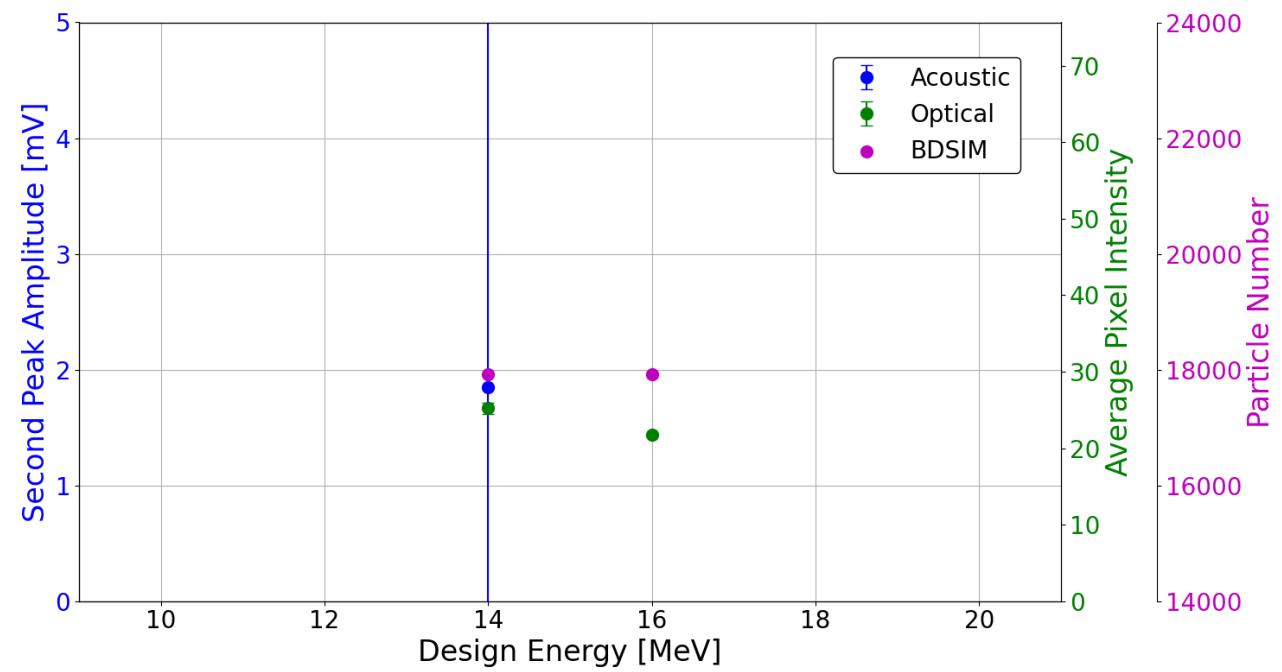
Day 2 & 3: Optical & Acoustic Comparison

Energy Scan **2 mm Collimator**

BP Range



Particle Number Relation



Day 2 & 3: Optical & Acoustic Comparison

Energy Scan **2 mm Collimator**

