

Bragg-Peak Sampler

RaBeMo Project – Development 13.05.25

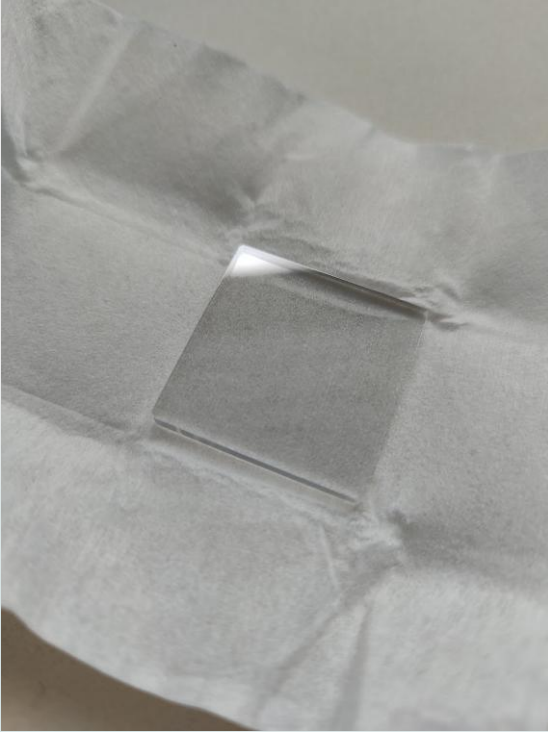
Niclas Fiedler, M.Sc.

Thin PbWO₄ Sheet Detector Concept



- 15x 3mm Thick
- 21x 2mm Thick

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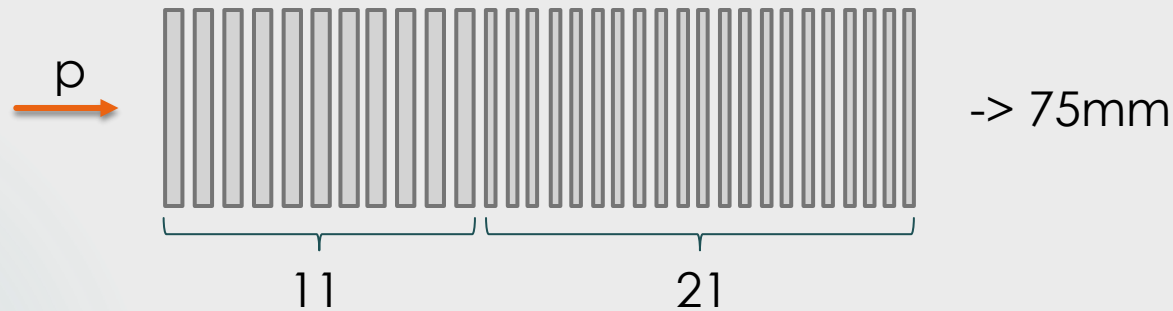
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 - Limited spatial resolution but 2.5x better than 1st prototype

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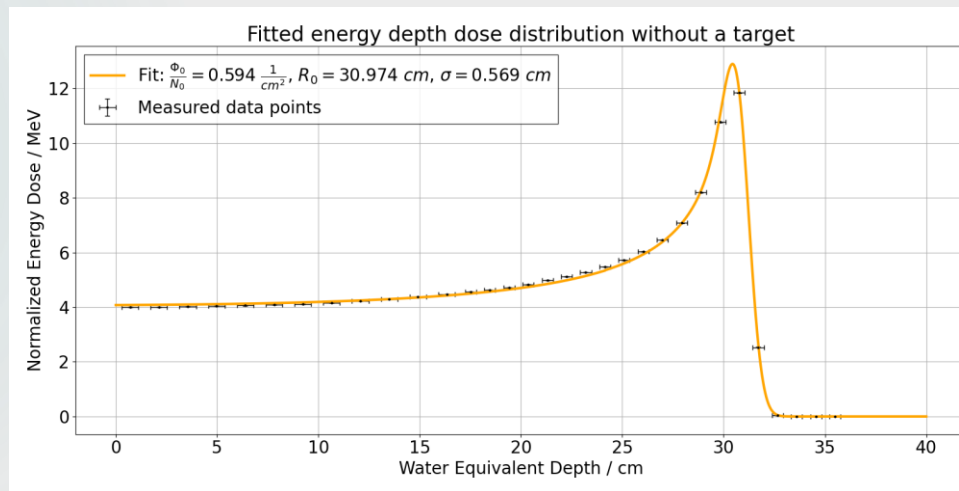
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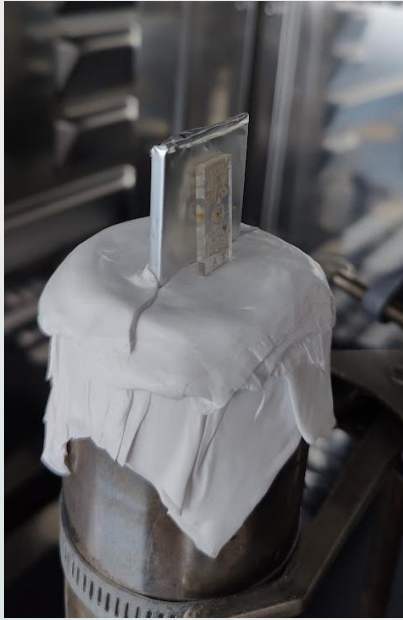


PbWO₄ Light yield

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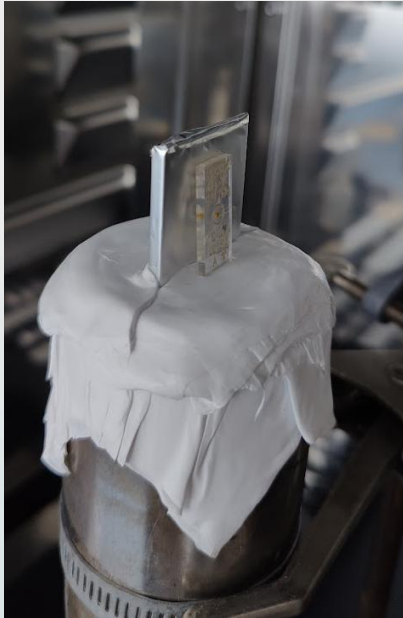


- Open side
- ~4mm window

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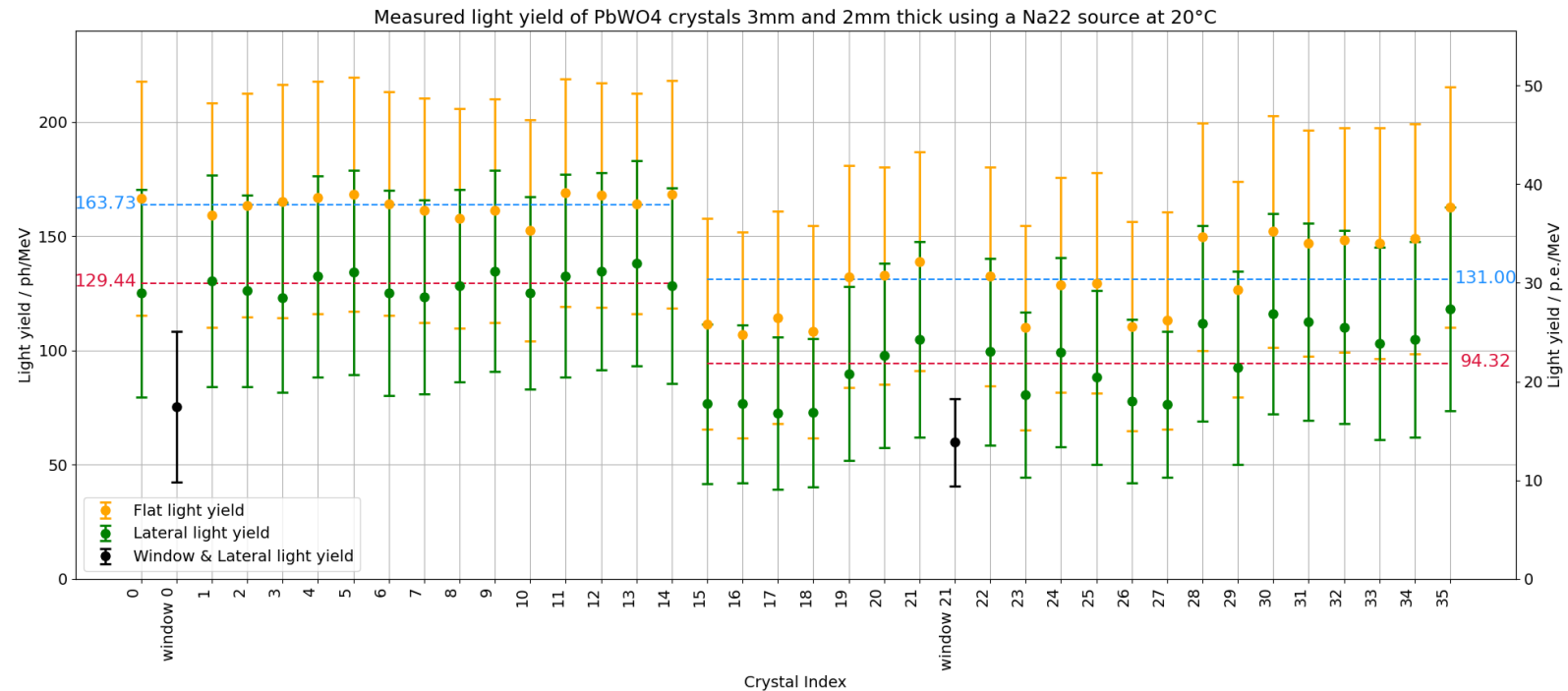
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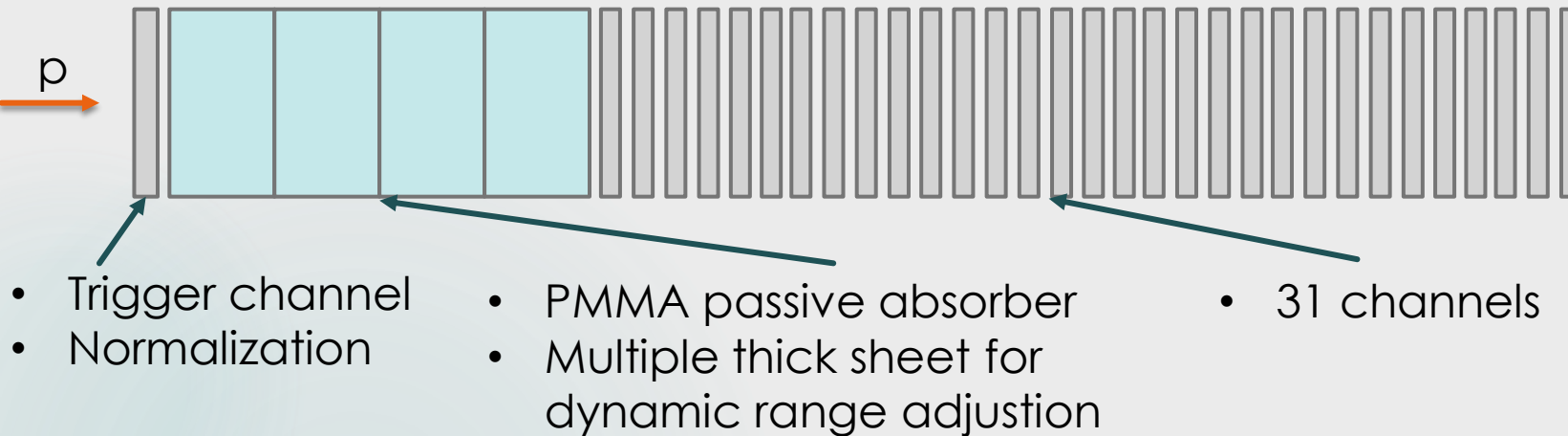


Plastic Scintillator Detector Concept

- 32 available channels to cover $\sim 32\text{cm}$ WET (220 MeV)

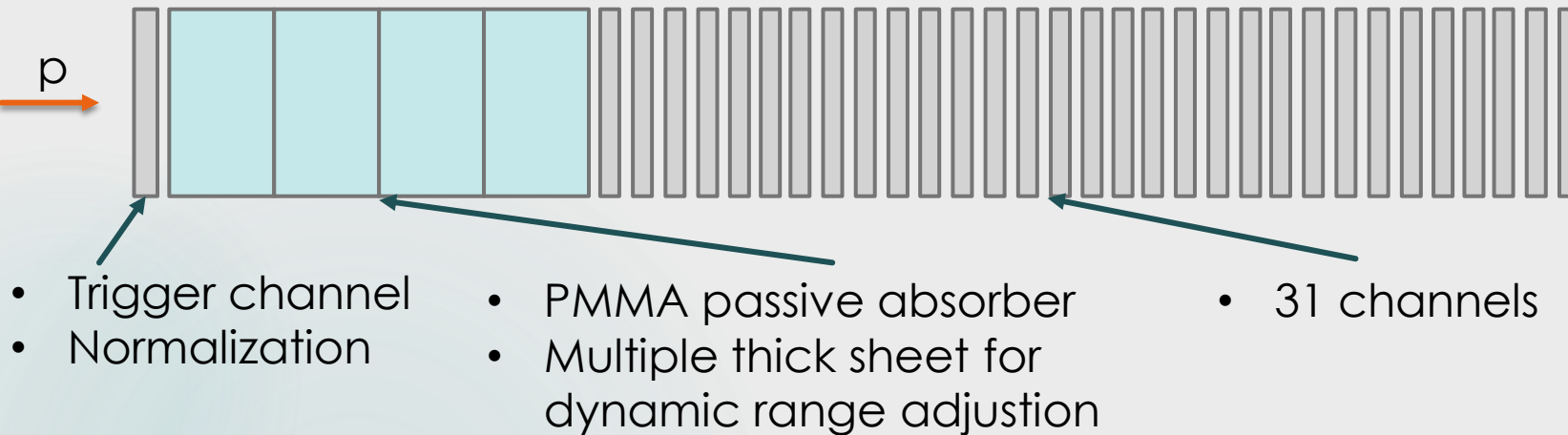
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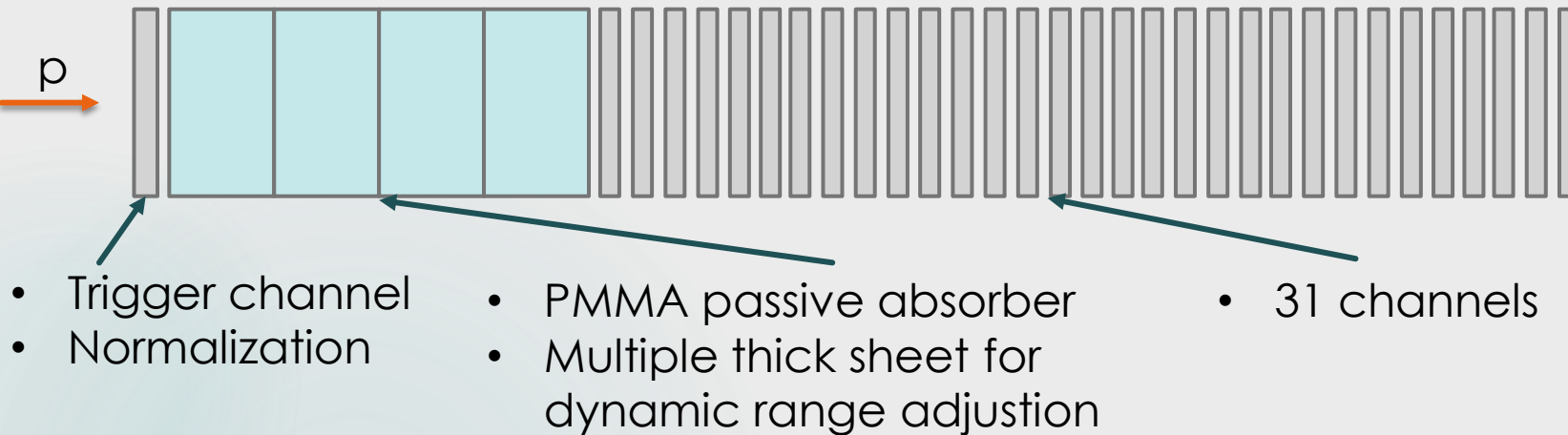
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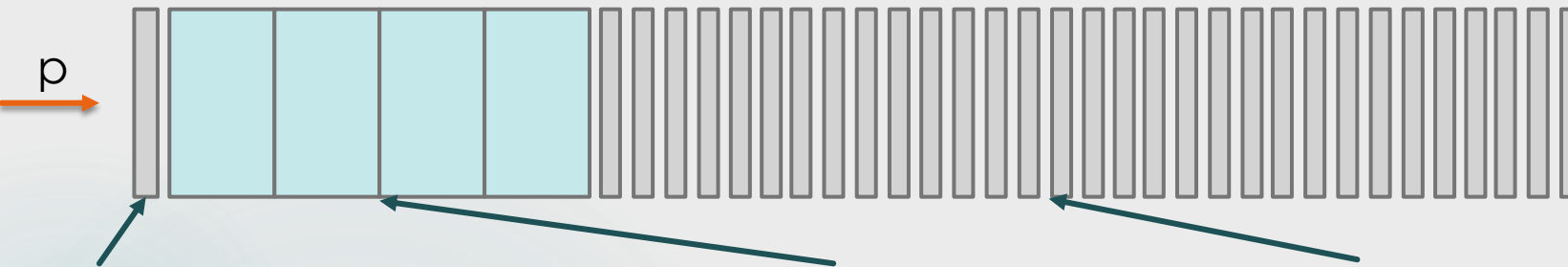
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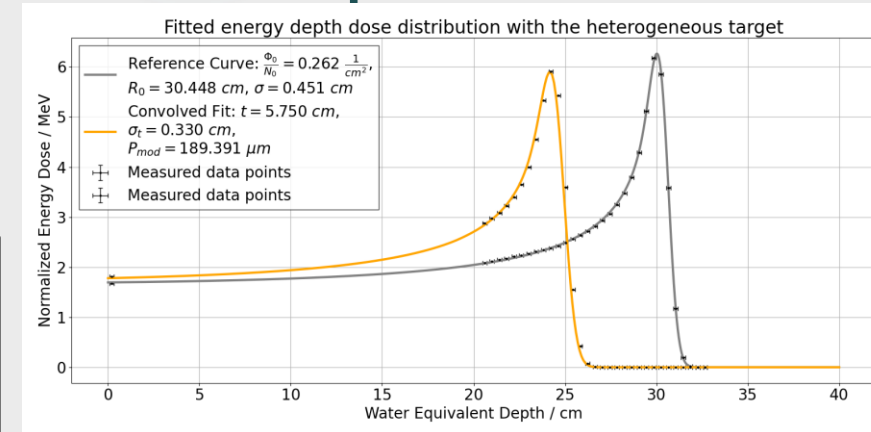
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- Trigger channel
- Normalization
- PMMA passive absorber
- Multiple thick sheet for dynamic range adjustment
- 31 channels

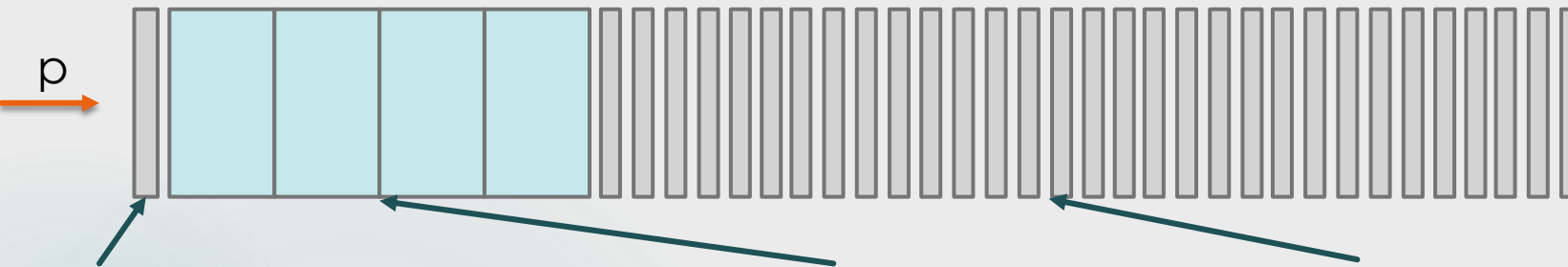
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- Simulated: 4mm Thick sheets
 - 20cm passive absorber
 - 12.8cm dynamic range
- 3mm -> 9.6cm dynamic range
 - 22cm passive absorber
- 5mm -> 16cm dynamic range
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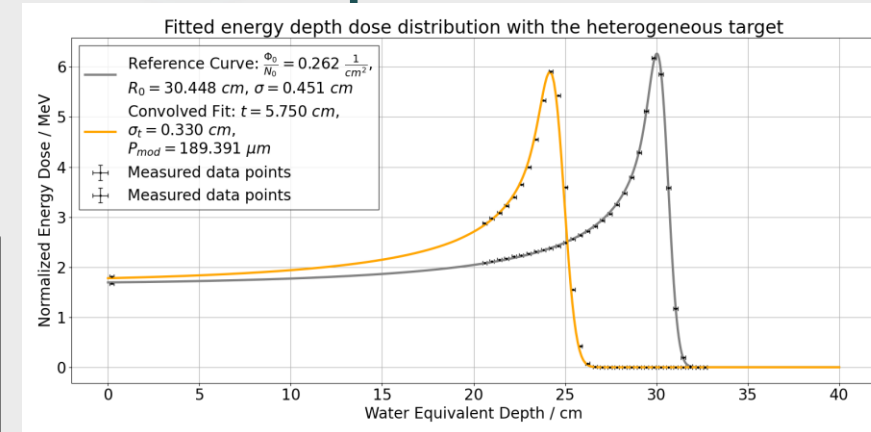
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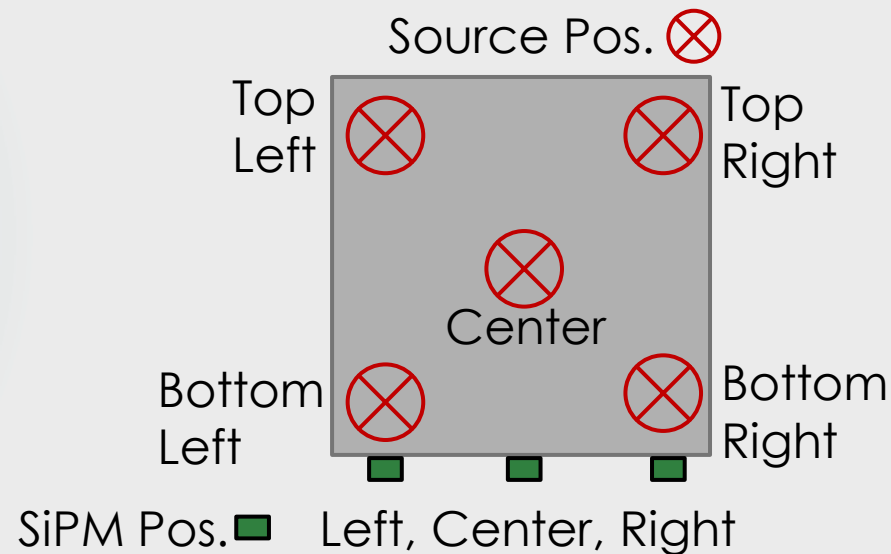
- Impact of sheet thickness on signal amplitude
- Tested plastic scintillators types, thicknesses and cross-sections
 - EJ200 $50 \times 50 \times 10\text{mm}^3$, BC420 $50 \times 50 \times 5\text{mm}^3$ & $100 \times 100 \times 5\text{mm}^3$,
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 - Sr-90 source with 2.2 MeV electrons, SiPM: S14160 3050 $3 \times 3\text{mm}^2$

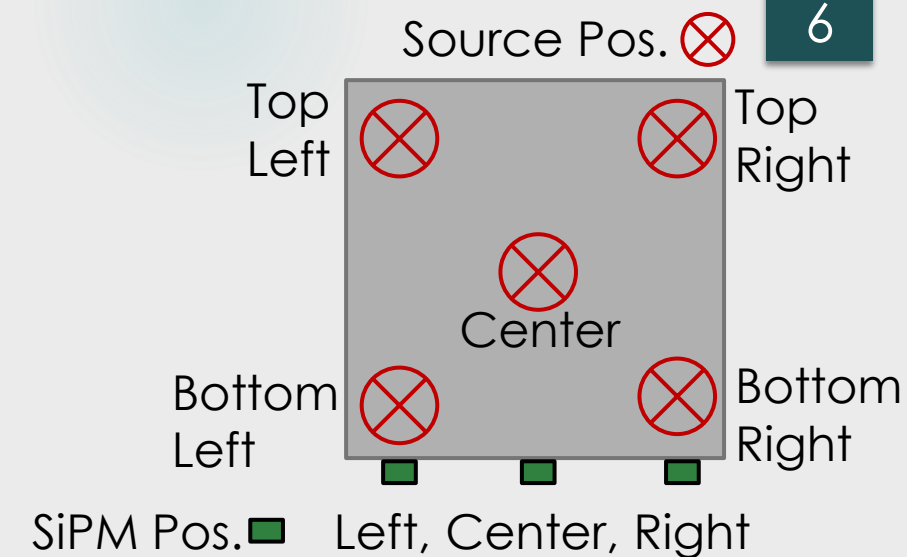
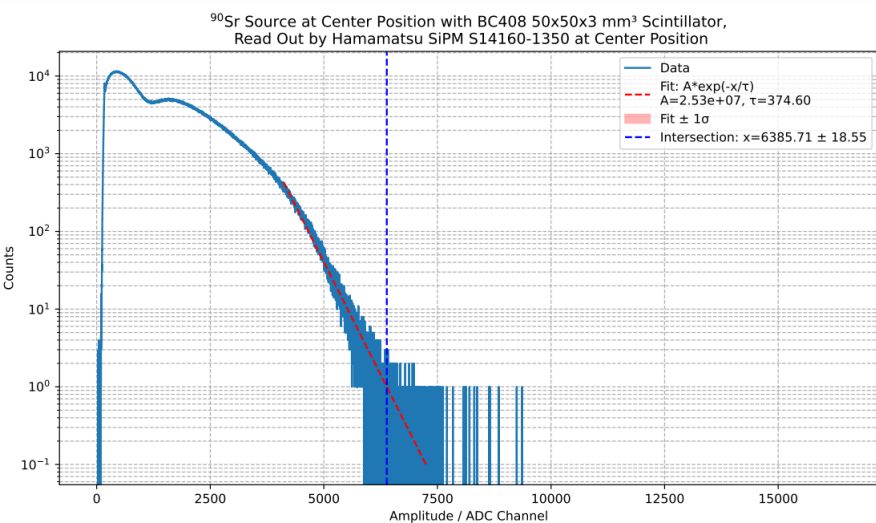
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- 15 Measurements per scintillator: 3 SiPM positions + 5 Source positions



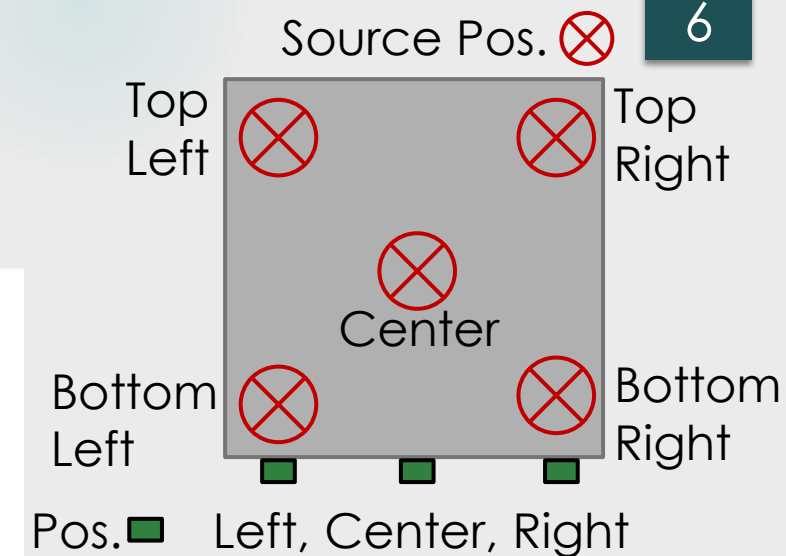
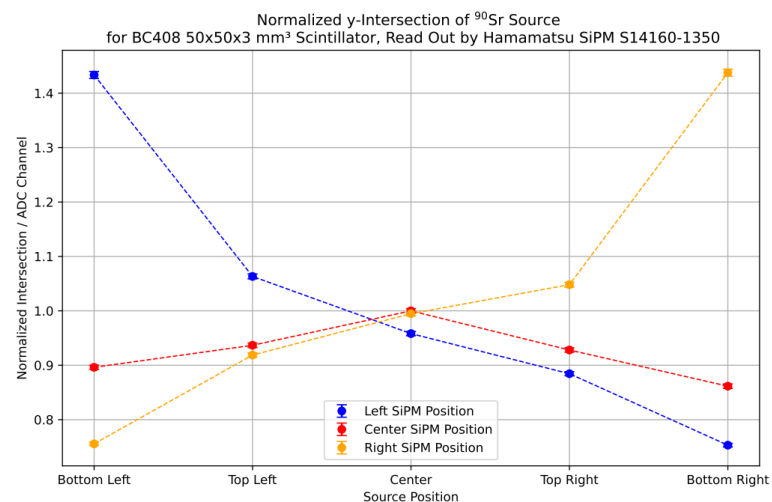
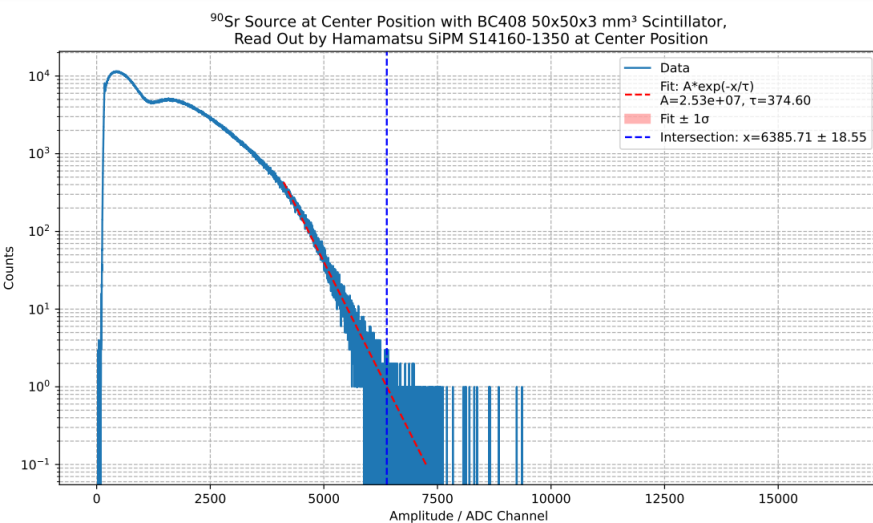
Linearity Results

- Exponential fit to high energy tail of Sr-90 spectra



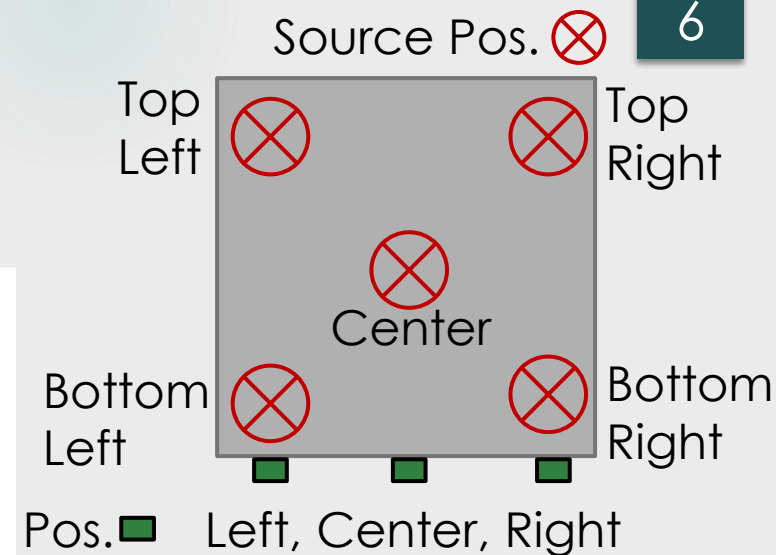
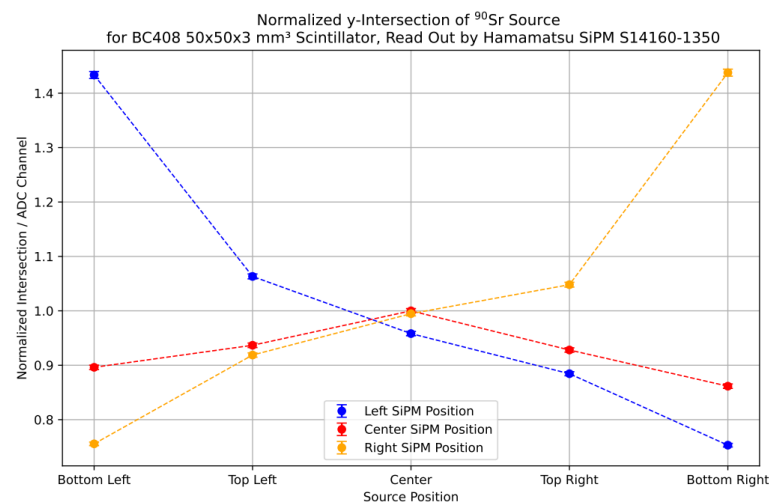
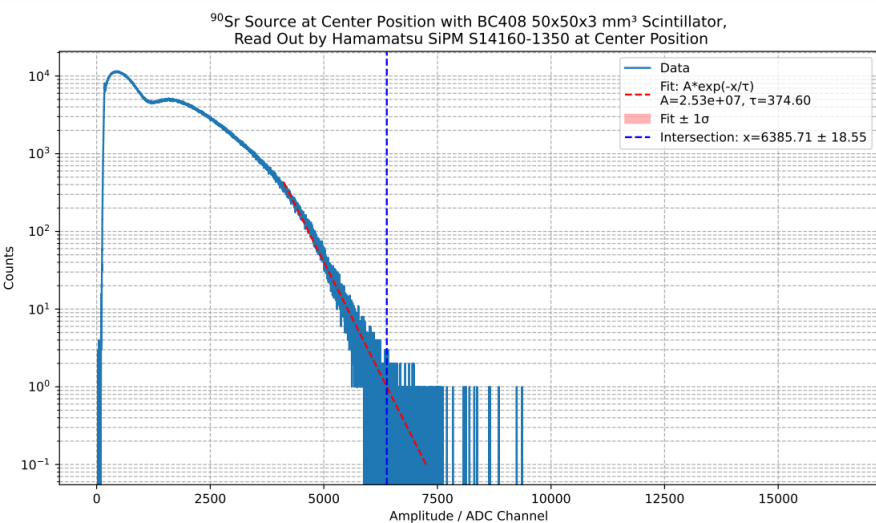
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- EJ200
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- BC420

