

OSU Light Collection

2/17/25

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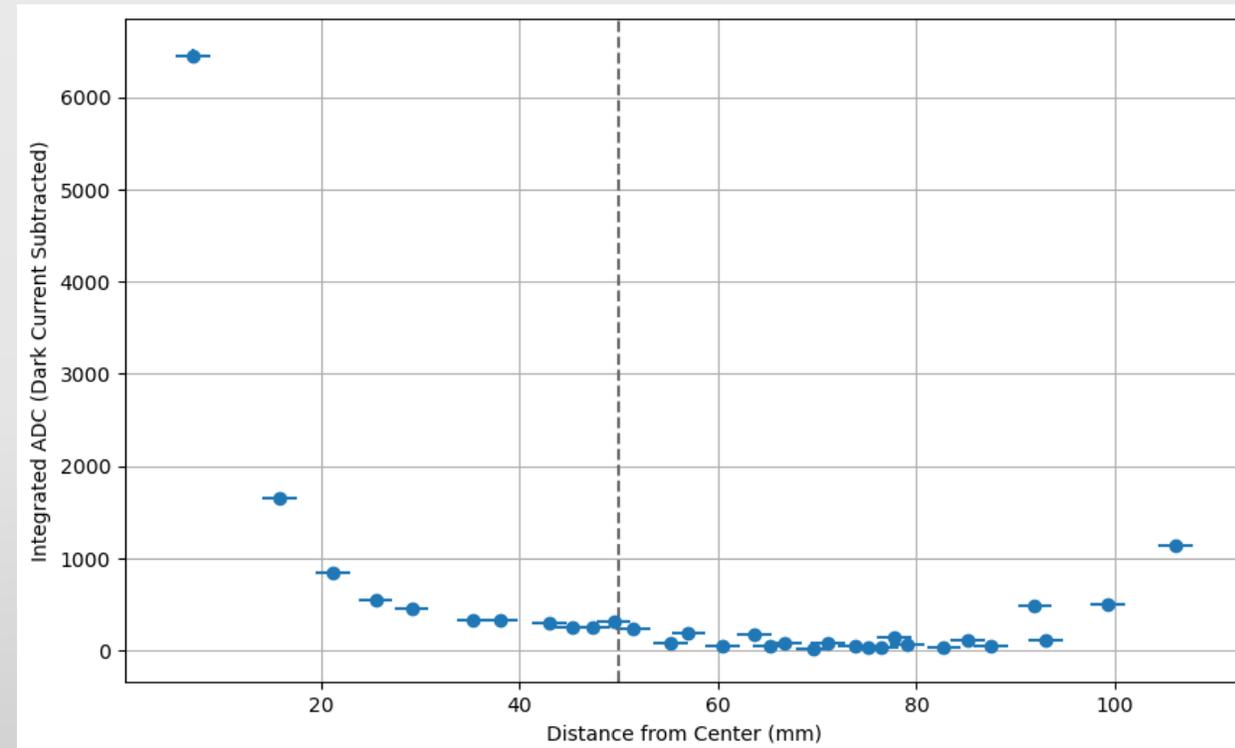
Last time: Wrapped tile

- Much less uniform than we expected/hoped.

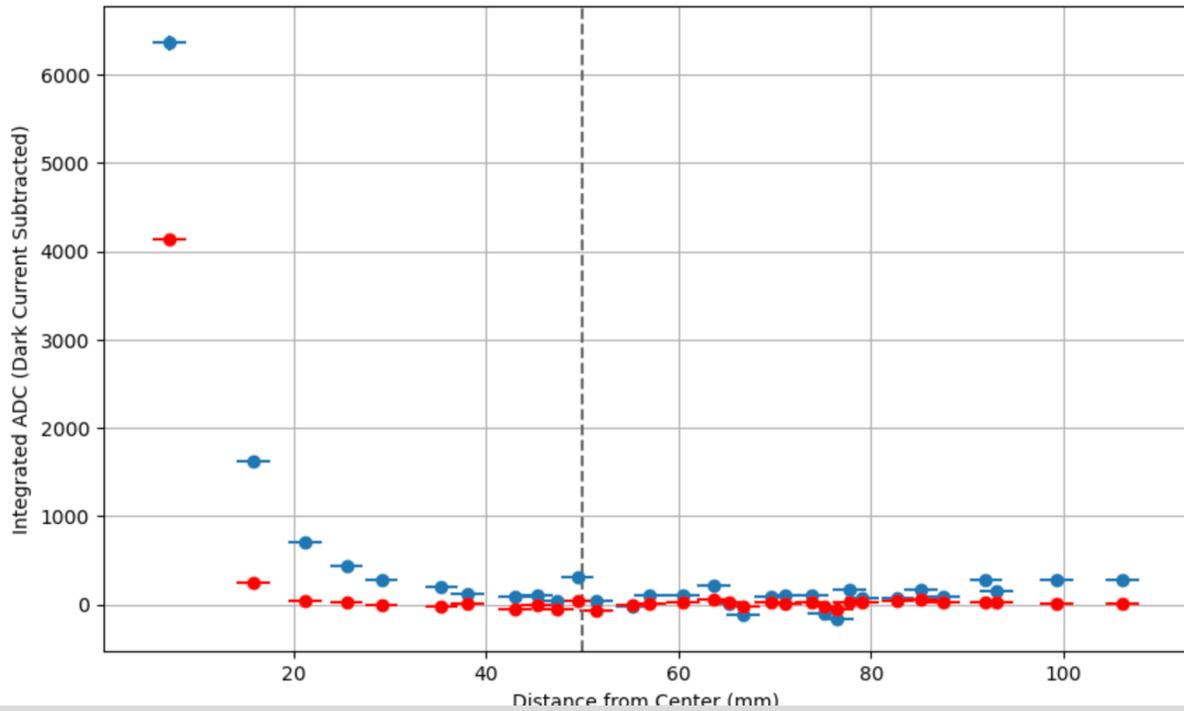
- Maybe improving wrapping could help?

- What does the source give us with no tile at all?

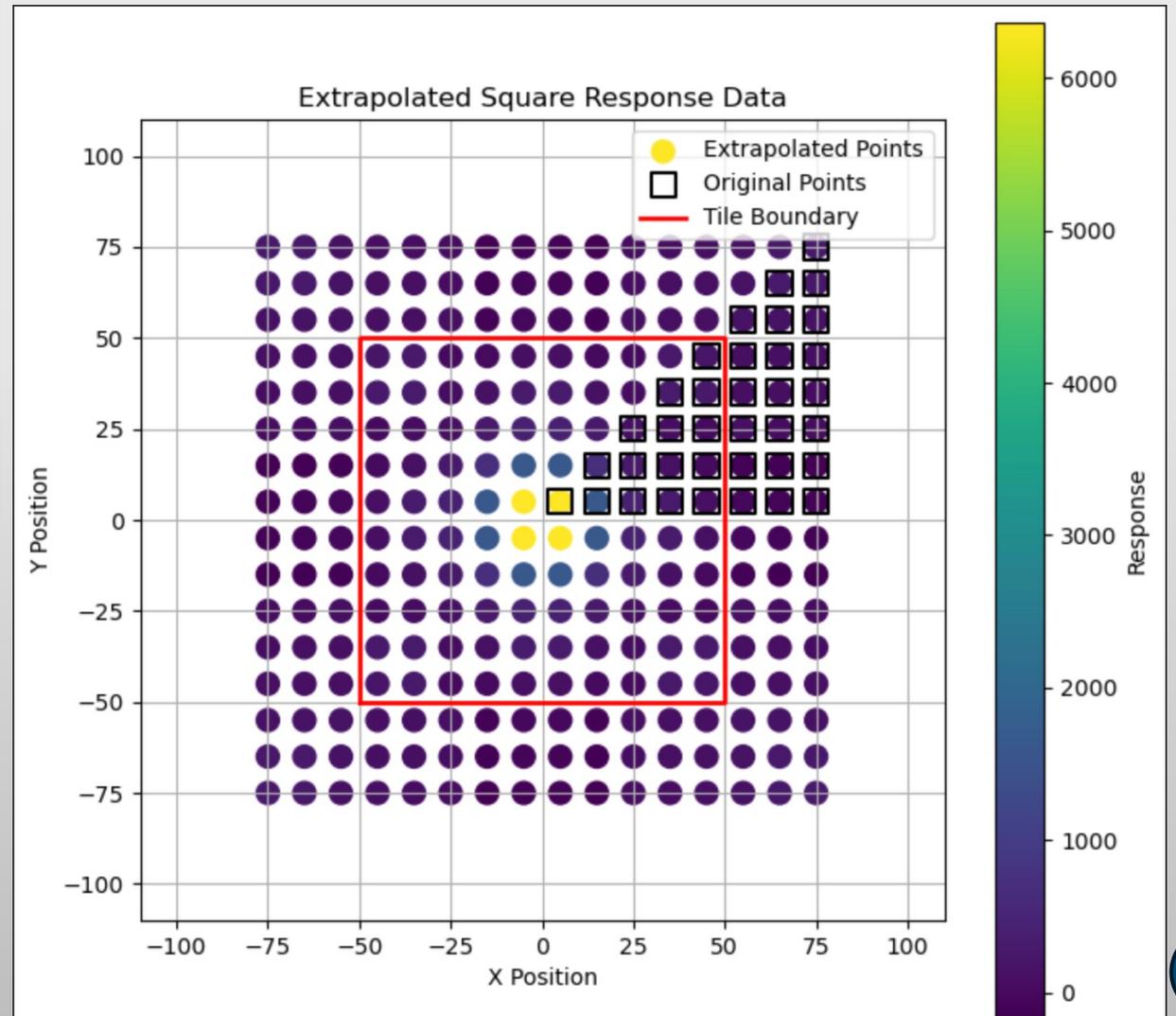
- +other ideas I don't have ready yet



“Improved” wrapping results

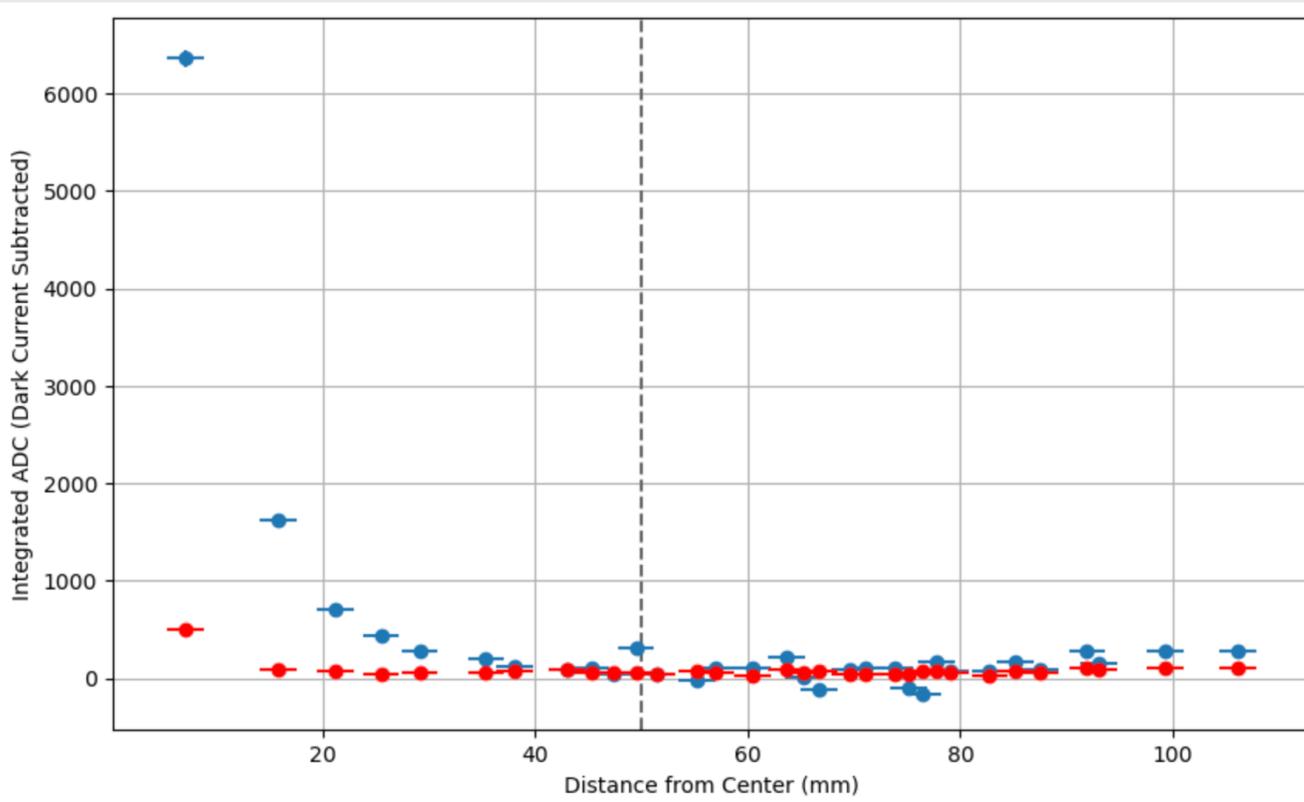


One (of many) questions: is it possible that we are uniform above ~25 cm and we're seeing our source directly at the 0cm peak?



Scan with no tile

- Repeat the same scan as before but with no tile at all
- This contributes some to the non-uniformity. $\sim 7.5\%$ overestimating most central region of tile.
- Great to know, but doesn't solve issues.



On the list: painted 10x10 tile, extra mechanical pressure, optical grease
Also, will try move SiPM to edge of tile, but this will take longer to set up.

Backup

List of available sample tiles

Polished+milled to correct size

- ~20 2.4x2.4x0.4 with dimple
- 1 2.4x2.4x0.4 painted with dimple
- 3 4.7x4.7x0.4 with dimple
- 1 4.7x4.7x0.4 painted with dimple
- 1 4.7x4.7x0.4 wrapped with dimple
- 2 5x5x0.4
- 1 5x5x1.6
- 1 10x10x1.6

Unpolished+not milled to stated size.

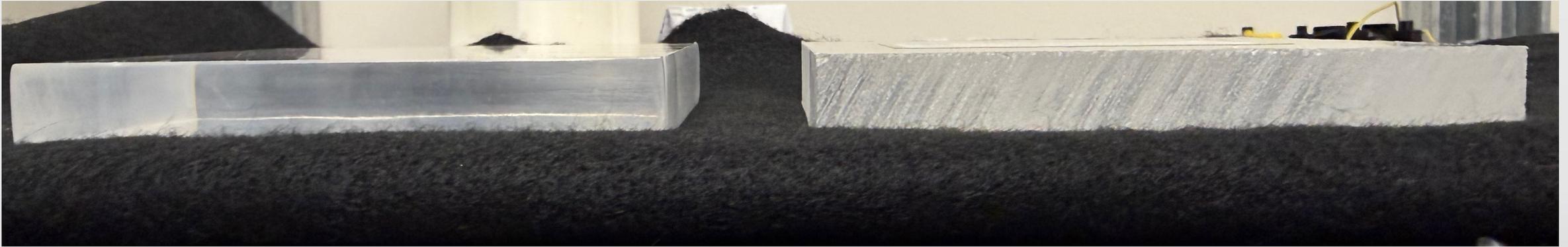
- 3 5x5x0.4
- 2 5x5x0.8
- 1 5x5x0.8 with dimple
- 3 5x5x1.6
- 1 10x10x0.4
- 1 10x10x0.4 with dimple
- 3 10x10x0.8
- 3 10x10x1.6

About ~2cm
extra material
in x,y

Will show results from this one today

Polishing the unpolished tiles

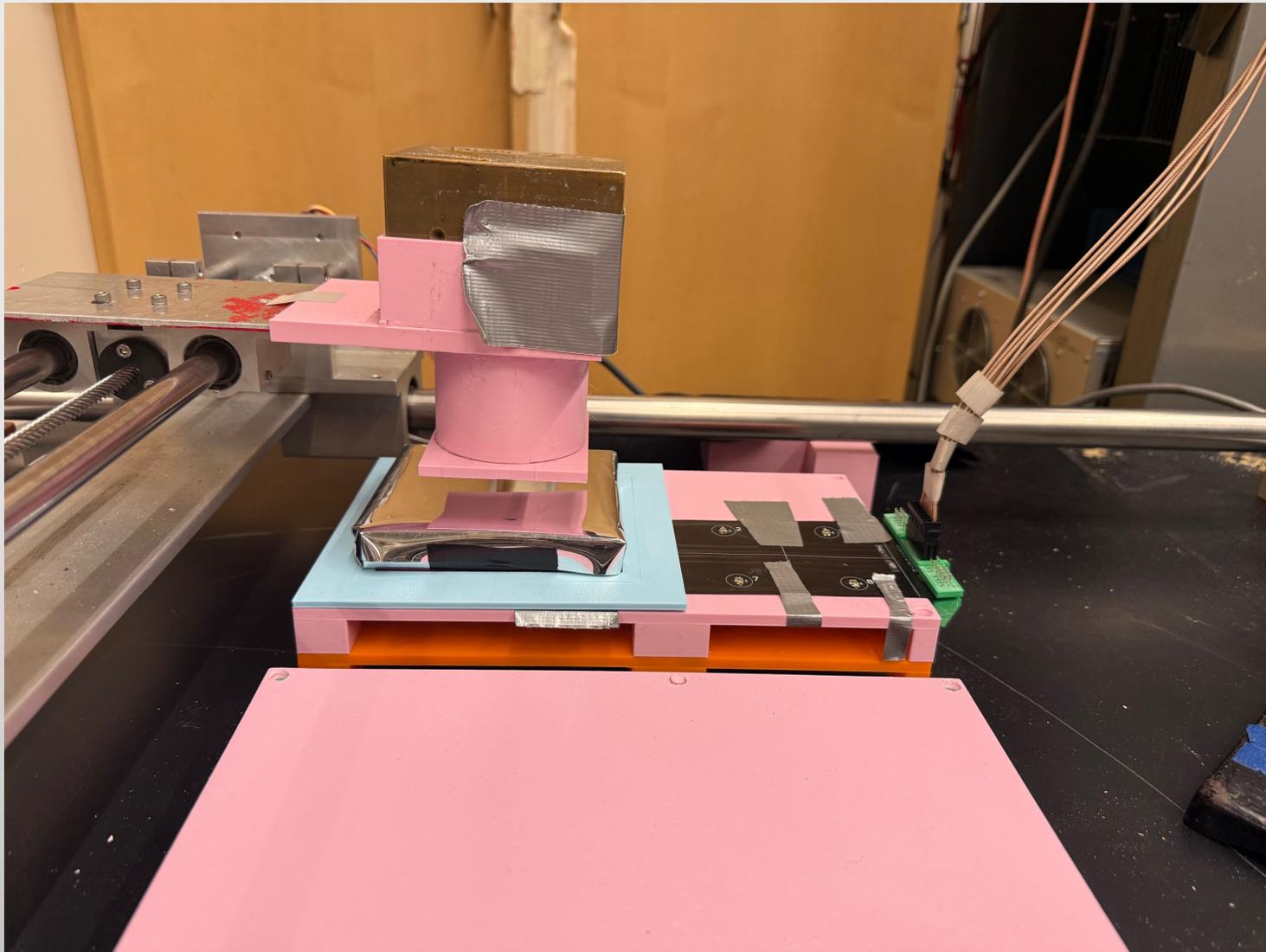
- Recently started polishing some of the un-milled tiles by hand.
- Here's an example



Polished

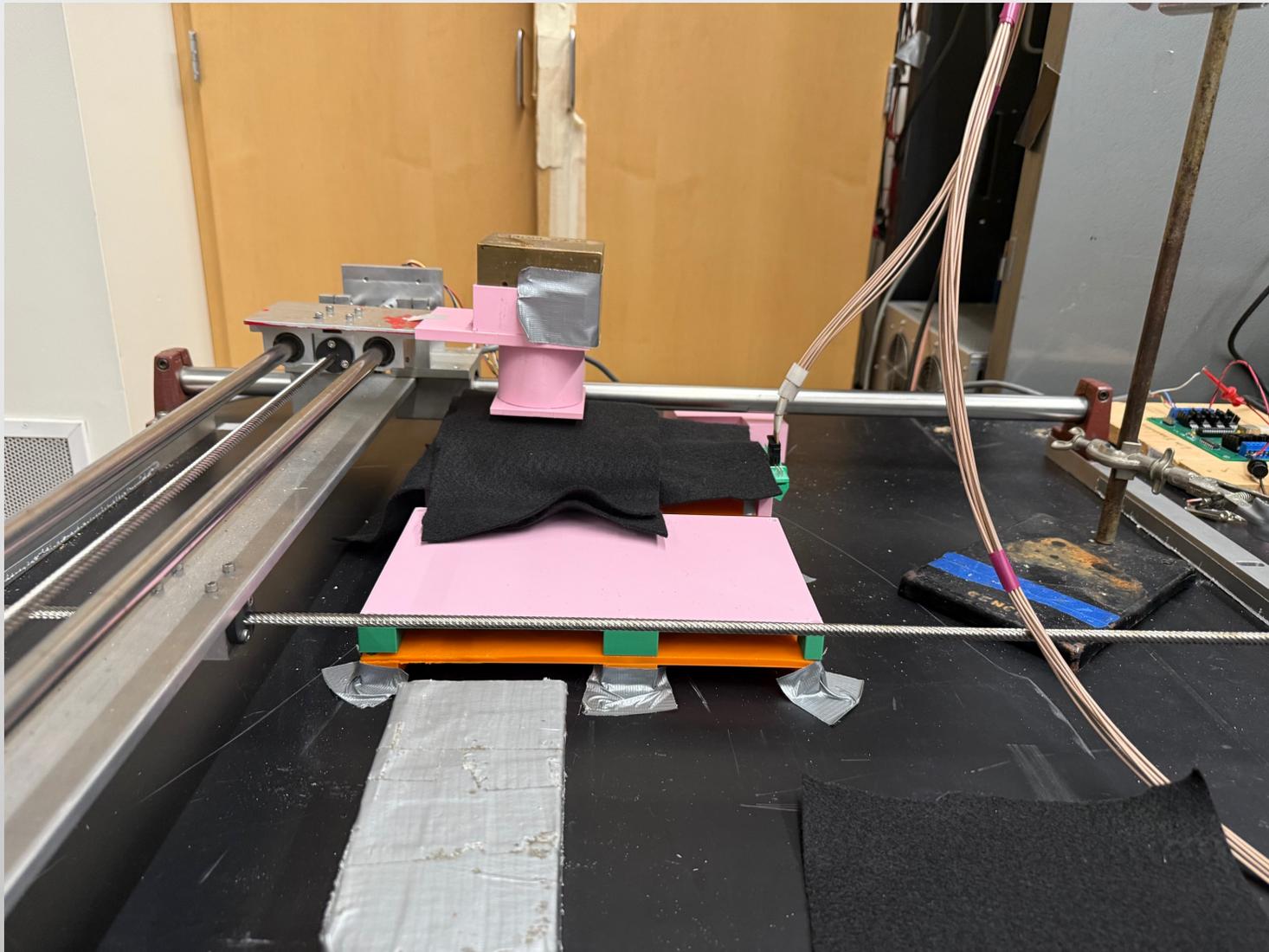
Original

Lab setup



- Sr90 beta source
- Source moved through a list of positions via x-y table
- Tile centered over SiPM
- Readout through CAEN module

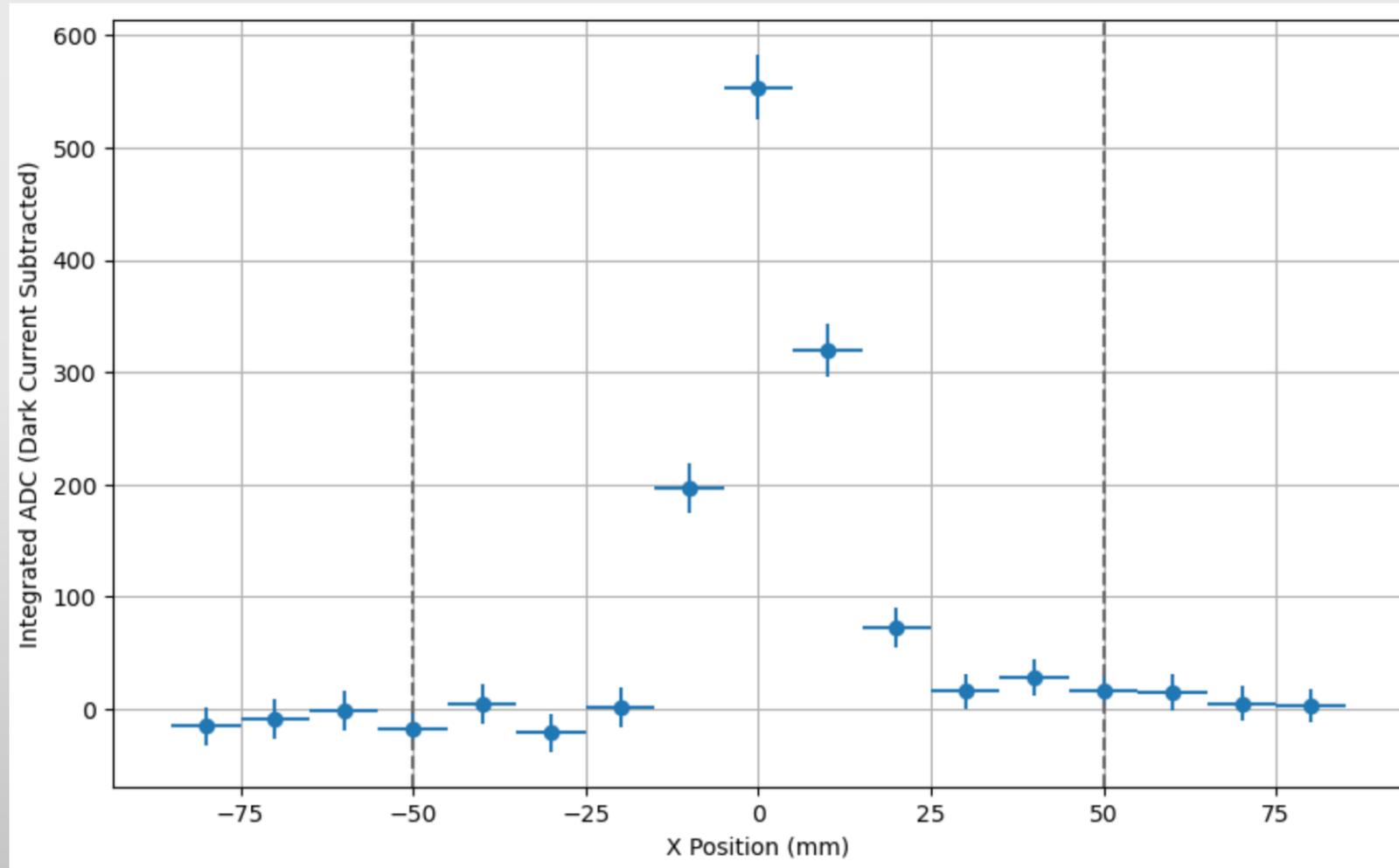
Lab setup (pt 2)



- For data taking, cover tile with felt and turn off the lights

Results from unwrapped, polished 10x10 tile

- Horizontal scan across the center of the tile:



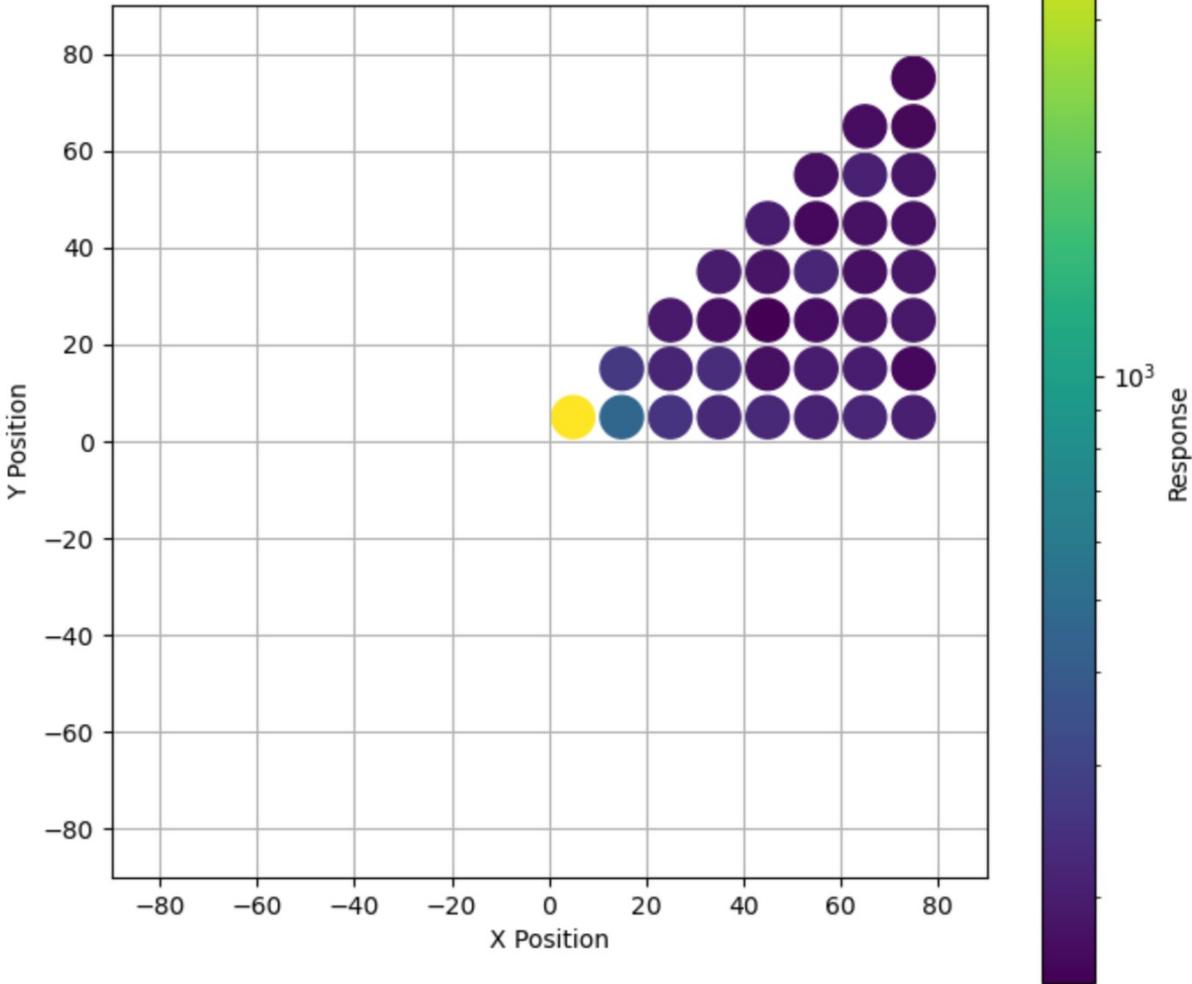
Vertical lines=edge of the tile

Results from unwrapped, polished 10x10 tile

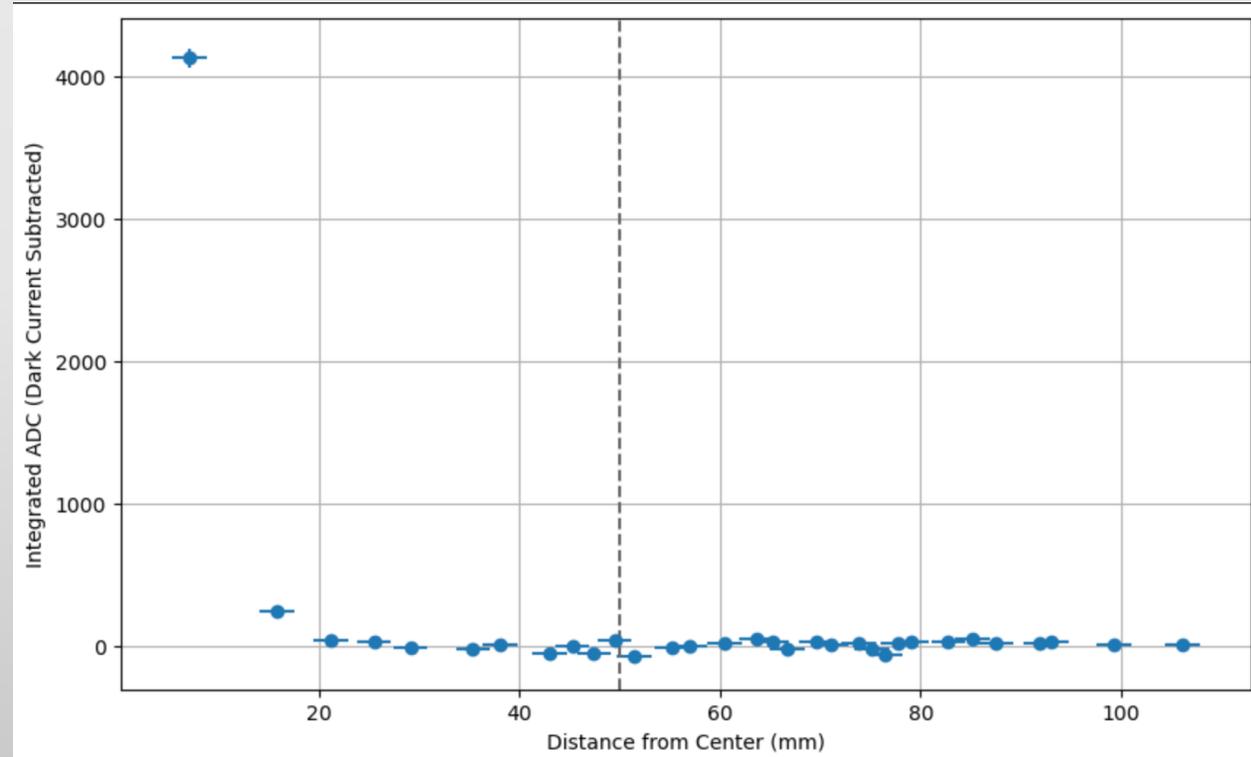
- 1/8th grid scan

X vs. y vs. yield

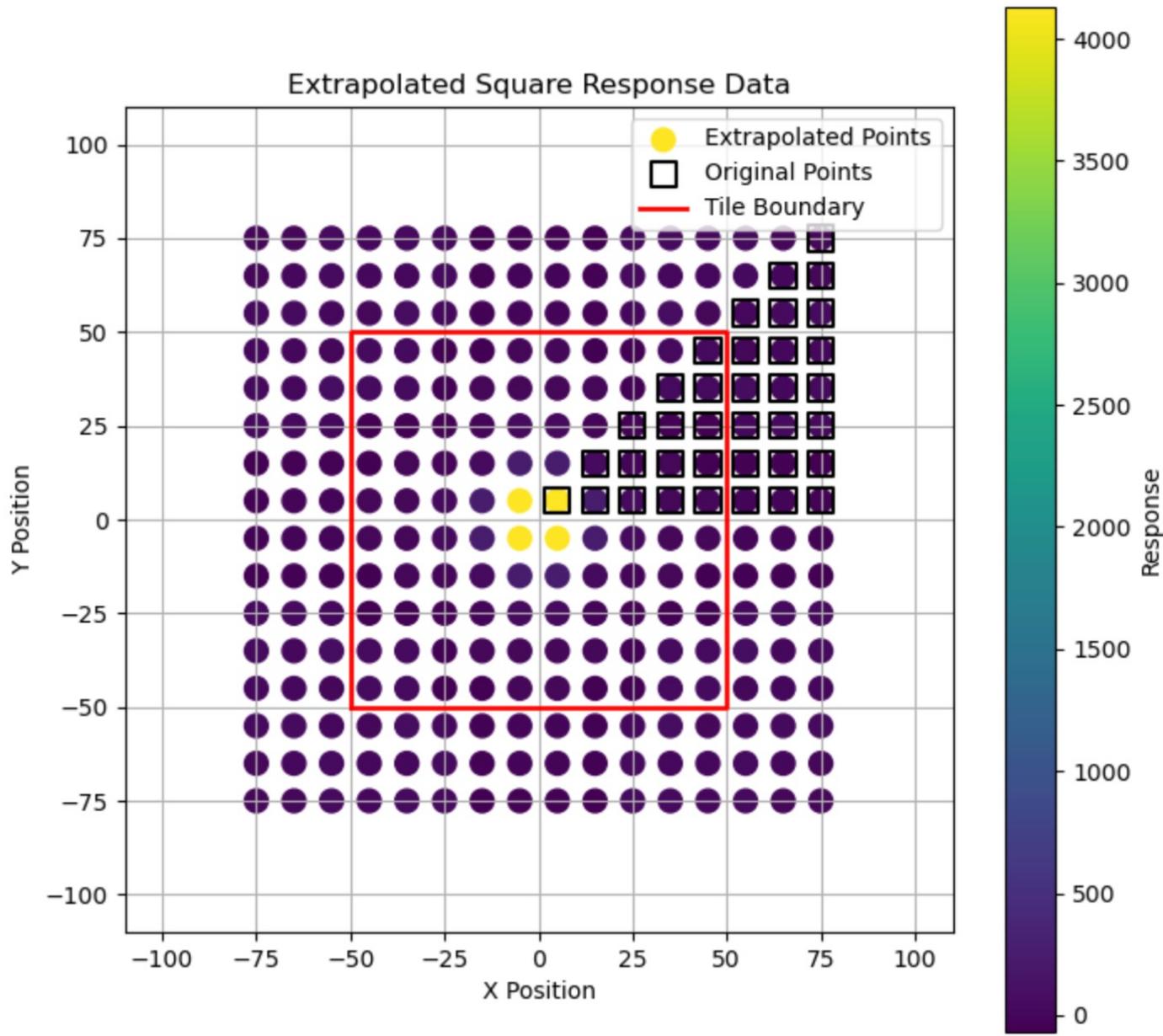
Original Square Response Data



$\sqrt{x^2 + y^2}$ vs yield

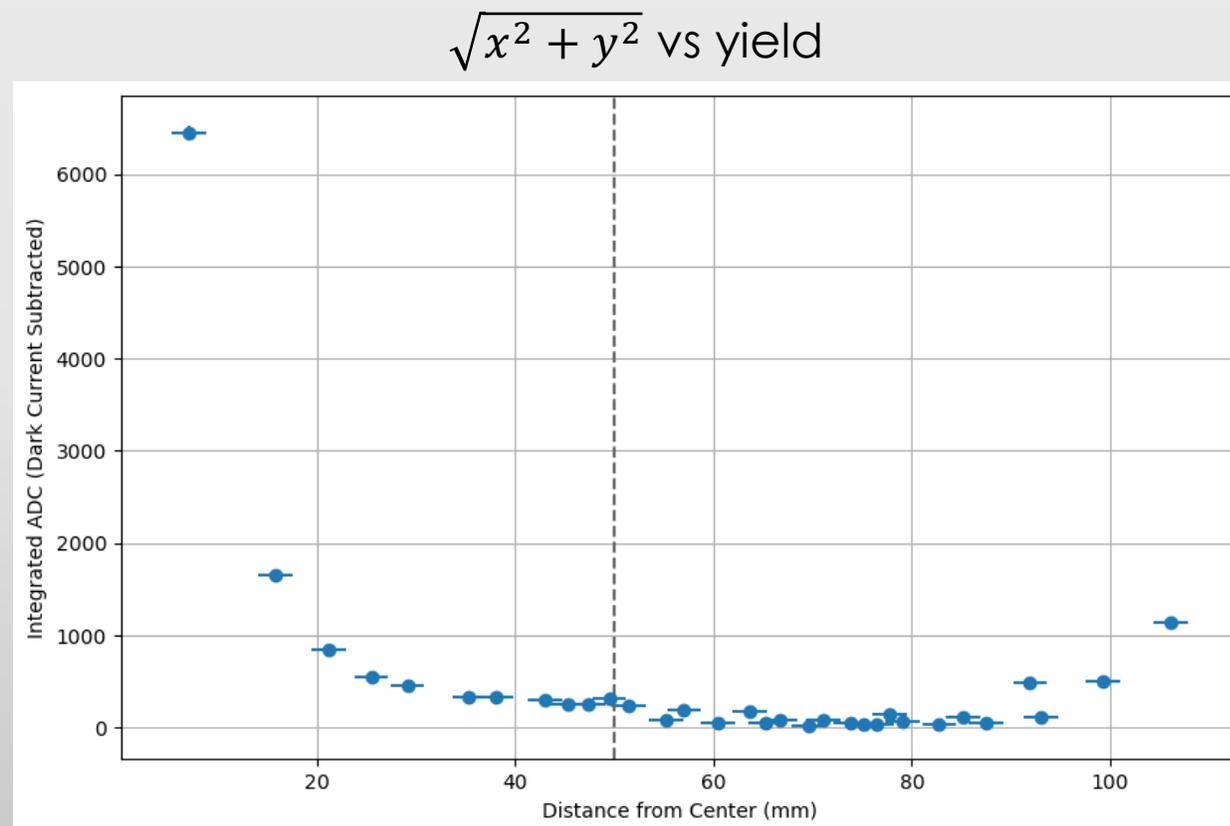
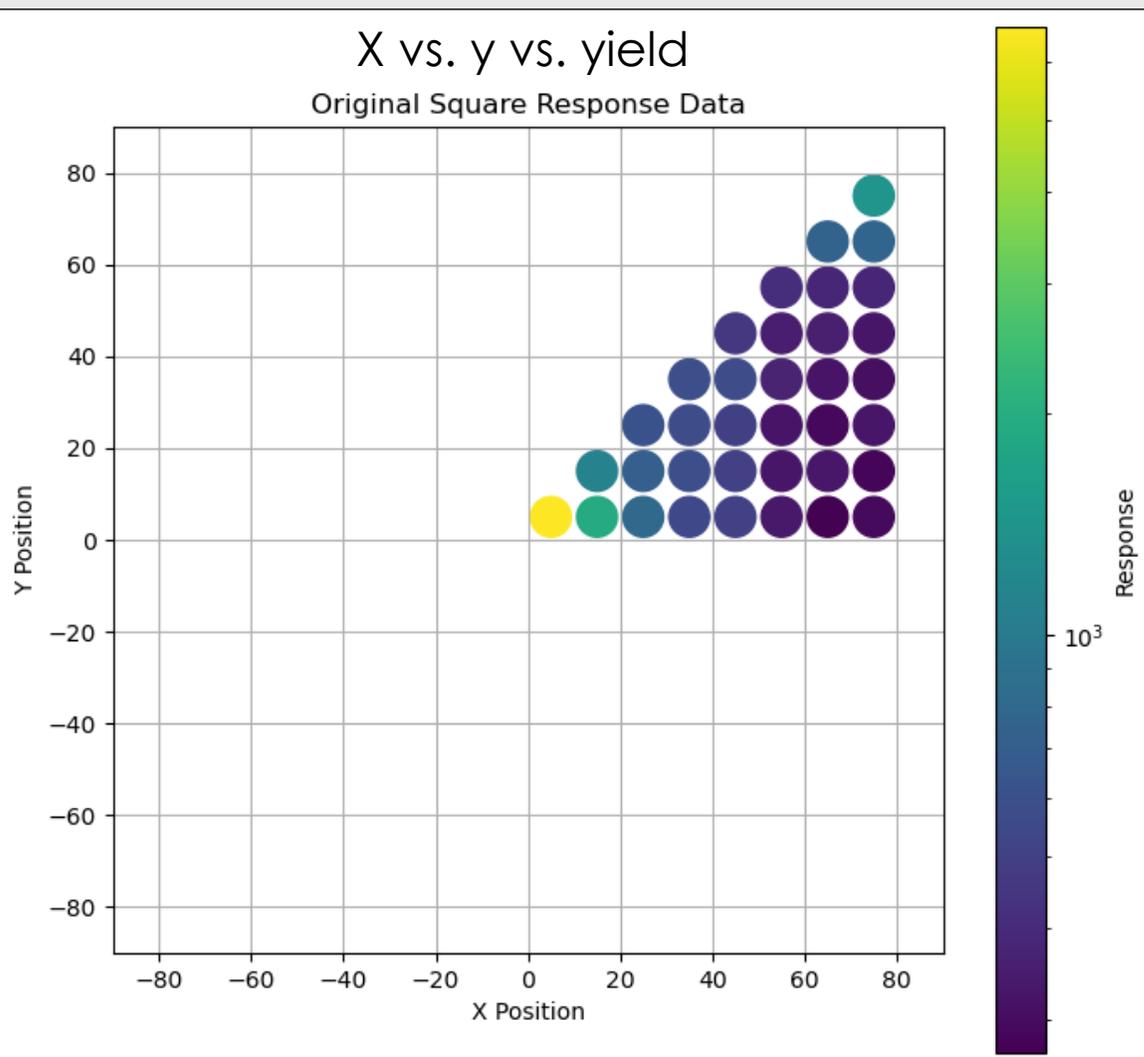


Heatmap from exploiting square symmetry



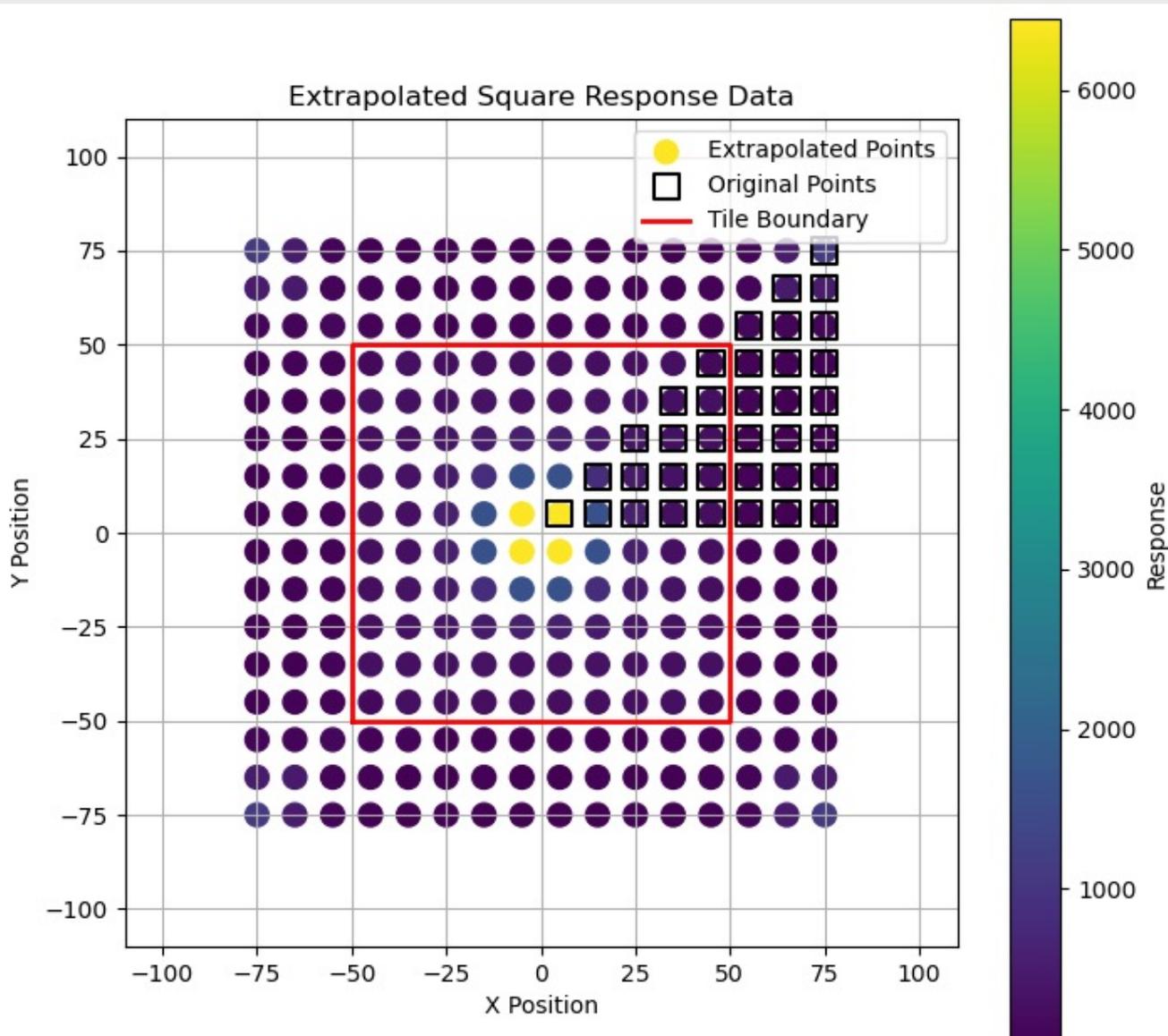
Results from wrapped, polished 10x10 tile

- 1/8th grid scan



Note: ignore these high yield points at 75, 75
I suspect due to my phone flashlight checking if it
was done

Heatmap from exploiting square symmetry



Clear improvement from unwrapped case, but very far from ideal.

Maybe wrapping can be improved (better technique/methodology)

Possible improvement by adding layer of reflective material over the PCB with only a very small hole for the SiPM. Could be that the whole cut into the tile's wrapping is too large.