

PCB layout

Phys150 Special topics

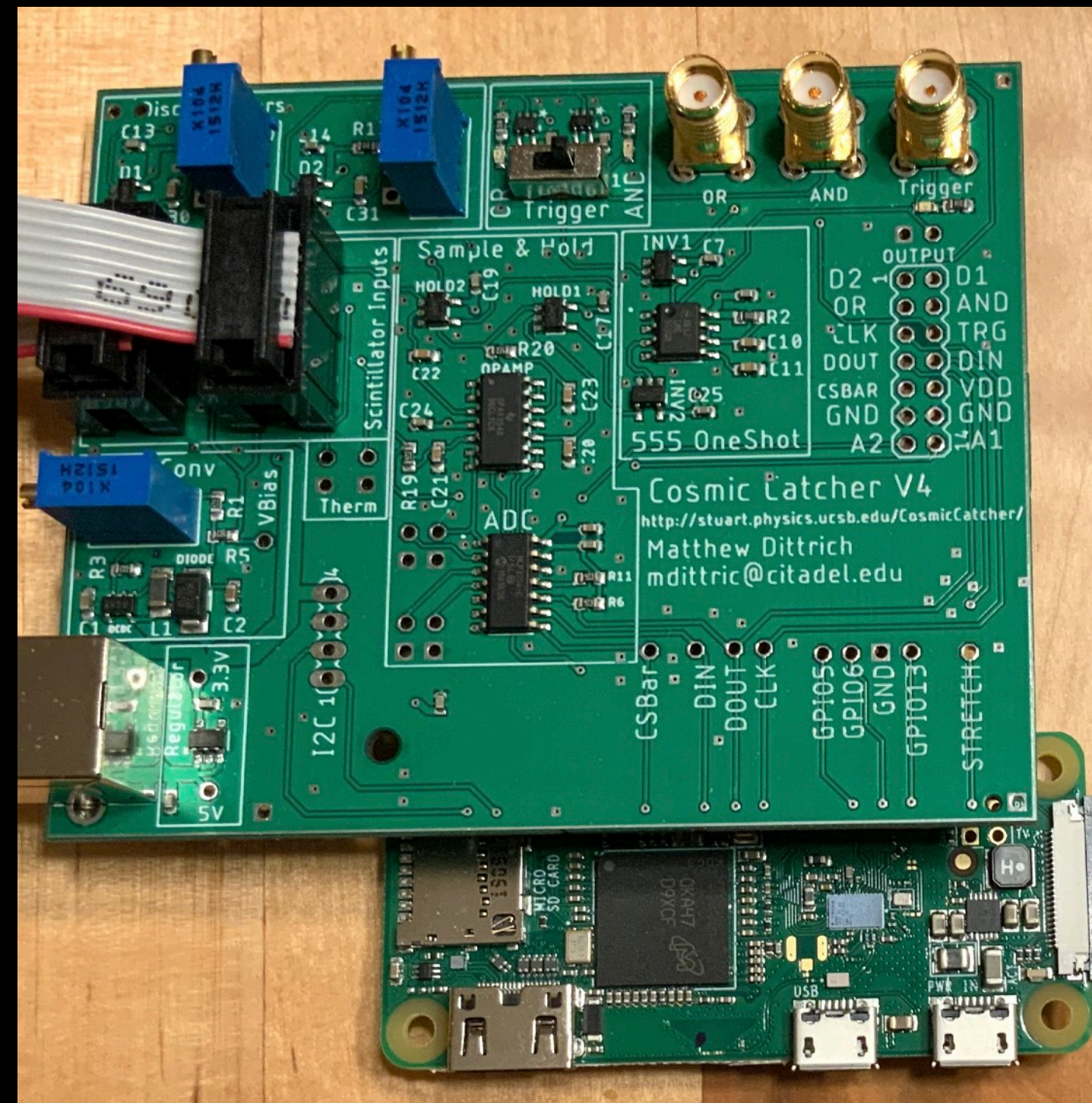
David Stuart, UC Santa Barbara

Last time we saw that we can learn a lot from the size of the signals beyond just the binary information from the discriminators.

In general, adding information is always a good way to disentangle different processes and understand more deeply.

Today I'll show a follow up from that, and then we will look at ways to expand the available information with a "mez-card" PCB.

Lets look at the analog signals

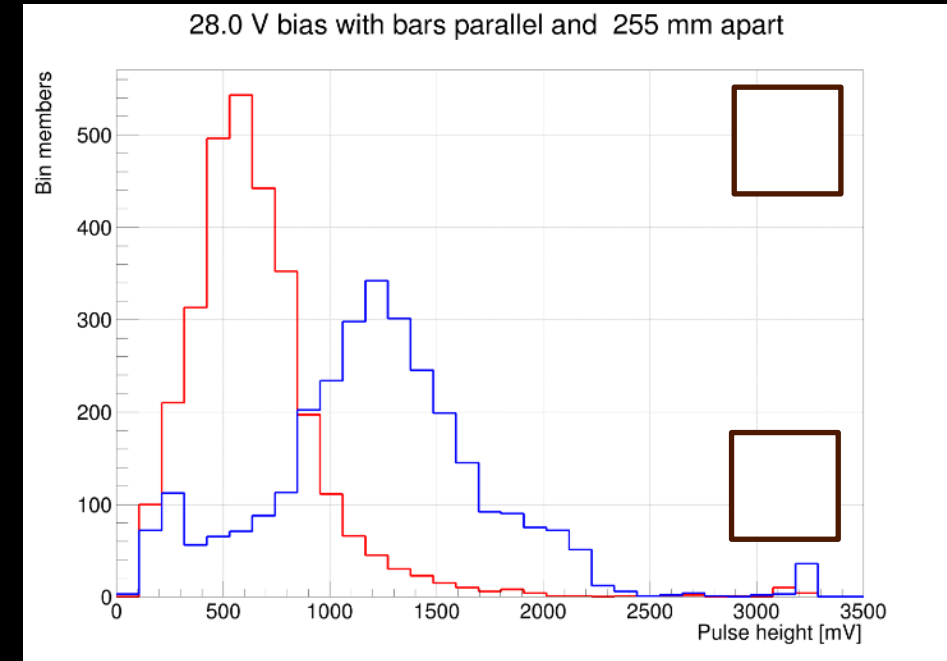
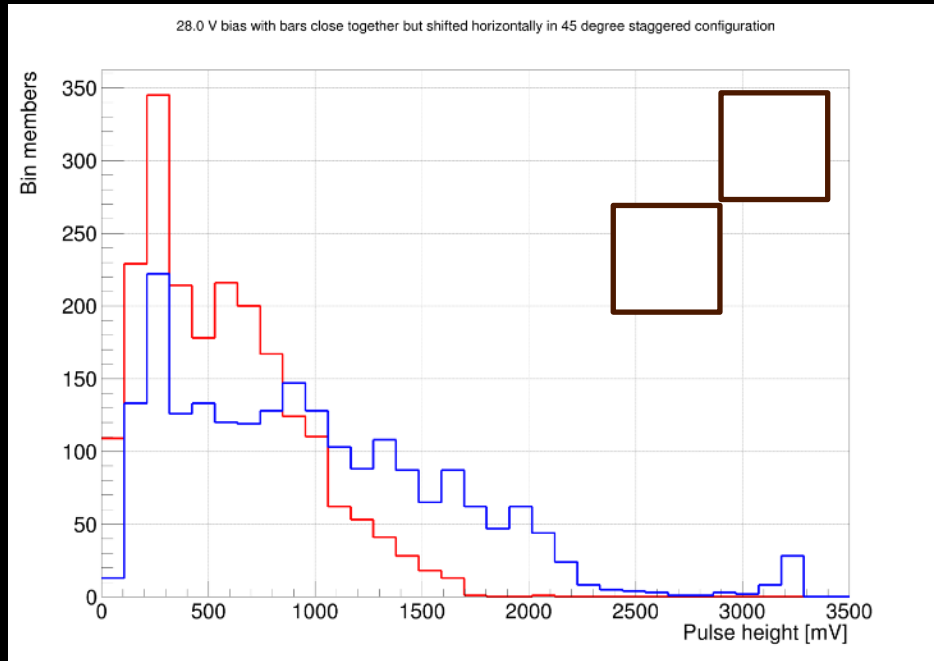


We've only been counting the rate of stretched AND signals.

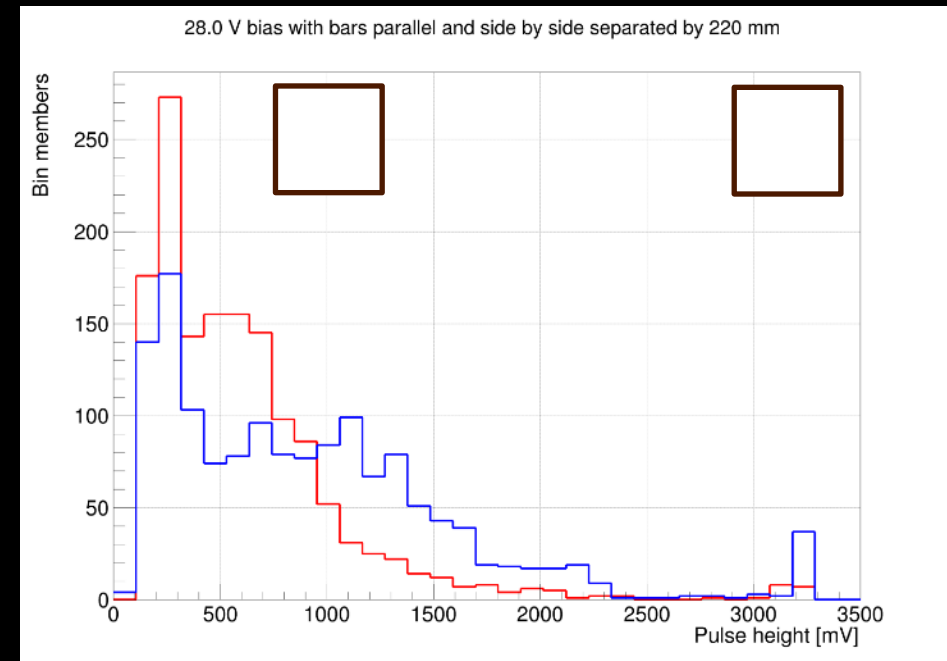
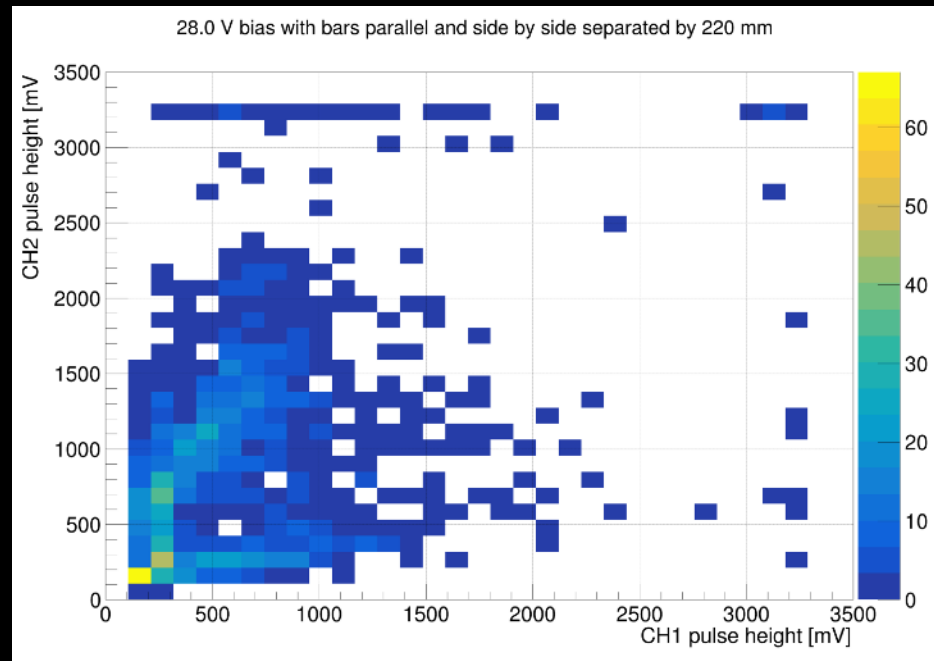
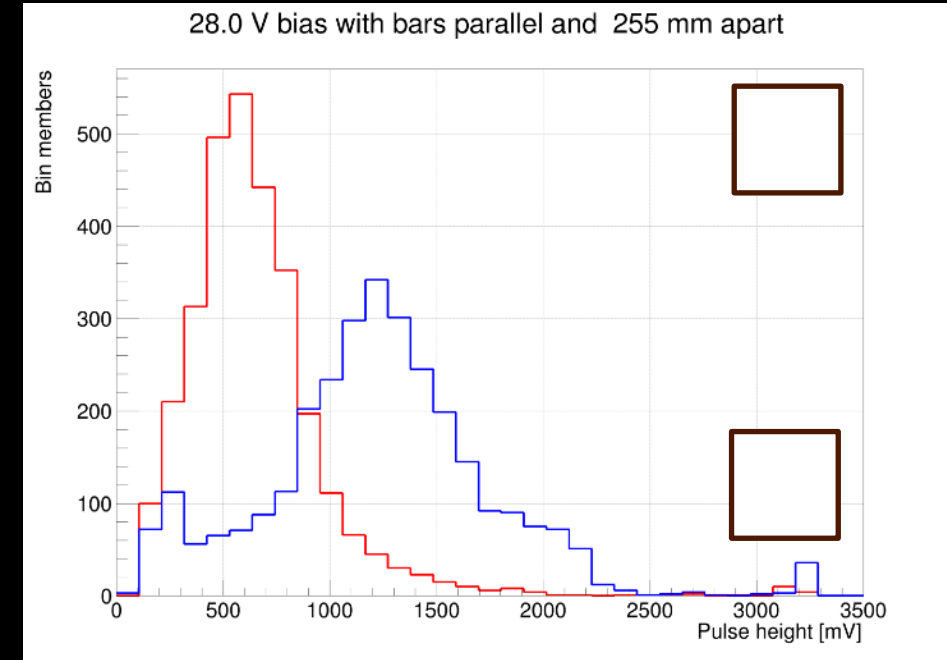
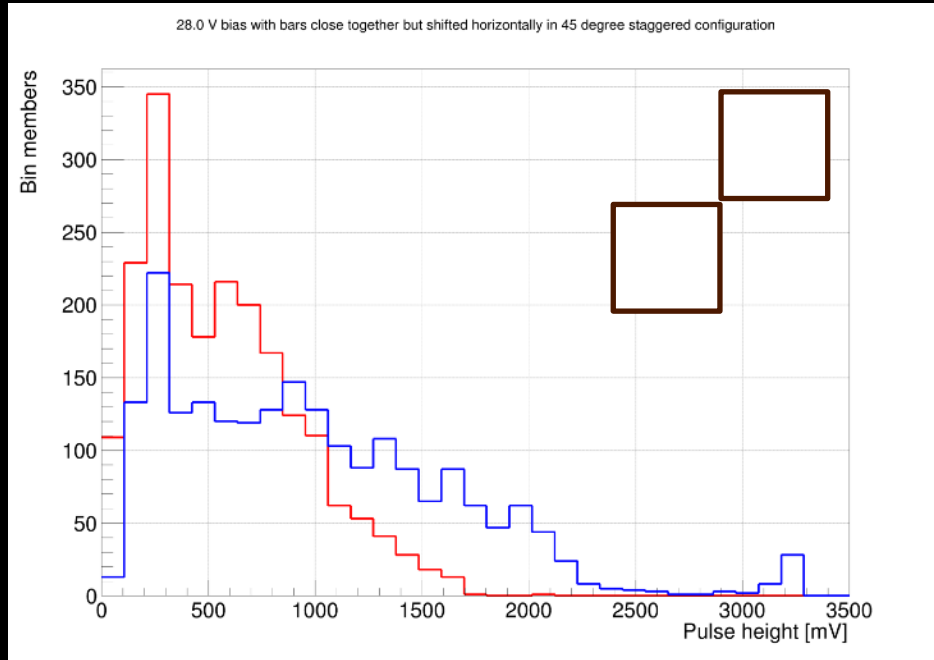
There is an expansion port with the analog signal from both channels, A1 and A2.

Let's look at them with a scope.

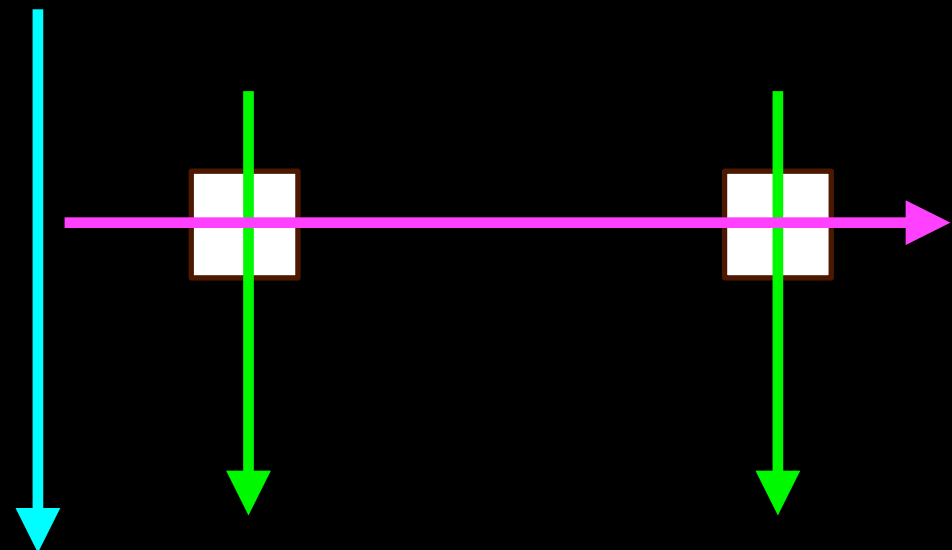
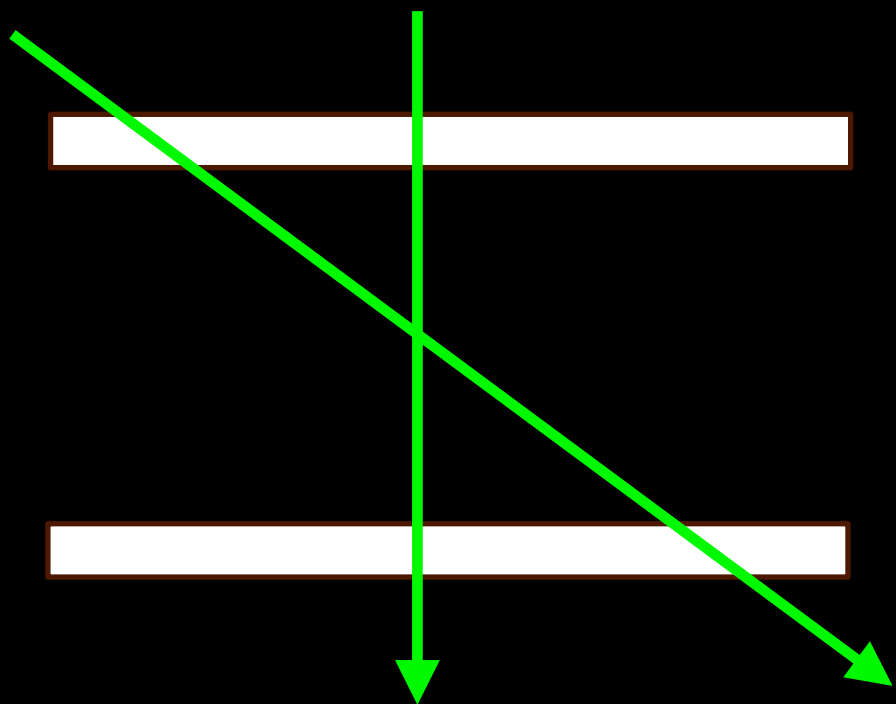
Changing path length



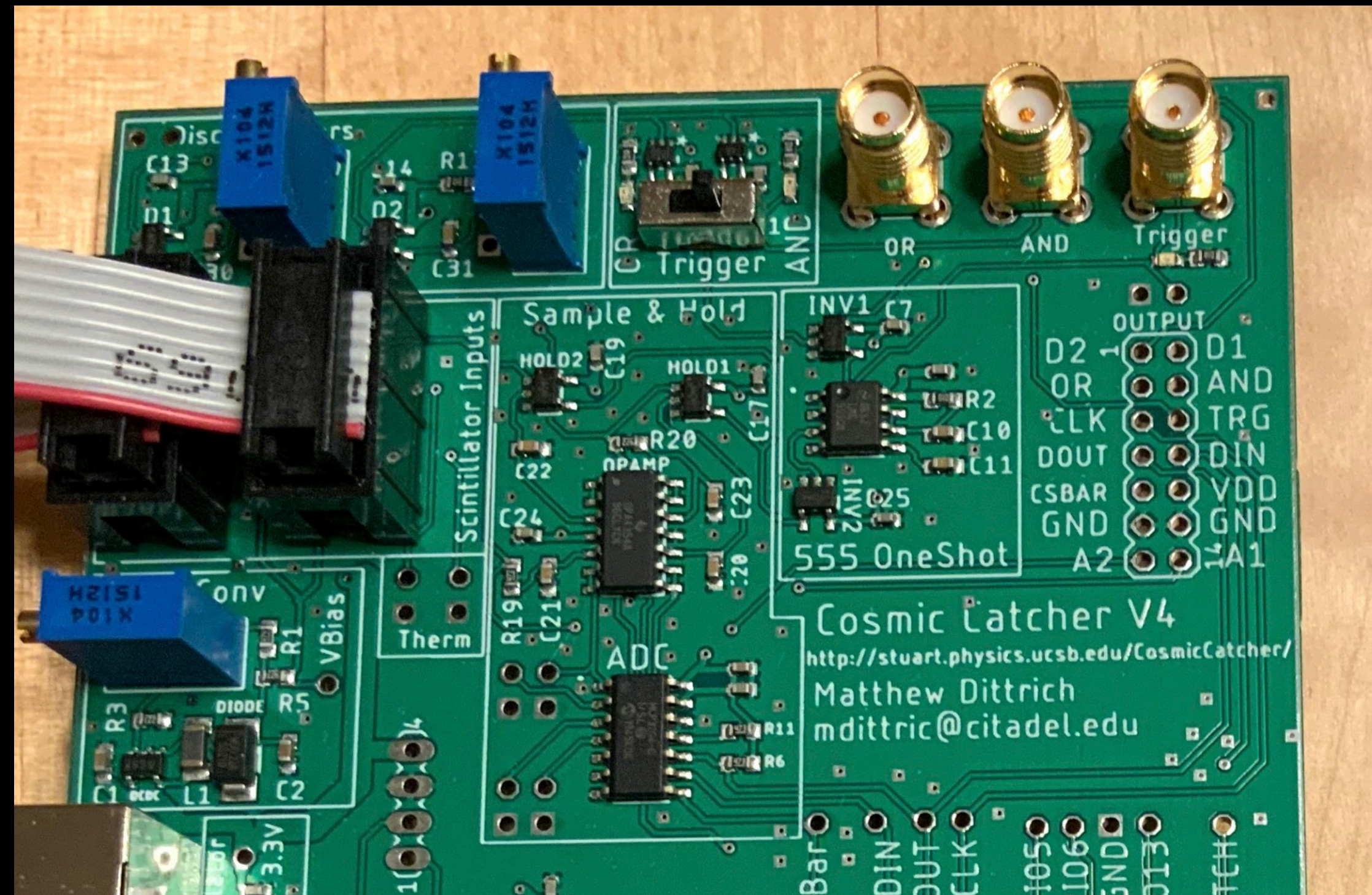
Changing path length



What about the other dimension?



Can extract additional information with an expansion port



Approach

Figure out what you want to measure then the design constraints.

What additional information could you glean?

What is missing?

Approach

Figure out what you want to measure then the design constraints.

What additional information could you glean?

What is missing?

Analog pulse height information.

Count of OR and AND at hardware speed rather than software speed.

More precise timing.

Better, automated, control of bias voltage and thresholds.

Automated altitude measurement.

Optimization

How do you make an optimal design?

Optimization requires a figure of merit.

Optimization

How do you make an optimal design?

Optimization requires a figure of merit. But here there are many.
Time, cost, ease of use, simplicity, flexibility.

"Better" is the enemy of "good".

Optimization

How do you make an optimal design?

Optimization requires a figure of merit. But here there are many.
Time, cost, ease of use, simplicity, flexibility.

"Better" is the enemy of "good".

Make it a simple add-on, not a critical "Rube Goldberg" element.

Of course, in this case the point is to learn.
So make it simple but not too simple.

Play with layout software

First, let's look at the cosmic board in Eagle.

Then we will look at a Sample&Hold + ADC board in EasyEDA.

Then we'll make something new but simple in EasyEDA.

You should follow along playing with your own EasyEDA.