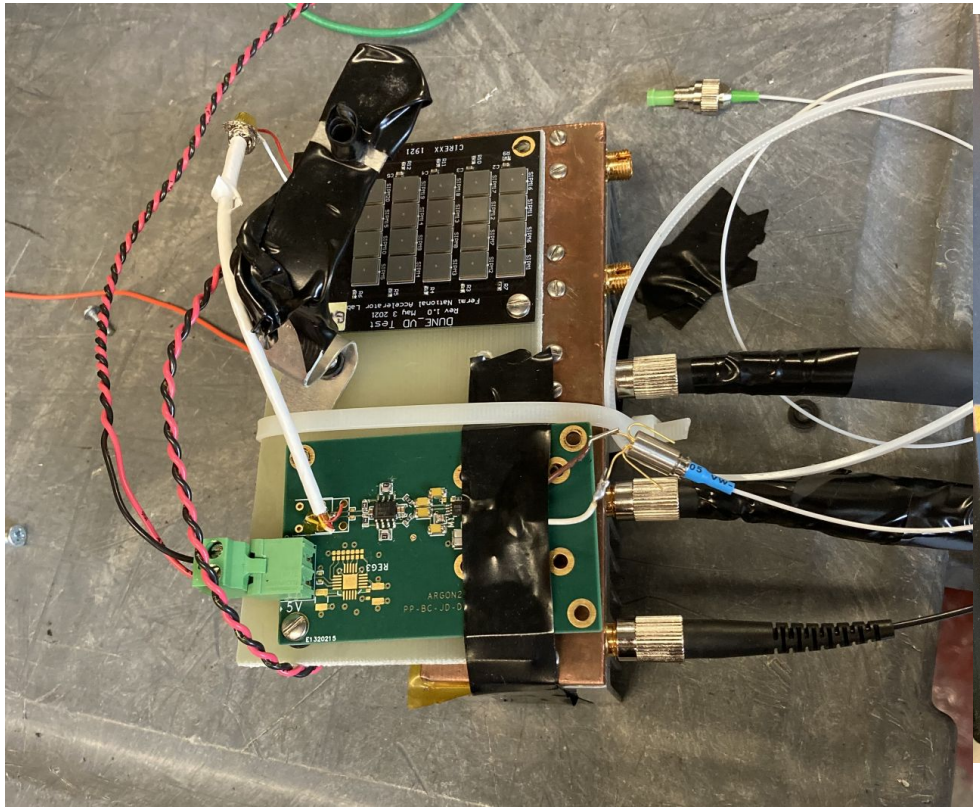
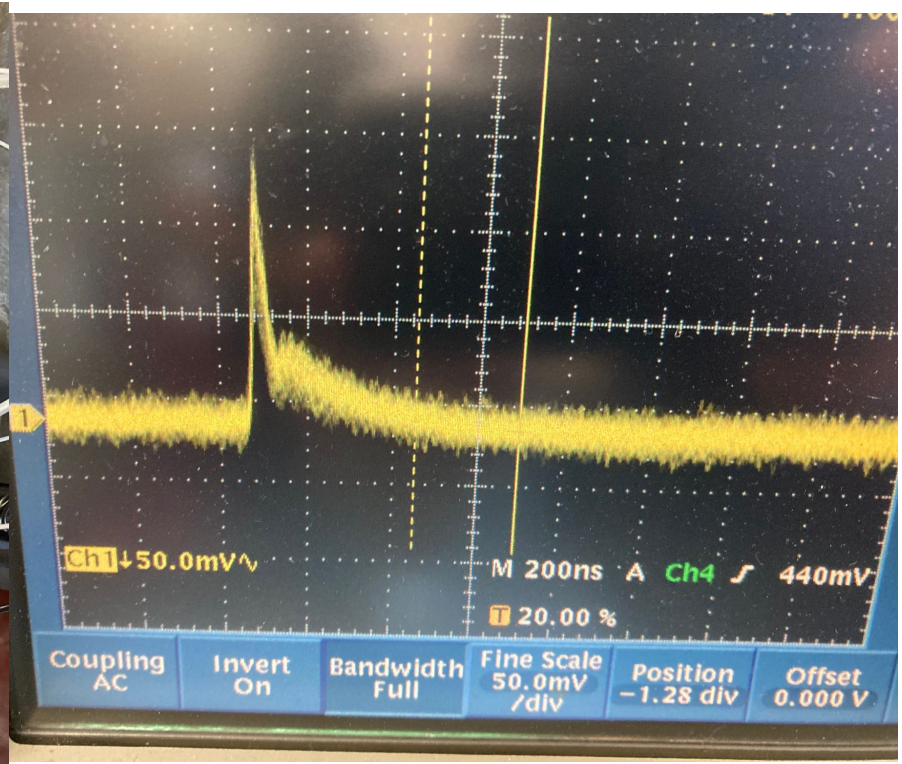
FD2 PDS Cold Box 1 Status

DUNE Far Detector #2
Photon Detector System

Last update: August 12, 2021
Ryan Rivera & Flavio Cavanna

Yesterday first demonstration of full readout chain in cold w/PoF!





Cold Box 1 Installation Schedule (from PD perspective)

- 2nd week of September Philippe there and could start mounting plate. Mesh completed before PD components added.

- 3rd week of September: Complete install of PD mounting plates on cathode.

- 4th week of September: Cathode (built in same room is CRP) is moved (5km) to EHN1.
    - 29th of September CRP is moved wednesday (+10 days of work)
    - 11th October anode ready to install (really will be 12th Tuesday at the earliest)

- 1st week of October: PD readout electronics mounted to pre-installed PD mounting plates. PD feedthroughs, fibers, wall-mount plates added to cold box. Warm racks w/PoF setup.

- 2nd week of October: cathode lowered into cold box. Final PD connections made to pre-installed fibers on wall.
    - install option A by 8th October (before cathode lowered). 9th/10th Saturday/Sunday. 11th earliest last day of cathode work.

Cold Box 1 - A,B,C coexisting instances

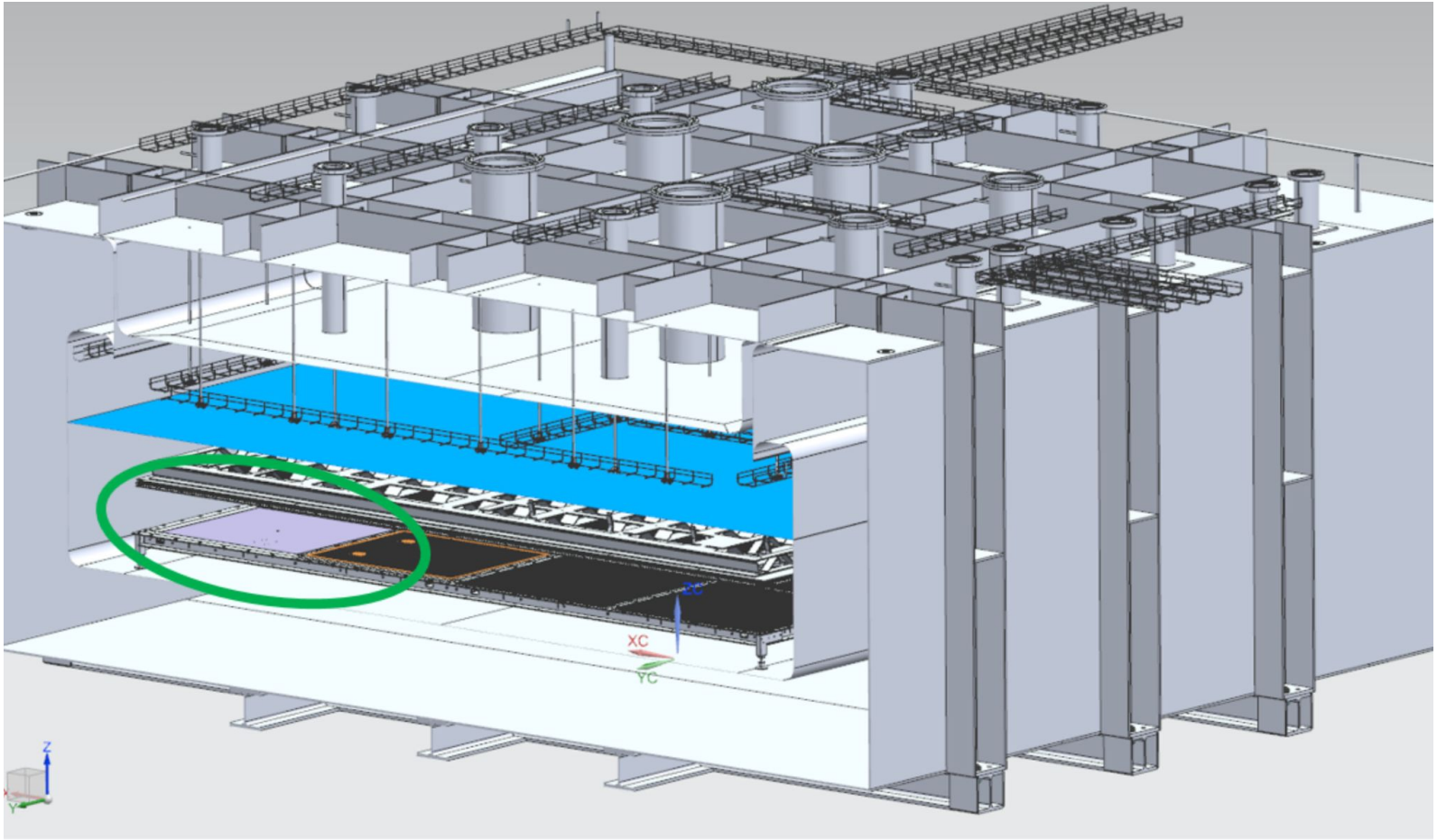
Observe event with APA with power over fiber.

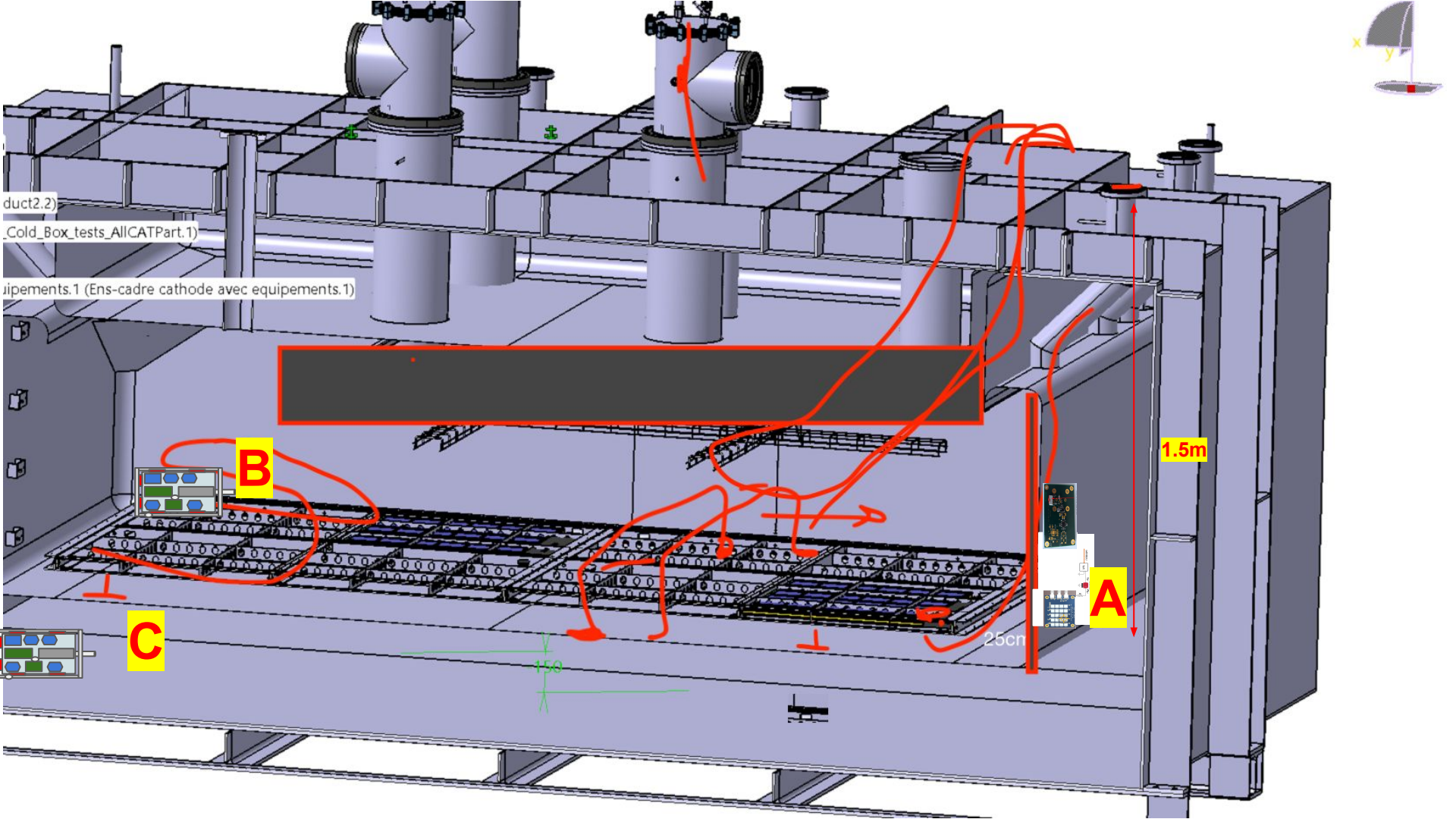
A. Base goal: Minimum implication is…
   - **Bias PoF + 5x4 Test Board + Analog/Cryosub Readout**
   - Everything Mounted **on wall**.
   - LV power through copper.
   - Oscilloscope readout (warm readout can mature after installation)
   - Intermediate .. **Bias PoF + 5x4 Test Board + Analog/Cryosub Readout + LV PoF**
     - **On wall**

B. **Target goal**: add LV PoF so that…
   - **Bias PoF + 5x4 Test Board + Analog/Cryosub Readout + LV PoF**
   - Mounted on **cathode**

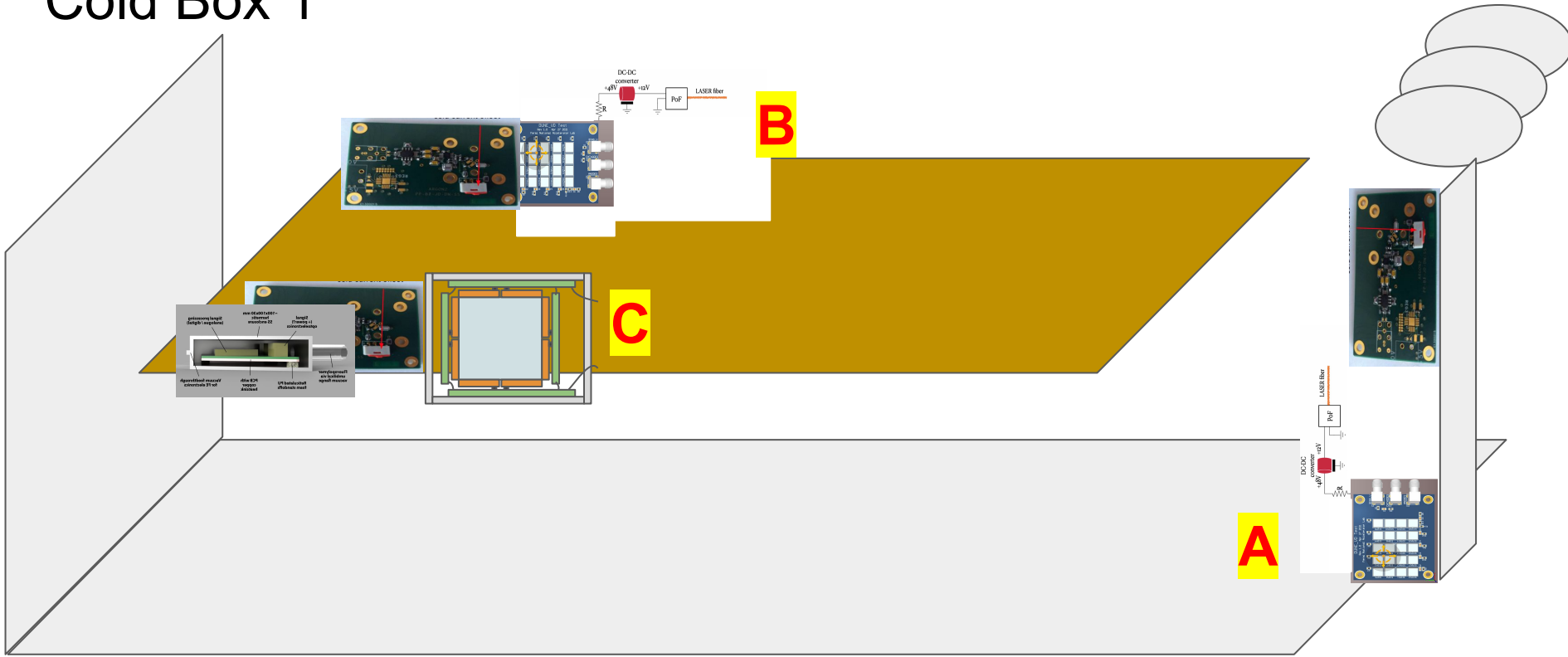
C. **Achievable Stretch goal**: add xARAPUCA so that…
   - **xARAPUCA + Bias PoF + Analog/Cryosub Readout + LV PoF**
   - Mounted on **cathode**

One of two cathode locations

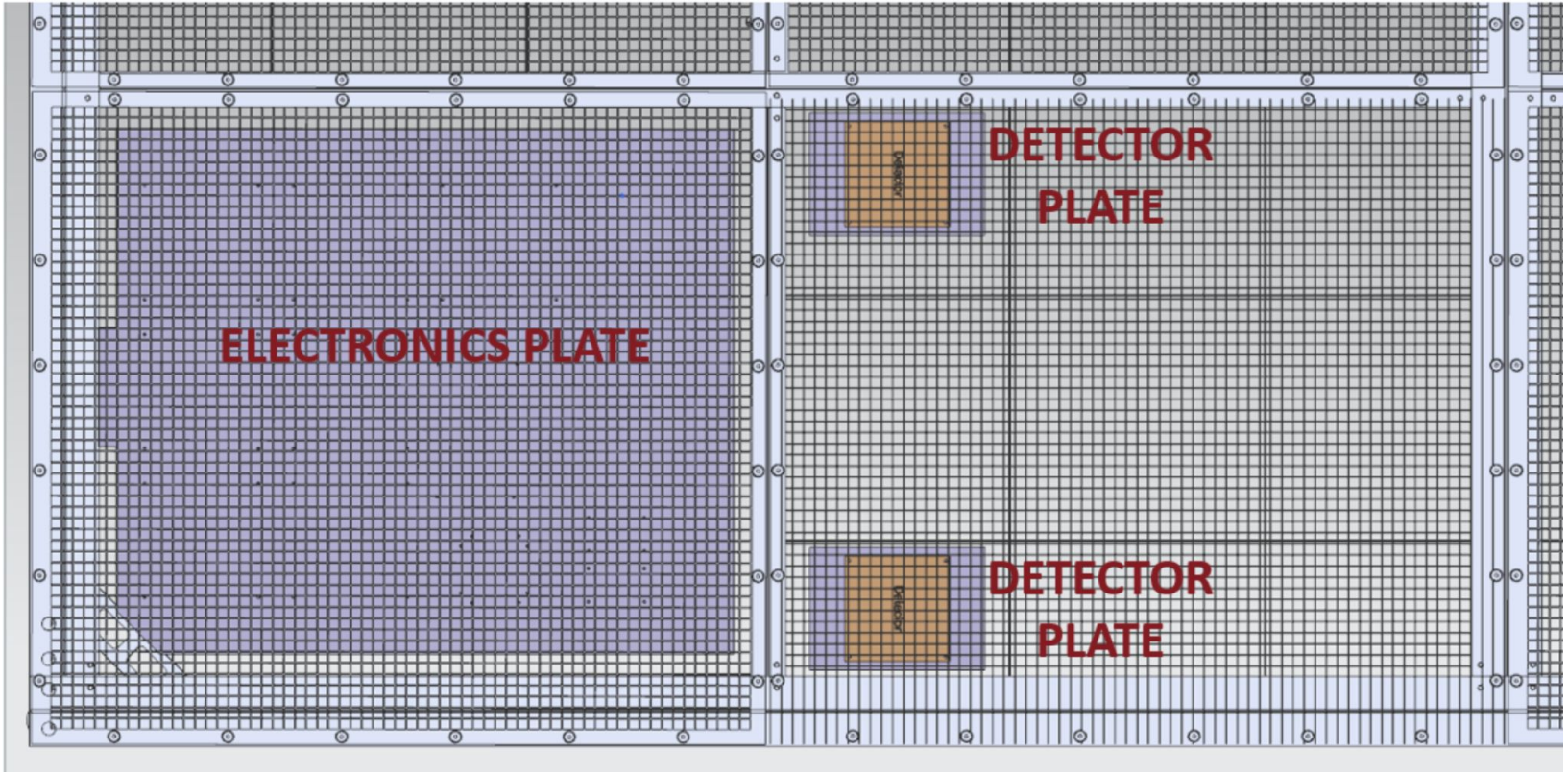


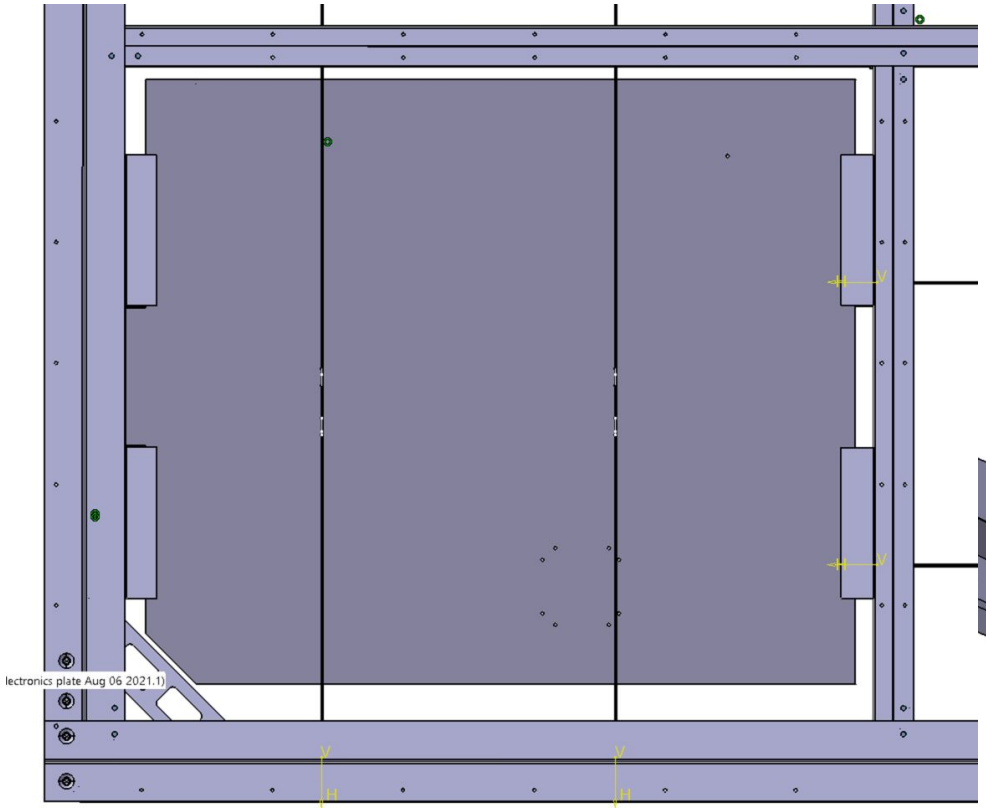

duct2.2)
_Cold_Box_tests_AllCATPart.1)
ipements.1 (Ens-cadre cathode avec equipements.1)
B
C
A
1.5m
25cm
150

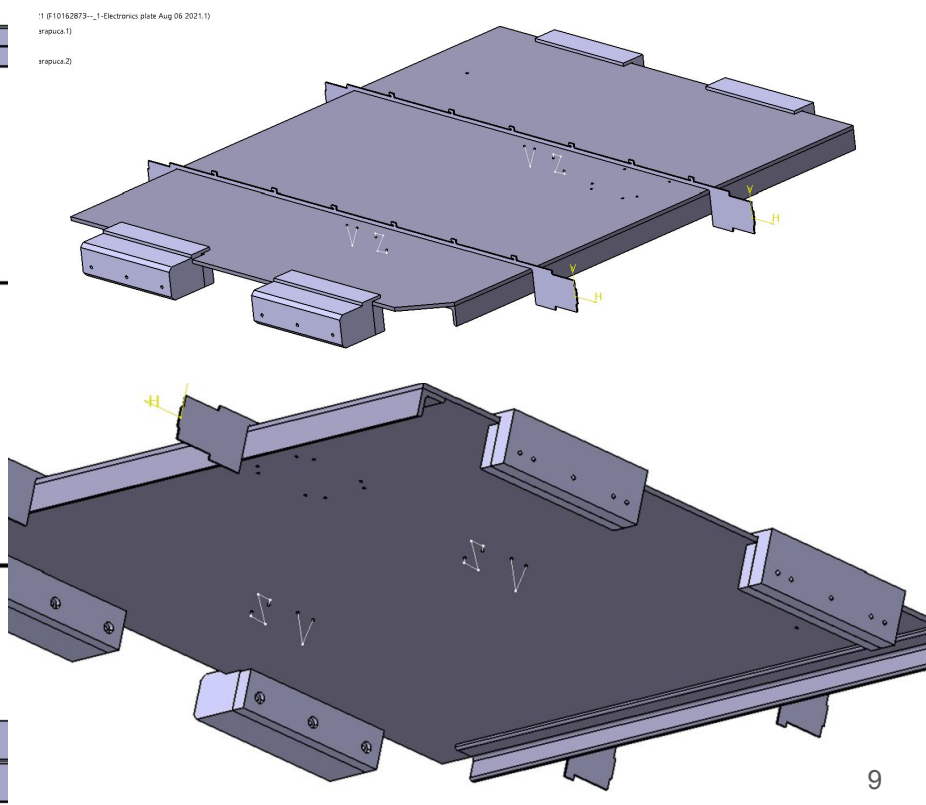
Cold Box 1

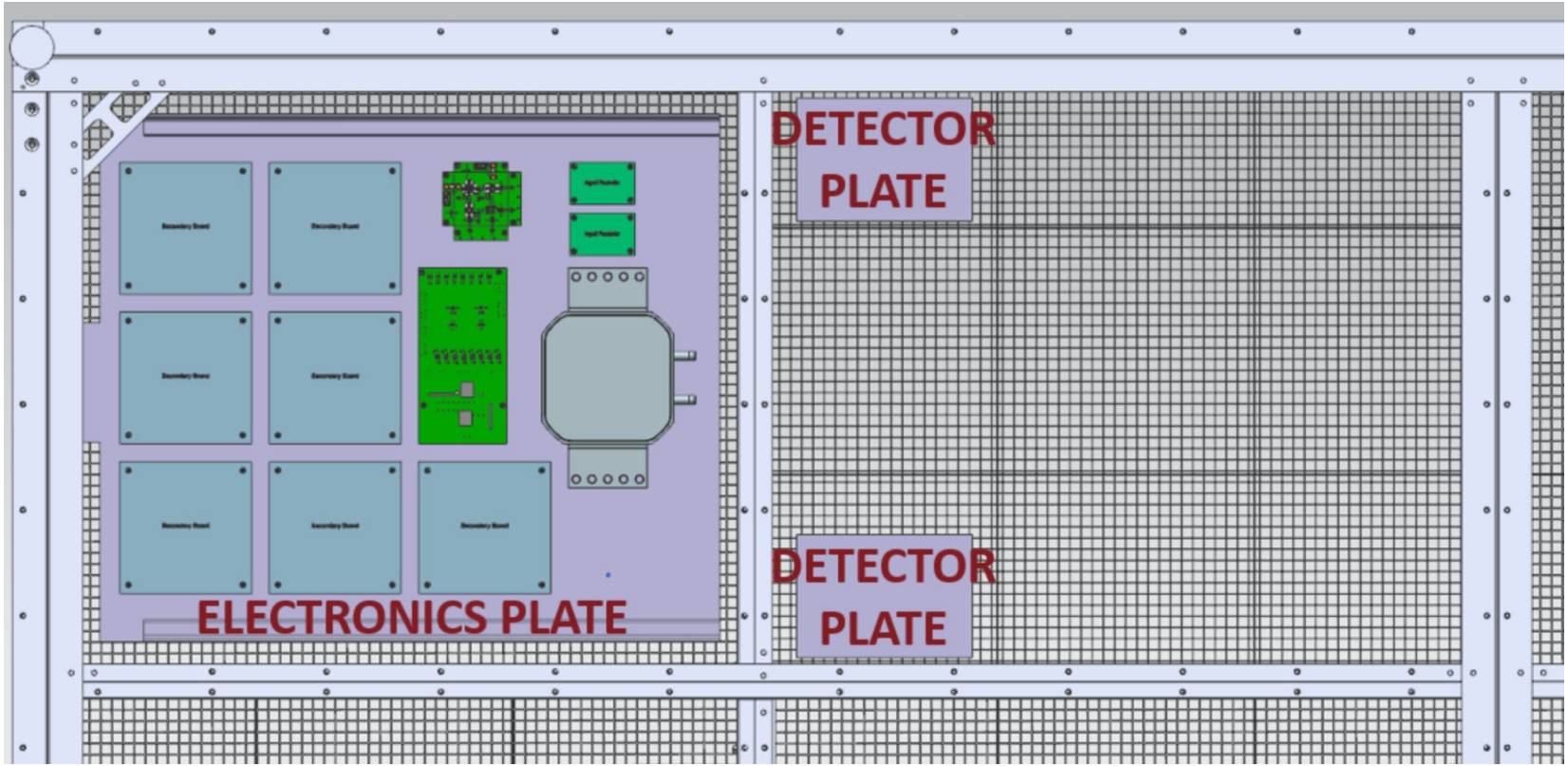


Looking down at the cathode

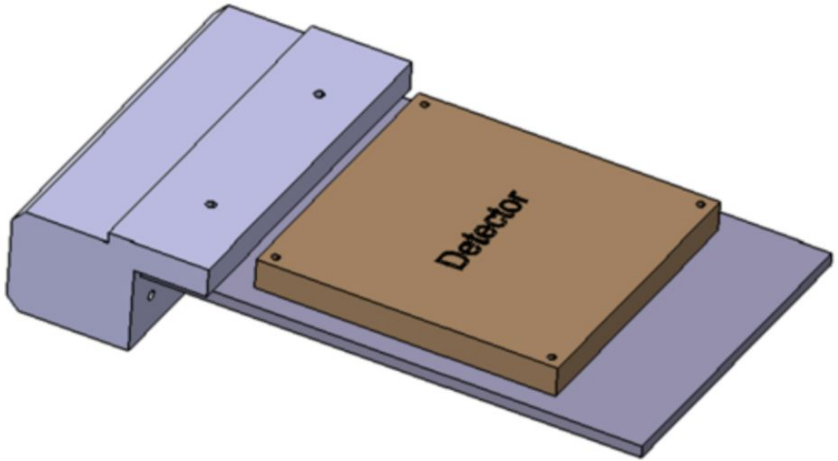


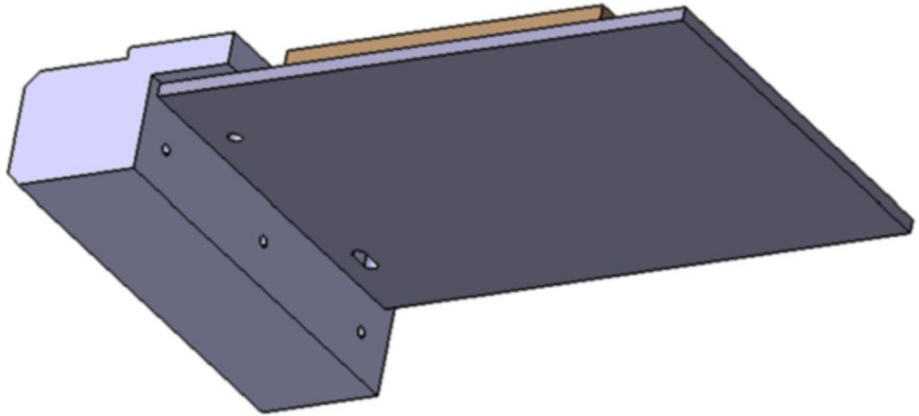

lectronics plate Aug 06 2021.1)


:1 (F10162873--_1-Electronics plate Aug 06 2021.1)
srapuca.1)
srapuca.2)

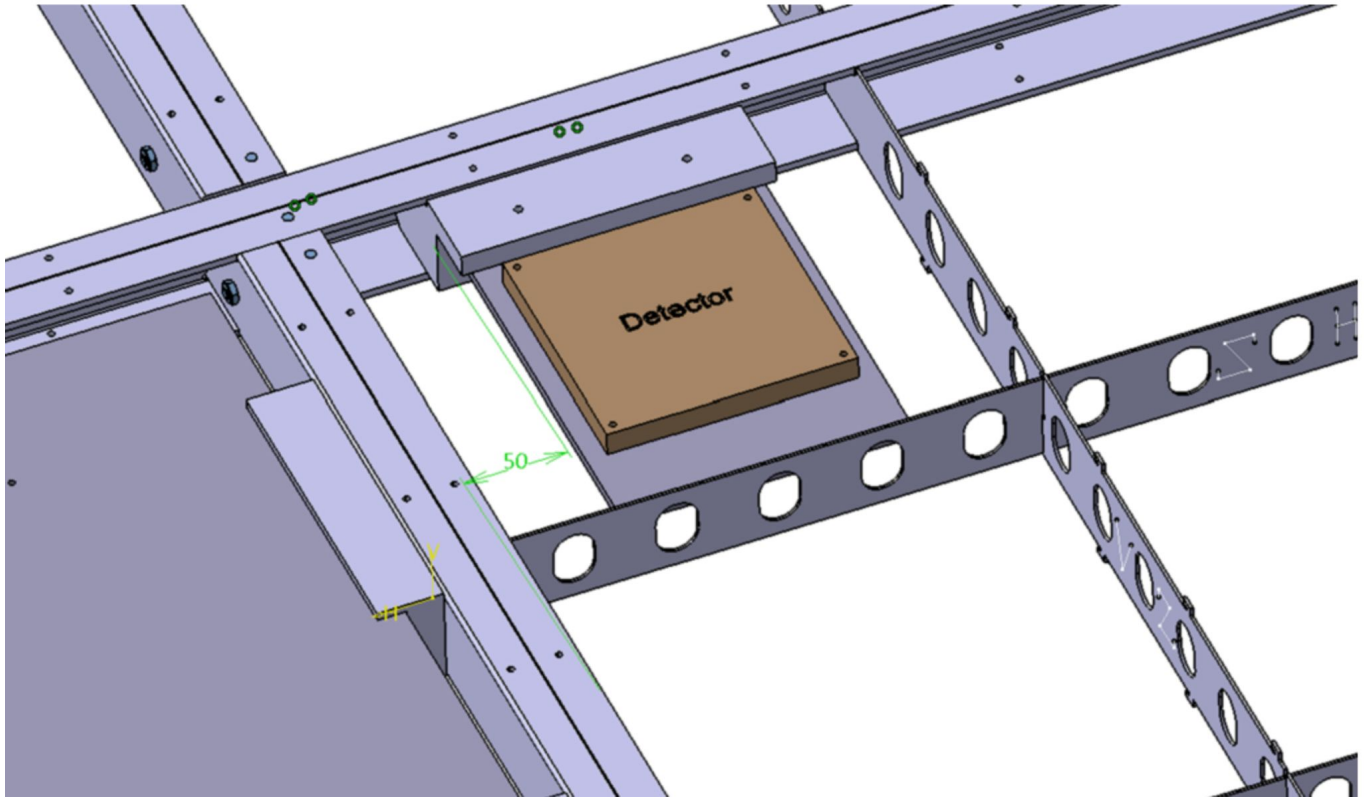

DETECTOR PLATE
DETECTOR PLATE
ELECTRONICS PLATE

Detector cantilever mount

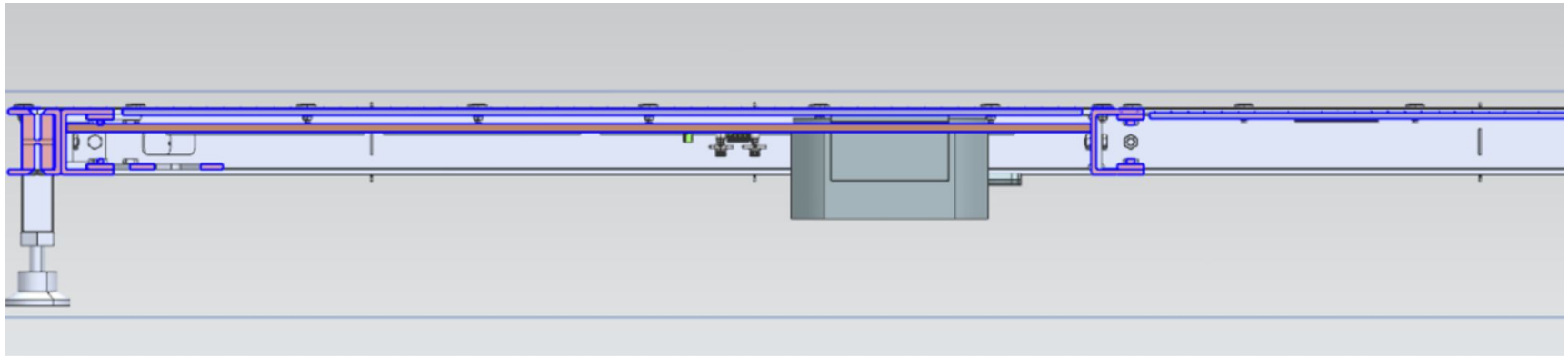




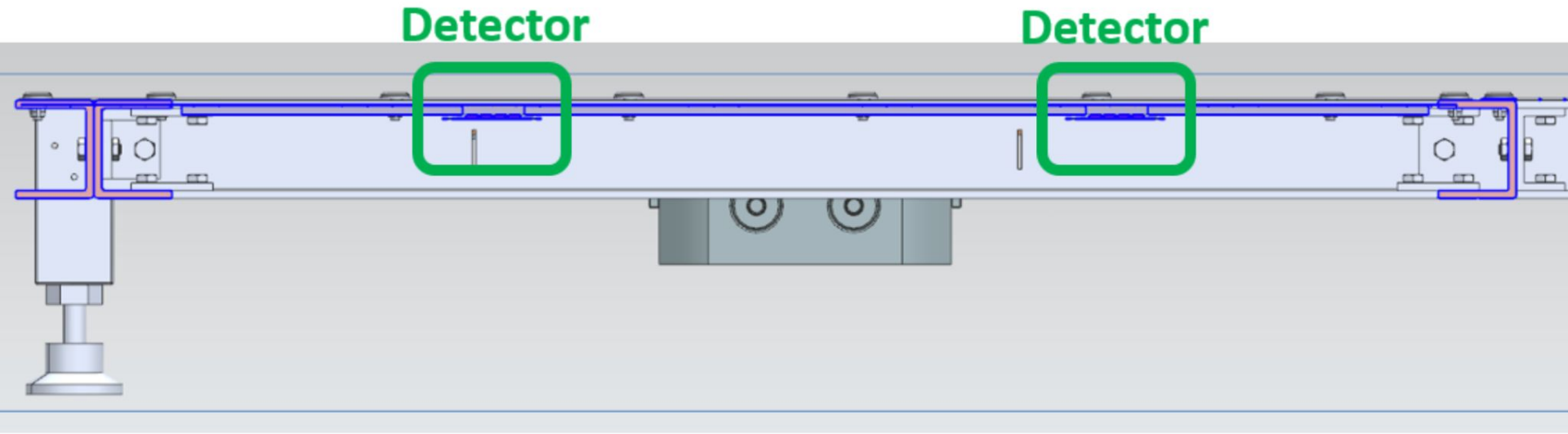
Detector cantilever mount in cathode



Side view



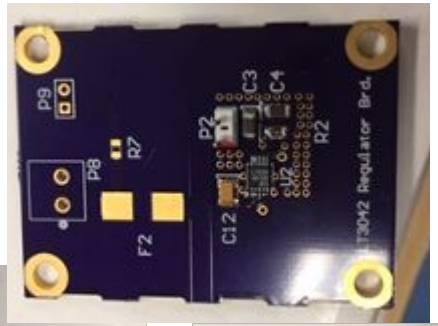
Cross section of the detector plate at the detectors

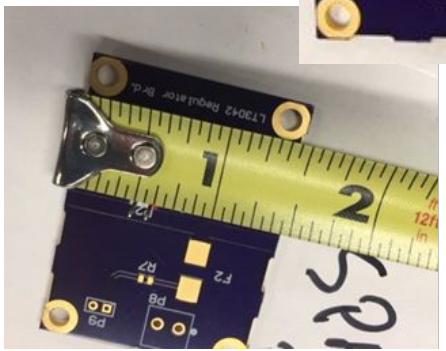


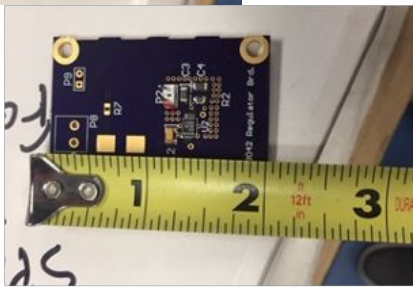
Low Voltage Power-over-Fiber

100mA @ 5V

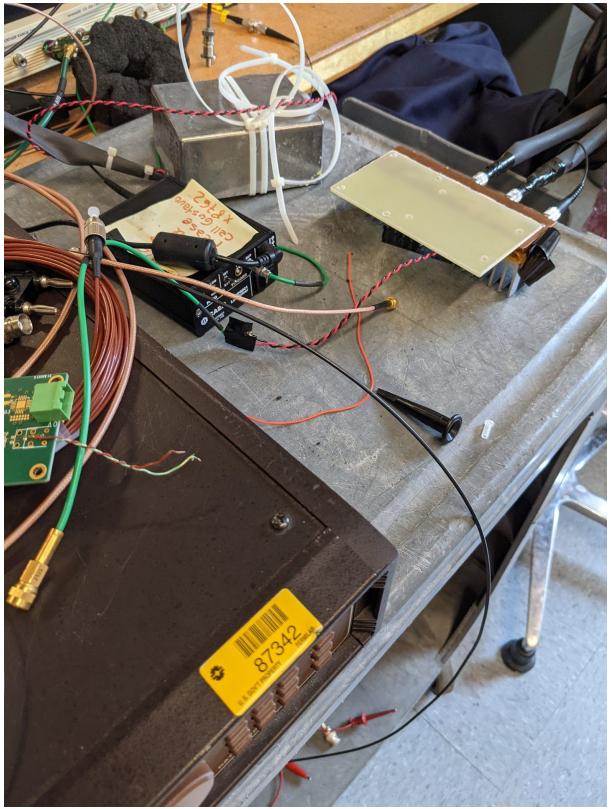
2 PoF receivers

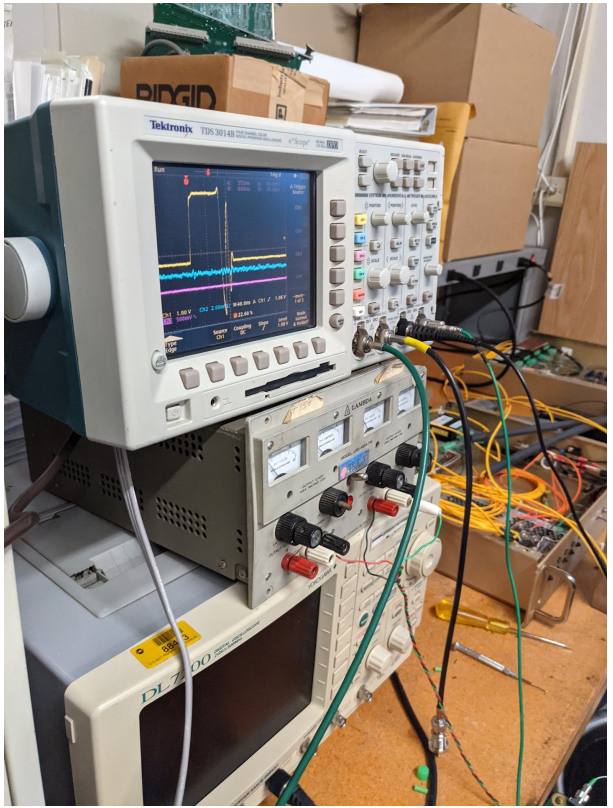




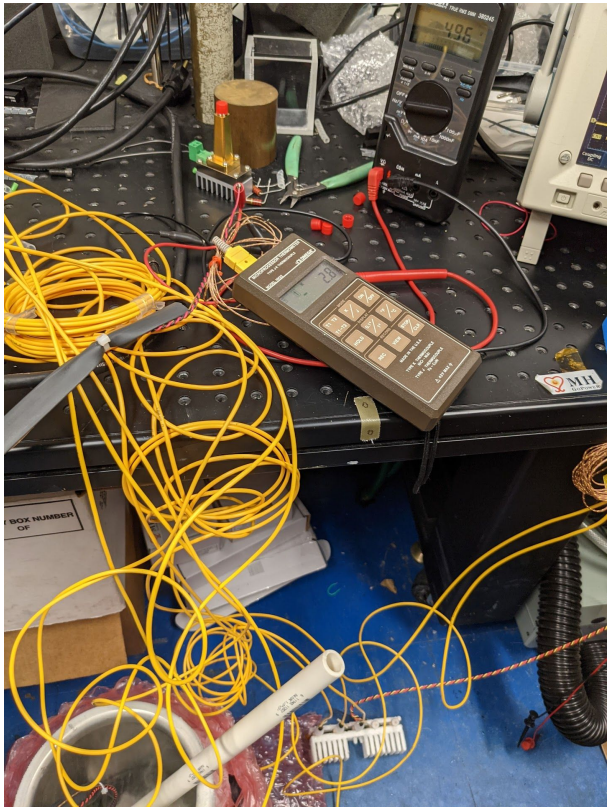


PoF to analog readout

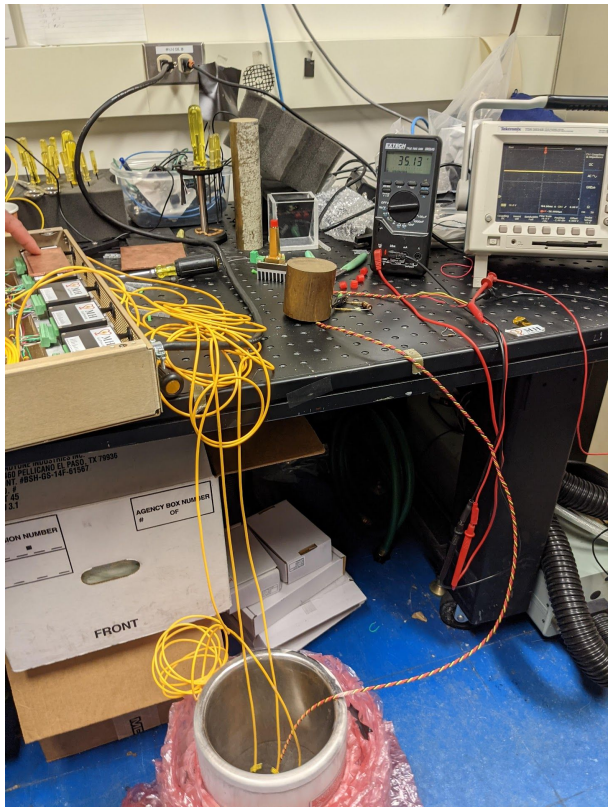




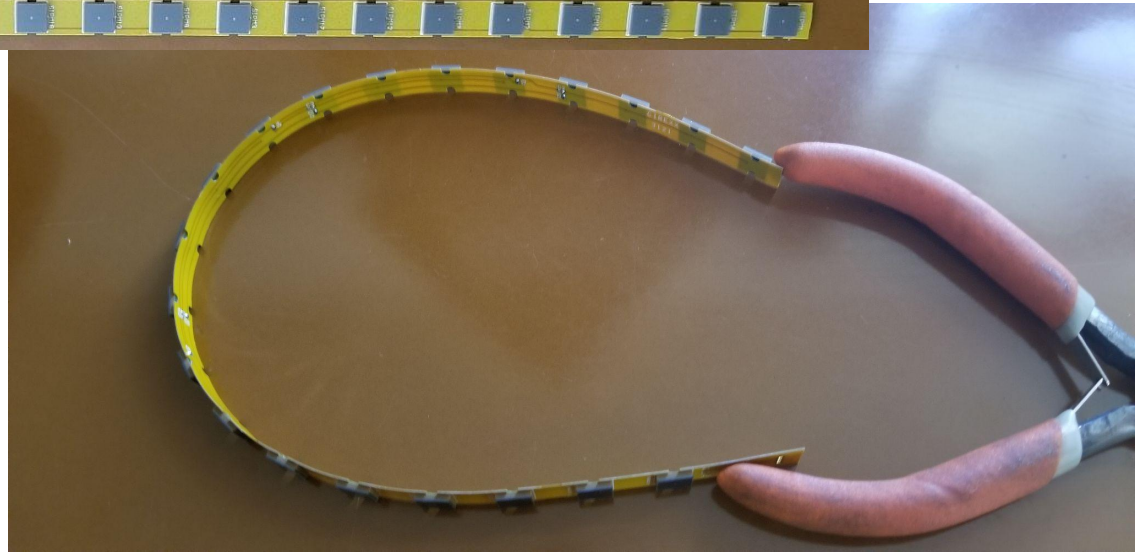
LV PoF



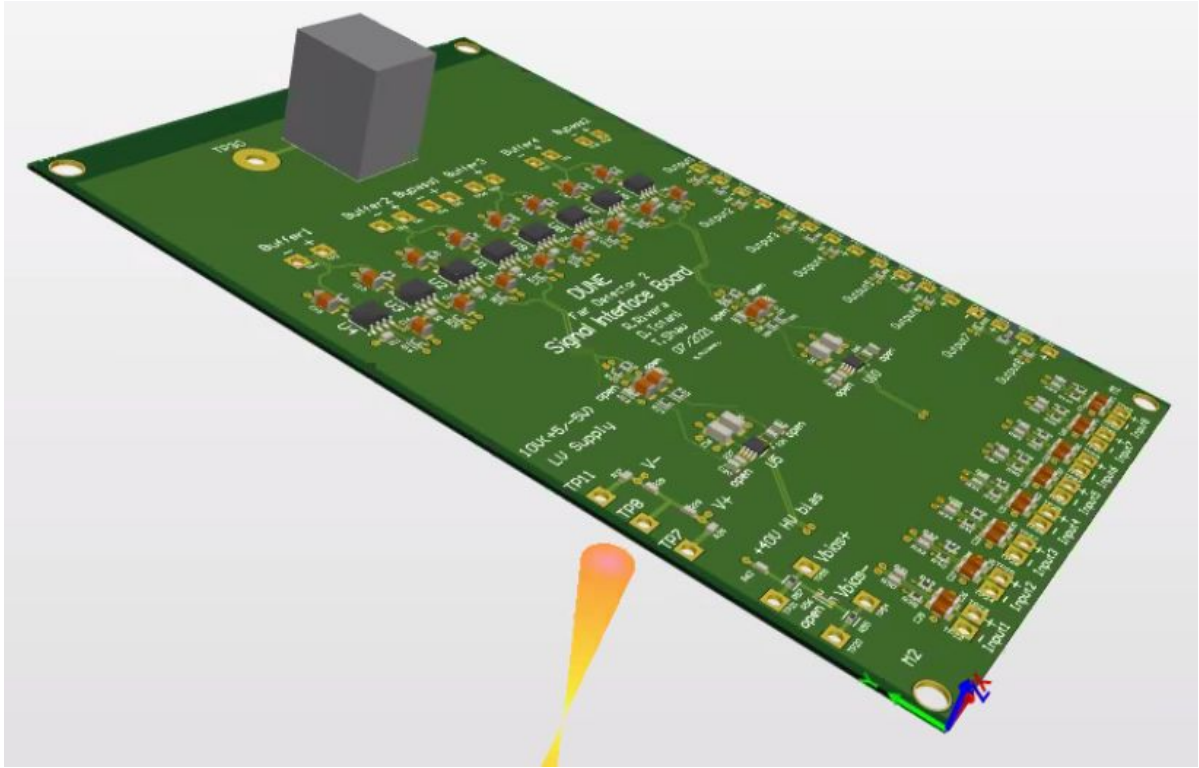
Bias PoF



20-SiPM Flex Circuit



Signal Interface Board



Open issues

- No valid purity test or bubble test available at Fermilab
  - We see persistent bubbling in our open small dewars even when everything is off