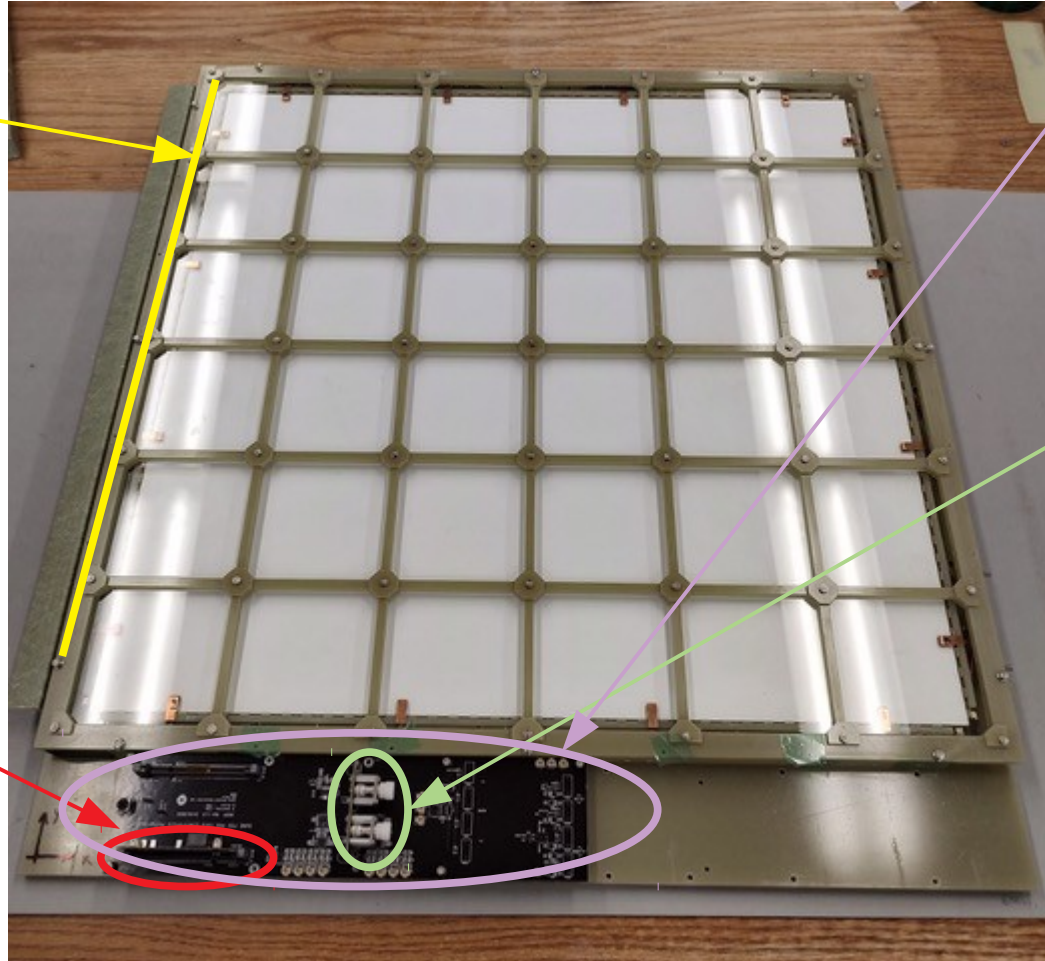# Electronics Testing Protocol

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APC - 21/10/2022

Flexes:
-testing?
-provide bias requirement
-cable check

DCem motherboard:
- Fermilab production
- PoF
- bias/first stage amplification

Laser adapter card
- APC production
- lasers

Other components:
* light tight box
* fibers
* signal cables

DCDC card:
- production?
- configured according to SiPM info

What needs to be checked

- PoF correct voltage output when loaded, in cold
- DCDC correct voltage output, in cold

    → a DCem boar should be prepared with probes to check as done by Mike

- Laser voltage bias offset (warm=cold)
- Laser "alive" after assembly (warm)
- Read out full board using koheron and oscilloscope (in LAr/cold):

    - Noise level (i.e. no noise from DCDC). Check FFT.

    - Baseline level (i.e. laser not disconnected when frozen)

- After connecting to xARAPUCA (and shielding assembled?):

    - Ideal: put in dark box and power. Check signals → check for shorts!

        (caveat: maybe DCDC bias is not OK in warm)

    - Or: check with multimeter for possible shorts before boxing

- Cable connections→ avoid shorts

Testing of individual components

- Flexes → Italy? US?
  - Somehow tested to check they are ok?
  - Evaluate the required bias voltage of each xARAPUCA asap
- DCDC board → Berkley and Iowa in prod.
  - Configure each board according to LV_DCDC and the required SiPM BIAS (PICO board is configurable though 45-47V)
  - Check output in LAr with independent power supply
- Laser driver → can be tested at APC
  - Determine expected laser output when powered warm
  - Warm test: check laser output
  - Cold test? To check laser offset? (300mV on S3 and 5V bias)
- DCem → testing at Fermilab?
  - Using copper power, check LDO out (5.1V) and voltage level on S2 (~300mV)
  - Configure jumpers and check for oscillations
  - Power up PoF, check voltage levels: LV_6V, 5V, LV_DCDC

DCem and Laser driver integration

- WARM/copper:

  – Check LDO out

  – Check laser bias offset

  – Check laser power output/koheron

  – Check continuity btw flex and board

- COLD/PoF/DCDC final check:

  – Read out laser signal using Koheron and oscilloscope

  – High enough baseline

  – No oscillations/noise

- Testing facility requirements:

  – LAr

  – PoF lasers

  – 5V and HV power supply

  – Koheron

  – Oscilloscope

  – Function generator?

Questions - Comments

- Can we trust that if we test one DCDC board for noise, then the others will be OK?
- Can we trust PoF to give consistent output? (or do we need to test all assemblies in LAr?)
- Do we need to test each light shielding box?
- We need to test the tubes! (at least one)
- Testing all boards in LAr: necessary to avoid surprises (bad solders or issues with components, laser)
- All lasers should be checked in LAr. Can be done with just the adapter card.

- Where will each testing stage take place?