

# FD2 PDS

# Status and Summer Schedule

2 August 2022  
DUNE PDS Consortium  
Ryan Rivera - FD2 PDS L2

# Upcoming Reviews and Reports

- July/August 2022 - Technical Design Report
  - Need to generate a significant amount of text in the next few weeks.
  - Michel Sorel and Bob Wilson need content to edit!
- 06 December 2022 - FD2 PDS Final Design Review
  - Opportunity to push back?
  - Final design decisions would need to be documented week of November 28
- April 2023 - DOE CD2/3 Review
  - Cost/Schedule changes frozen end-of-August 2022 (Marco said more time?)
- End-of-2023 Production Readiness Review(s)
  - May want to separate fiber installation PRR to allow more time for prototyping
    - Independent of X-ARAPUCA production/orders



# Critical Remaining Downselects before FDR

## 1. Bias Generation

- HV discharge studies point to need for independent power close to field cage
- With viable bias generation, each XA can have independent power

## 2. Signal-over-Fiber fiber coupling

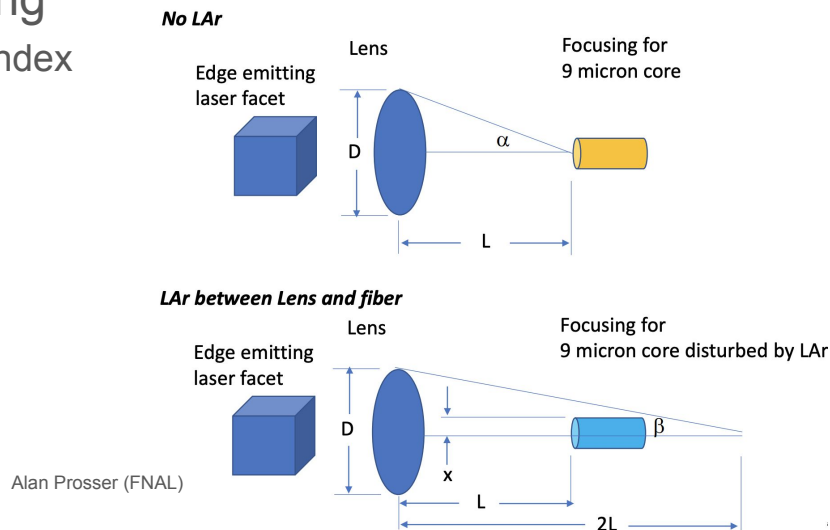
- Compensate for LAr refractive index

## 3. SiPM-to-WLS Mounting

- Implications on frame design

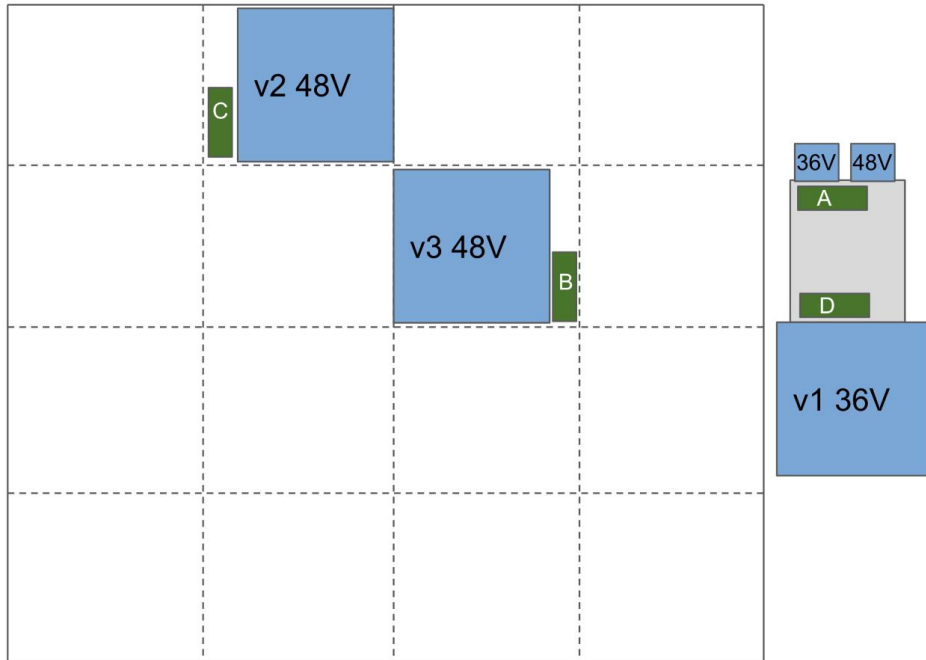
## 4. Dichroic Filters

- Size and process



# August/September is PD Cold Box

- We have a rapidly developing plan:



Picture from Chris Macias (Iowa)

This is the email thread for us to decide (during hours outside of our meetings) what we are installing during August 8<sup>th</sup> week at CERN at the Cold Box. This timeline only leaves **countdown: 4 working days** to populate boards and do any lab tests at Fermilab. From Fermilab, we have two travelers - Wei will leave August 6<sup>th</sup> from Fermilab and arrive at CERN August 9<sup>th</sup> or 10<sup>th</sup>. Andres departs August 10<sup>th</sup>; Wei and Andres can carry readout kit components. From CSU, we have one traveler - Jon Harton departs CSU August 5<sup>th</sup> and will carry all the v3 XA components.

Keep in mind, **I will be taking parental leave starting August 9<sup>th</sup>** unless the baby has other plans and comes sooner! I will try to stay in email contact.

- Strategy:

- Use all GaAs PoF on the cathode

- GaAs has the advantage that we can operate the LDO warm and cold because of the smaller voltage differential warm vs cold. This should allow us to do warm verification, which we could not do at the last Cold Box - GaAs is favored over Si PoF for this reason (GaAs is also more efficient and possibly cheaper).
    - Regarding the idea for Si PoF bias generation, I spoke with Bill and we are worried it is too complicated to arrange for August 8<sup>th</sup> and B+ run. Bill will arrive August 25<sup>th</sup>, and if we still want it Si PoF bias for the B+ run, he can work to implement it at the end of August.

- Use all black multimode fibers to minimize light leakage (**Flavio confirmed 11x 62.5um + 4x 105um black fiber at CERN**)

- Use flooded FC-coupled lasers and one set of Paris-potted lasers (if ready)

- I spoke with Bill and we do not think we have time for another potted laser attempt from Fermilab

- Position A

- Detector: 2x (**possibly 3x?**) mini-XA on the wall

- Readout kit: DCEM rev1.0, (**possibly an Argon2x2 as reference?**), Laser Adapter rev1.0, BIAS\_SODIMM rev3.0 (if not available, rev2.1)

- Power: copper 6V in, LDO at 5V
    - Signal: 2x analog Paris-potted (if not available, FC-coupled) lasers out
    - Bias: Bias-A from **copper at 36V**, Bias-B from copper at 46V

- Position B

- Detector: v3 XA on the cathode

- Readout kit: DCEM rev1.0, Laser Adapter rev1.0, INFN\_SODIMM (if not available, BIAS\_SODIMM rev3.0/rev2.1)

- Power: 2x GaAs 6V in, LDO at 5V
    - Signal: 2x analog FC-coupled lasers out
    - Bias: Bias-A and Bias-B from PICO at 46V

- Position C

- Detector: v2 XA on the cathode

- Readout kit: DCEM rev1.0, Laser Adapter rev1.0, LBL\_SODIMM, BIAS\_SODIMM rev3.0/rev2.1

- Power: 2x GaAs 6V in, LDO at 5V,
    - Signal: 2x analog FC-coupled lasers out
    - Bias: Bias-A and Bias-B from LBL DC-DC at 46V

- Position D

- Detector: v1 XA on the wall

- Readout kit: DCEM rev1.1, CDR Rev2.0, CDR\_Interface Rev1.0

- Power: copper 6V in, LDO at 5V
    - Signal: 1x digital FC-coupled laser out
    - Control: 2x control lines for ADC
    - Bias: **PICO at 36V**

- Total counts

- LV Supplies:

- **6 GaAs cold rx and warm tx (3B + 3C)**
    - 2 copper 6V in (1A + 1D)

- BIAS Supplies:

- 1 PICO at 46V (1B)
    - **1 PICO at 36V (1D)**
    - 1 LBL at 46V (1C)
    - 1 copper 46V bias (1A)
    - **1 copper 36V bias (1A)**

- Signal:

- 5 FC-coupled laser (2B + 2C + 1D)
    - 2 Paris-potted lasers (2A)

- Fibers:

- **11 black 62.5um + 2 black 105um fibers (2A + 5B + 5C + 1D)**
    - 2 black Plastic-Optical-Fiber (2D) for control

- All readout schematics will be posted here:

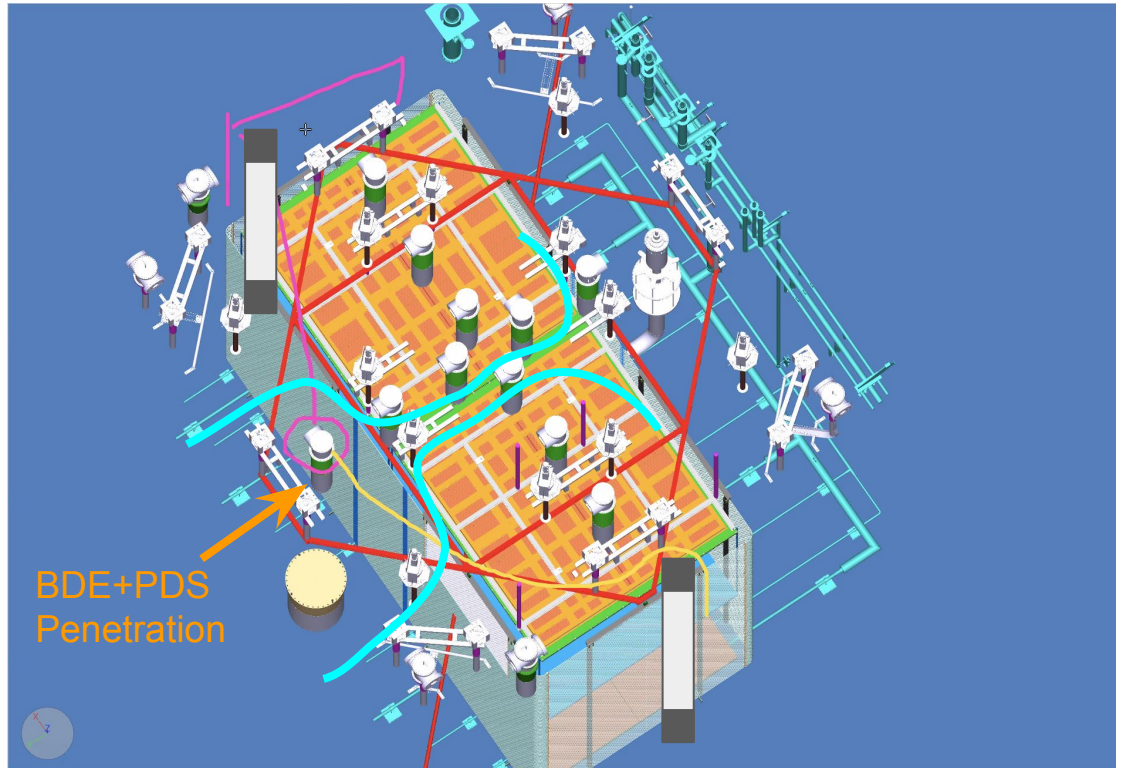
- <https://edms.cern.ch/project/CERN-0000229819>

- All mechanical models will be posted here:

- <https://edms.cern.ch/project/CERN-0000229933>

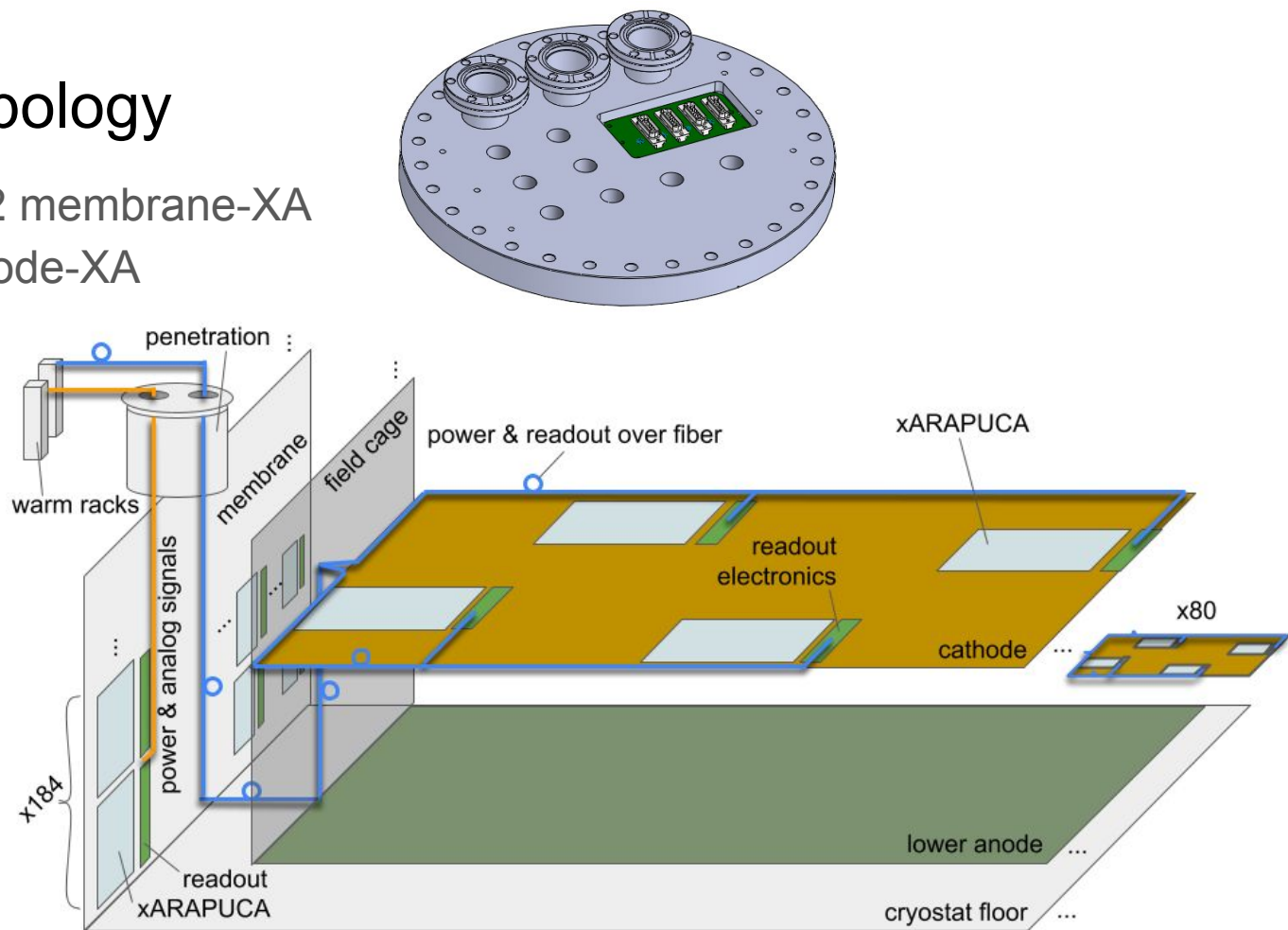
# Module-0 Topology

- Cable trays installed November 2022
- 4 Membrane-mount XA installed December 2022
  - One column on short-wall is being pushed from a mechanical perspective
    - This could have a significant interference with the instrumentation cabling or CALCI.
  - PD consortium would like to plan for two columns, one on each short-wall
- 8 Cathode-mount XA installed January 2023
- Response & Monitoring installed December 2022 and January 2023
  - Attached to top CRP
  - Direct to XA
- 4 Membrane-mount XA installed February 2023?
  - The 2nd column on TCO side?



# Cable/Fiber Topology

- 1 HD-cable per 2 membrane-XA
- 8 fibers per cathode-XA
- 15 Response & Monitoring fibers per penetration (20 penetrations per long-wall)






# Managing module-0 Deliveries

- Peter Shanahan has offered to start a spreadsheet to help manage
- Hope to start weekly ProtoDUNE2-VD coordination meeting (next week?)
- Tight delivery schedules
  - SiPMs
  - Cables
    - FD1 PDS cables
    - Twisted pair
  - Fibers

# FD2 PDS Meetings

- Please email Flavio/Ryan to be added to mailing lists

CDT	CEST	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	16:00				Analog Readout - Dave C / Bias Generation - Mike M	ProtoDUNE-VD PDS Planning - Flavio C
10:00	17:00			Photo-Collector - Carla C		
11:00	18:00	Mechanical - Vishnu Z		Cold Electronics - Flavio C		
12:00	19:00					Power-over-Fiber - David M

 New Meeting

# Organizing FD2 PDS Travel

- PD team is entering unconfirmed/confirmed travel to help everyone plan:
  - [https://docs.google.com/spreadsheets/d/1qT\\_wY5rvEtjS2t741bd8TGejxSAtKZIWu3m8GozzA/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1qT_wY5rvEtjS2t741bd8TGejxSAtKZIWu3m8GozzA/edit?usp=sharing)
- Latest daily schedule maintained here (source for weekly schedules):
  - <https://calendar.google.com/calendar/u/0?cid=bjVmaGNqZ2NhMzM1MmFrbmJtYjNIODRkMmtAZ3JvdXAuY2FsZW5kYXluZ29vZ2xlLmNvbQ>