FD2 PDS Short-term Plan

DUNE Far Detector #2
Photon Detector System
FD2 PDS Photo-collector Working Group

Last update: September 27, 2022
Ryan Rivera & Flavio Cavanna

FD2 PDS Weekly Schedule

Month	Week #	Date
Sep '22	37	05-Sep
	38	12-Sep
	39	19-Sep
	40	26-Sep
Oct '22	41	03-Oct
	42	10-Oct
	43	17-Oct
	44	24-Oct
	45	31-Oct
Nov '22	46	07-Nov
	47	14-Nov
	48	21-Nov
	49	28-Nov
Dec '22	50	05-Dec
	51	12-Dec
	52	19-Dec
	53	26-Dec
Jan '23	1	02-Jan
	2	09-Jan
	3	16-Jan
	4	23-Jan
	5	30-Jan
Feb '23	6	06-Feb
	7	13-Feb
	8	20-Feb
	9	27-Feb
Mar '23	10	06-Mar
	11	13-Mar
	12	20-Mar
	13	27-Mar
Apr '23	14	03-Apr
	15	10-Apr
	16	17-Apr
	17	24-Apr
May '23	18	01-May
	19	08-May
	20	15-May
	21	22-May
	22	29-May
Jun '23	23	05-Jun
	24	12-Jun
	25	19-Jun
	26	26-Jun
Jul '23	27	03-Jul
	28	10-Jul
	29	17-Jul
	30	24-Jul
	31	31-Jul
Aug '23	32	07-Aug
	33	14-Aug
	34	21-Aug
	35	28-Aug

Cold Box
- Cold Box B++ Run
- Cold Box CRP3 Install
- Cold Box CRP3 Run
- Cold Box CRP2b Install (v4 / v5)
- Cold Box CRP2b Run
- Cold Box CRP4 Install (v6)
- Cold Box CRP4 Run
- Cold Box D Install (v7) "Module-1"
- Cold Box D Run "Module-1"

Module-0
- Module-0 Orders
- Module-0 Production
- Module-0 Flange & Feedthrough Install
- 4x Module-0 non-TCO Membrane Install (v6)
- 8x Module-0 Cathode Install
- 4x Module-0 TCO-side Membrane Install
- Module-0 Install milestone
- Module-0 Ops

Reviews and Deliveries
- FBK 250 SiPM Deliverey
- Spain Hamamatsu 702 SiPM Deliverey
- INFN Hamamatsu ? SiPM Deliverey
- Final Design Review
- FBK 750 SiPM Delivery
- CERN Collaboration Meeting
- CD2/3 Director's Review
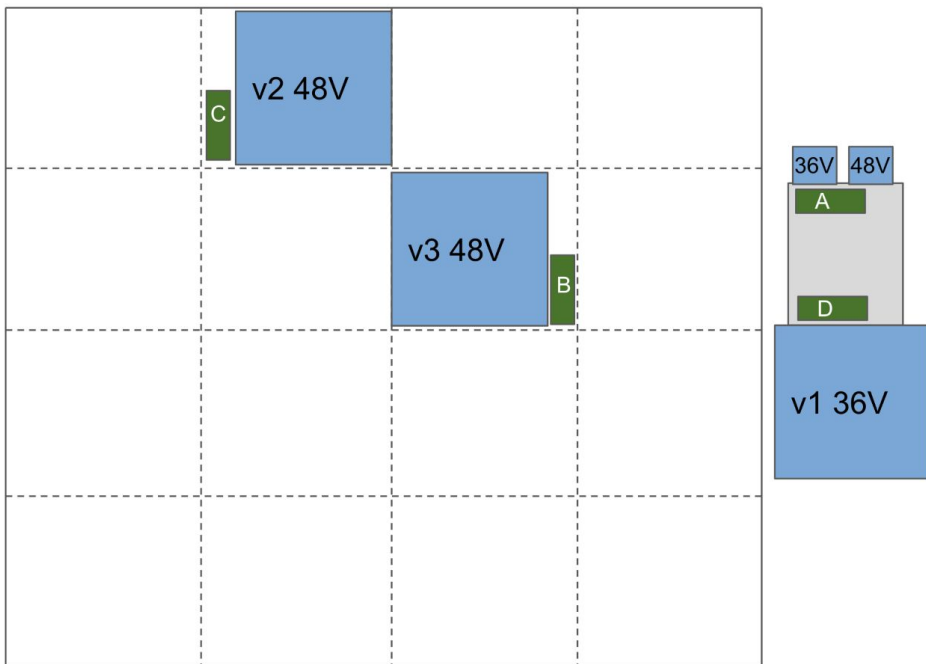- Internal PD Design Workshop
- CD2/3 DOE Review

We are here

XA Frame Mechanics Plan

- V4 and V5 will be the last divergent frame design
- Starting with the V6, we will have one joint VD frame design
  - Same design for Cathode and Membrane XA frame; Membrane will just have a blank backing board.

CRP3 Cold Box Installation

- Active now:
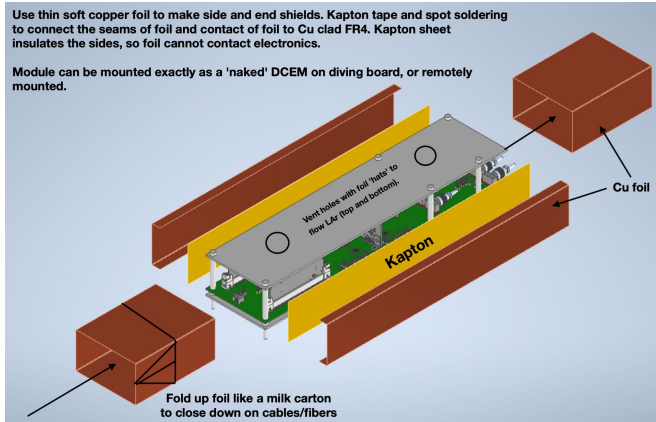 - Fix light leakage, attempt to stop laser leaking, demonstrate bias generation options

Picture from Chris Macias (Iowa)
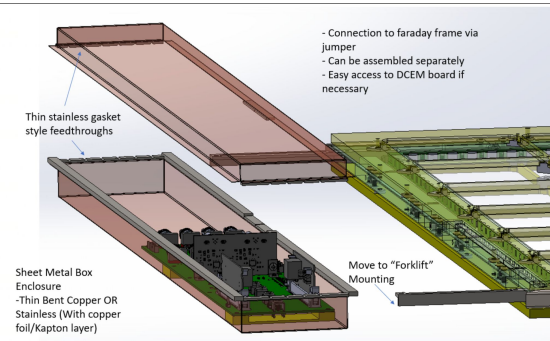
CRP3 XA Modifications

- Light leakage mitigation is critical
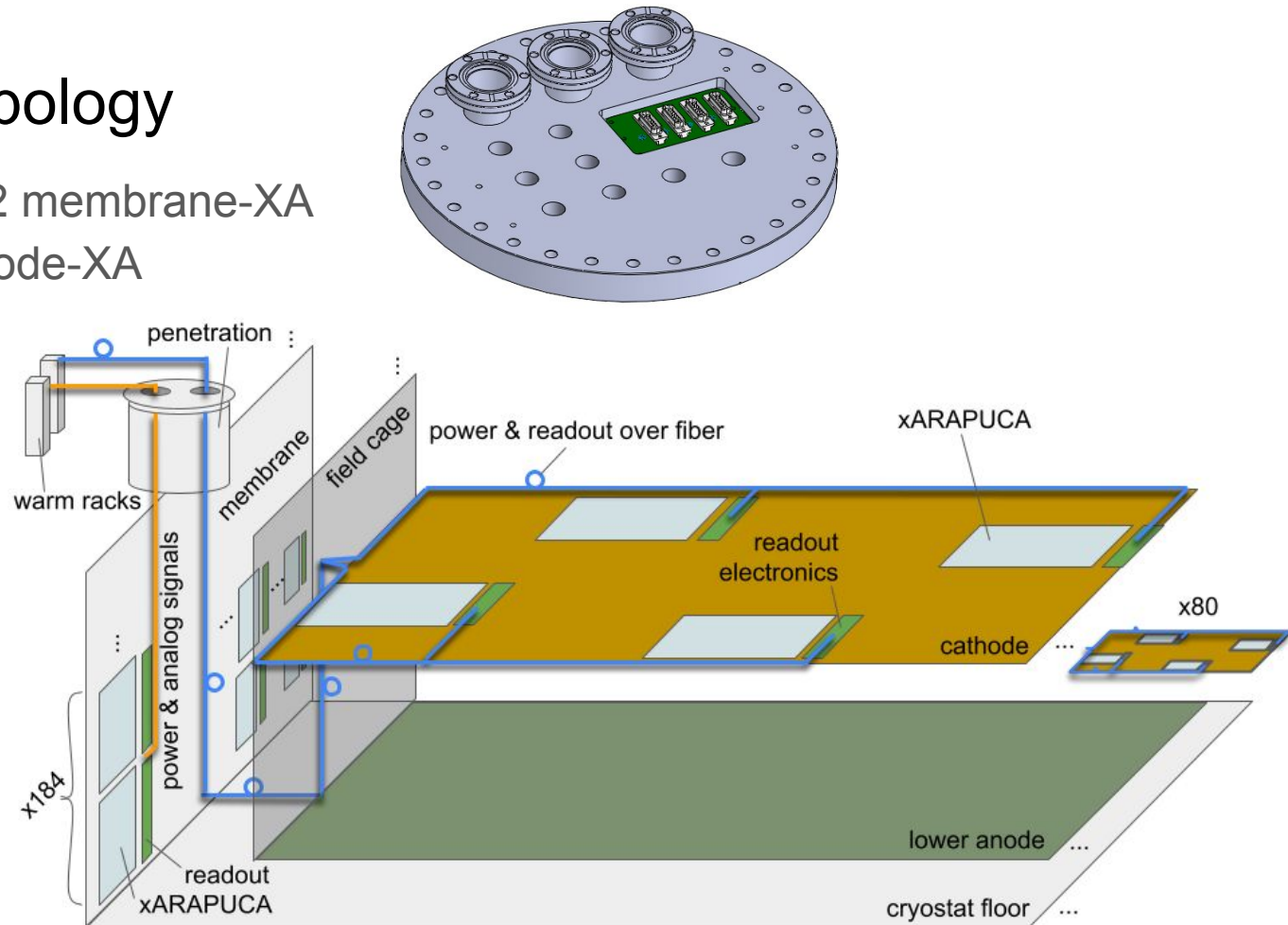 - E.g. Copper-clad G10 box
  - E.g. Silicone/potting

- Connection to faraday frame via jumper
- Can be assembled separately
- Easy access to DCEM board if necessary

Thin stainless gasket style feedthroughs

Move to "Forklift" Mounting

Sheet Metal Box Enclosure
-Thin Bent Copper OR Stainless (With copper foil/Kapton layer)

Future?

Use thin soft copper foil to make side and end shields. Kapton tape and spot soldering to connect the seams of foil and contact of foil to Cu clad FR4. Kapton sheet insulates the sides, so foil cannot contact electronics.

Module can be mounted exactly as a 'naked' DCEM on diving board, or remotely mounted.

Vent holes with foil 'hats' to flow LAr (top and bottom).

Cu foil

Kapton

Fold up foil like a milk carton to close down on cables/fibers

Now

Past

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)

CE Schedule (Production/Installation)

- 60 FBK + 140 HPK **SiPM Flex boards** ordered by UCSB
  - **Flex** expected 14-Oct, then ship to INFN
  - INFN/Spain expect 952 **SiPMs** by 24-Oct
    - **Enough for only 5 X-ARAPUCA!**
    - 250 FBK + 702 HPK (+750 FBK Jan 23')
      - Missing 1700?
  - INFN is planning **SiPM population** order
    - Keep SiPMs for 8x Membrane XA
      - For CERN/Ciemat/INFN XA assembly?
    - Ship NIU SiPMs for 8x Cathode XA
  - **Fallback plan** is use SiPMs from 4x Cold Box XA and 3x Test Stand XA for 12x ProtoDUNE2-VD install
- 17-Oct: Readout/DC-DC **PCB Designs and BOMs frozen**
  - 2-weeks to place order + 4-week lead times on turnkey orders
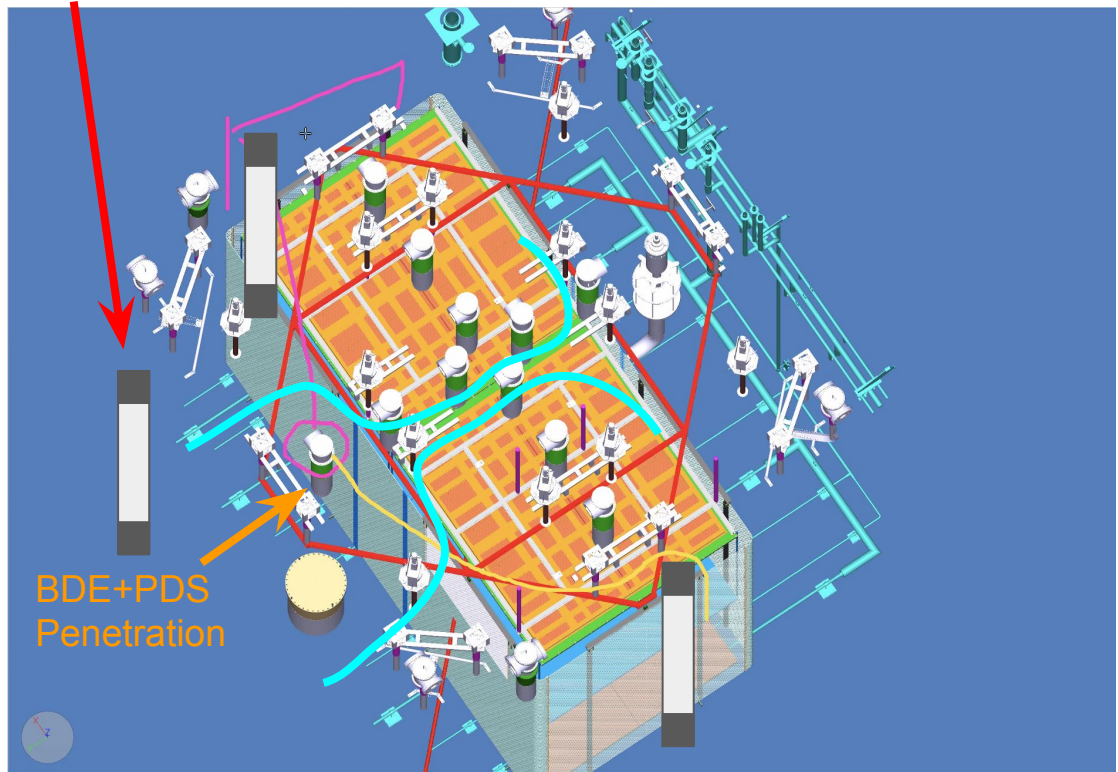- Critical Path Severity: <mark>High</mark>

> Do we consider 1-ch (4-flex) X-ARAPUCAs?

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Cold Box	Cold Box B++ Run		Cold Box CRP3 Install			Cold Box CRP3 Run		Cold Box CRP2b Install (v4 / v5)		Cold Box CRP2b Run		Cold Box CRP4 Install (v6)		Cold Box CRP4 Run								
Module-0					Module-0 Orders				Module-0 Production				Module-0 Flange & Feedthrough Install	4x Module-0 non-TCO Membrane Install (v6)							8x Module-0 Cathode Install	

Module-0 Topology

- Flange/Cables/Fibers/Cable trays installed November 2022
- 2-or-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
- 2-or-4 Membrane-mount XA installed February 2023
  - The 2nd column on TCO side

New possibility?!

BDE+PDS Penetration

Organizing FD2 PDS Travel

- PD team is entering unconfirmed/confirmed travel to help everyone plan:
  - https://docs.google.com/spreadsheets/d/1qT_wY5rvEtjS2t741bd8TGejxSAtKZIWIWu3m8GozzA/edit?usp=sharing
- Latest daily schedule maintained here (source for weekly schedules):
  - https://calendar.google.com/calendar/u/0?cid=bjVmaGNqZ2NhMzM1MmFrbmJtYjNlODRkMmtAZ3JvdXAuY2FsZW5kYXIuZ29vZ2xlLmNvbQ