

# ProtoDUNE SP Update

Gina Rameika

Collaboration Phone Call

October 6, 2017

# Status of :

- APAs
- CPA/Field cages
- Photon Detectors
- Electronics
- Cold Box Preparation
- Detector Support Structure
- Cryostat

*Many other things happening and LOT's of work going on that I don't have time to talk about this time...*

*Sarah will give an update on High Voltage Studies*

# Anode Plane Assemblies

- PSL APA#1 : in EHN1 Clean Room
  - Preparing to move into Cold Box on Monday
- PSL APA#2 :
  - X-plane complete
  - V-plane complete
  - U-plane : 1<sup>st</sup> half wound and soldered; start winding 2<sup>nd</sup> half next week
- UK APA#1 :
  - X-plane complete
  - V-plane : V-plane winding started this week
- PSL APA#3 :
  - Frame is being assembled
  - Plan is to have it ready for winding as soon as APA#2 comes off the winder for the last time

PSL APA#1  
In EHN1  
Clean Room  
August 15, 2017





## Tension measurements

## Soldering U-Plane wires on PSL-APA#2 (10-03-17)



# U.K. APA#1 on winding machine

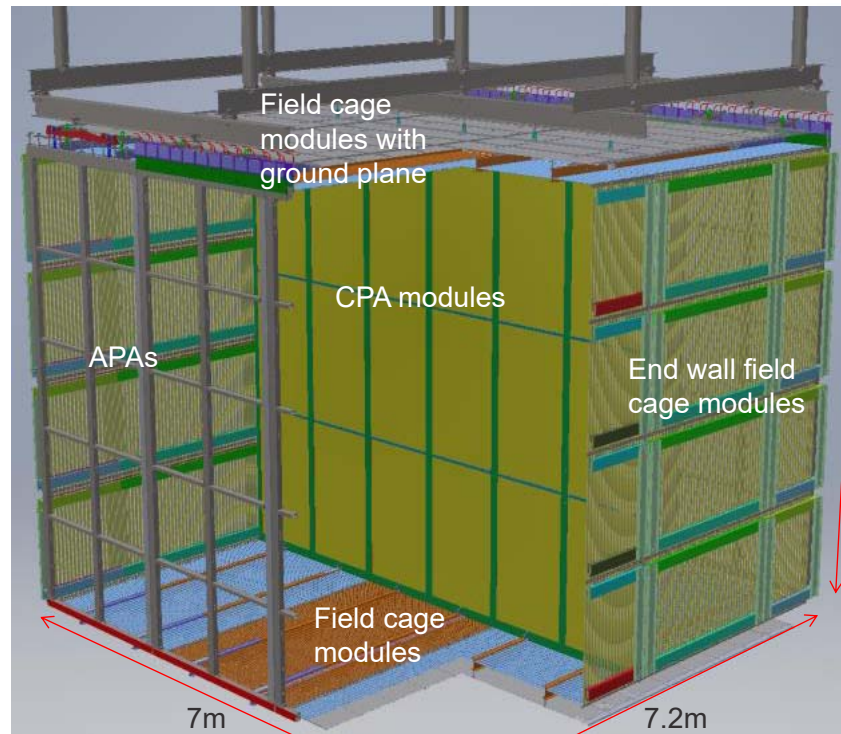


## U.K. APA#1 on process cart





# Cathode Plane and Field Cage

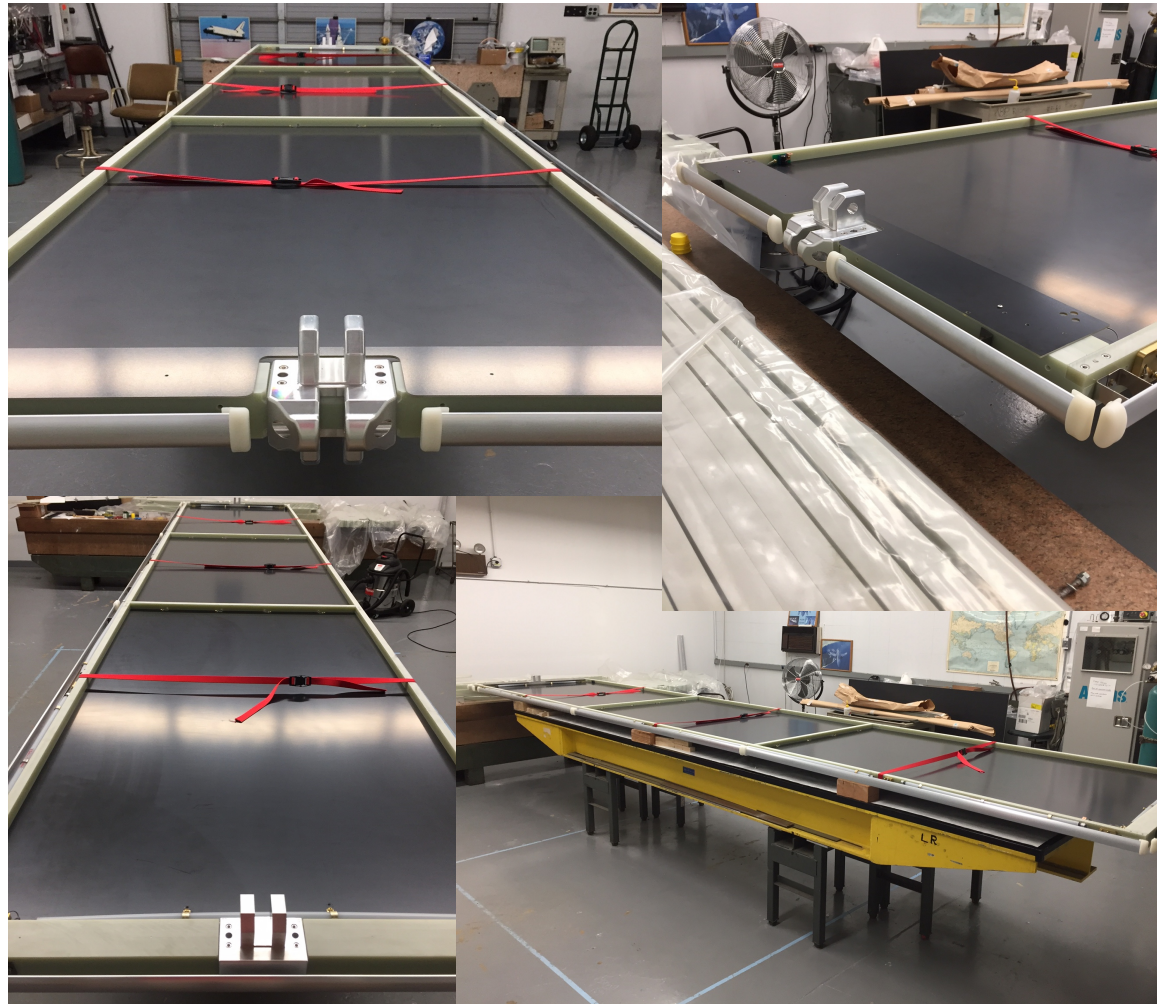


- Cathode composed of 18 CPA modules, grouped in panels of 6
- Top and Bottom Field cage composed of 12 modules , 3 per side, top and bottom
- Endwalls composed of 16 modules, 4 per side, upstream and downstream

# Cathode Plane assembly at ANL

3 modules  
in a panel

As many  
connections  
as possible  
are made at  
ANL before  
shipping



1<sup>st</sup> six modules have shipped and will arrive at CERN soon

# 1<sup>st</sup> pair of panels shipped this week



Top and Bottom Field Cages assembled at Building 182 (parts fabricated by Stonybrook)



(Professional photography by CERN)

## Resistor Divider Boards (LSU)



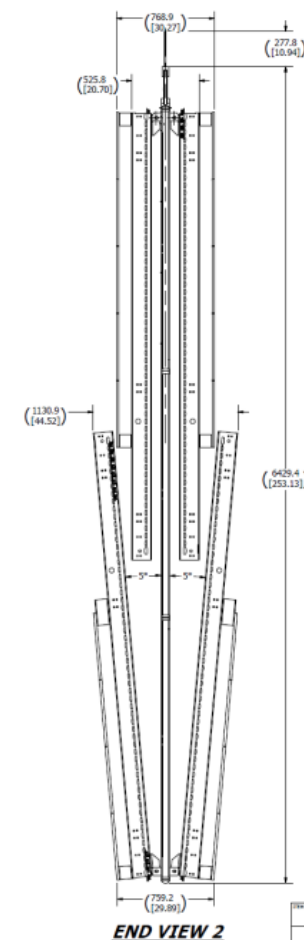


We can start to assemble the CPA/  
FC units

(we need 3 total : DS, MS, US)

As soon as we have :

- 1) Assembly tables in clean room
- 2) Trolleys to hang them off of the rails
- 3) The right people at CERN to do the assembly
- 4) Access to the cryostat
- 5) Trolleys to position the Bridge Beam at the TCO so that we can store the completed units in the cryostat



All 12 Top/Bottom modules are complete  
and stored at EHN1

# Photon Detectors

- 10 photon detector modules are installed in APA#1
  - 5 radiator bars
  - 5 dipped bars
- Successfully readout with all channels responding
- Next milestone is reading out while in the Cold Box
- Modules for APA#2 being assembled at CSU
- Next batches of each type (for APA3+) are in preparation





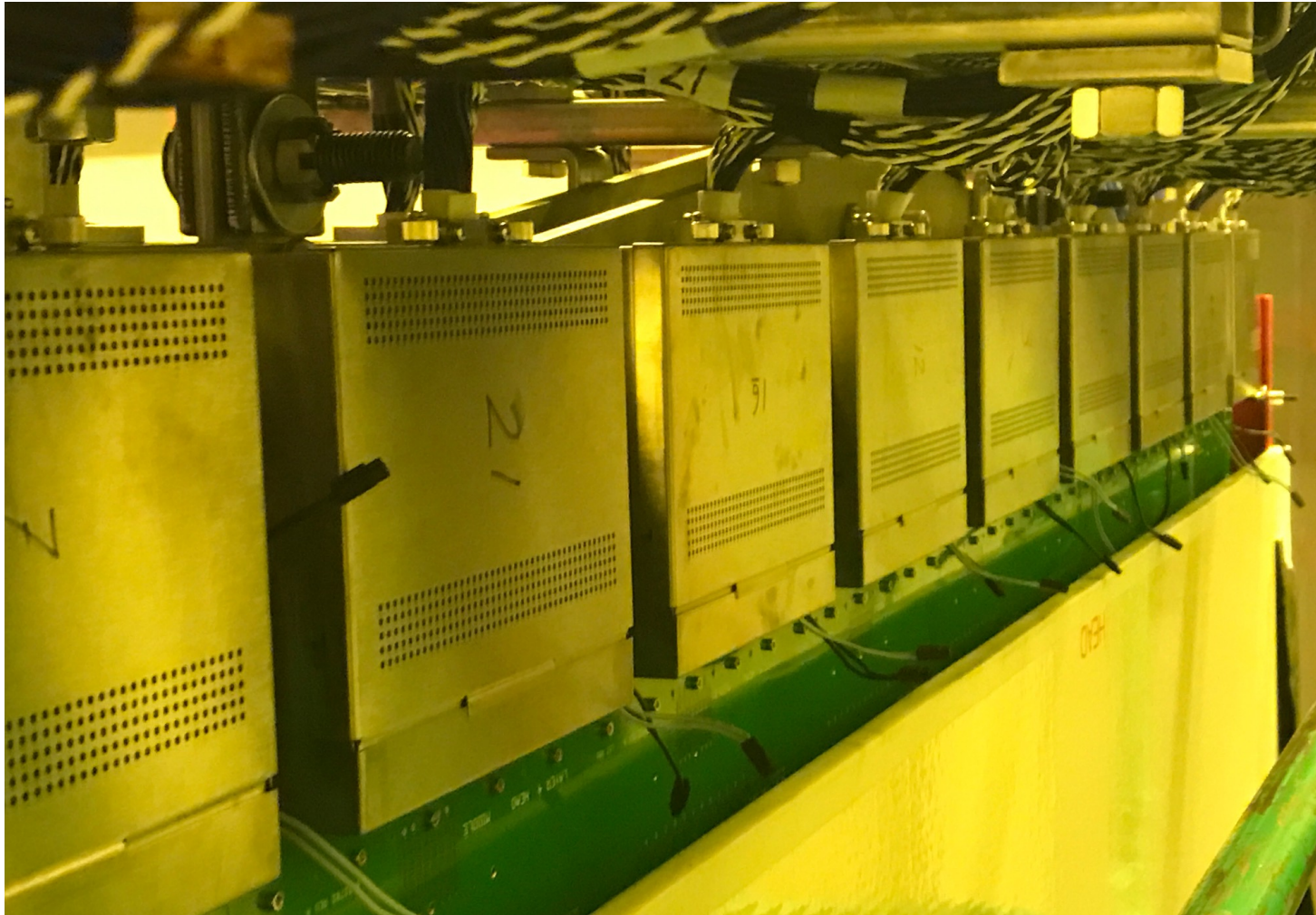
# Cold Electronics

- Began testing production ASICs (Front-end and ADCs) in August
  - ~800 Front-ends tested and passed
  - ~700 ADCs tested and passed
  - 20 Front End Mother Boards for APA#2 being assembled
    - Chose 160 ADCs with the highest Q factor
    - Ready for testing in ~2 weeks
- Twenty CE boxes installed on APA#1 first week of September; all but one channel (out of 2560) respond with noise
- Next milestone is readout (stand alone) in Cold Box
- Five V2 WIBs are now at CERN for use in Cold Box Test
- Six Feed-through Tees for cryostat are en-route to CERN

# ASIC Testing at BNL (June - ??)



## CE Boxes installed on APA#1



# Cold box

- Cold box commissioning was initiated last week but had to be suspended due to a failed heater.
- Plan is to move the APA into the Cold Box next week and begin warm testing of the electronics and photon detectors.
- When the new heater arrives the Cold Box commissioning will be restarted.
- Plans are being evaluated as to the best procedure for doing this with or without leaving the APA in the box.

# Detector Support Structure

- All beams are in the cryostat in a bolted configuration
- We are awaiting the delivery of the Bridge Beams (to PSL) and then to CERN
  - These are required to move the beams to the TCO where they can accept detector components





# Cryostat

- Construction complete
- Leak check by GTT/Garibaldi complete
- Higher sensitivity leak checking by collaborators underway; ~ half done
- Installation of internal cryogenic piping has started
- Scaffolding will be removed starting Monday
- False floor to be installed on Tuesday/Wednesday
- Cleaning will start on Thursday and continue through the 19th

Self-organized effort by many colleagues :  
Andrea,  
Stefania,  
Francesca,  
Francesco,  
Jake,  
Serhan,  
Bill,  
Cole,  
Roberto,  
Kevin,  
Ana,  
Ettore,  
Umut,  
Pablo

## Higher Sensitivity Leak Test of NP-04



*Thanks to Stephen Pordes for bringing this huge effort to our attention 😊*



# Summary

- Activity on both sides of the Atlantic is very intense
- Delivery of components is on-going and we are pushing very hard to keep to a schedule which will result in a fully instrumented detector with 6 APAs on the same time scale as the cryogenic system is completed
- The current schedule has the detector ready for cryo commissioning in early summer and ready for beam in early fall
- The beam goes away in mid-November 2018

