

ProtoDUNE-II installation at CERN

How to build a mini-DUNE?

Anyssa Navrer-Agasson

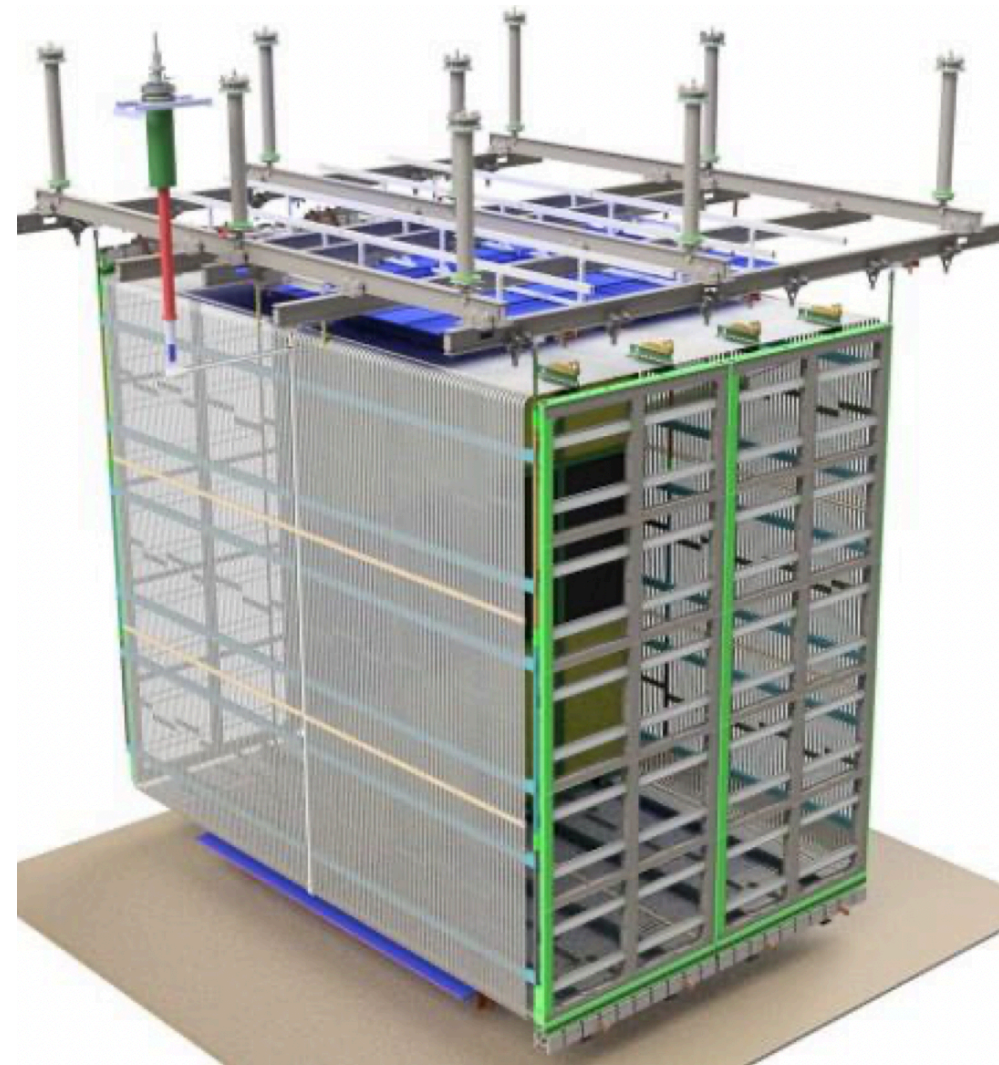
UK/Latin America LArSoft Workshop - 6th to 9th September 2022

A tale of two ProtoDUNE

Prototypes for the DUNE Far Detector Modules

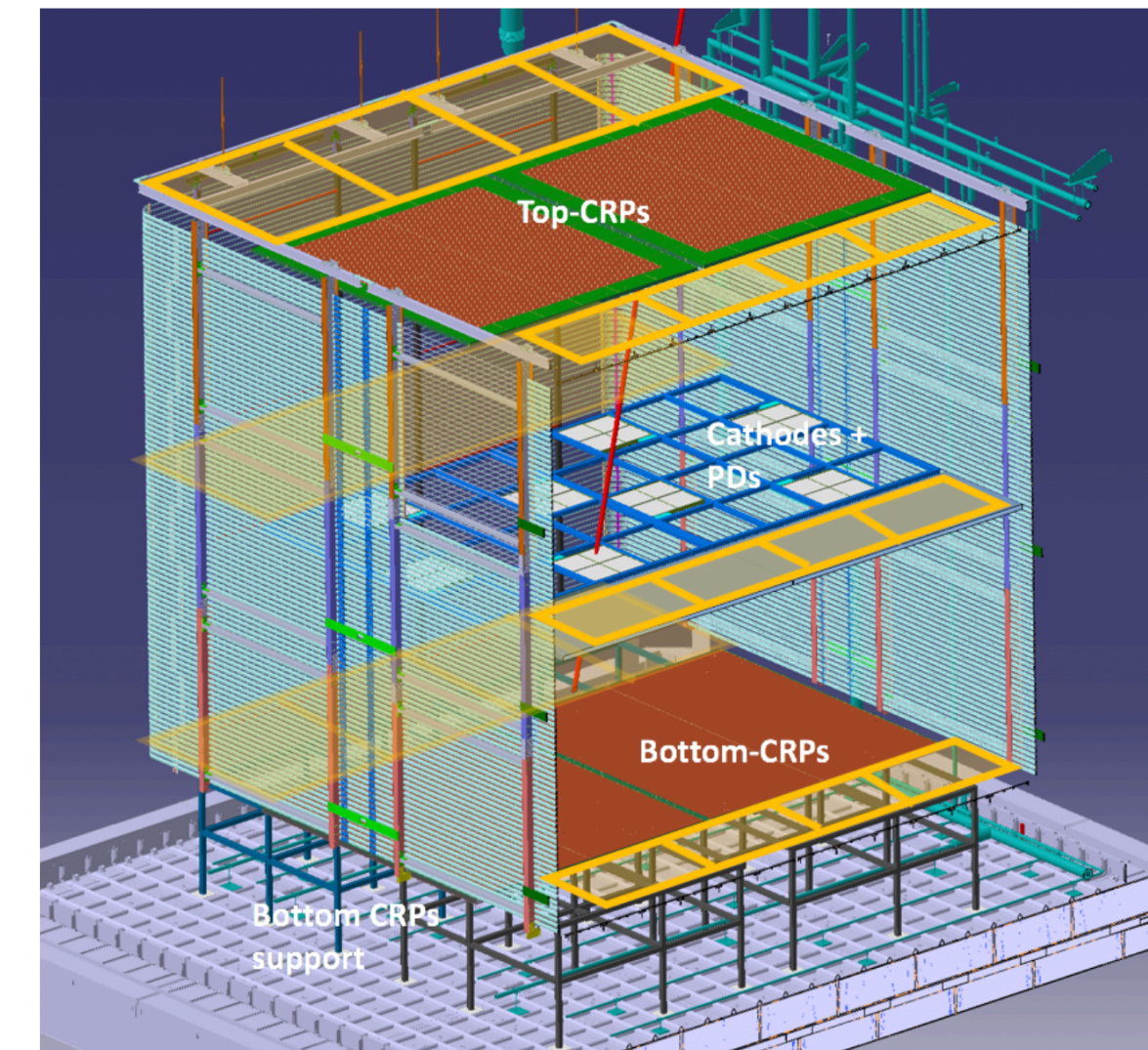
Horizontal drift

- CERN code name: NP04
- “Classic” LArTPC design
- Charge collection: wire planes
- Light collection: X-ARAPUCAs (SiPMs)



Vertical drift

- CERN code name: NP02
- Charge collection: PCBs
- Light collection: X-ARAPUCAs (SiPMs)



CERN Neutrino Platform

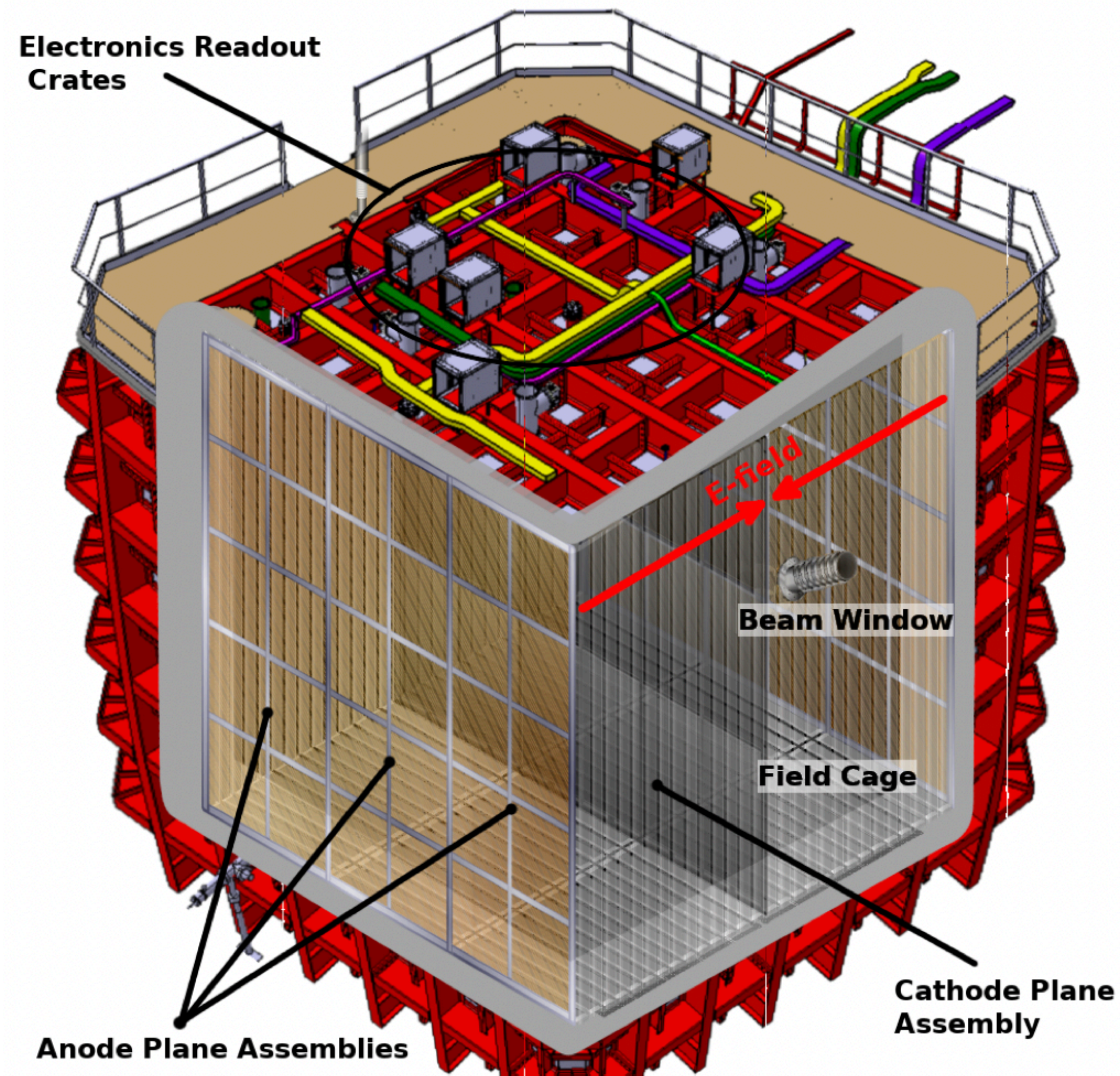


NP02 (Vertical drift)

Clean room

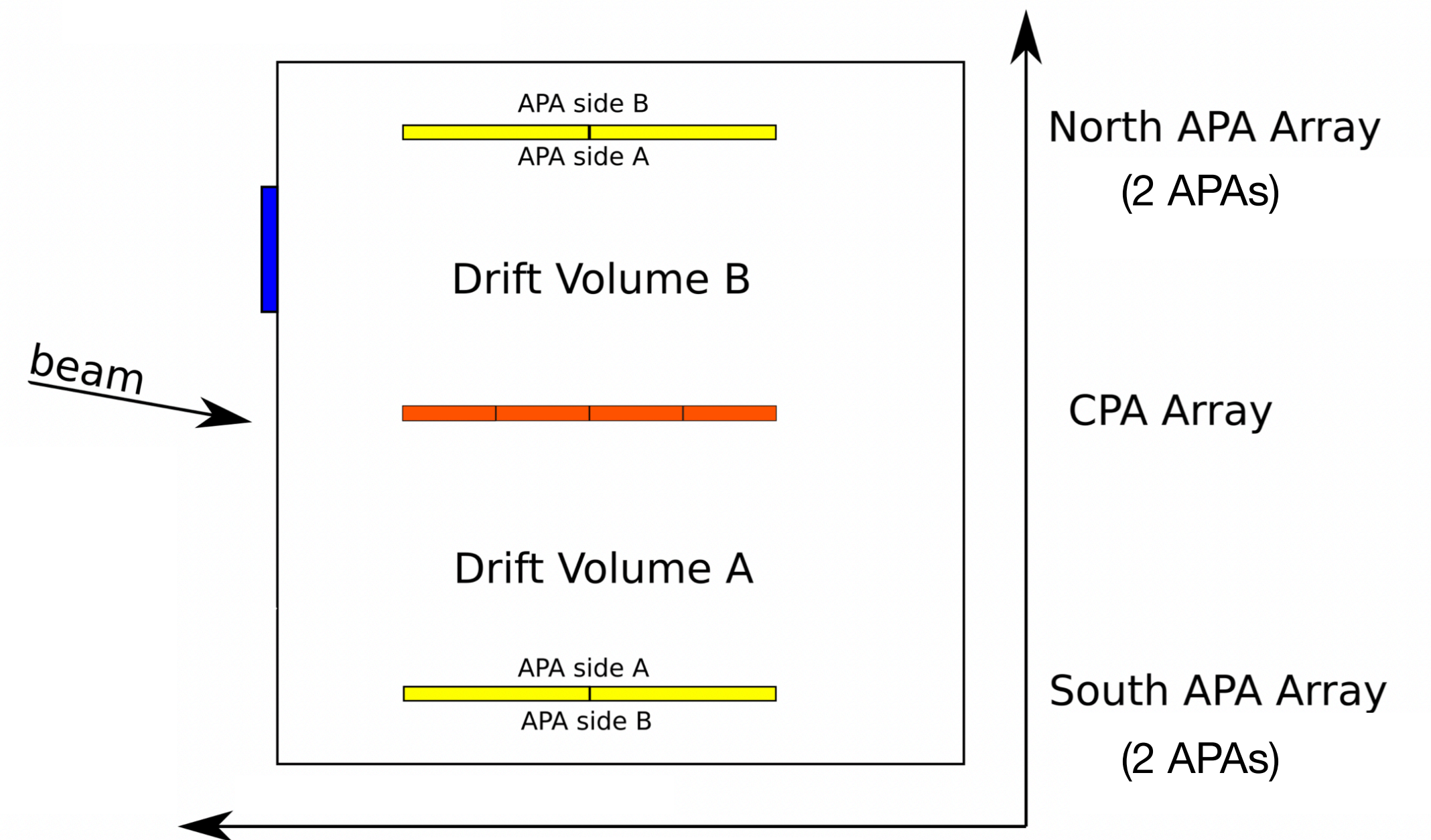
NP04 (Horizontal drift)

ProtoDUNE-II Horizontal Drift



APA: Anode Plane Assembly

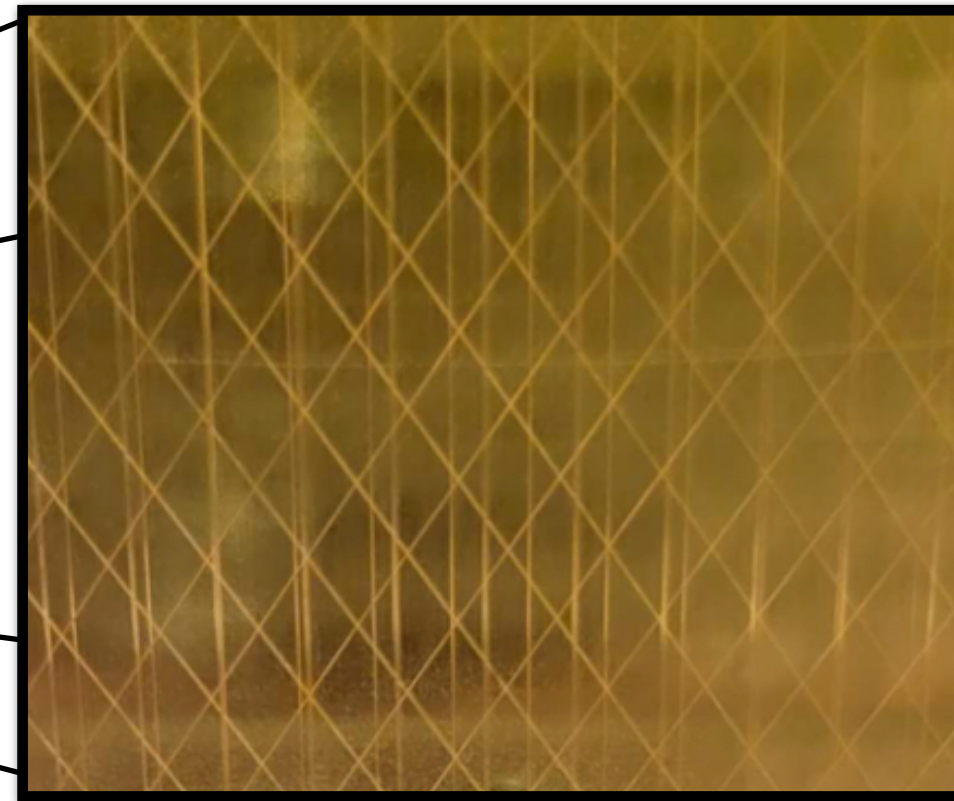
CPA: Cathode Plane Assembly



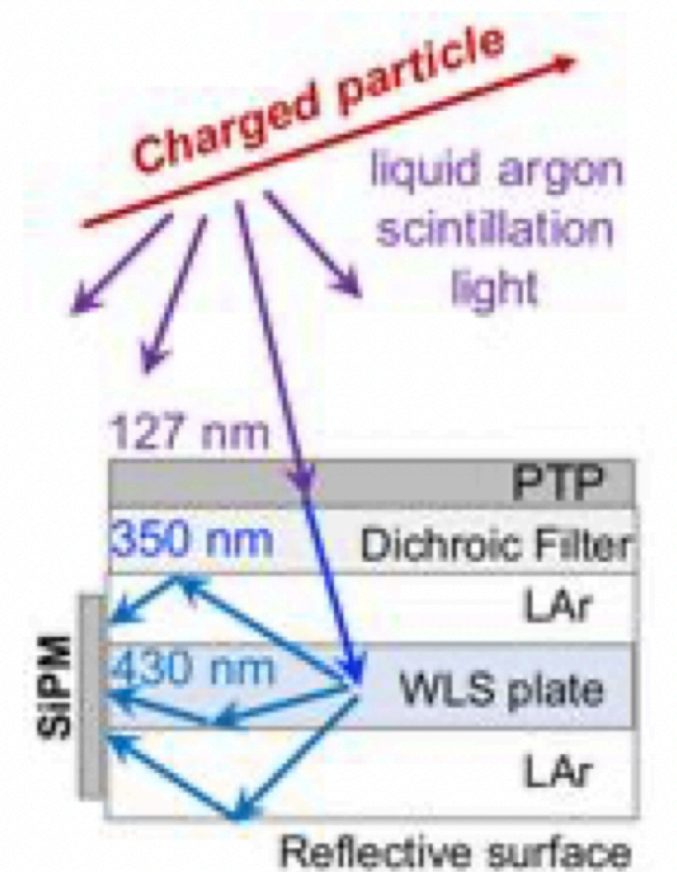
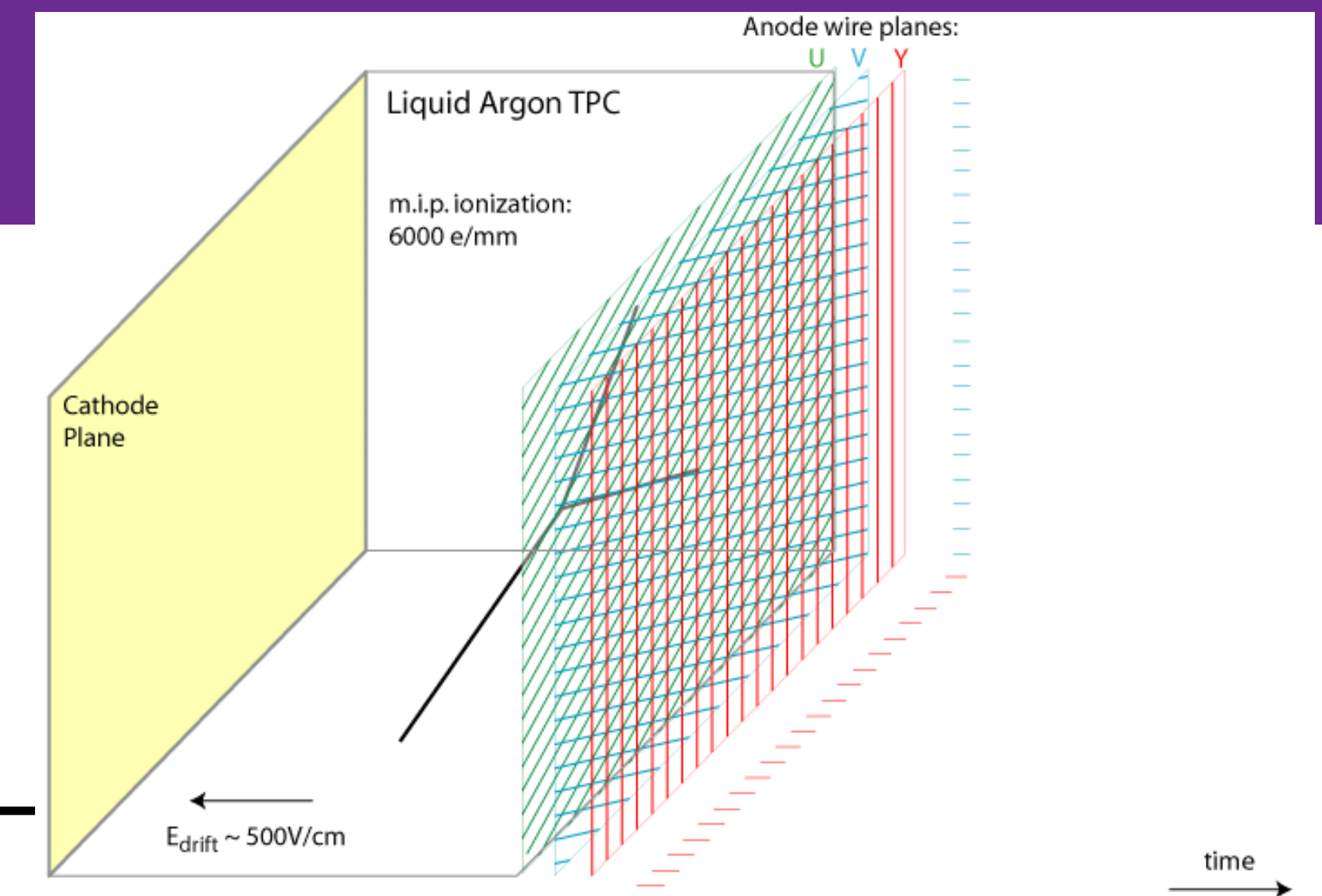
Anode Plane Assembly



ProtoDUNE-II
has 4 APAS

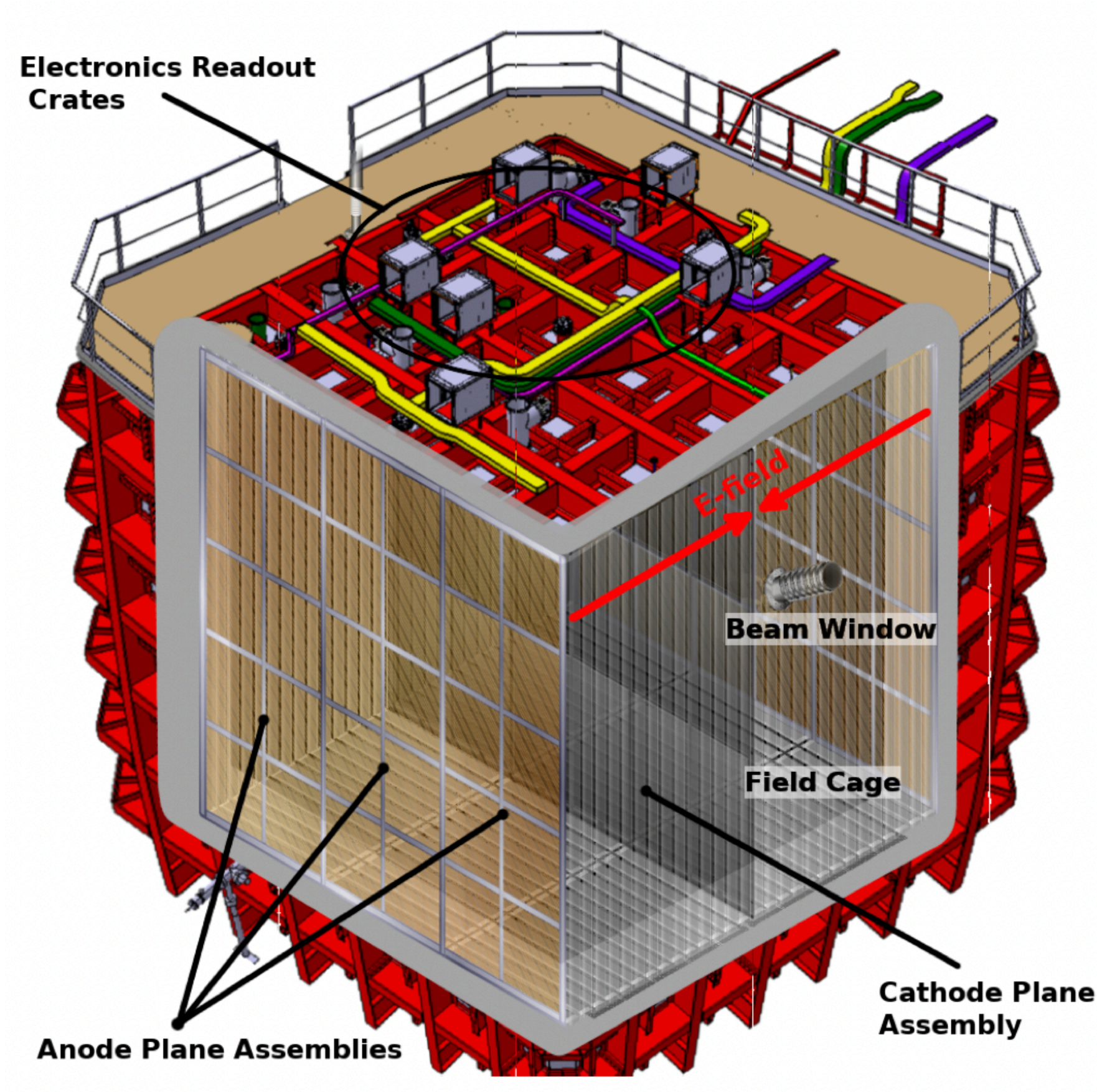


Photon detectors
to collect light

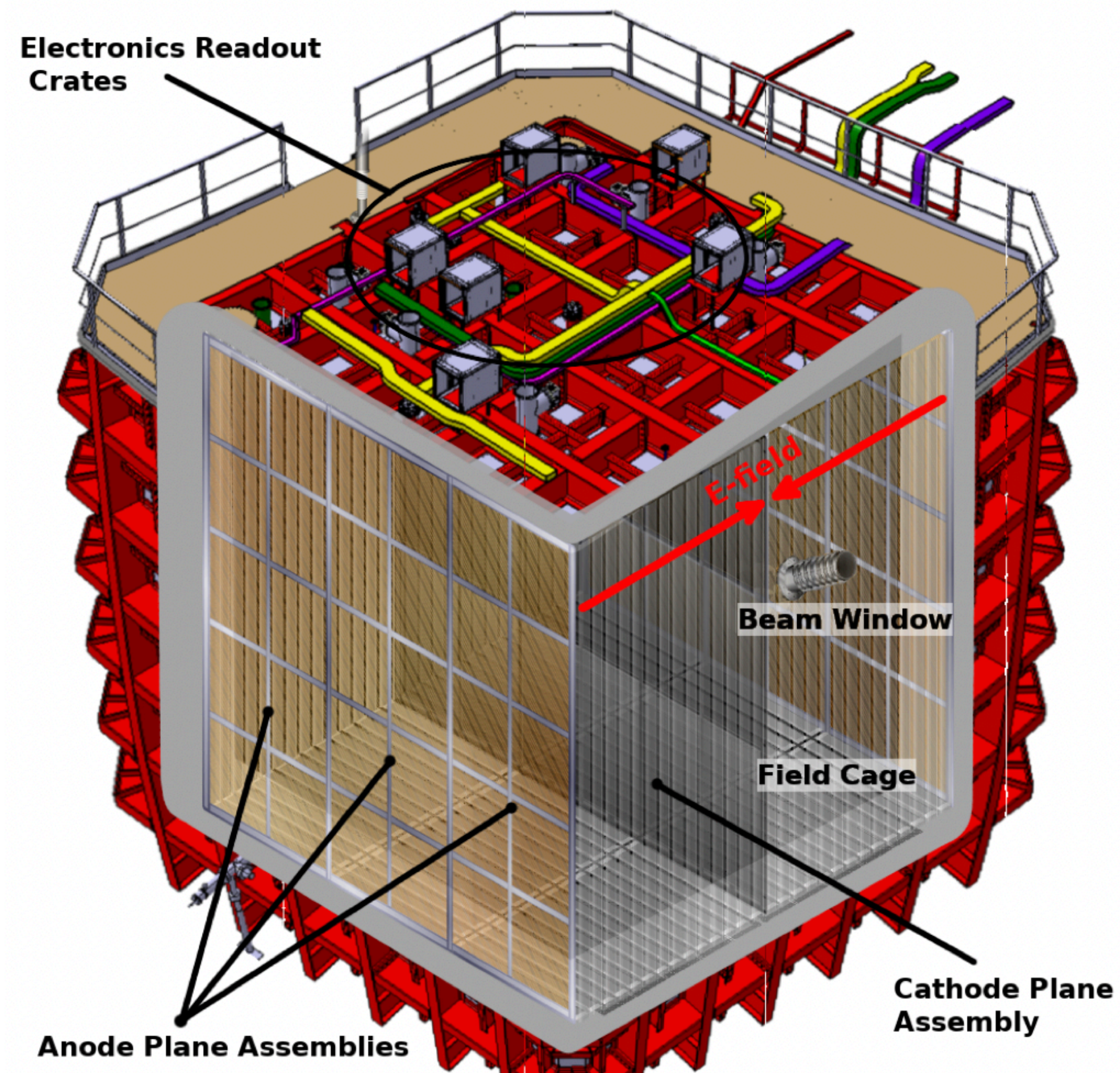


And it all goes...

...in the cryostat!



And it all goes...

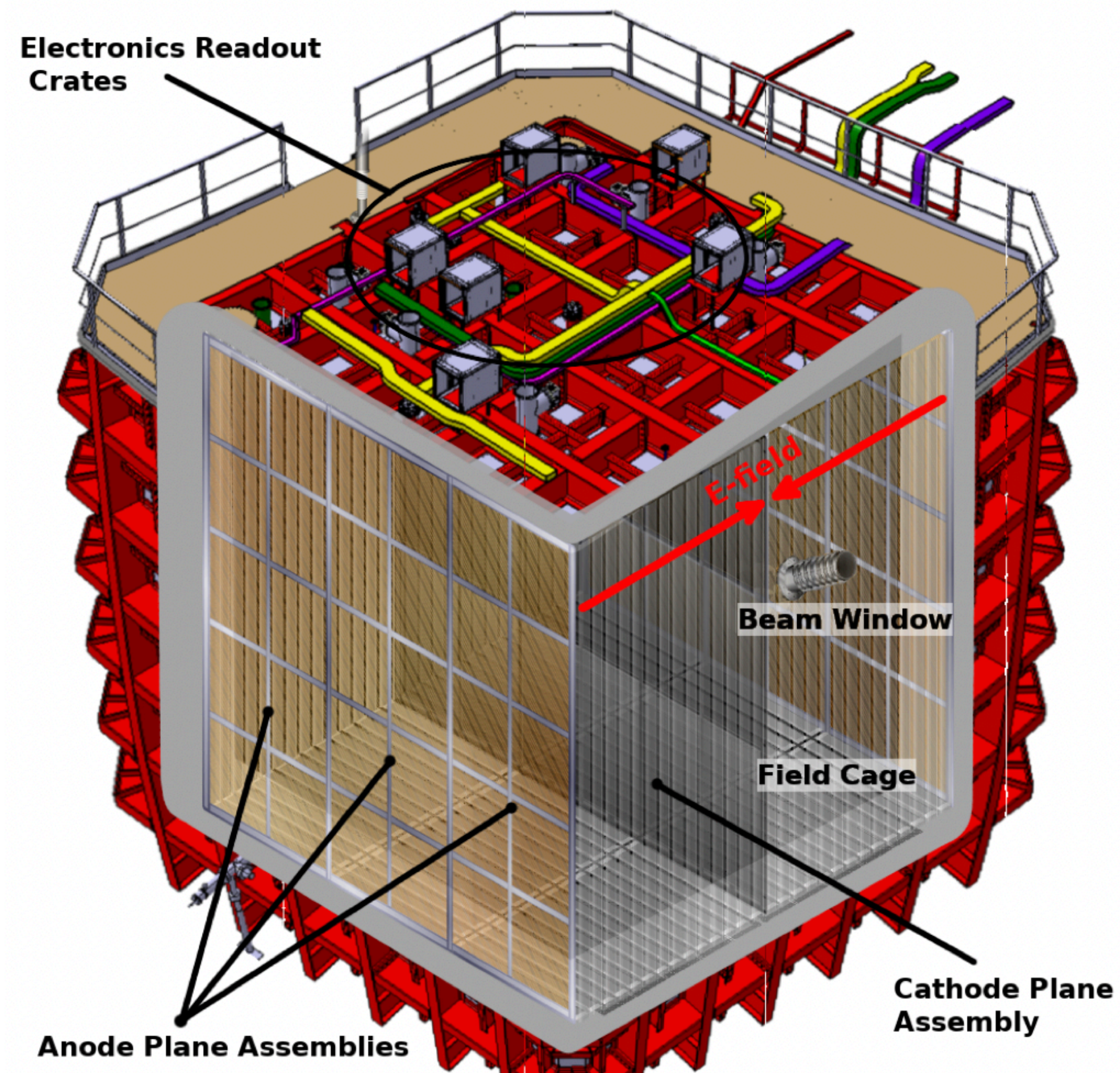


...in the cryostat!

(Yes, via this ridiculously small opening)

HOW?

And it all goes...



...in the cryostat!

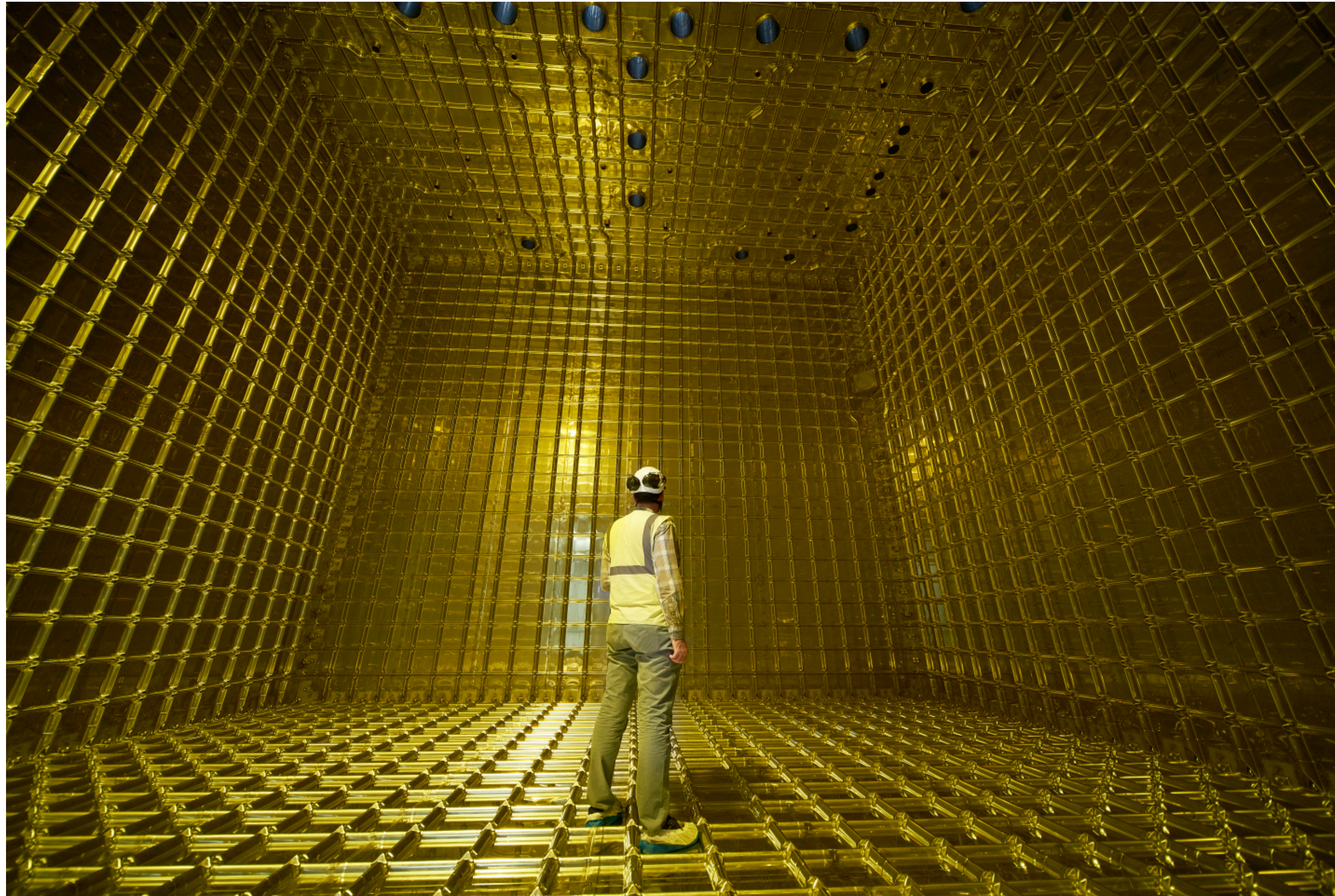
(Yes, via this ridiculously small opening)

HOW?



By assembling it inside!

ProtoDUNE Cryostat

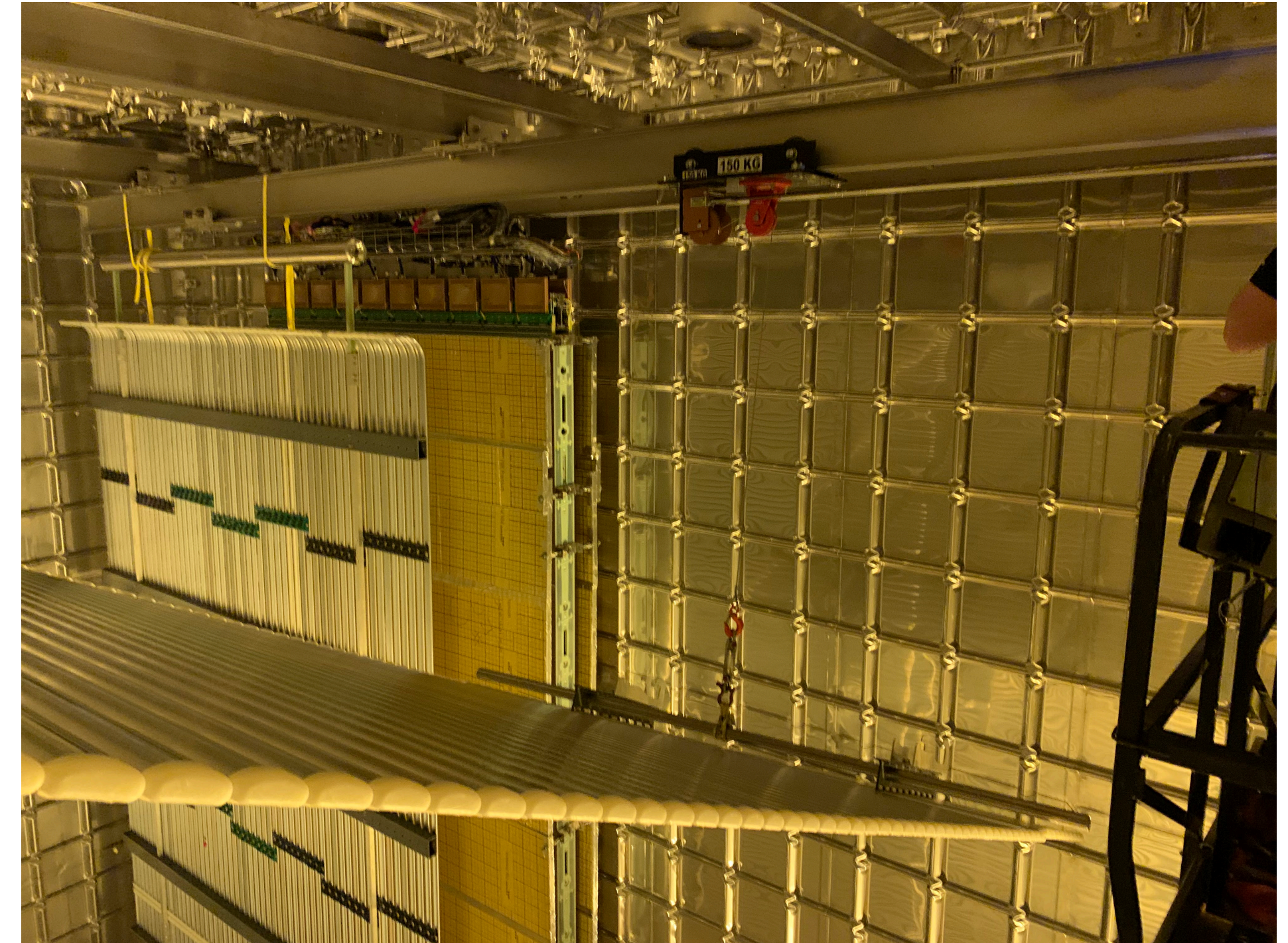


- Designed to handle shrinking at cryogenic temperature
- Needs to be cut open for installation then welded back shut

ProtoDUNE-II: APAs in the cryostat



- APAs slide into the cryostat one after the other
- Can be moved around thanks to beams on rails



Steps of ProtoDUNE-II HD installation

1. APAs arrive at CERN, photon detector and cold electronics modules are assembled
2. APA moved into the clean room
3. Photon detectors and electronics installed on the APA
4. Fully assembled APA is cold tested
5. Repeat 1-4 for all 4 APAs

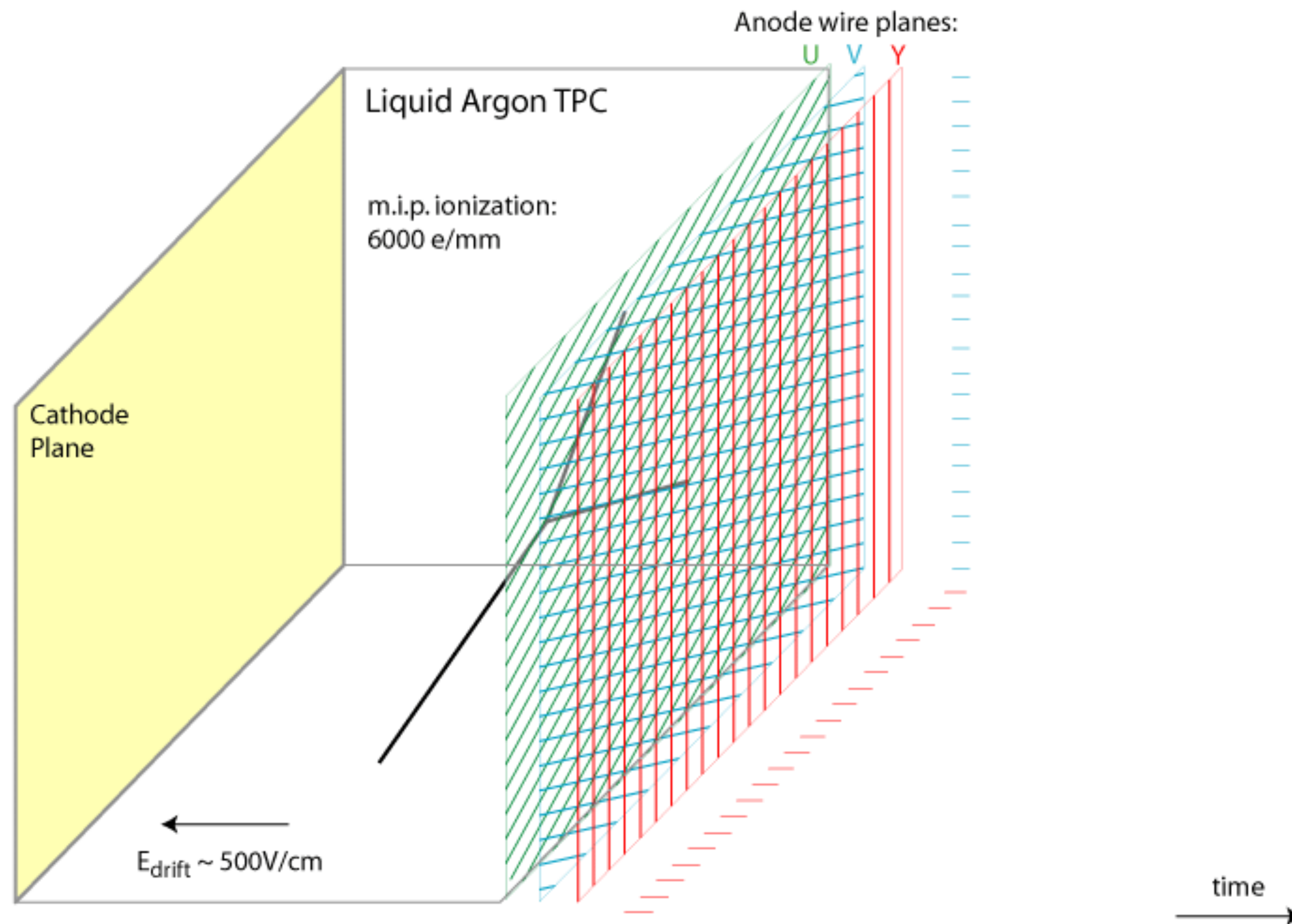
The field cage is also installed at some point during the process.

We are currently in the process of assembling and testing the last APA!!!

Now, a little illustration! :D

Backup

LArTPCs



- Charged particles interact in the LAr
- Creation of ionisation electrons and scintillation light
- Electric field drifts the electrons towards the wire planes, where they are collected
- Light is collected by photon detectors placed in the TPC