

CRP news

D.Duchesneau

- CRP and NP02 status
- Anode PCB development status and next prototype
- Bottom CRU installation status => regular weekly meetings on going: very close to complete the studies for the adapter plate and feet. Will be a contribution for a future meeting
- PRRs time update

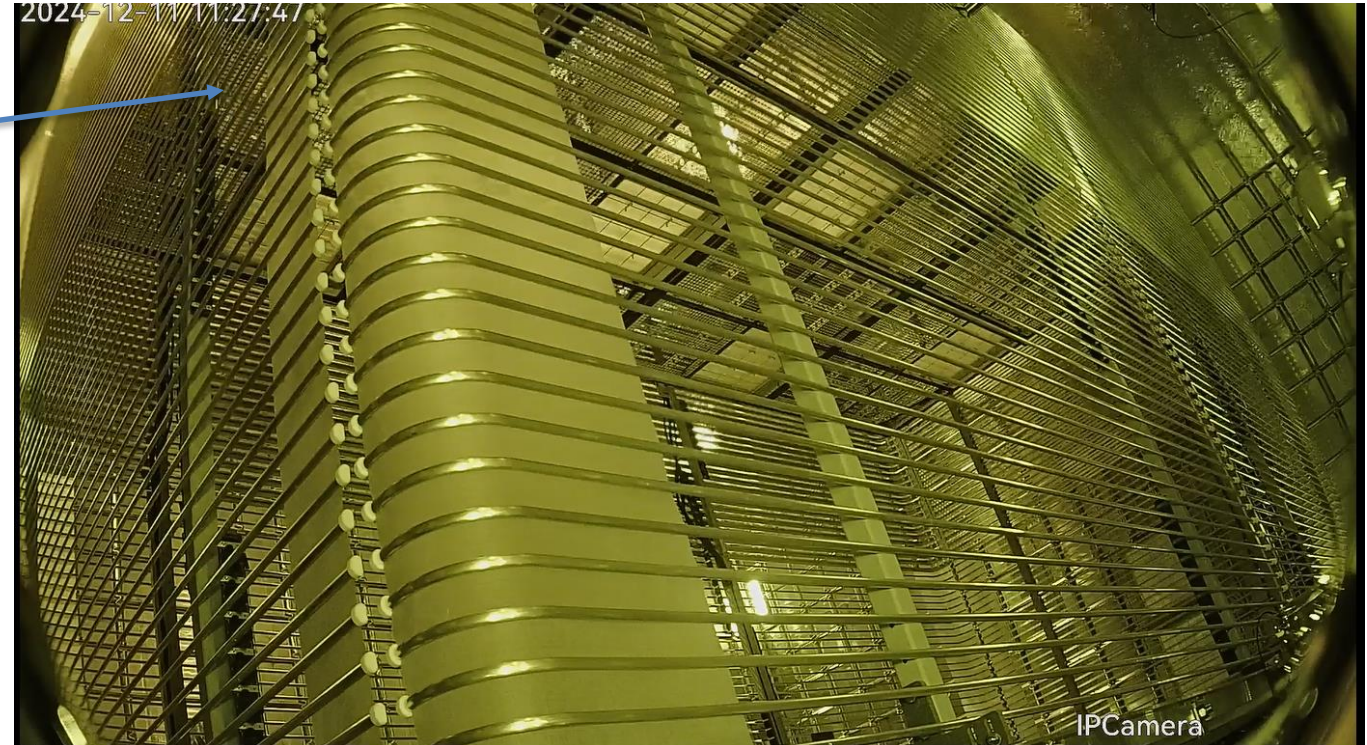
CRP meeting
January 8th 2025

CRP in NP02 and commissioning activities

LAr transfer from NP04 : started on December 4th:

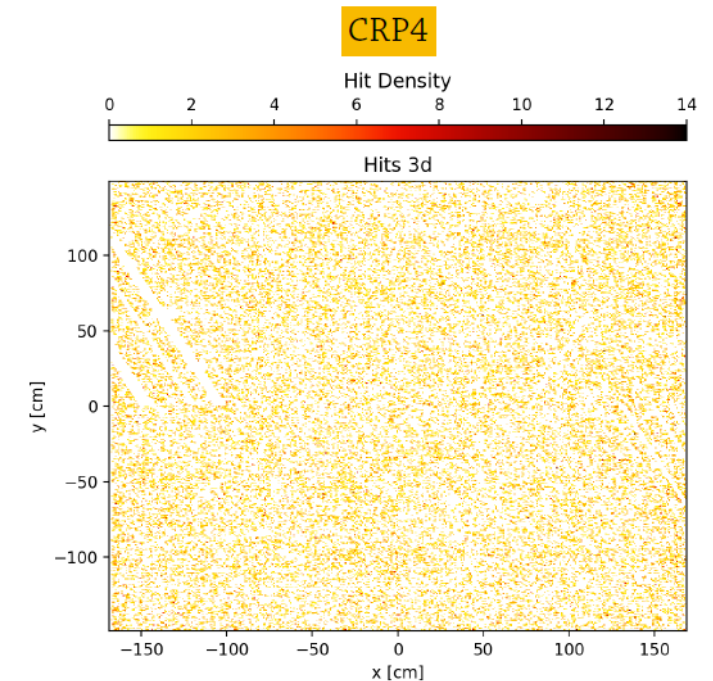
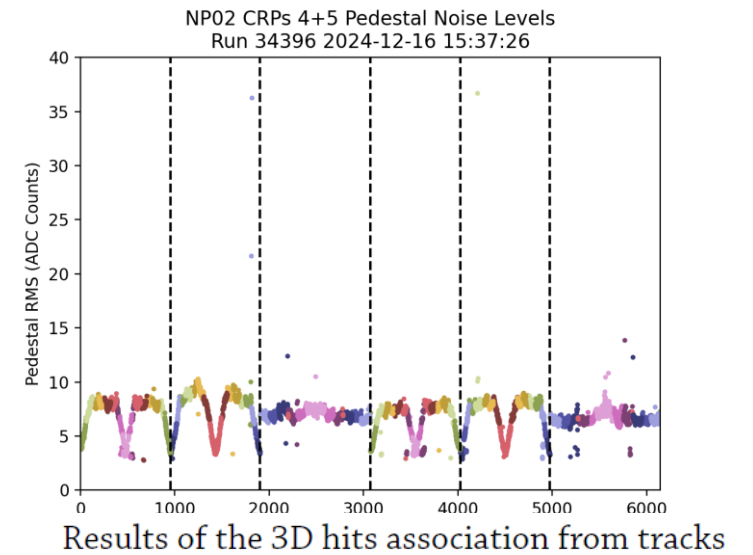
- Transfer was completed on Dec 12th reaching 5.7m (130t left in NP04)
- During CERN closure: boiloff, transfer and recondensation allowed to reach 6m on Jan 6th
- Additional top up will start next week from truck delivery
- Expect the complete filling by Week of Jan 20th

⇒ During this phase there was a constant monitoring of the Top and Bottom CRPs



Bottom CRPs in NP02 (CRP4 and CRP5)

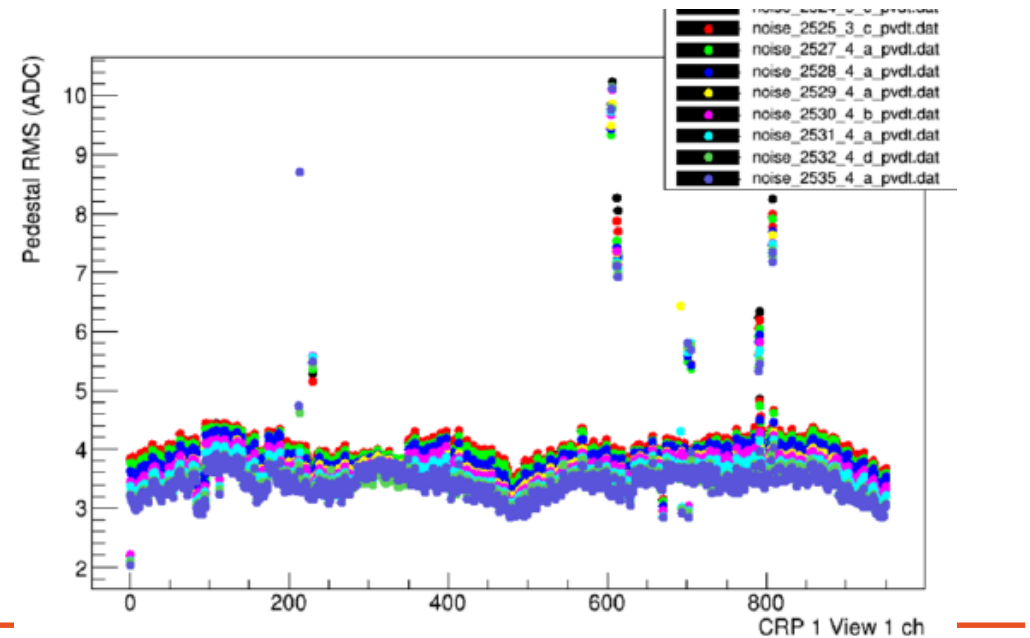
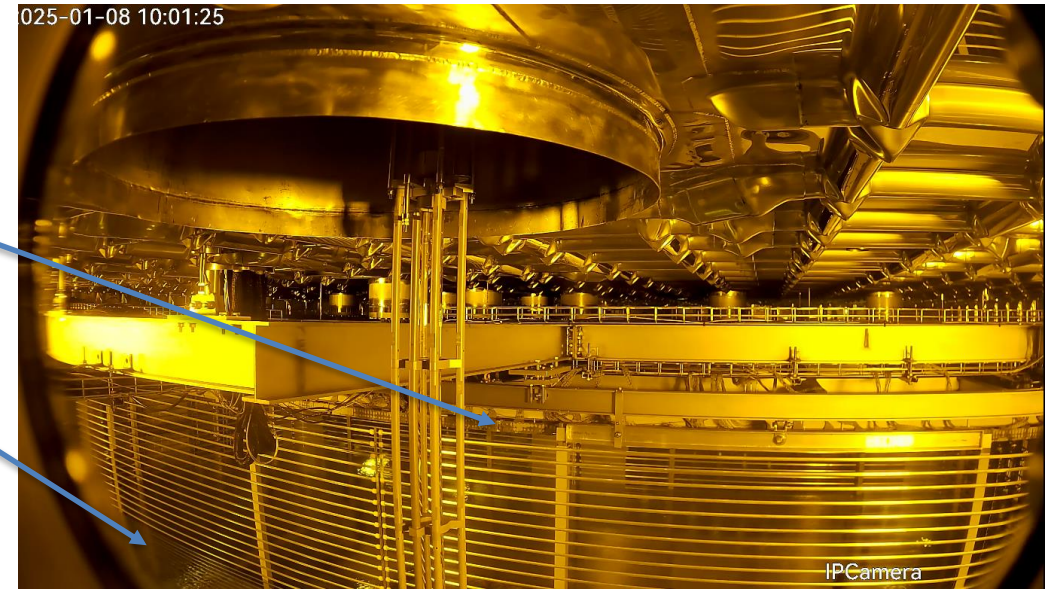
- Both Bottom CRPs (#4-5) fully submerged and working well
 - Noise improves at cold as expected
 - A few noisy outliers under study
 - 3 new dead channels (occurring during first HV ramp up or first ramp down)
- Bias HV tests (starting 12/9)
 - improvement in noisy channel behaviour; after setting the bias to nearly nominal values all noisy channels appearing at cold went down to normal levels (dusts, ?)
- Cathode HV test at 20kV (60V/cm) 12/17: observe tracks on both CRPs



Top CRPs in NP02 (CRP2 and CRP3)

Liquid level

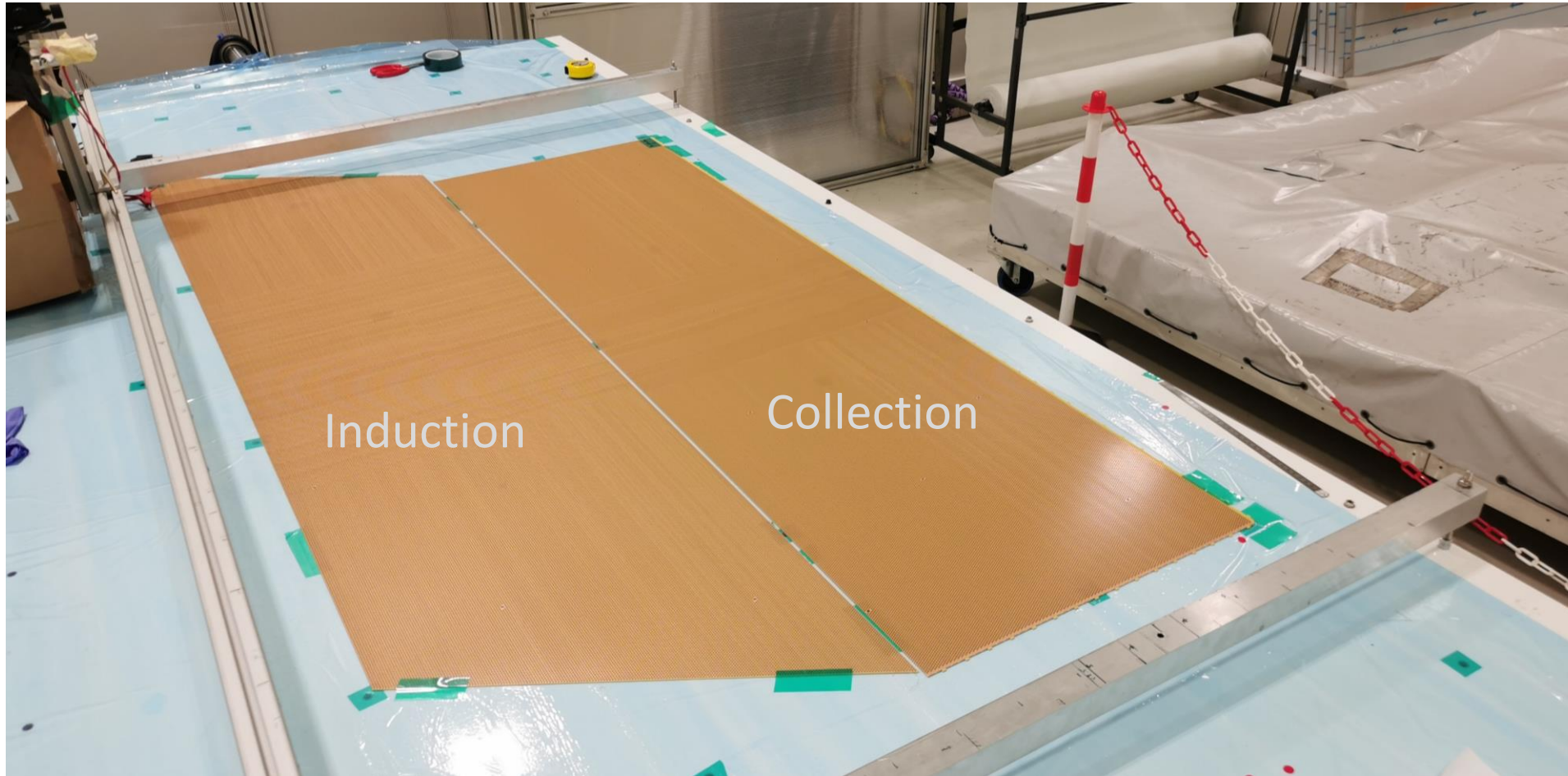
- still in ullage and working well
 - Temperature at top CRPs now 151K (LAr at 6m)
 - Noise dropped with temperature as expected
 - **Significant noise correlation with Heinzinger HV supply**
— under study and will need dedicated test periods
- No bad channels on TDE,
- a few noisy due to accidental resistive couplings in between CRP strips seen in the faraday cage tests
- ~10 channels disconnected at CRP
- 12 channels have bad cable connection due to last minute CRP cable replacement



Anode PCB development and status

Received PCBs from Chaosheng on Nov 15th

There were 2 different PCBs : 1 induction N and 1 collection A:



Checks done by:
F. Boran
L. Manzanillas
Yi Wang
D.D.

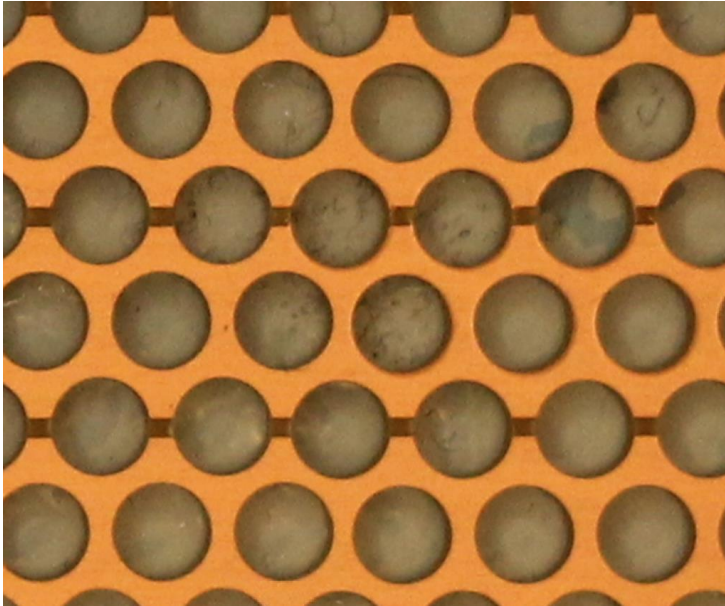
Visual inspection was first done and didn't show anomalies or visible problems;

QC checks were done with the photo analysis of those samples

L. Manzanillas

The collection PCB was good and acceptable apart from 1 place with a small pitch offset

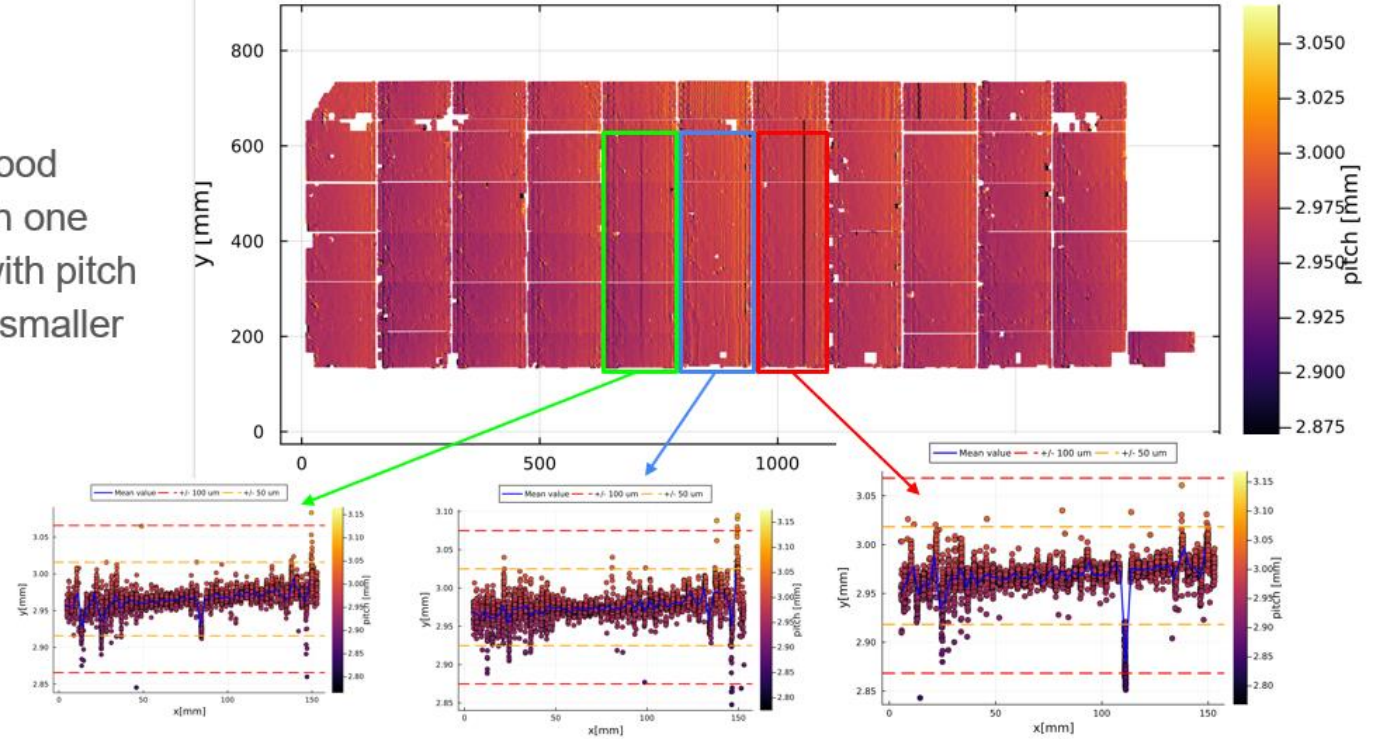
Photo 77



Collection 0 degrees

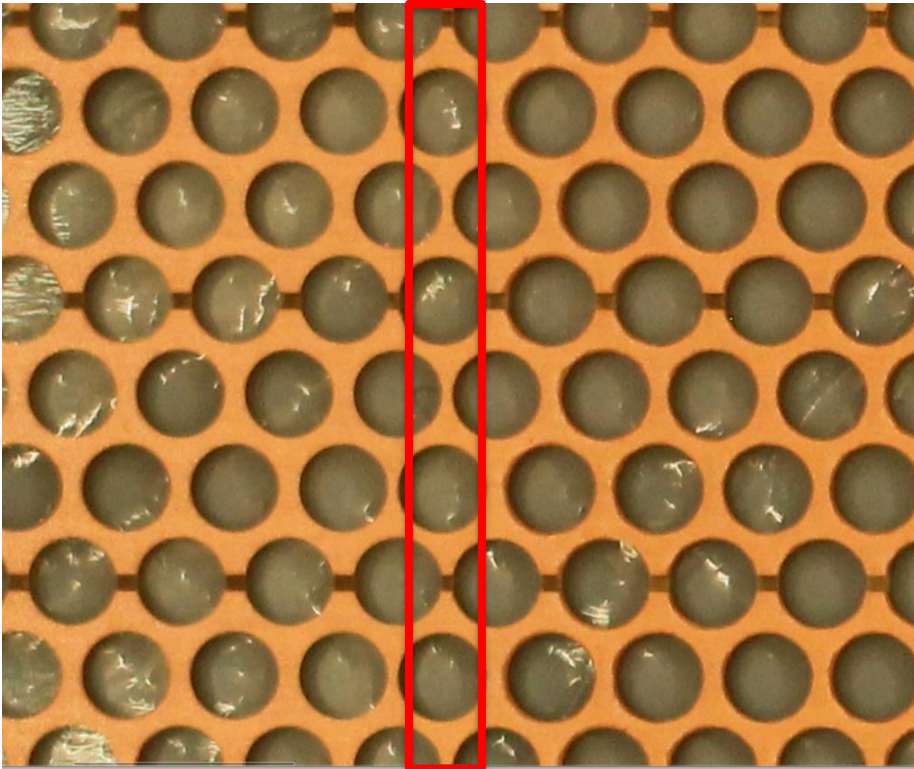
Pitch 0.0°

Looks good except in one region with pitch ~80 um smaller



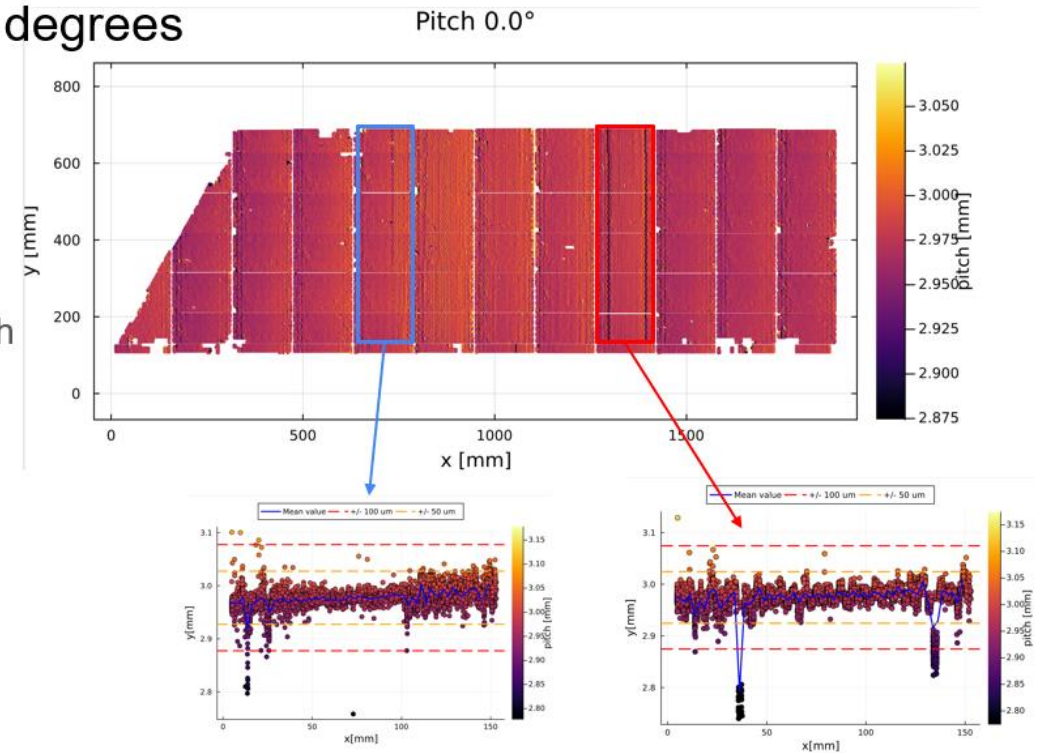
QC checks were done with the photo analysis of those samples

The induction PCB had a more impacting offset effects up to 170 μm



Induction 0 degrees

Looks good except in one region with pitch $\sim 150 \mu\text{m}$ smaller



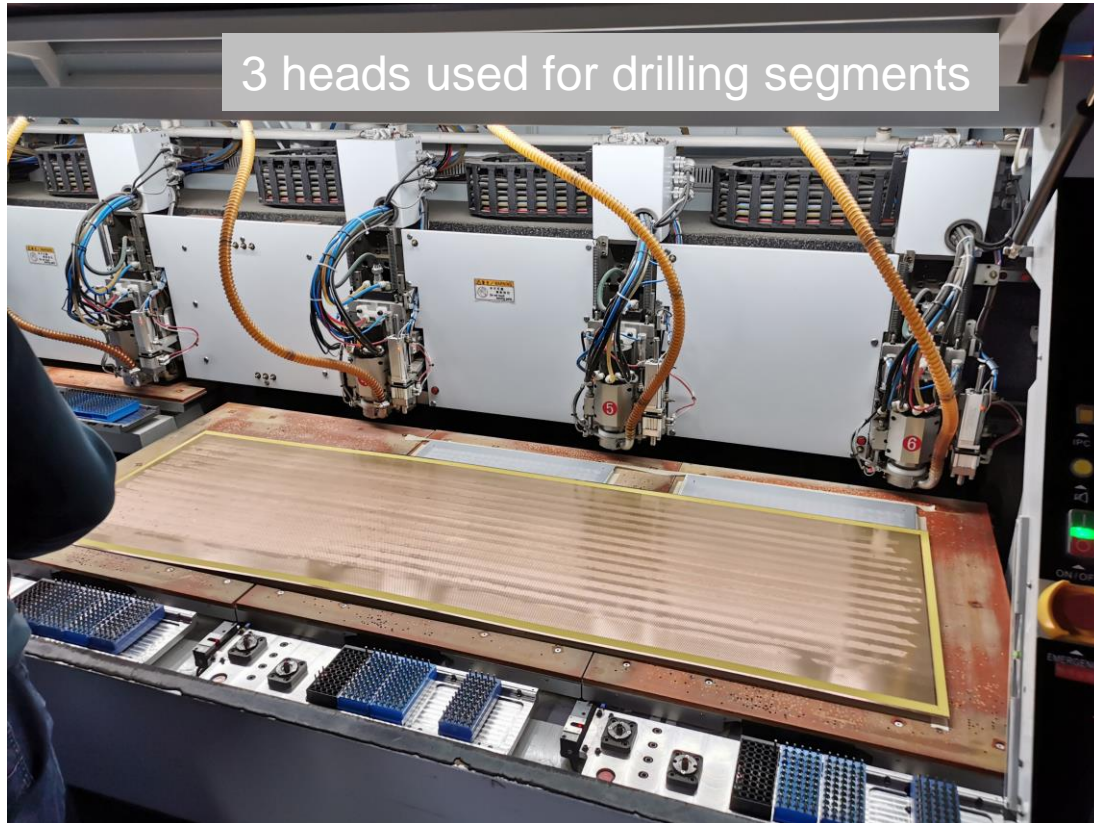
However, Yi was able to discuss with the company the same day and the reason was found: there was an error in the process where the positioning parameters of the drilling head was not changed while it should have been after rotation of the panels

Anode PCB development and status

After the sample have been discussed and corrections/modifications tested

Visit to the company in Shenzen before Christmas

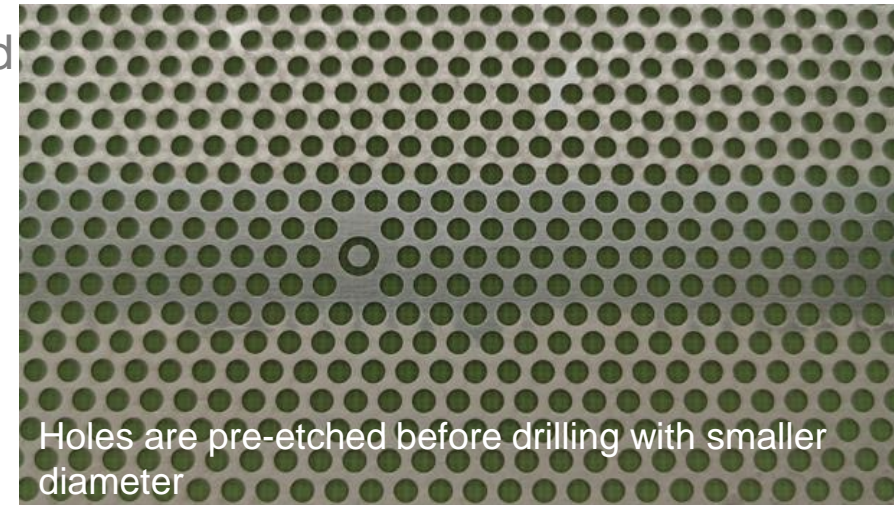
Very useful and important to go over details of manufacturing and QC



3 heads used for drilling segments



Drill bits changed often



Holes are pre-etched before drilling with smaller diameter

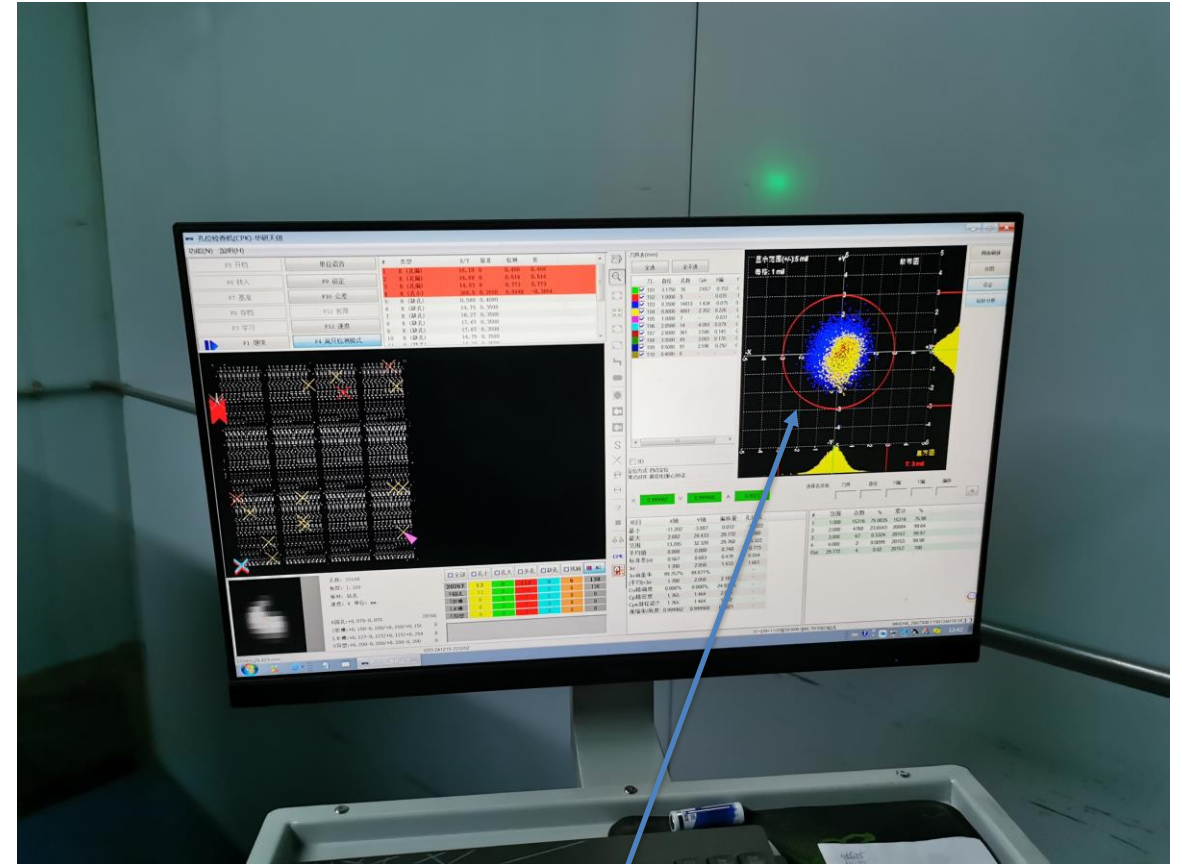
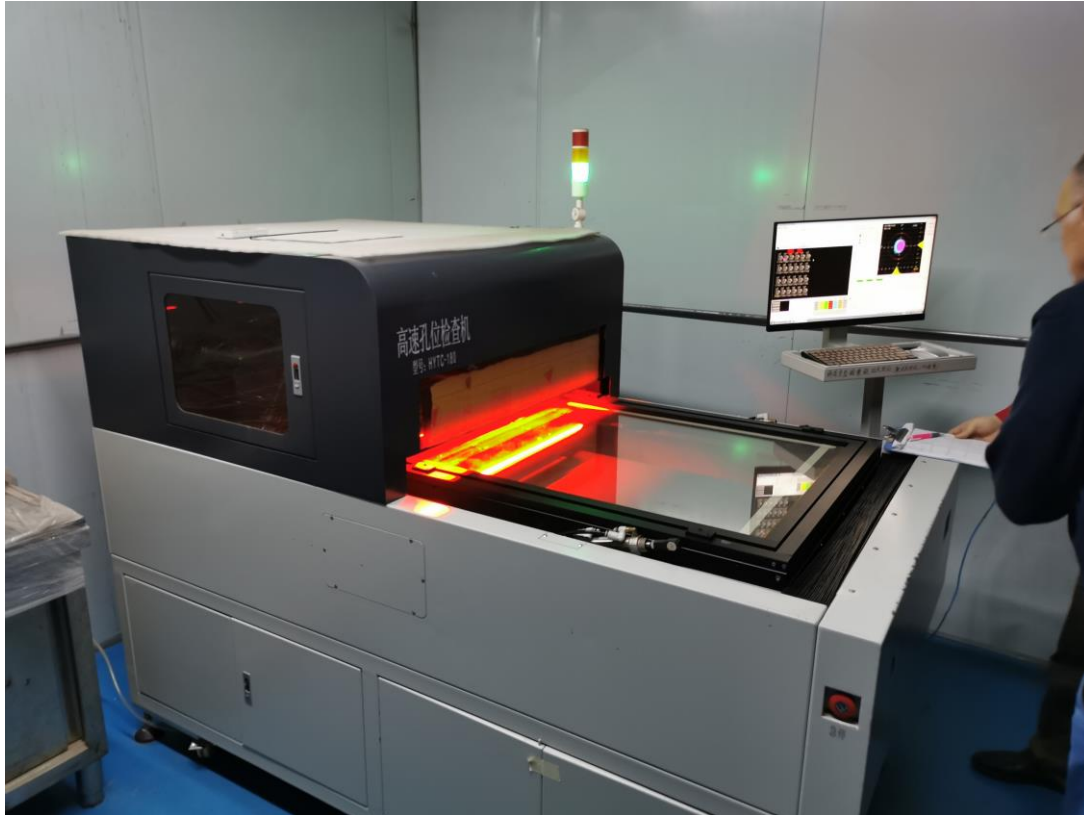
- The company uses six-head machines, with three heads per panel, focusing on slow and precise drilling.
- After each panel is drilled, they use optical analysis to check hole alignment and make adjustments.

The company can produce panels in less than six months with the capacity to use up to 50 machines. But QC has to be applied and considered altogether

Updated : careful head inter-alignment position

Anode PCB development and status

After each panel is drilled, they use optical analysis to check hole alignment and make adjustments

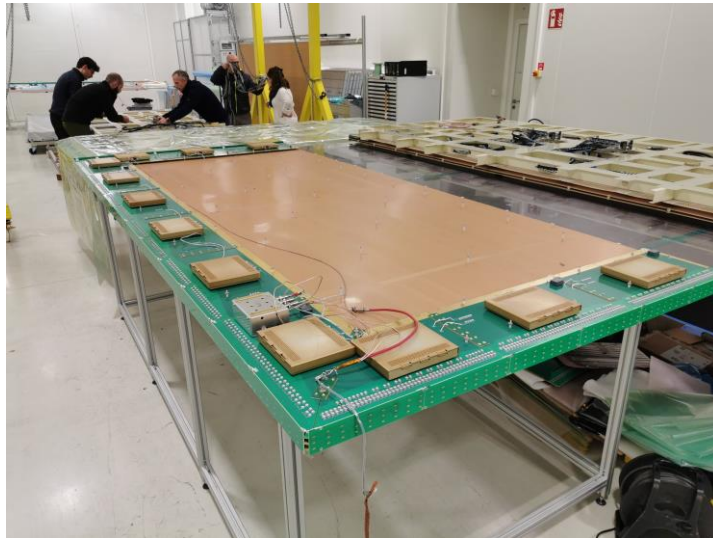


QC: all hole distribution is controlled and panel rejected if not all within the specs

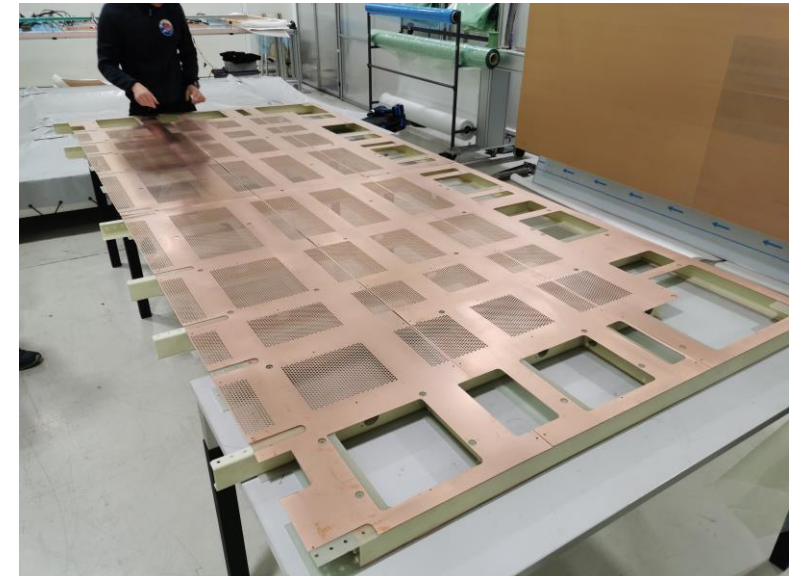
Next prototype: CRP8

- ❑ It is foreseen to build a complete CRU with the Chaosheng anodes
 - ❑ The order is sent, the PCB segments are being manufactured and the plan is to get the PCBs produced by Jan 18th
- ❑ The assembly of the the anode panels can occur after careful inspection of the PCB segments after delivery hopefully during week of Jan 20th
- ❑ The assembly of the new CRU can be foreseen after the DUNE Collaboration meeting beginning of February reusing the composite, the adapter boards and the edge cards) but replacing all anodes

- ❑ CRP6b has been completely dismantled



and new copper ground plane has been installed in advance

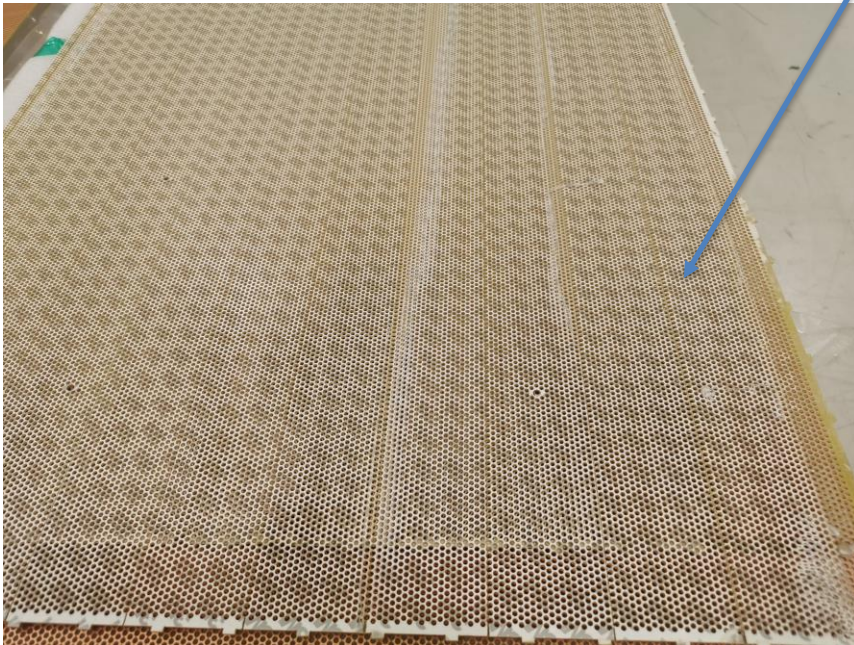
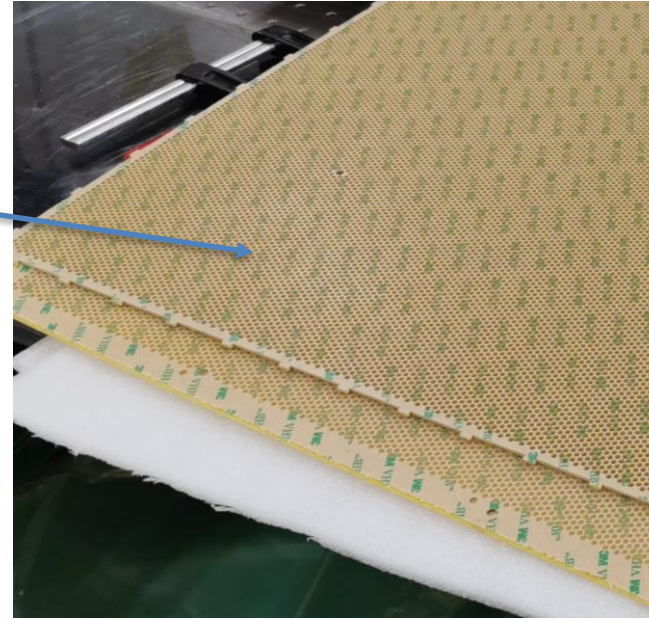


Other study ongoing on 3M double side tape:

Initial reference: 3M 9460PC VHB double-sided tape

The tape on CRP6 and CRP7: 3M 9080A (not a VHB type)

The tape used was not a VHB 3M tape as requested initially and showed poor aspects at delivery time
A heat gun was needed to peel of the protective layer



=> it has properties less performant than expected and also less mechanical peeling and shear capabilities from the Technical specifications

Some delamination effects observed on CRP7

=> Test campaign defined and discussed with Rui to compare the mechanical properties under several extreme conditions

END

Update: PRR schedule for CRP components

CRP items and sub-component PRR list:

- **Composite frame:** Oct 10 2024
- **PCB anodes and panels:** Feb 2025
- **Adapter boards and edge cards :** Jan-Feb 2025
- **QC test setup and assembly site:** Jan-Feb 2025
- **Bottom CRP ground plane** Jan 2025



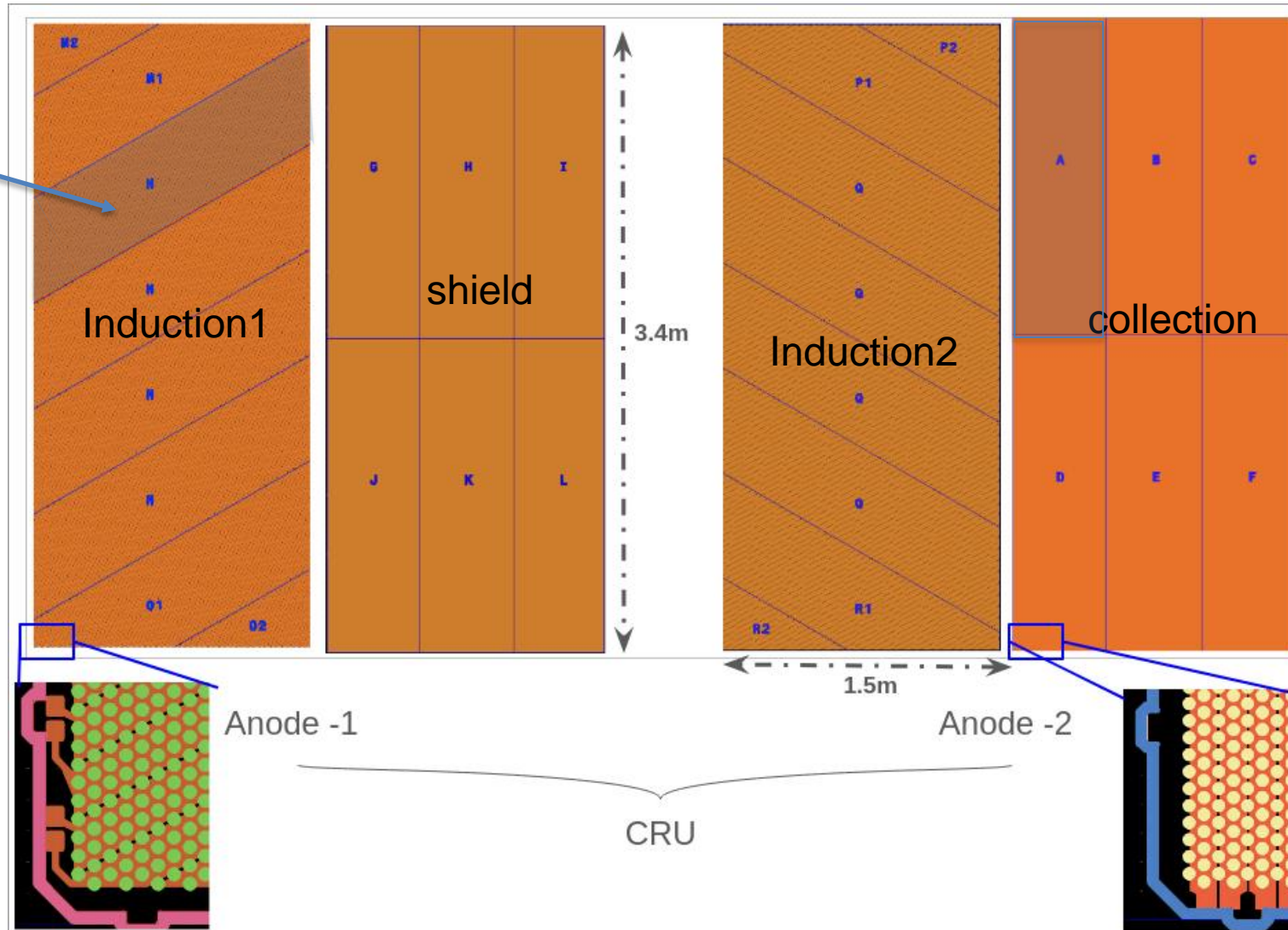
Postponed to beg of 2025

CRP Factories: (Main factory PRR and follow-up later for the second site)

- Grenoble and CERN Factories: first in March 2025 (TBC)
- US factories: Yale and 2nd site TBD: first in Jul 2025, second in Sep 2025
- **Bottom CRP support:** adapter plates + feet : Sept 2025
- **Top SST :** March 2025
- **Top cable trays:** March 2025
- **suspensions + decoupling system:** June 2025

22 different types of PCB panels

Shaded types are the ones produced and received for QC



Sketch by Serhan