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# Purity monitors for NP04 and NP02

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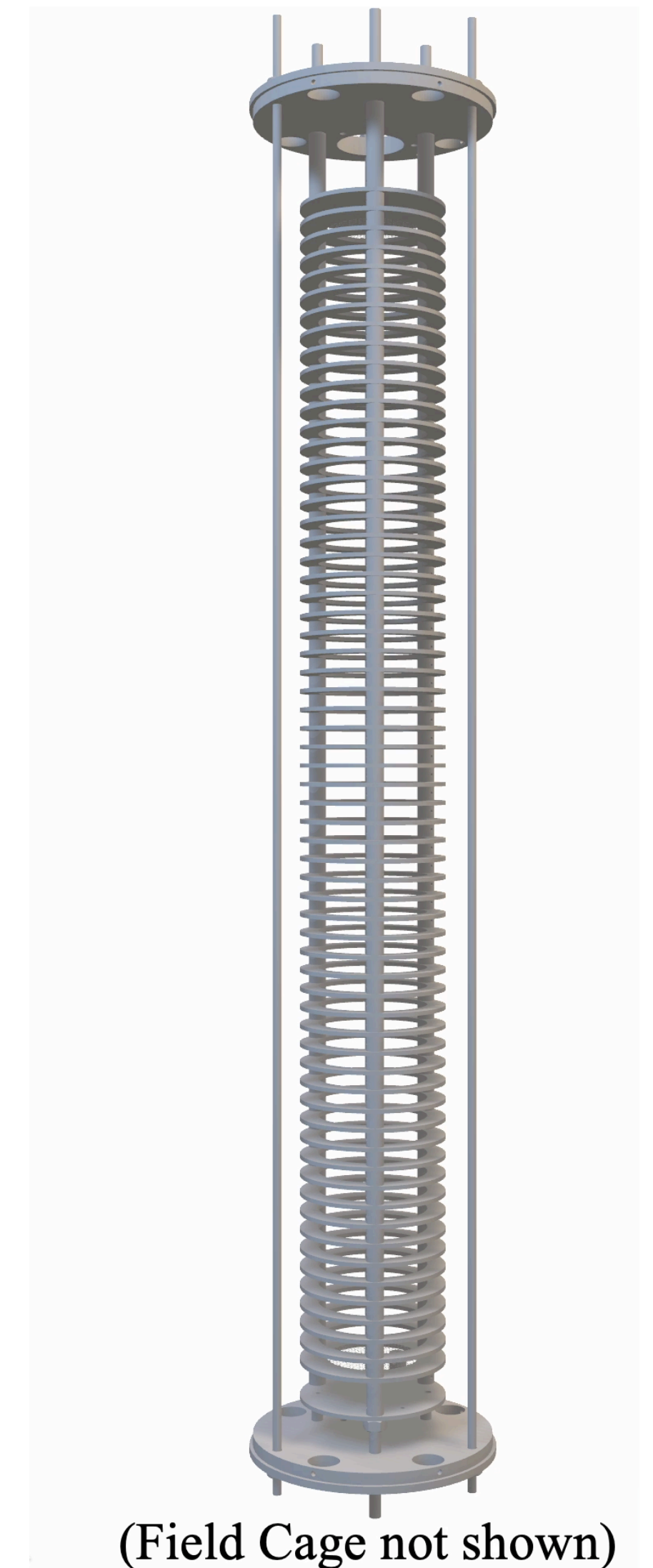
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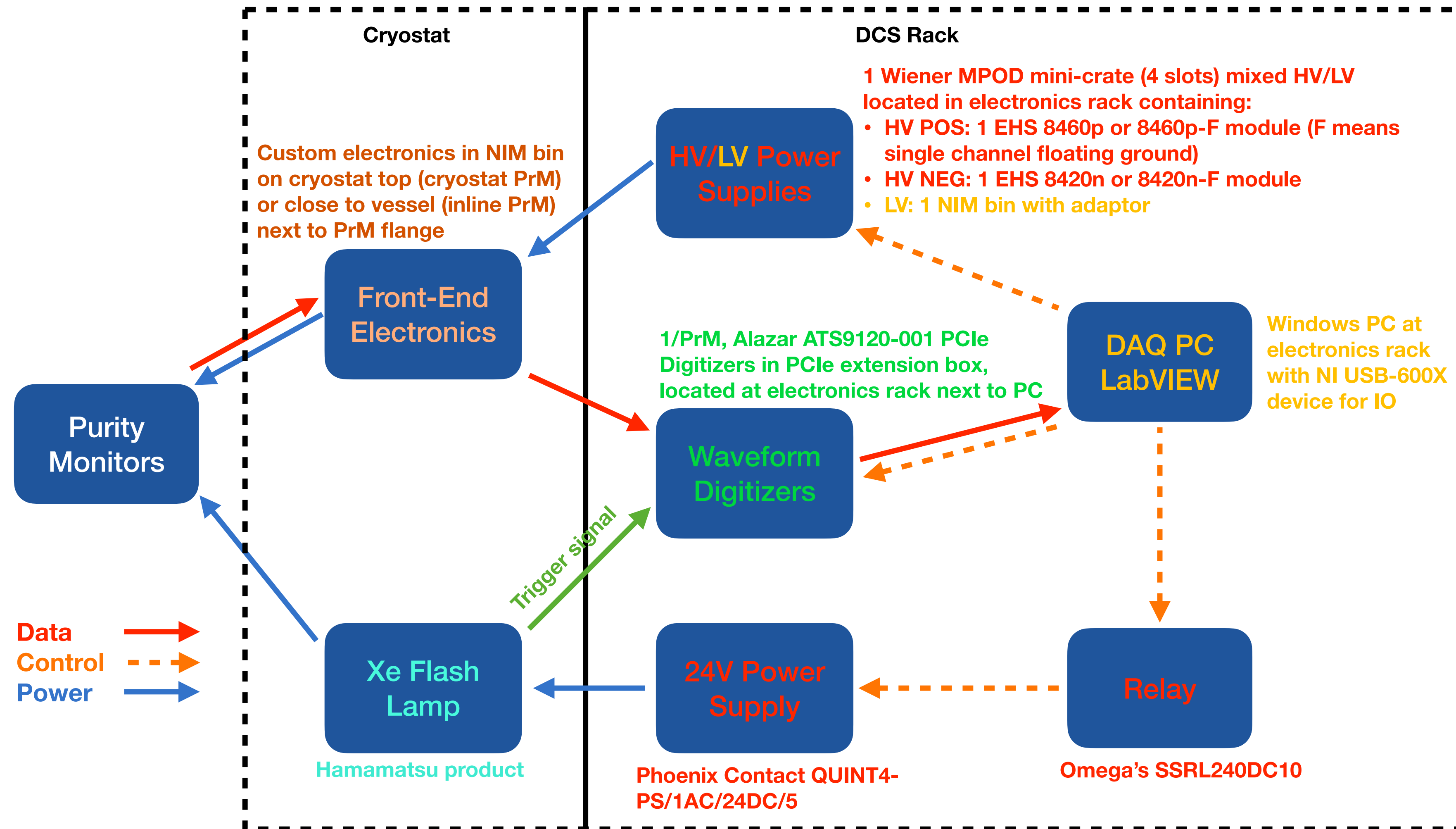
# Reminder of PrMs in ProtoDUNE-HD

- ProtoDUNE-I SP has 3 PrMs located inside the cryostat, outside the field cage, with the same length of 25 cm
- For ProtoDUNE-II HD, 2 of the 3 PrMs (top and middle) will be reused
  - Top PrM: remain as the top PrM
  - Middle PrM → Bottom PrM
- A long purity monitor (75 cm) will be installed as the new middle PrM
  - Reduce the systematic uncertainty in the absolute lifetime measurement
- The long PrM was shipped and assembled at CERN
  - Performance tests in vacuum and mechanic-robustness tests in LAr have been carried out



# Preparation for the installation

The workflow has been tested with the test stand, and is working with no problem



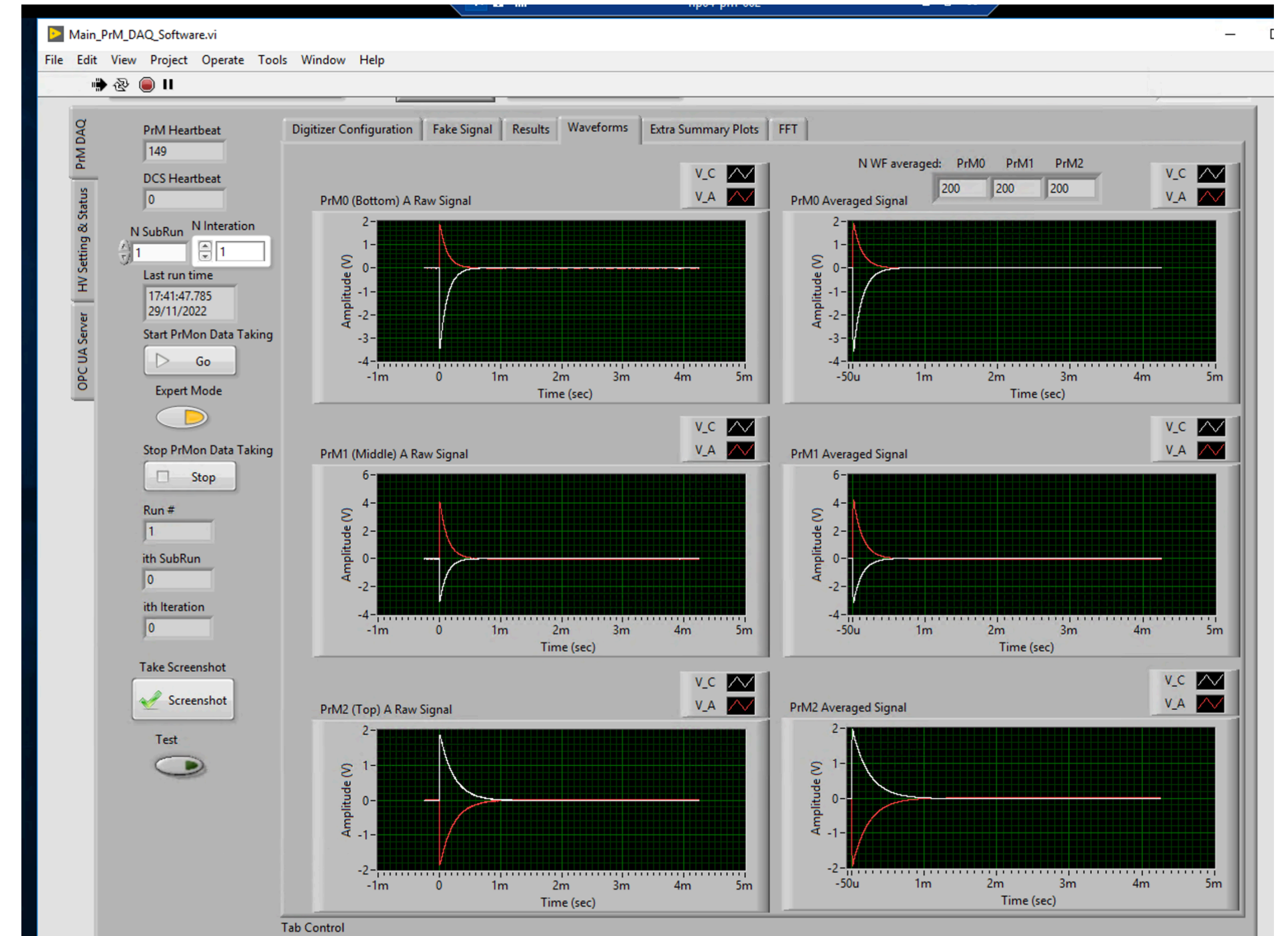
# Current status

- Store the PrM assembly in the long pipe and wait for inserting to the cryostat
  - Storing PrM in the vacuum environment is better for the photocathode performance
  - The insertion will wait until the filling



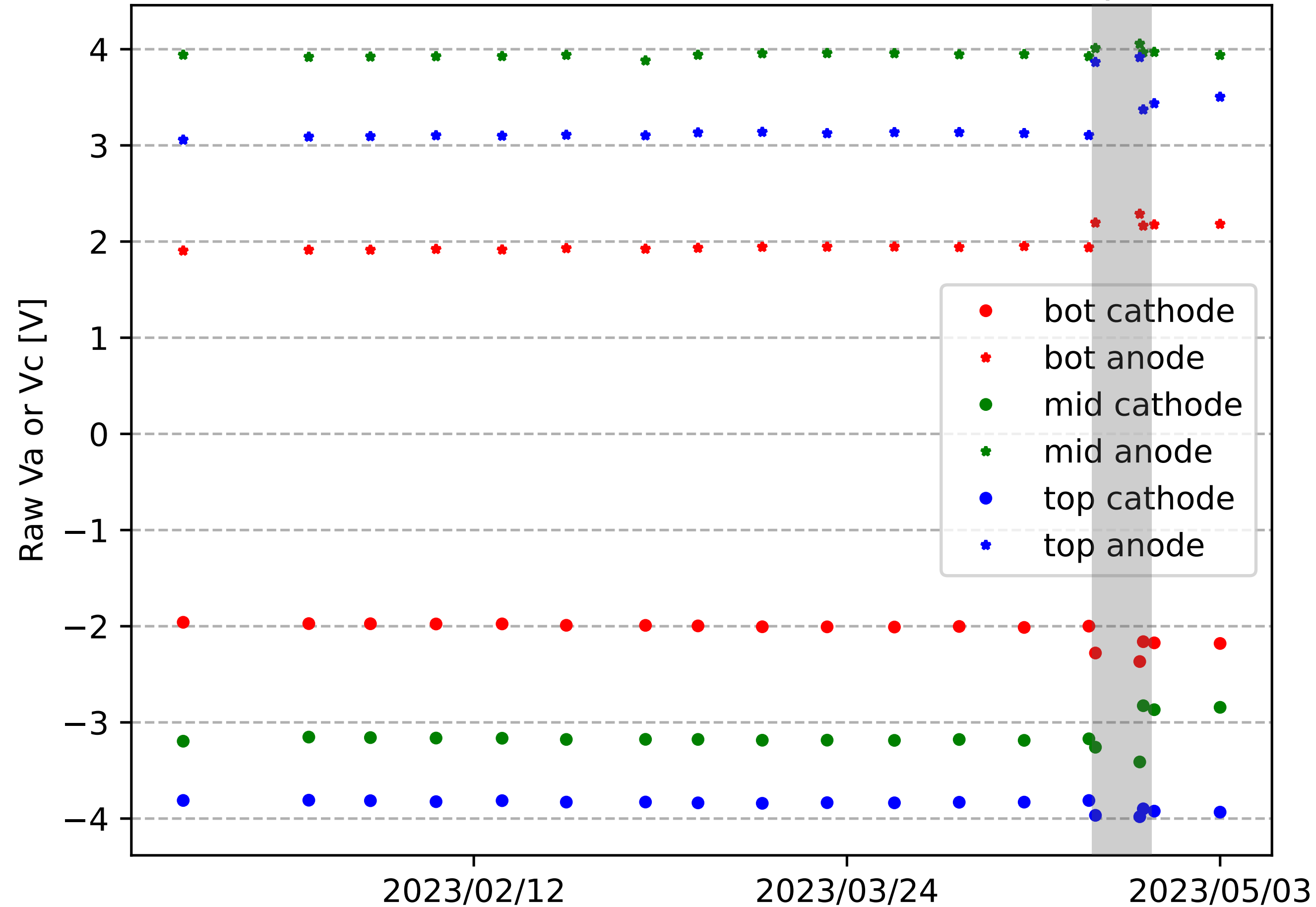
# Current status

Connect the readout to the DCS system so we can remotely monitor the performance



# Current status

disturbance from moving the long pipe:  
vacuum condition, optical fiber location



In general, the photocathodes are performing as good as from the beginning.

No sign of degradation so far.

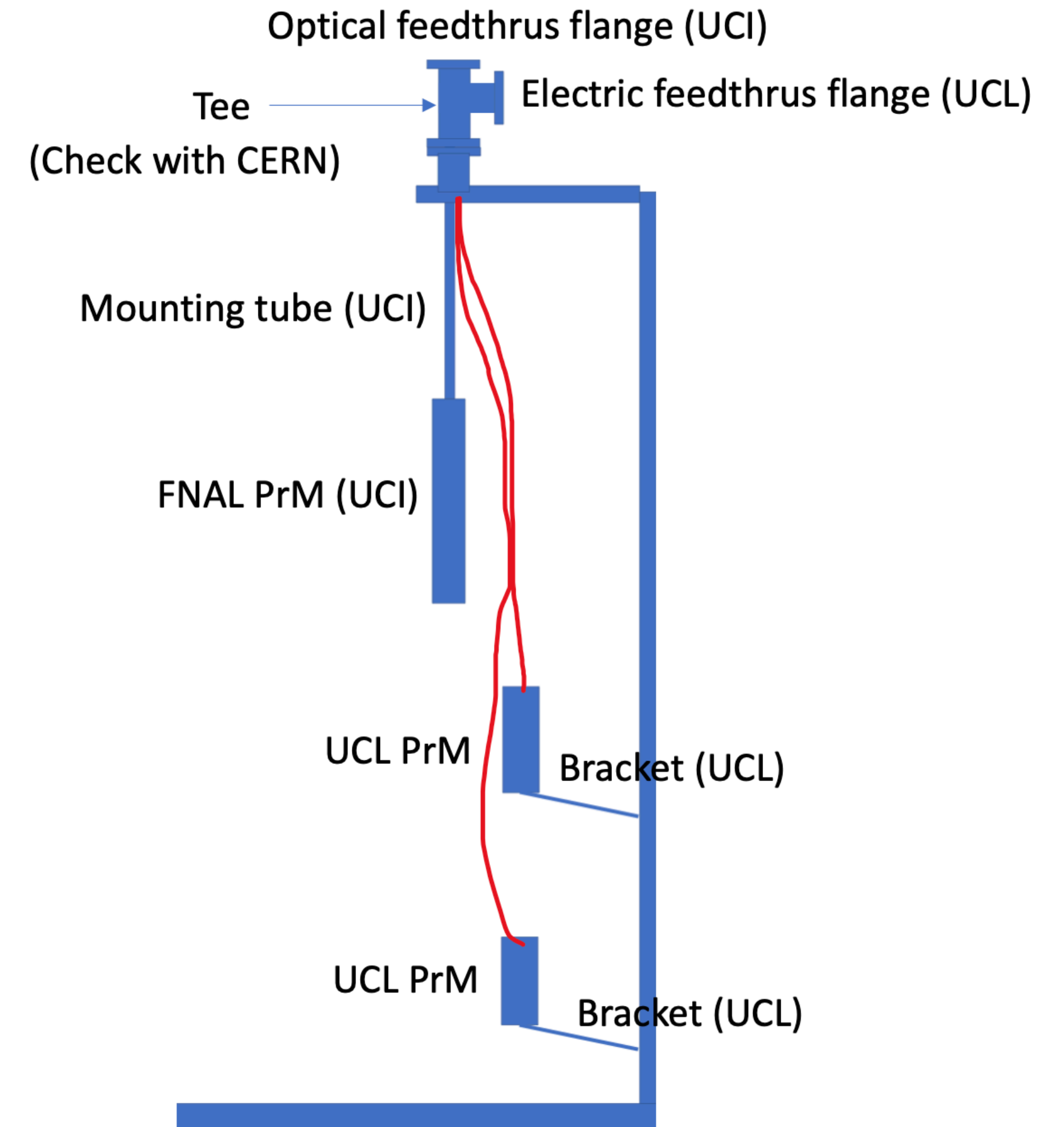
# PrMs in ProtoDUNE-VD

- Three purity monitors were installed for ProtoDUNE-DP, and they'll be reused for ProtoDUNE-VD
  - Two short purity monitors, drift length ~20 cm (UCL)
  - One long purity monitor, drift length ~50 cm (UCI)
- They were disassembled, need to be re-furbished and re-installed this year



# Installation plan

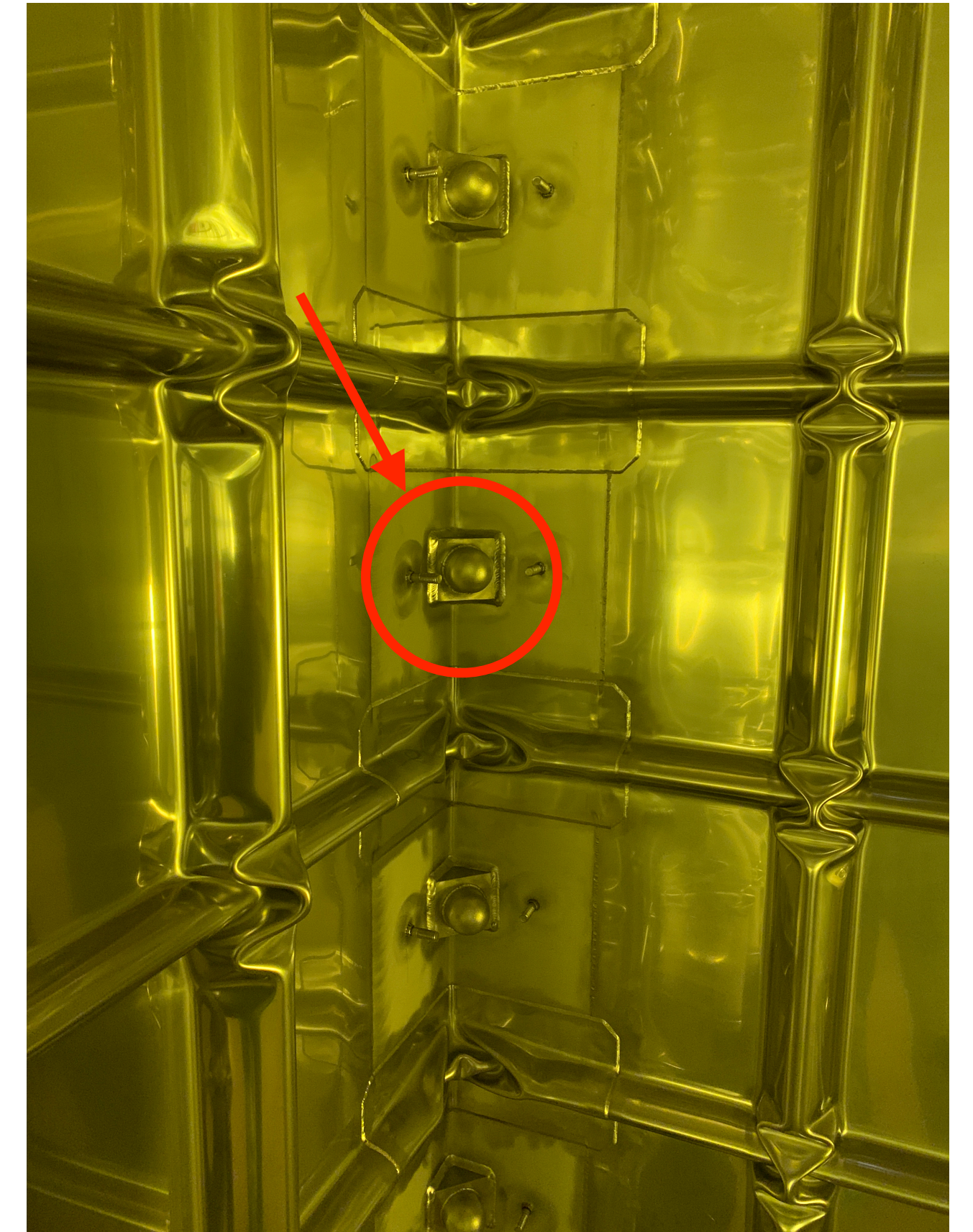
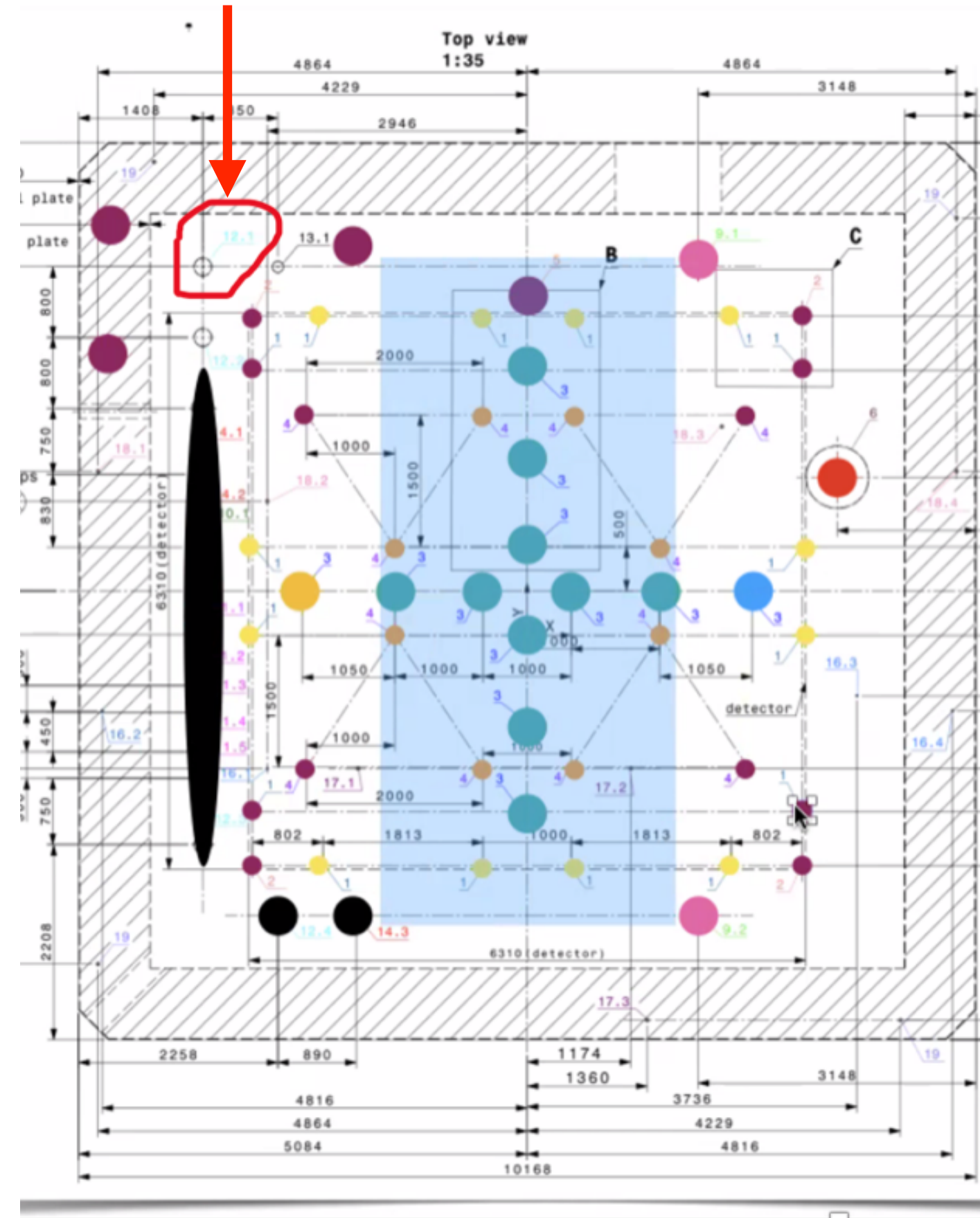
- Two short purity monitors each supported by a bracket mounted to the wall
- The long purity monitor mounted from the top flange by a tube





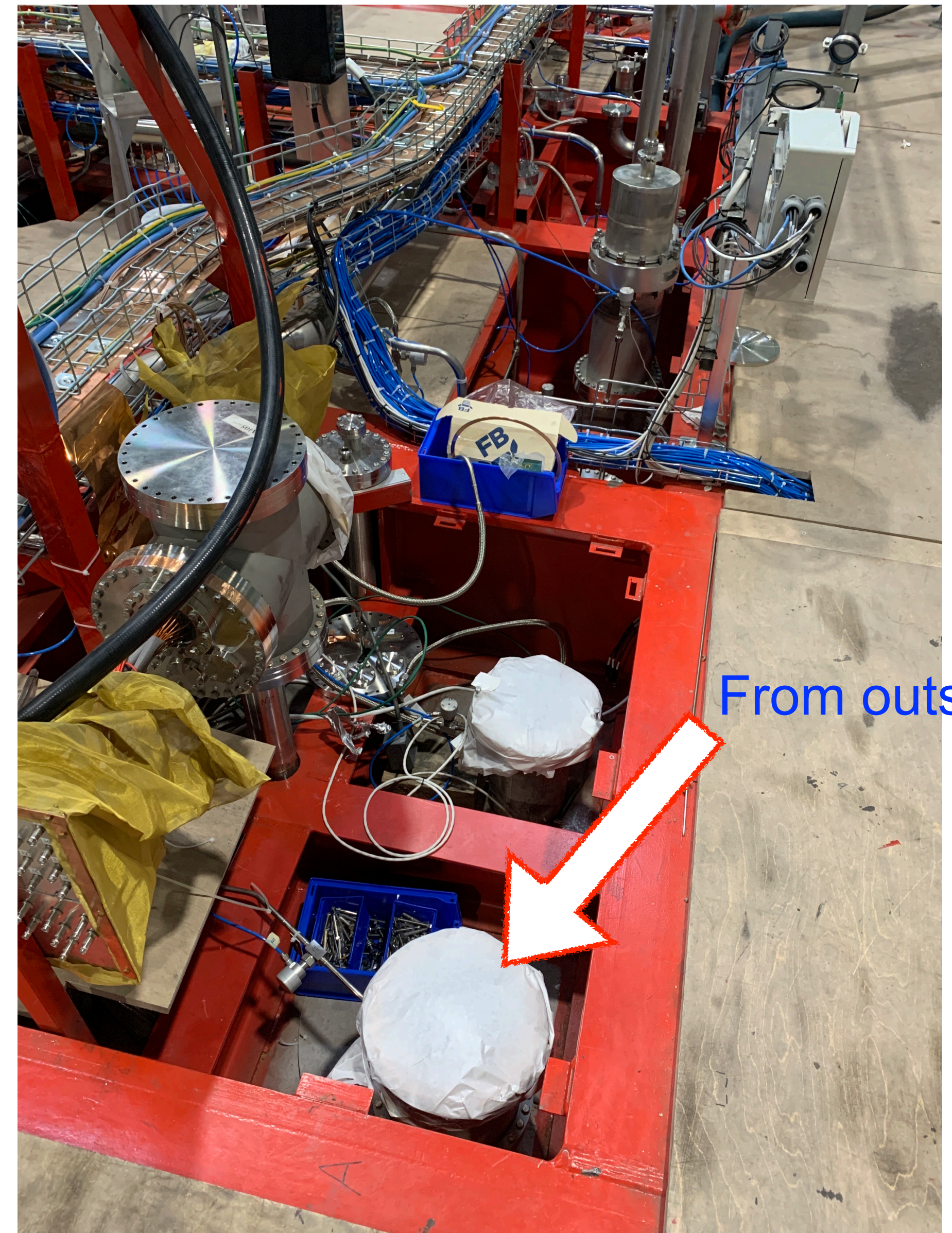
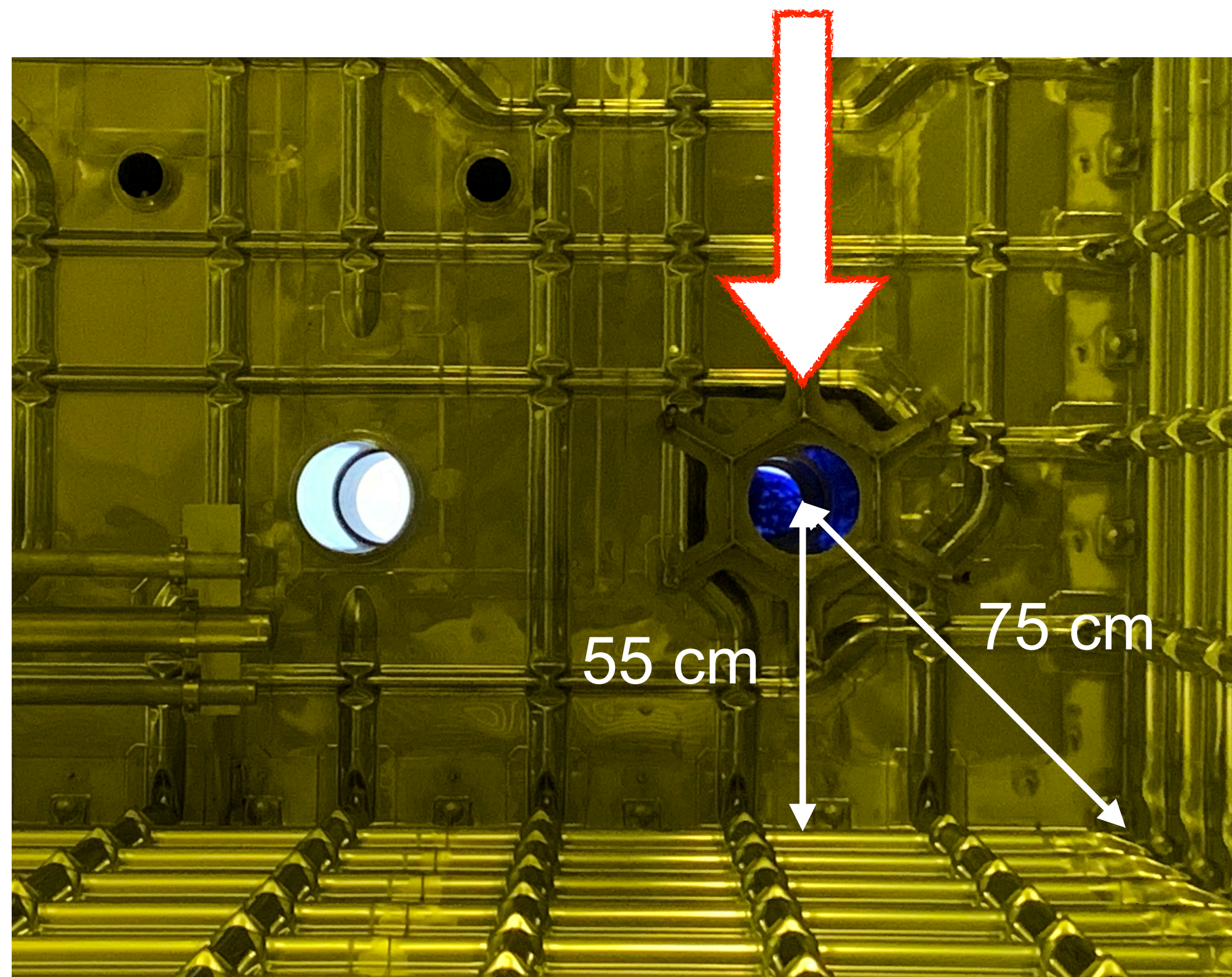
# Port reserved for PrMs

- Port 12.1 is reserved for PrMs
  - It's located near the corner, where bolts can be used to secure the brackets for short PrMs
  - The distance from 12.1 to the wall is still large enough

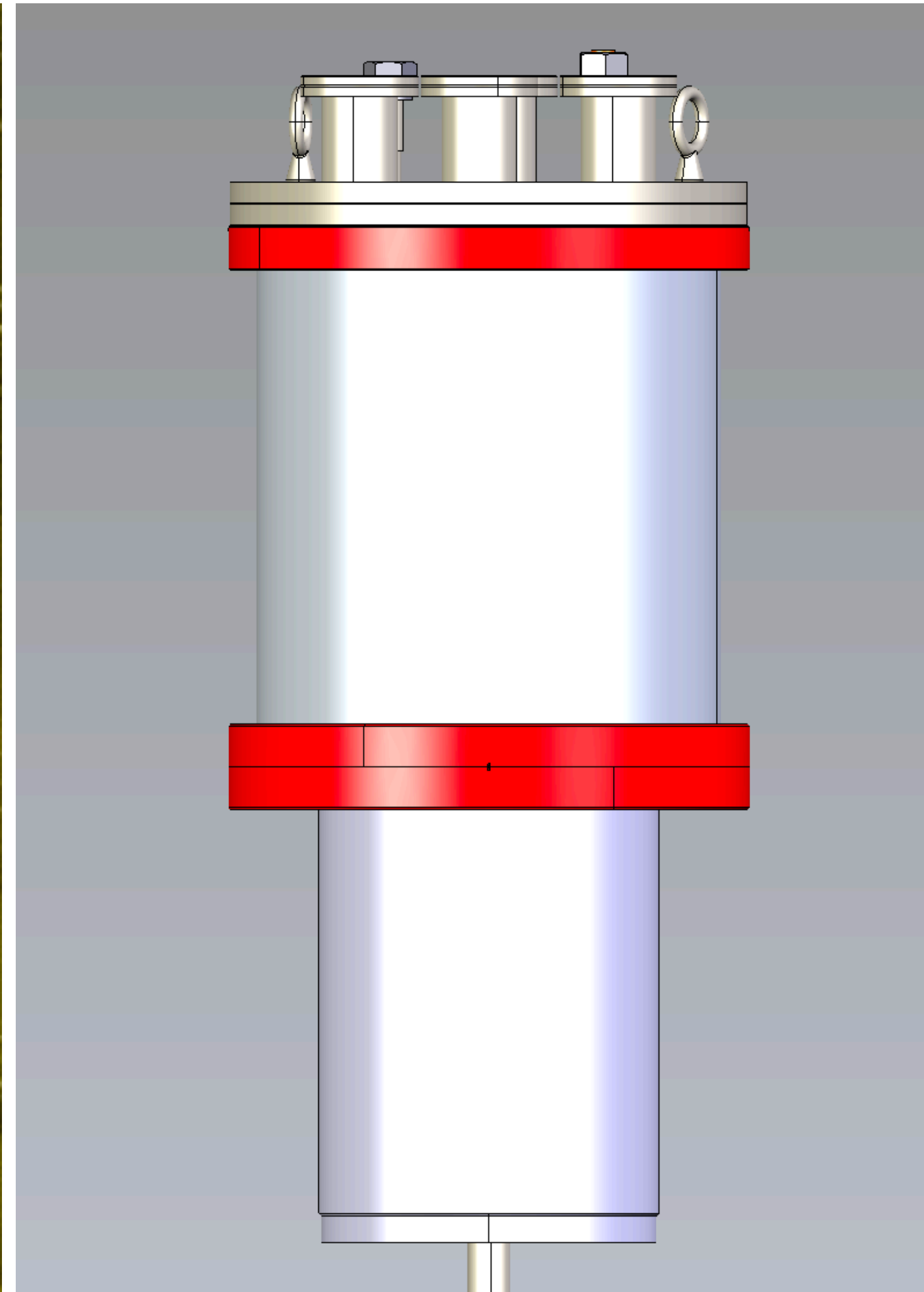
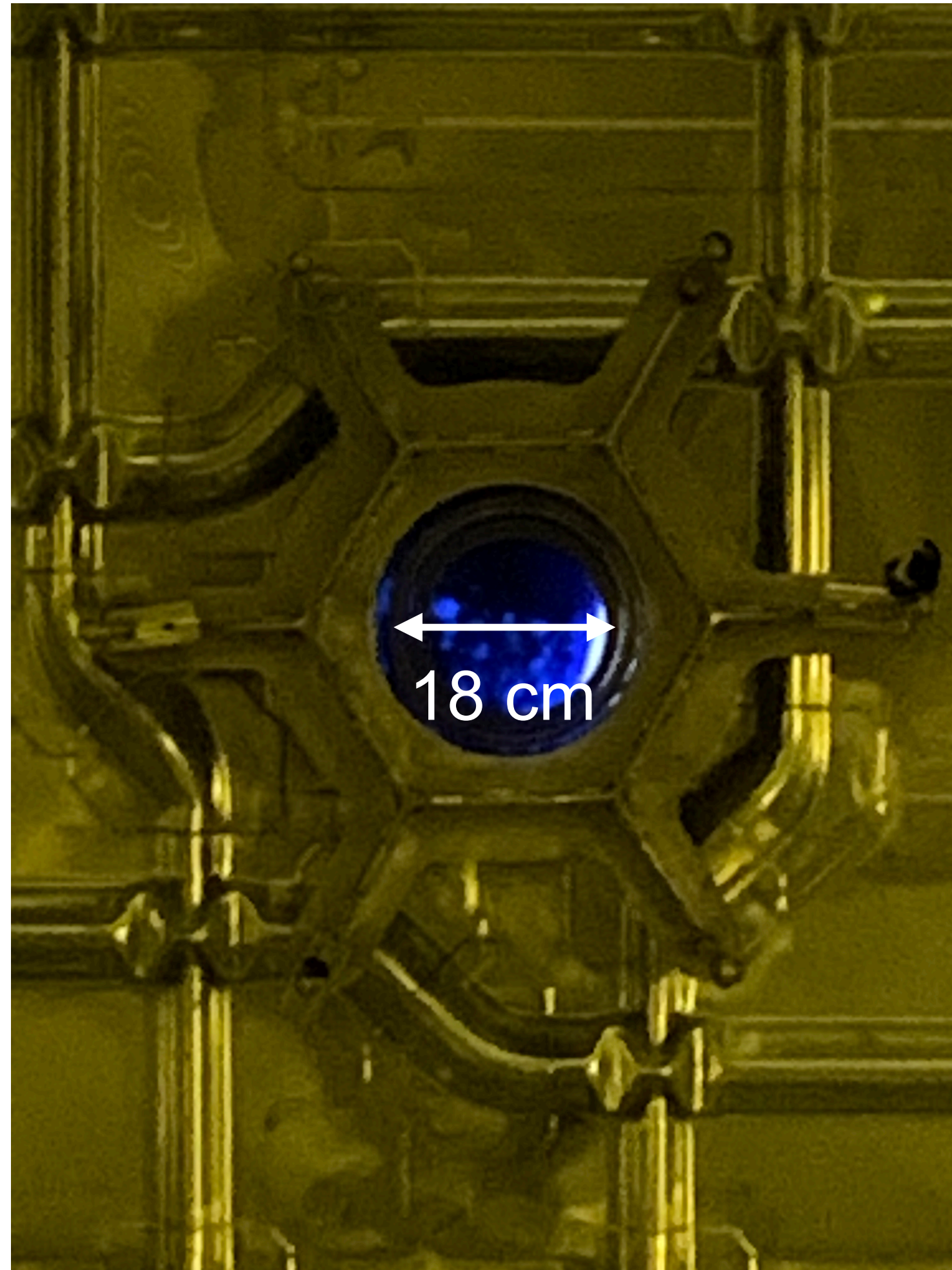


# Port reserved for PrMs

From inside

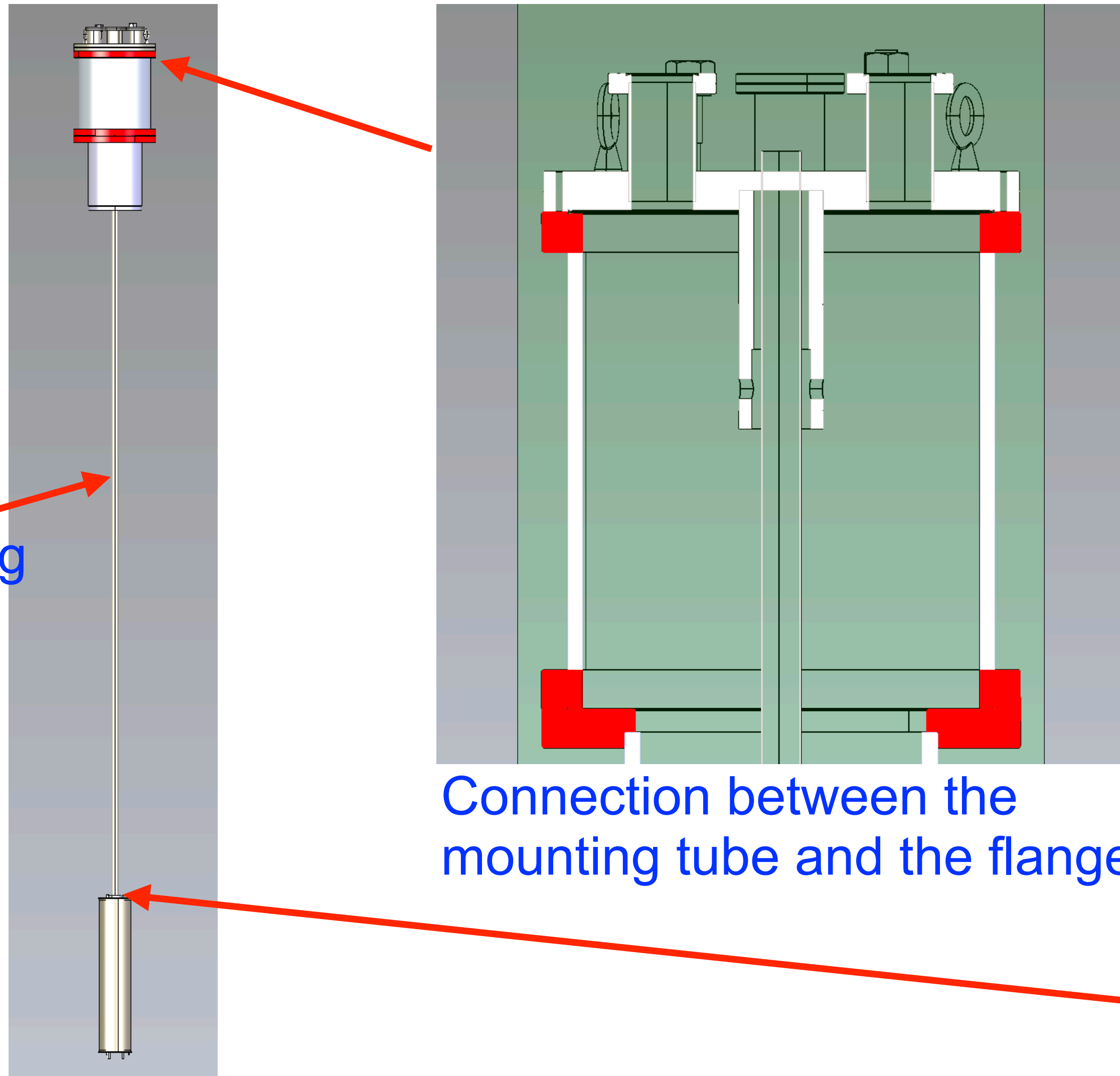


# Installation plan

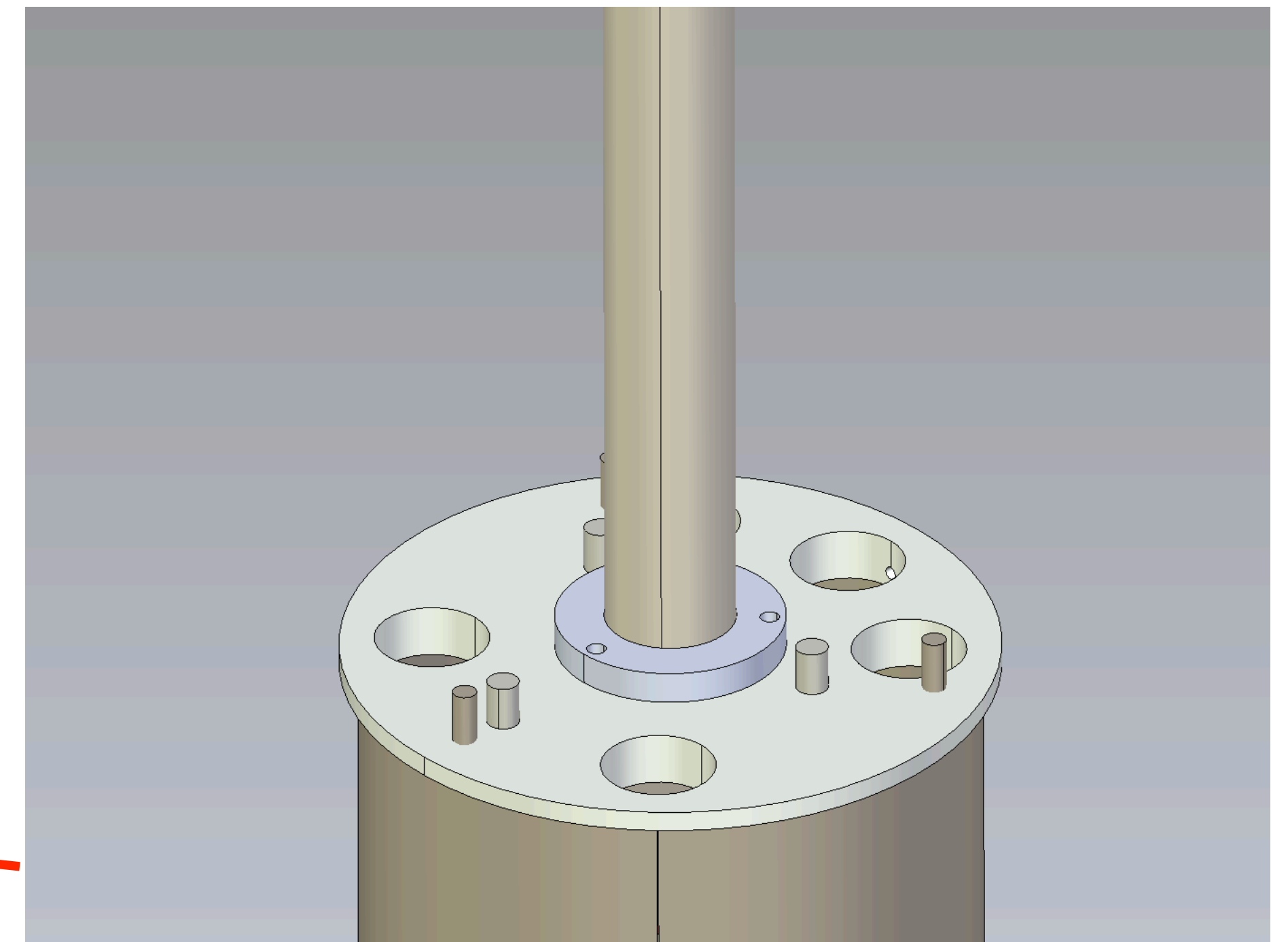


- Will fabricate an extension pipe in order to incorporate all feedthroughs
  - 3 electric feedthroughs
  - 1 optical fiber feedthrough

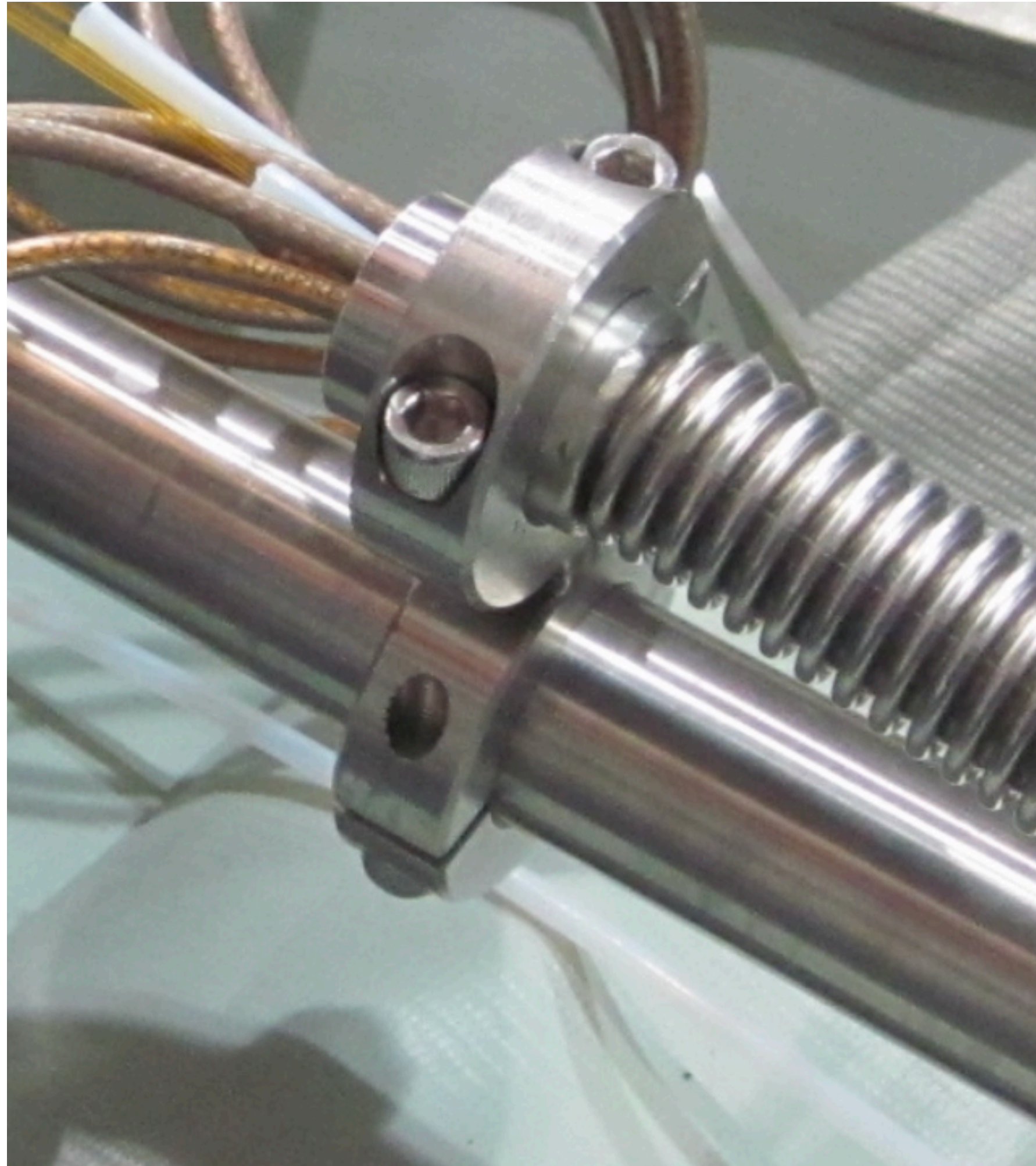
# Installation plan



Connection between the mounting tube and the PrM

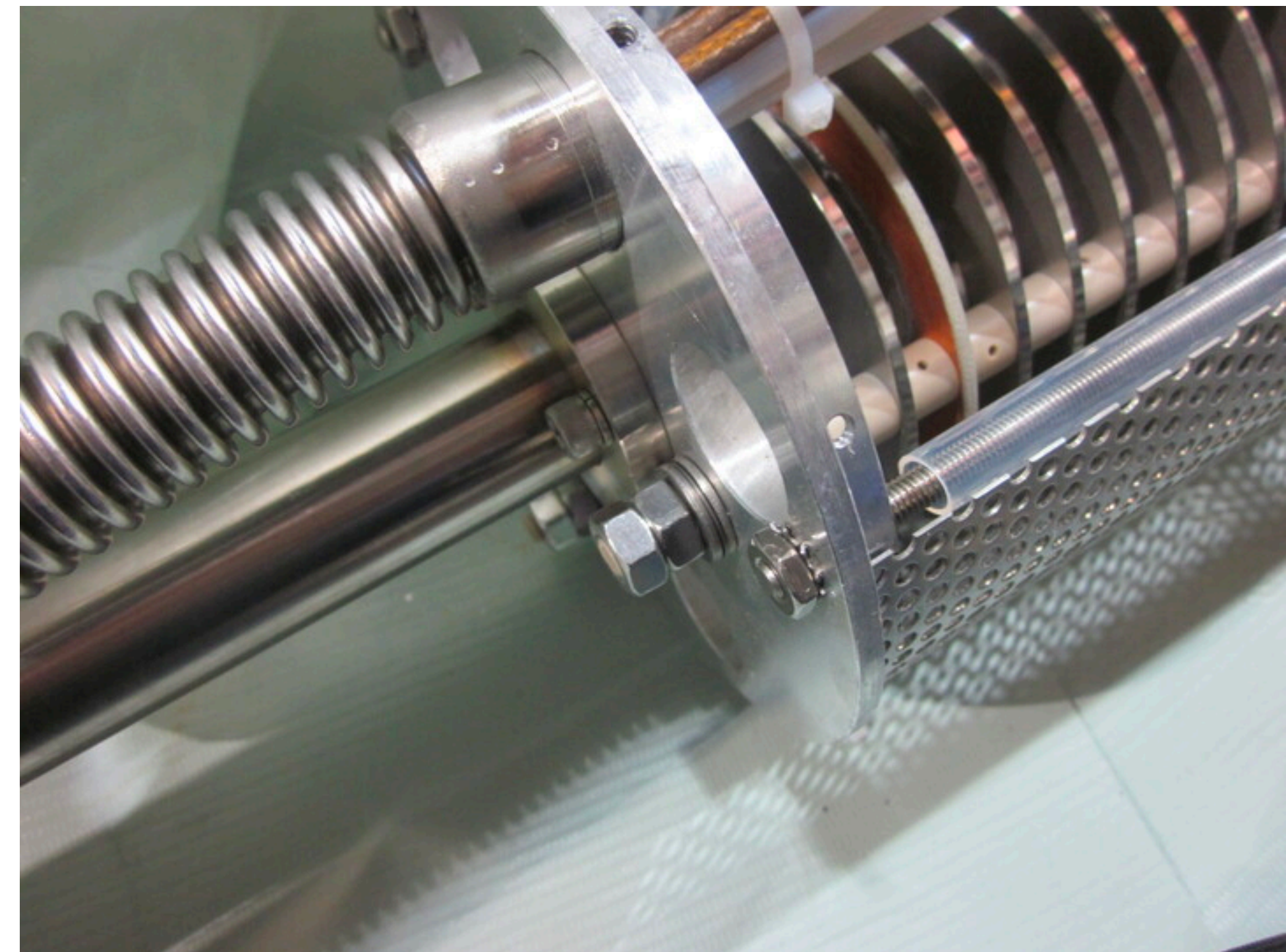


# Installation plan



Cables and optical fibers will be protected by a flexible bellow

The bellow will be fixed on the mounting tube by a double clamp



# Summary



- PrMs for HD are sitting in the vacuum pipe, waiting for insertion
  - No sign of degradation of the photocathodes
- The long purity monitor for VD is being refurbished and reinstalled
  - Will fabricate the components for installation when the drawings are complete
  - Will assemble the purity monitor and test the performance

# Backup Materials

# Port 12.1

