

# **Closing/Conclusions from WCTE Meeting**

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WCTE Collaboration Meeting  
Wednesday, Dec. 1, 2021



# East Area Tour - Wall Height

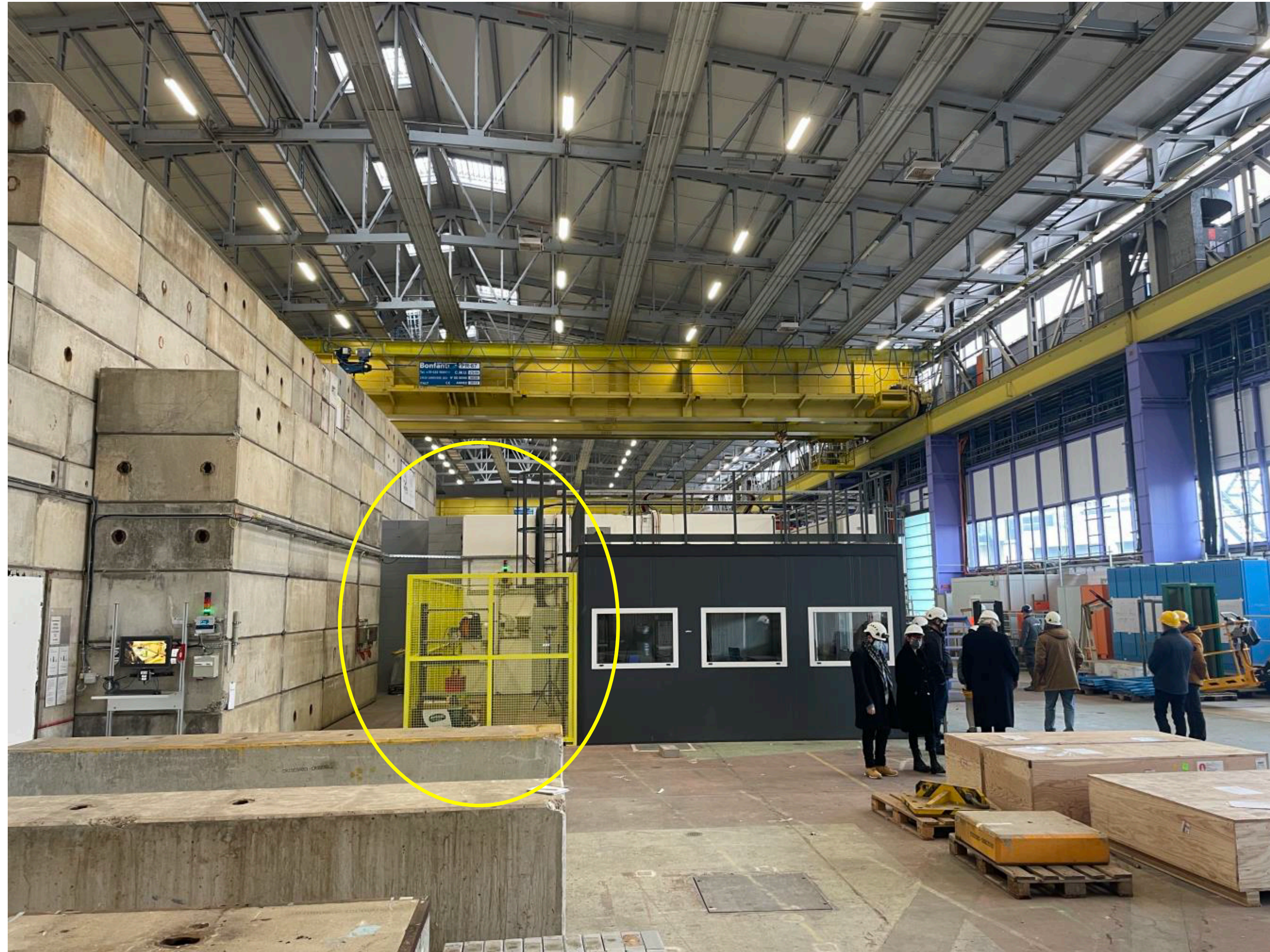


View from downstream of T9

- Identified gap between cable tray and shielding wall where we can bring in detector
- Gains ~500 mm additional clearance
- Requires temporary removal of shielding blocks
  - Confirmed that this can be done as long as beam to the irradiation facility is turned off



# East Area Tour - Water System Area



View from downstream of T9

- Area in yellow fence is identified as potential location for water system
- ~2 m wide
- There is a conduit that runs under the floor/wall that we could use for the water system pipes/hoses
- Was suggested that we should also consider going over the wall
- Are flexible hoses acceptable for water circulation?



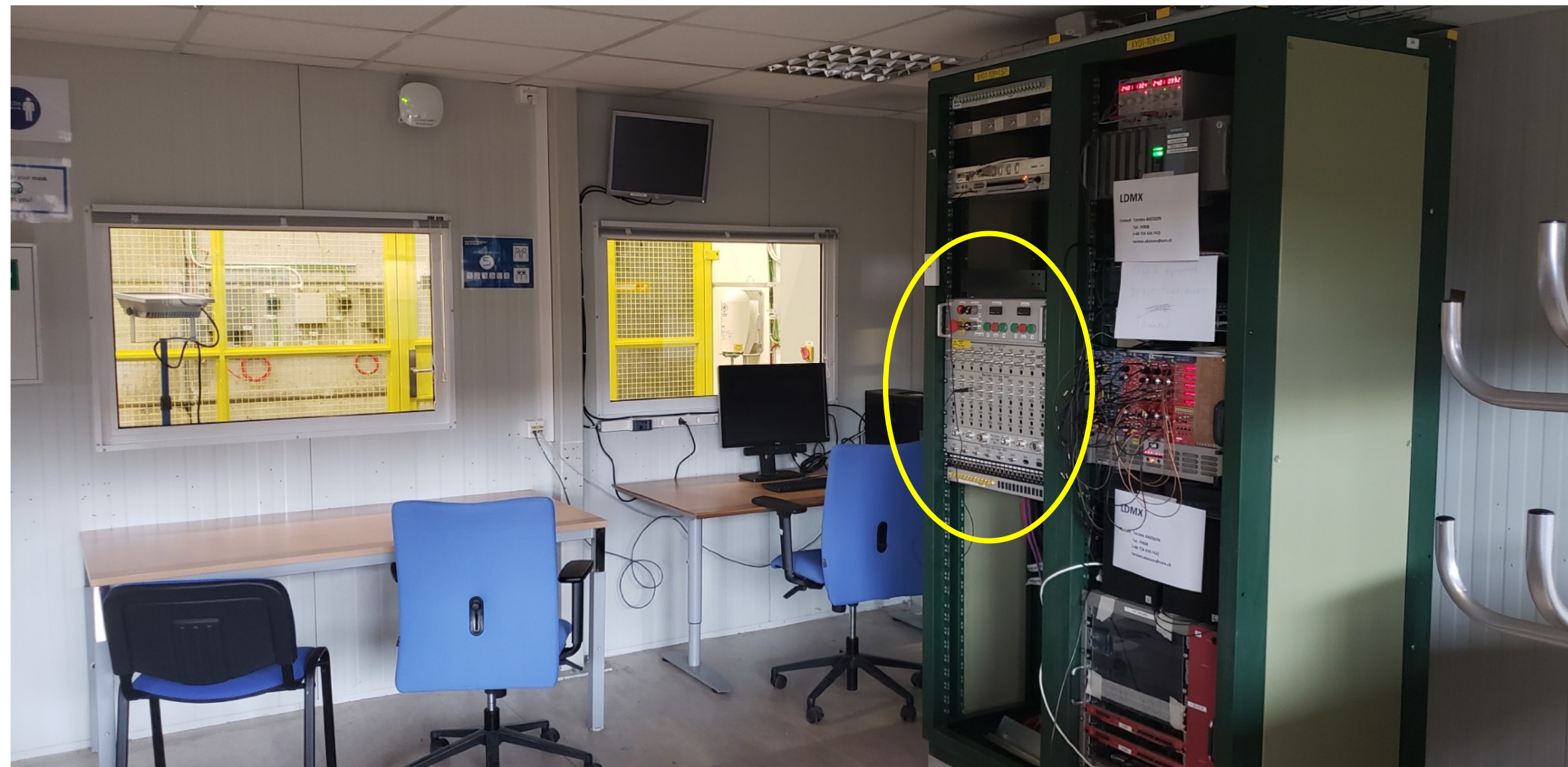
Opening in floor for conduit into experimental area



# East Area Tour - Control Room

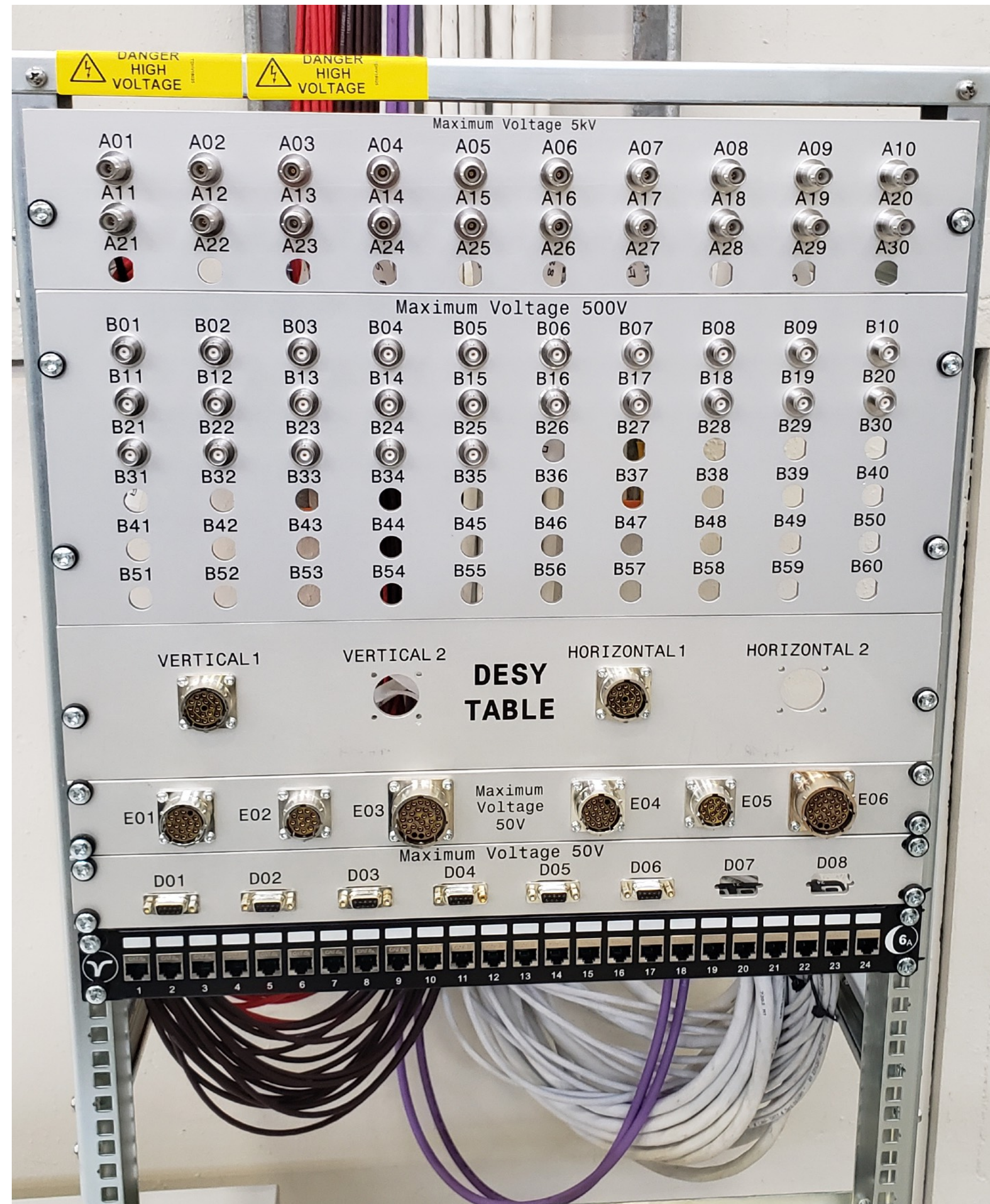


- Appears to be plenty of space in the control room
- Two racks installed - one used by LDMX at the moment
  - Additional racks can be added if necessary
- Panel with connectors for cables running into the experimental area





# East Area Tour - Cable Panel



- Cable connector panel in the experimental area
- Includes HV and LV cables
- Includes network cable connections
- Are these sufficient for us?



# East Area - Gas Systems

Area outside of T9  
for gas bottles and  
mixing



- They do have a reclamation system (for SF6) - asked for more details
- Do we bring our own mixing apparatus? If not, we can request CERN support
- They have R134a, SF6 and butane

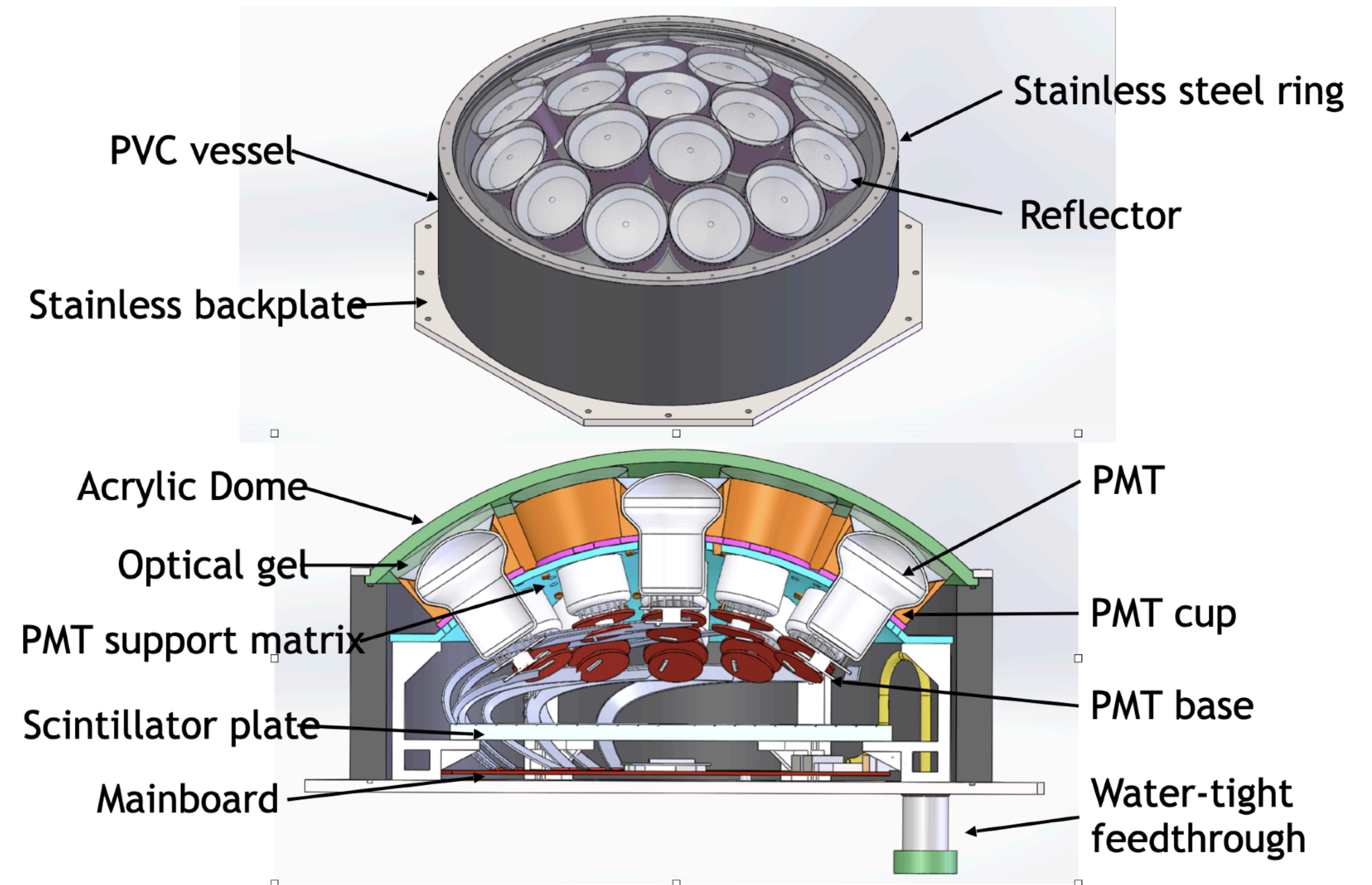


Cabinet inside  
experimental area



# PVC Fire Hazard

- Met CERN fire safety engineer - Fabio Corsanego
- Concern about CERN policy against the use of PVC (multi-PMT cylinder)
- Good news - derogation from the CERN rule is possible
- We will prepare a derogation document that includes:
  - Which other materials were considered and why they cannot be used
  - Quantity of material to be used
  - Compensatory measures to be taken - for example overcurrent protection for electronics to avoid fire





# Muon Identification

- Important aspect of the secondary beam operation is muon identification (separation from surviving pions)
- A. Konaka showed that combination of TOF and aerogel threshold detectors should be enough:
  - $n=1.10$  aerogel for 300MeV/c beam
    - #PE = 91(e), 32( $\mu$ ), 0( $\pi$ )
  - $n=1.04$  aerogel for 500MeV/c beam
    - #PE = 36(e), 16( $\mu$ ), 0( $\pi$ )
  - $n=1.02$  aerogel for 700MeV/c beam (using  $n=1.012$  data)
    - #PE = 31(e), 13( $\mu$ ), 0( $\pi$ )
  - at 300MeV/c, 9m of path length
    - $t(\mu) - t(\pi) = 1.2\text{nsec}$
    - TOF system provides enough separation below 300MeV/c
- This can be an opportunity for a small-scale but important contribution to WCTE

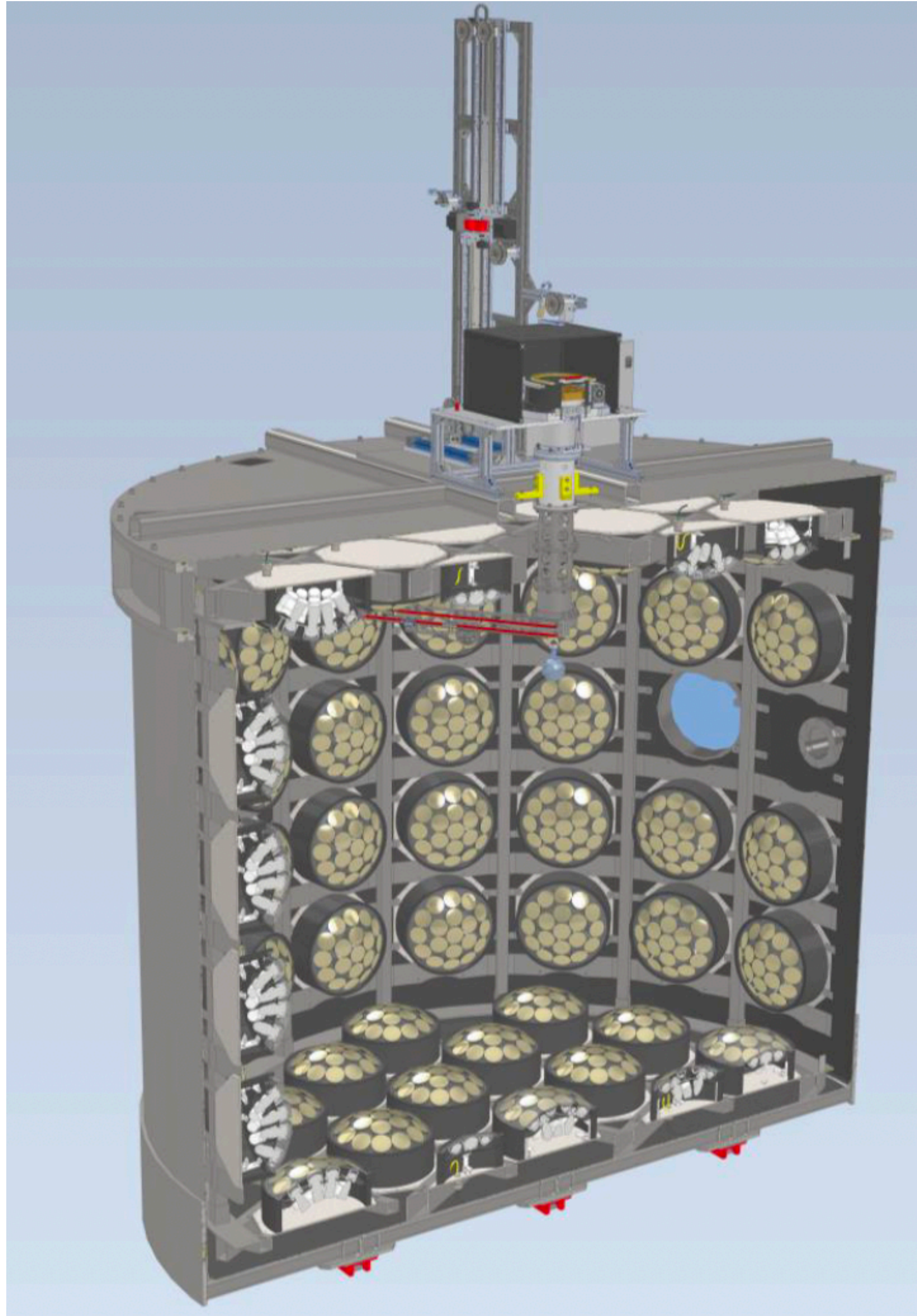


# Low Momentum Secondary Beam

- It was confirmed that the secondary beam line should be able to operate down to at least 200 MeV/c with the new power supply
- They plan measurements of beam composition during March 2022 commissioning
- For sub-GeV/c particle ID, they have TOF measurement over  $\sim 8$  m with 150-200 ps resolution
  - Should be good enough for mu/pi fraction measurement below 1 GeV/c (statistical fit above 500 MeV/c)
- If aerogel Cherenkov threshold detectors could be ready sometime next year, they may be interested in a low momentum run with those detector
- Are hadron fractions at 200 MeV/c enough to not need the tertiary beam configuration? Pion fraction would be suppressed by factor of  $\sim 100$  by decay-in-flight



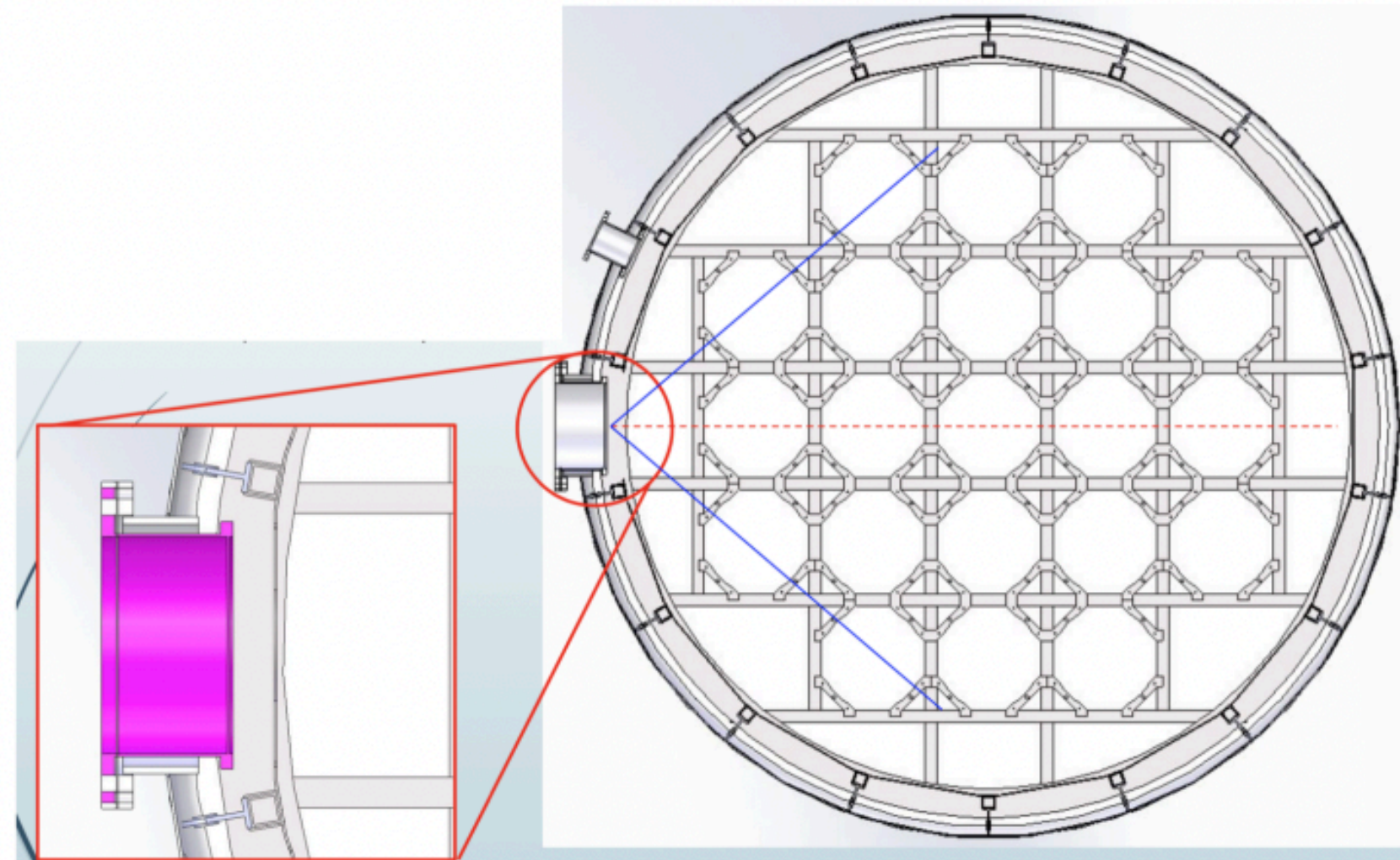
# Detector/Beam Window Height



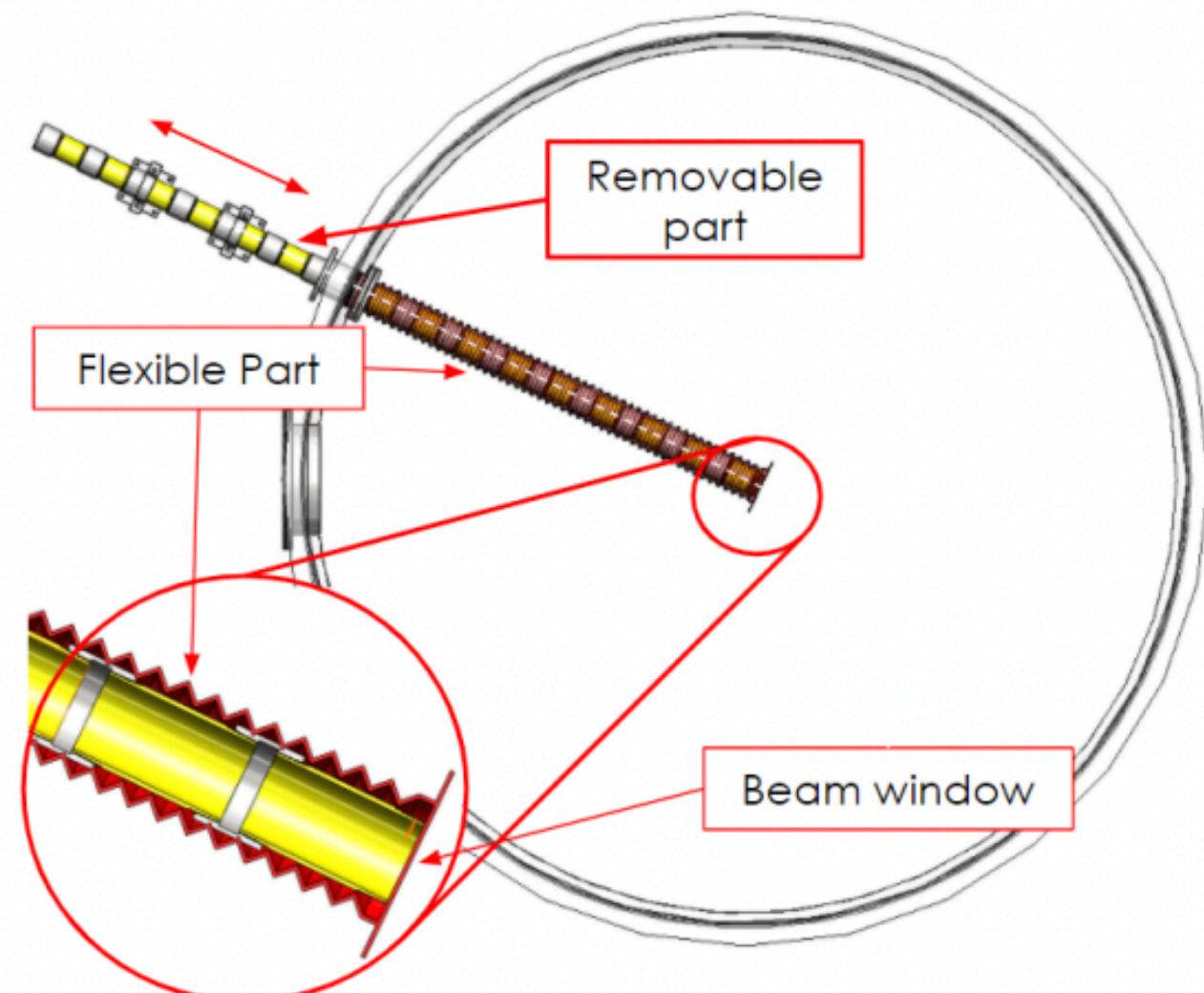
- In order to reduce the detector height so it can be lifted over the wall, we are planning to reduce the rows of PMT from 5 to 4
- Should agree to this change after completion of simulation/reconstruction studies by L. Anthony
- Need to decide if beam window should be in 3rd or 2nd row from the bottom
- If we keep it in third row from bottom, height of window doesn't change
- If we move it to second row from bottom, detector should be raised by ~80 cm which equals the shielding block height



# Beam Windows



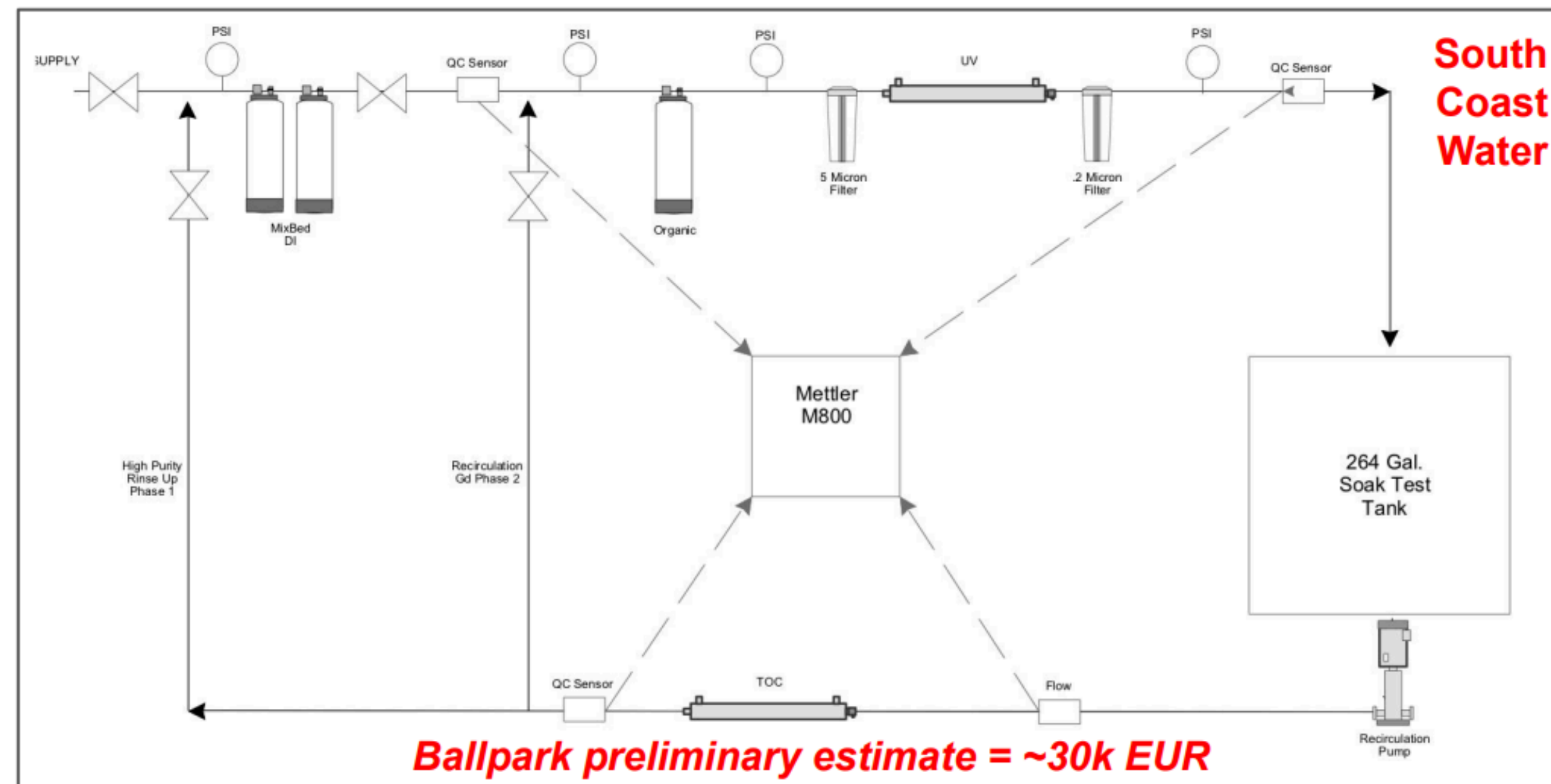
- The beam window's designs are still open questions
- Should the large tertiary beam window be inside the tank rather than outside to minimize shadowing and/or energy loss in the water?
  - Simulation study by Y. Alj Hakim is started
- Do we need an adjustable beam pipe for the secondary beam configuration?





# Water System

- Water system group is formed and basic development is started
- Test system at IPMU will allow for a better understanding of which components are necessary to achieve water quality required by WCTE



P. de Perio



# Supply Chain Challenges

- Both T. Lindner and R. Akutsu pointed out challenges in procuring PMT components
  - Optical gel is difficult to procure and has long lead times
  - Some electronics components have lead times out to autumn of next year
- Expect that similar issues may arise with other WCTE detectors/components
- Please consider to start looking at vendors and lead times as soon as possible
- We plan to update the schedule - new schedule should take into account any supply chain issues



# Towards a Technical Design

- We need to move as quickly as possible towards finalizing the WCTE design, particularly the interfaces between all WCTE sub-systems
- Encourage collaborators to work with Work Package leaders to fix design and interfaces of components
- We have started the draft of the TDR - all designs and interfaces should be documented here
- Time is tight, but work package groups should aim to have an initial draft before the holidays
  - Incomplete designs or interfaces can be documented as such in the initial draft



# Conclusion

- We have seen good progress on the design and prototyping of many WCTE systems at this meeting
- In-person communications this week have been invaluable
  - We will consider how to have more in-person activities in the future
- Thanks to everyone for participating in the meeting, even with early morning or late night connections
- We hope to receive good news about WCTE approval soon
- We can all look forward to moving ahead at full speed for WCTE!