

Status of IWCD Design and Construction

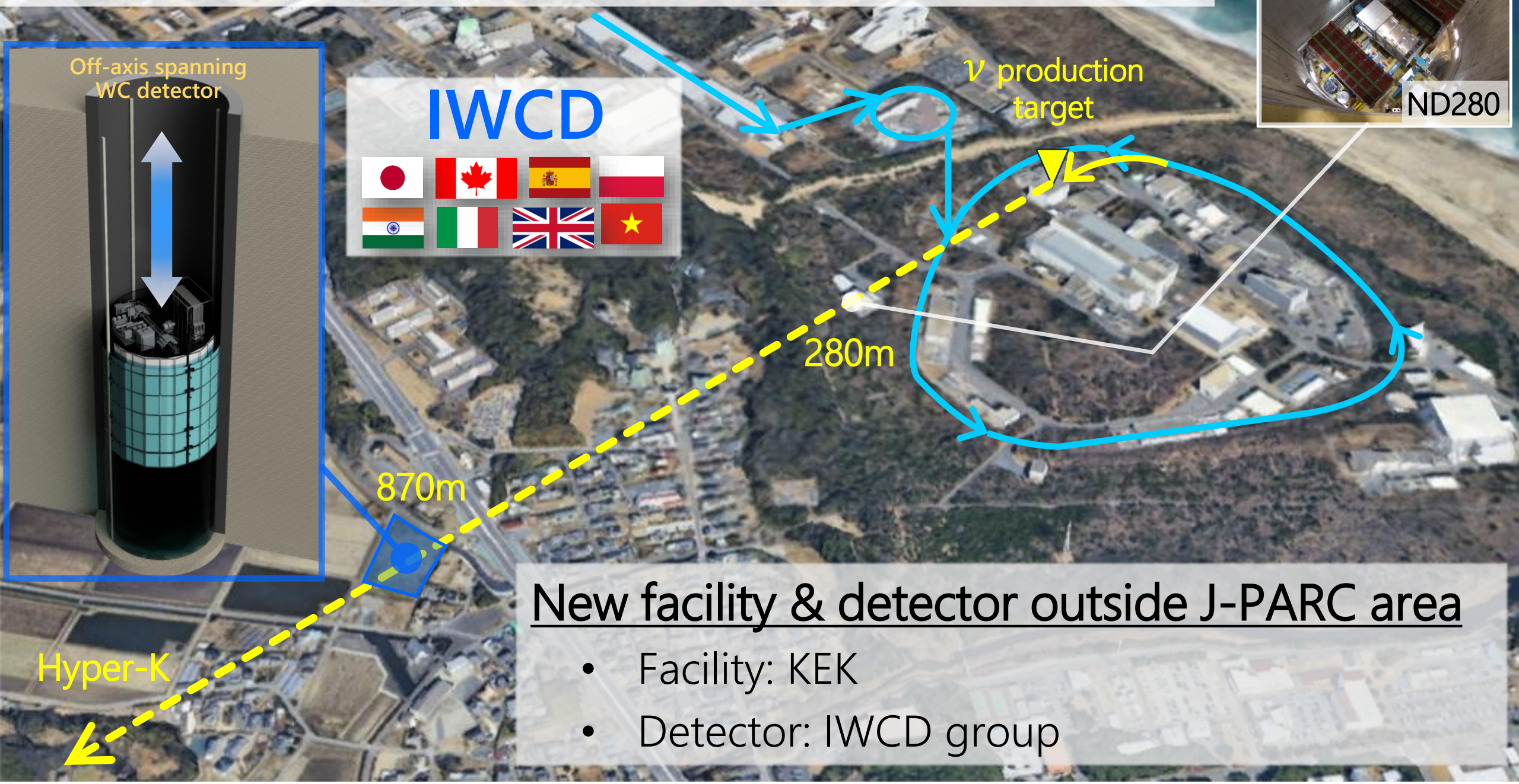
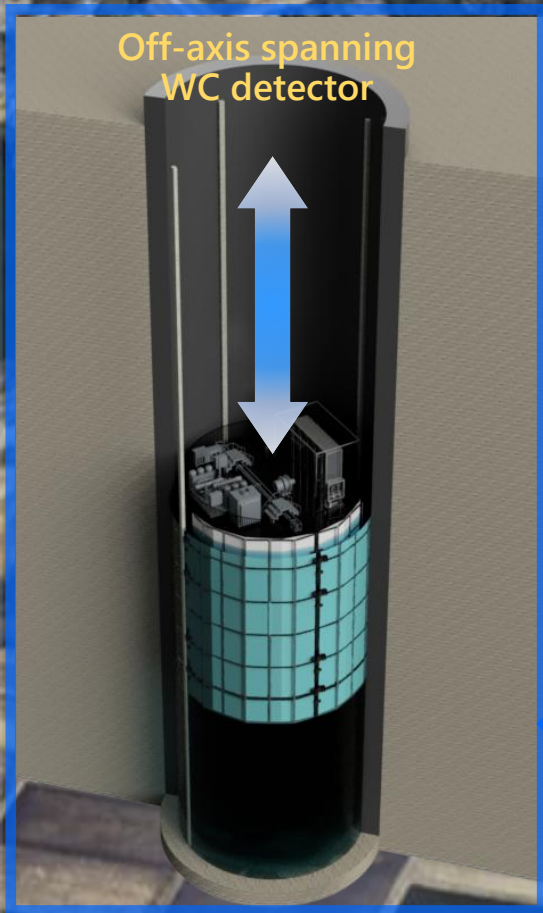


Ryosuke Akutsu (IPNS, KEK)

September 28th, 2026

KEK-Triumf Symposium

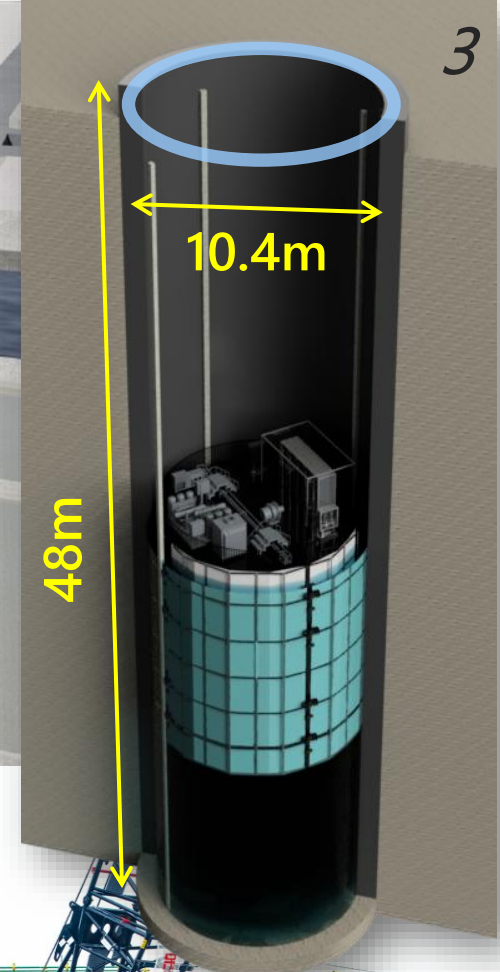
Intermediate Water Cherenkov Detector



New facility & detector outside J-PARC area

- Facility: KEK
- Detector: IWCD group

Progress on Facility



- Detailed design work completed in Mar. 2025
- Temporary access road constructed in Mar. 2025
- Facility construction started in Mar. 2025
- Ongoing pit excavation since Apr. 2026

Feb. 2025



Apr. 2025



Apr. 2026





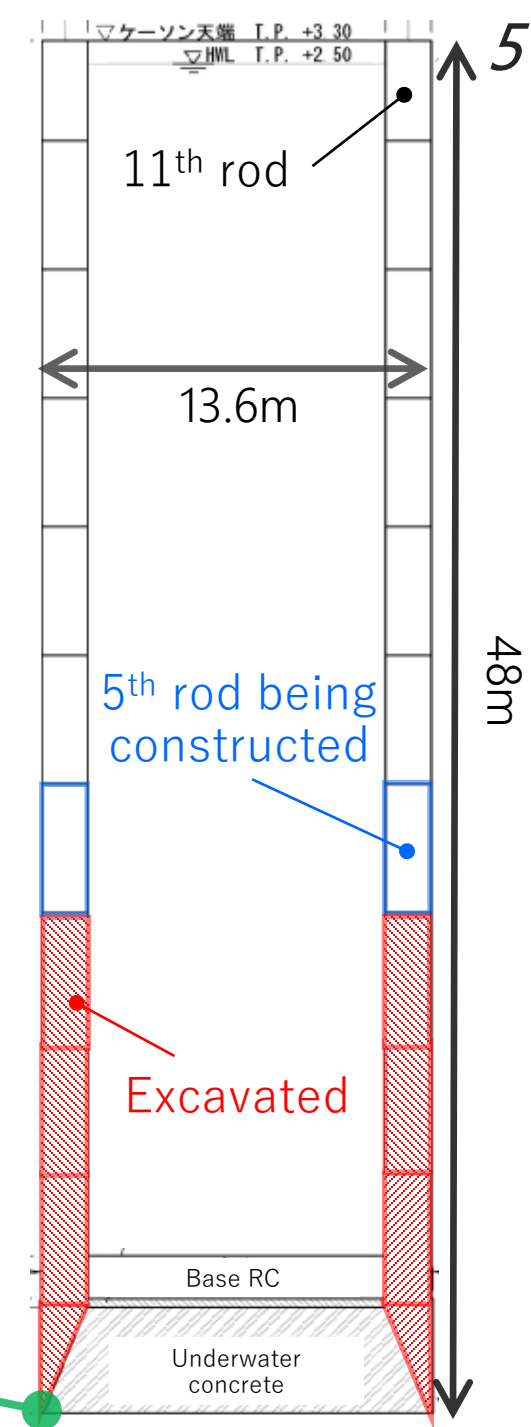
Construction Status

- Overall construction schedule

- Generally the construction work is going well
 - So far no issue with any of locals
- Two-month delay was caused during preparatory work
 - Ground improvement work due to unexpectedly insufficient bearing capacity against load concentration by steel cutting edge
 - Additional boring survey at the pit center

- Pit excavation

- Excavation of 1st – 4th rods was conducted smoothly, saving a week
- 5th rod construction is about to be completed



IWCD Detector

- A 750ton water Cherenkov detector
 - Detect neutrinos as Hyper-K does, minimizing systematic effects on event predictions at Hyper-K

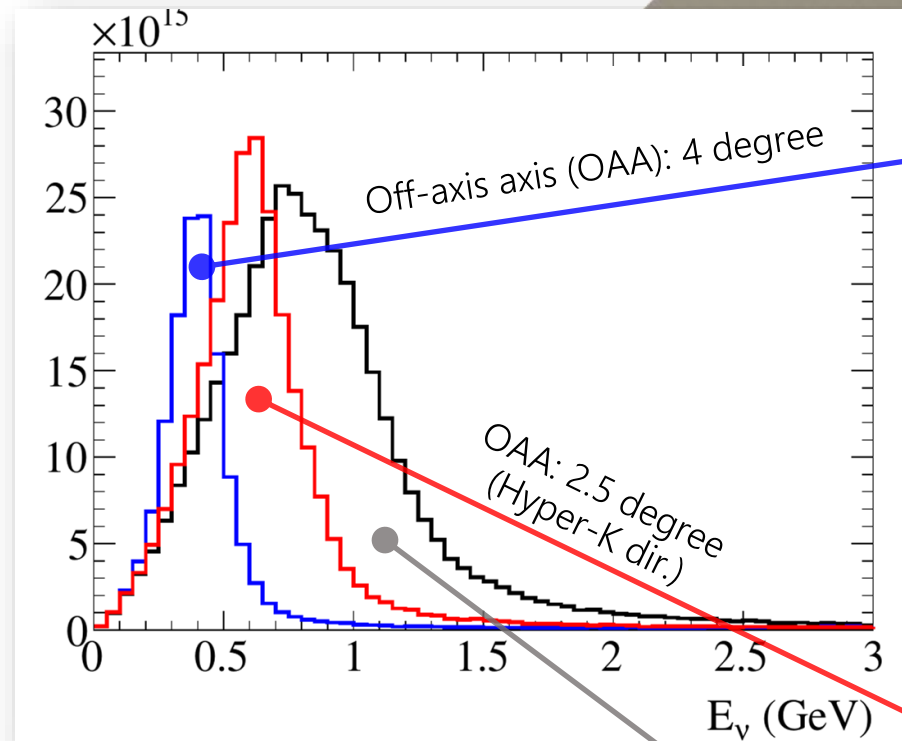
- Two novel capabilities

- $\nu_e/\bar{\nu}_e$ cross-sections
- Neutrino energy scanning

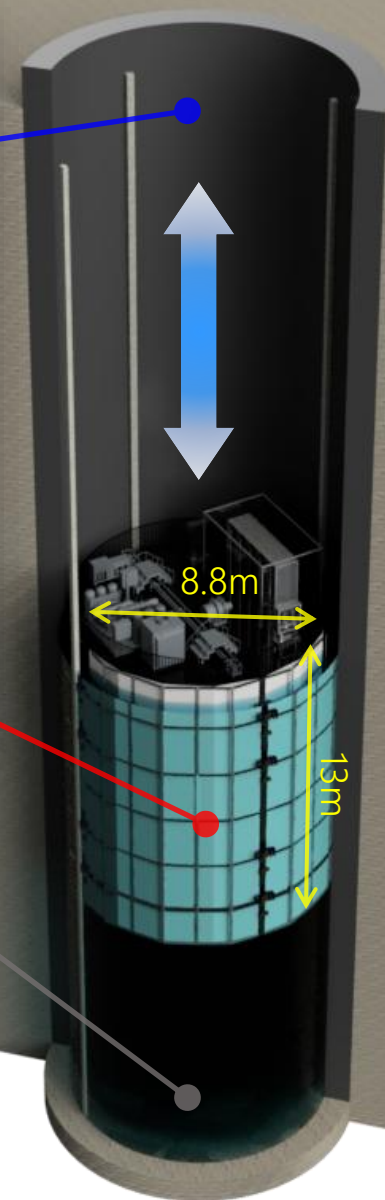
→ Vital to realize the projected sensitivities, including CPV

- Significant progress on design work

- Tank structure: engineering design work is about to be completed by Japanese company
- Sub-system: integration activities are ongoing by IWCD group



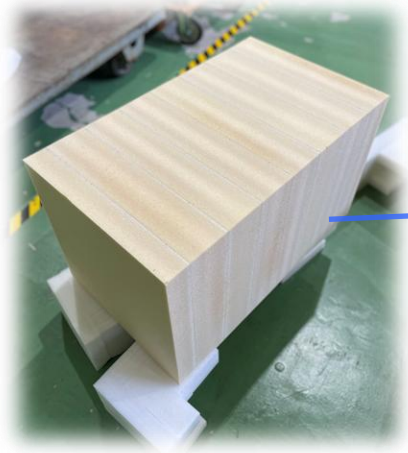
OAA: 1.5 degree



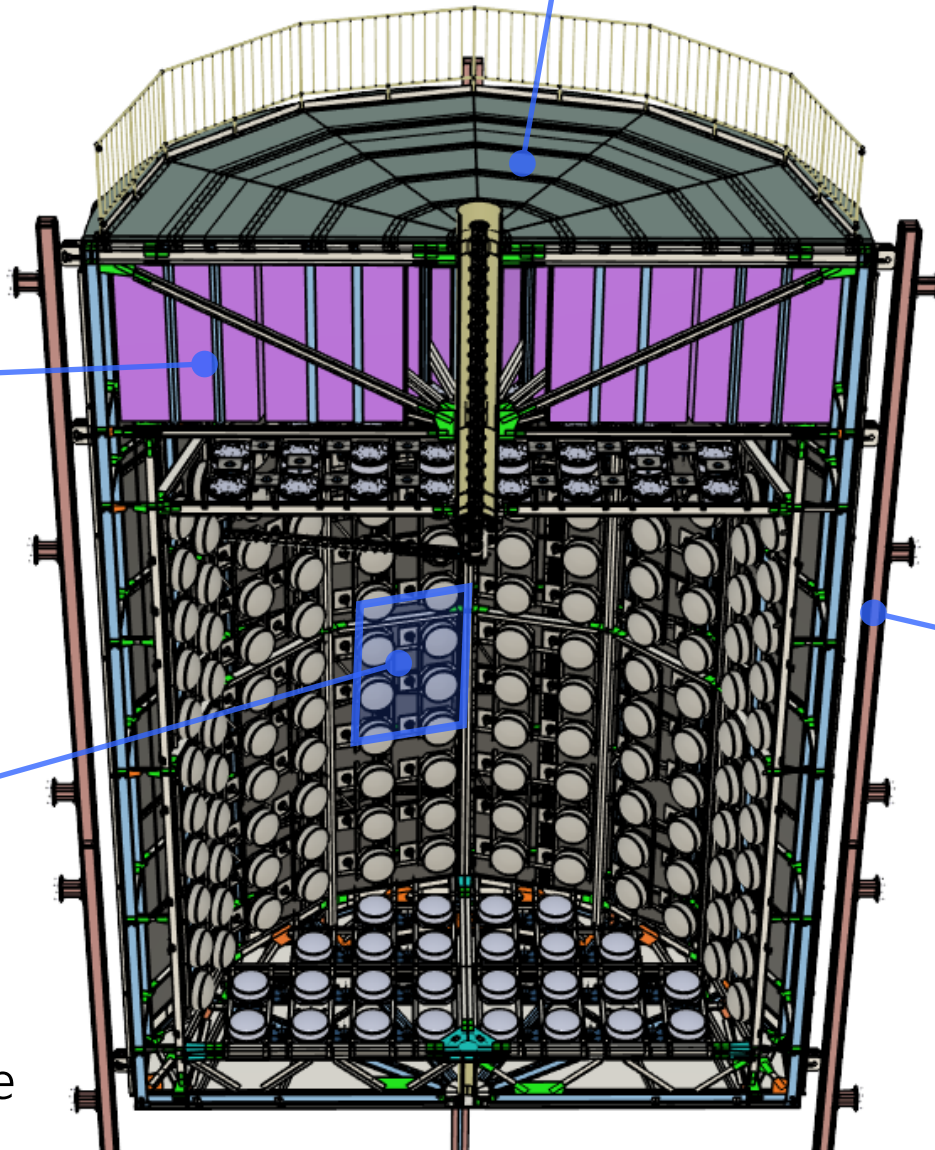
Tank Structure

7

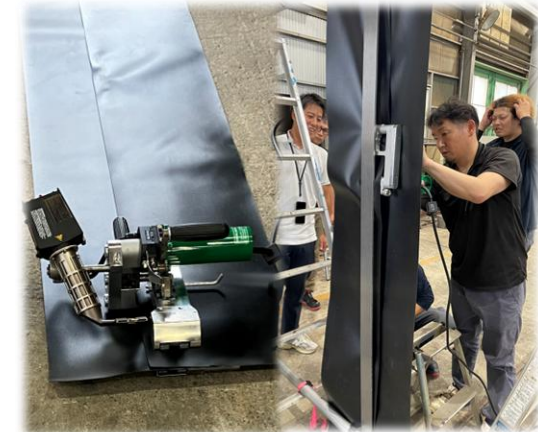
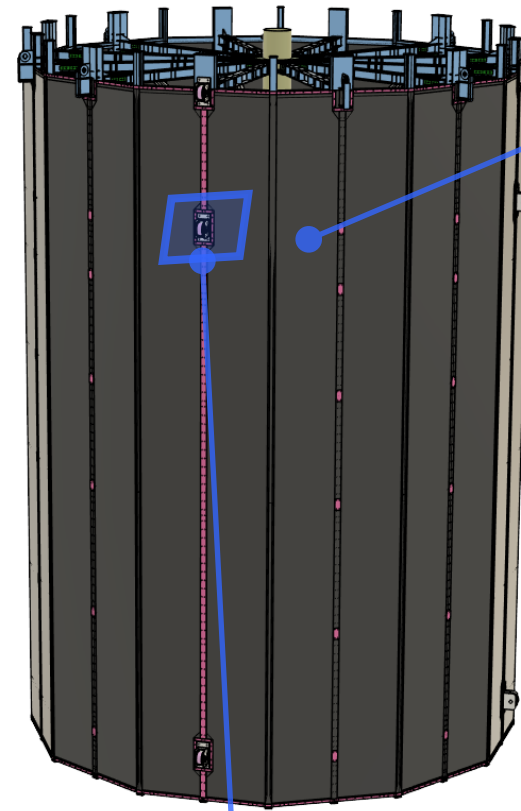
Floataction system
made of PVC foam



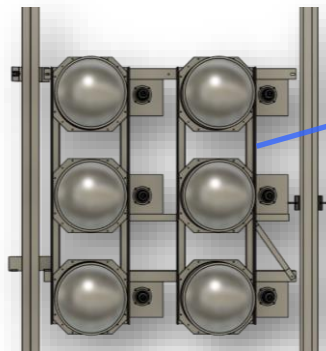
Top lid platform



Light & water-tight
outer barrier made
of geomembrane



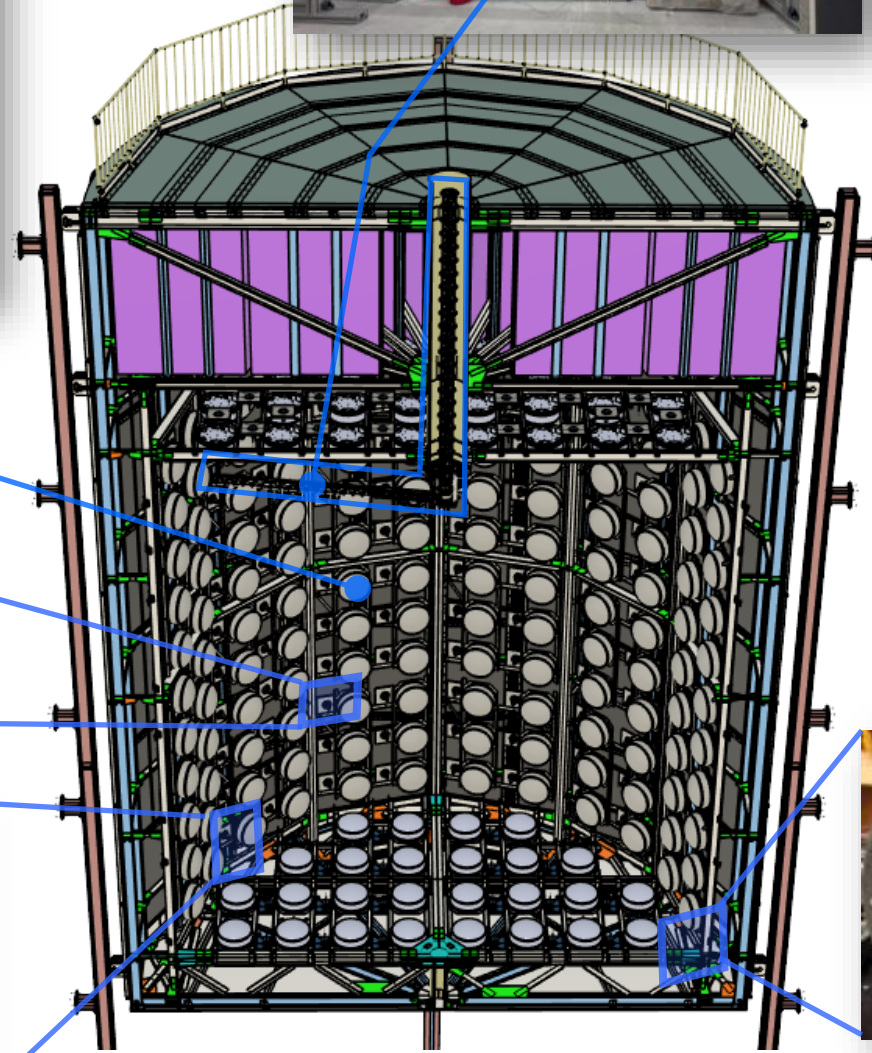
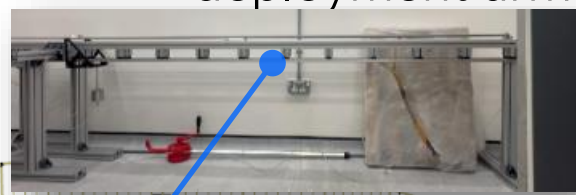
Moving system (roller & guide rail)
fully based on water gate



Super-Module frame
led by UVic team

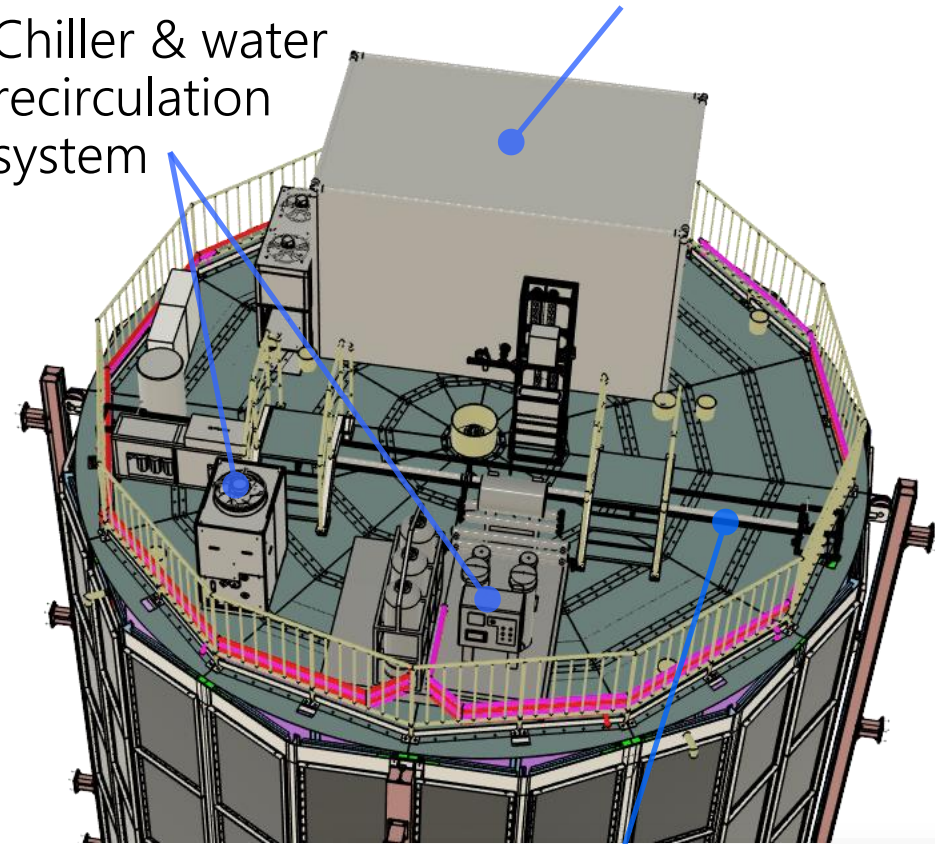


Sub-System



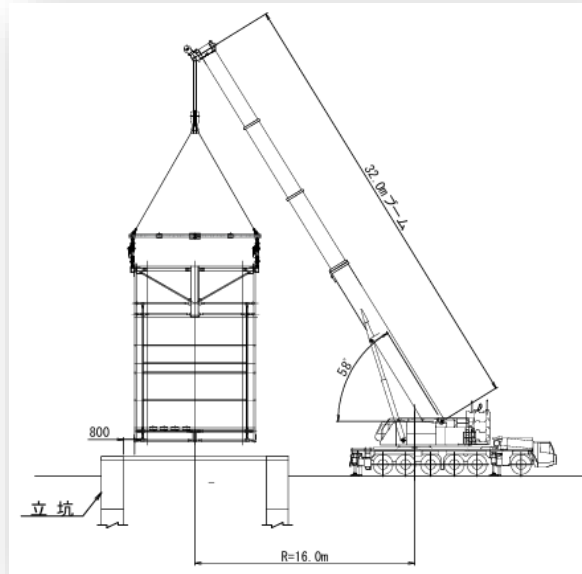
Chiller & water recirculation system

Electronics hut

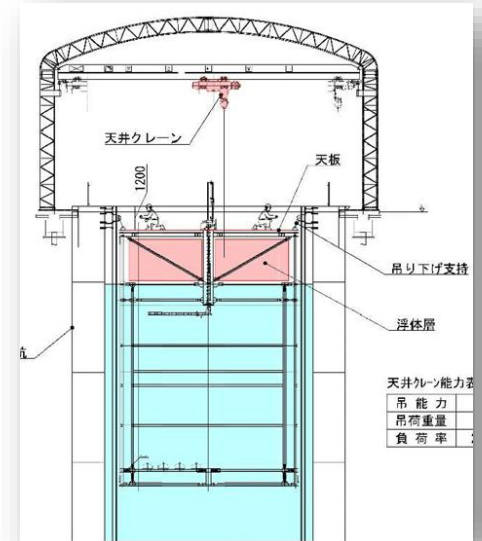


"In-pit work"

Detector frame assembly & installation



Floatation system & top lid platform installation



- Assembly of IWCD detector is planned to be conducted in two steps
 - "Surface work": to be done by contractors right after pit excavation
 - "In-pit work": to be done by contractors & IWCD group once tent is constructed

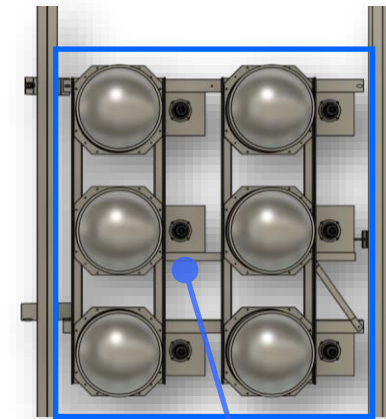
Super-Module Assembly

- mPMTs and OD PMTs will be assembled as Super-Modules
- SMs will be installed in the detector, enabling “in-pit work” to be efficiently done
- The SM assembly is planned to start around June 2027 at J-PARC RD building
- However, **the space necessary** for the assembly work & storage of assembled SMs has **NOT** been **SECURED YET**
 - Need to develop “**a concrete use plan**” by IWCD group
 - Plan to be submitted to the building manager by Dec. 2026

J-PARC Research Development building 10
(in service sine Apr. 2025)



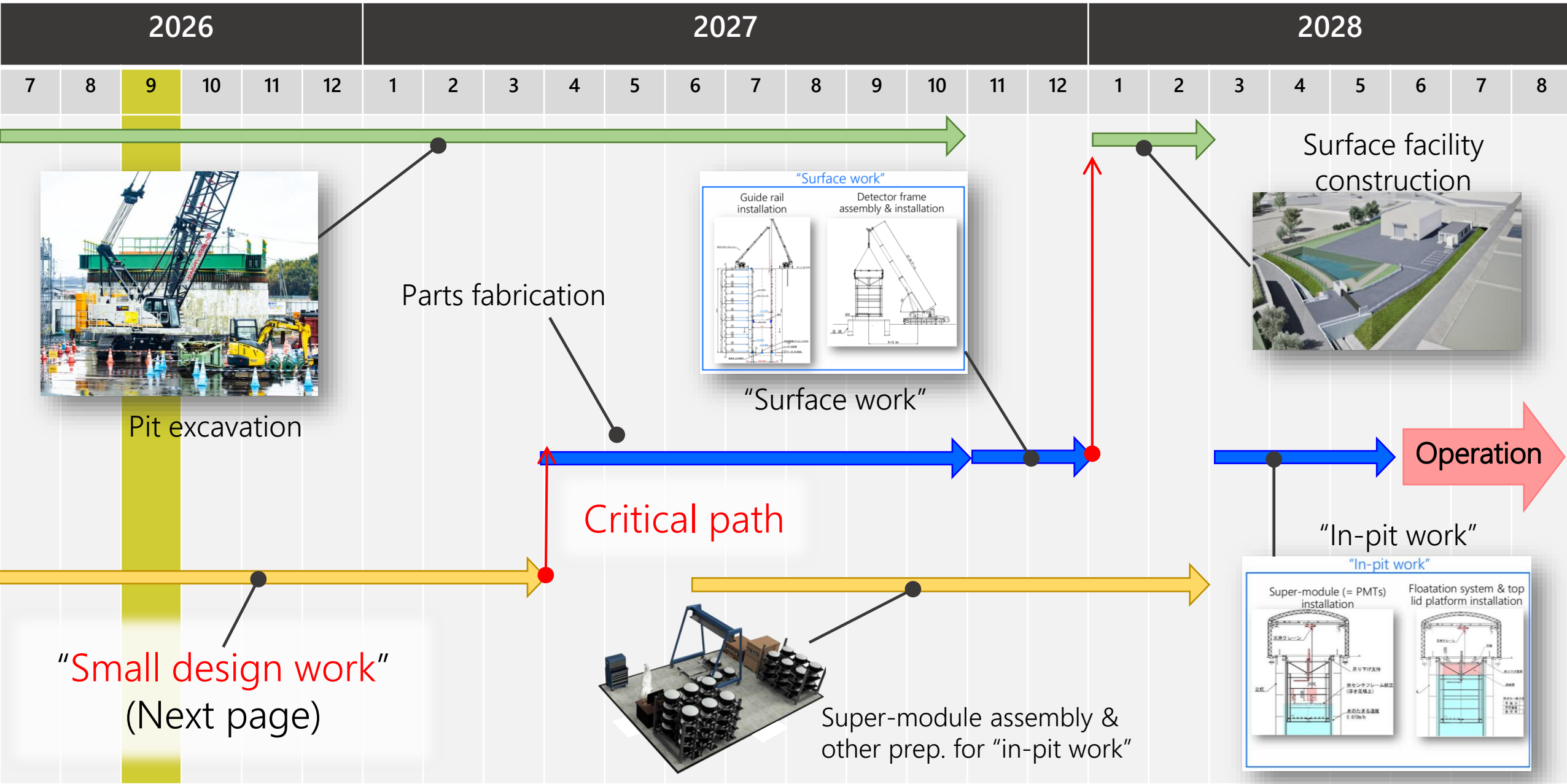
Image of assembly work



Barrel SM



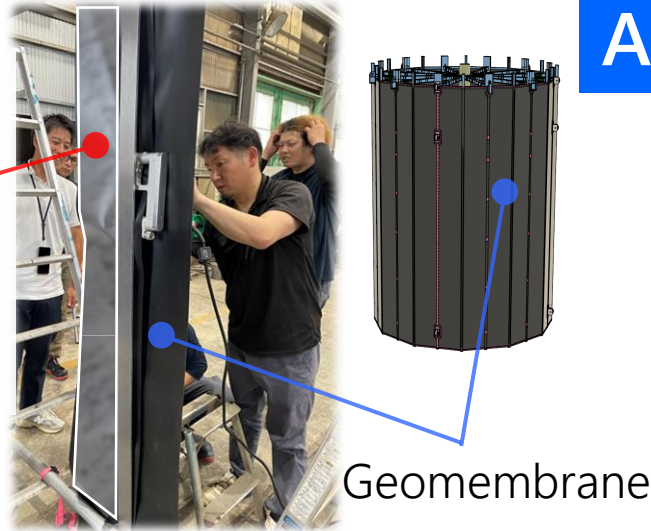
Overall Construction Schedule



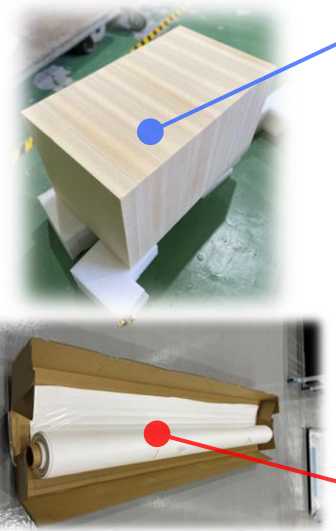
Remaining "Small Design Work"

The inner side of geomembrane will be lined with **Tyvek sheets** prior to "surface work"

→ Need to develop "installation procedure"



A

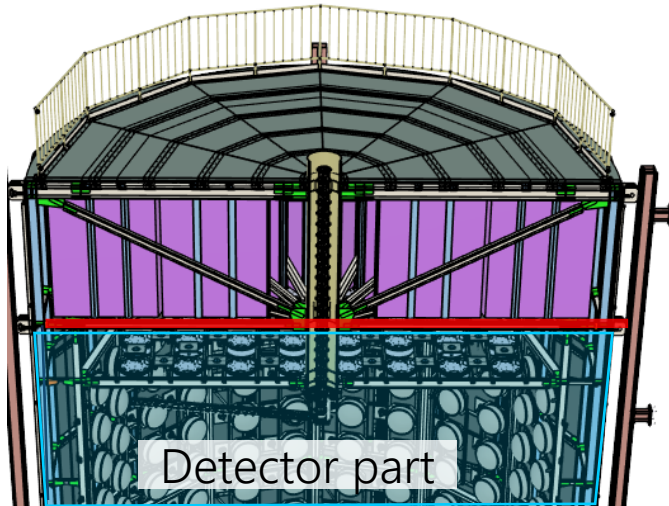


PVC foam block must be wrapped with **a waterproofing sheet**, in order to avoid deterioration of detector water quality

→ Need "material selection & develop development of wrapping procedure"

Polyethylene sheet - **a candidate**

B



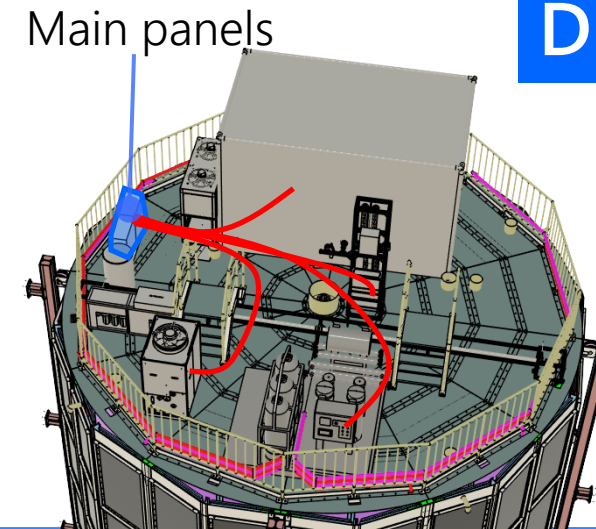
Detector must be light-tight at the **upper boundary**

→ Need "method to block light, including Tyvek lining method"

C

For each sub-system, **power & communication distribution** from main panels need to be done by IWCD group

→ Need "semi-conceptual electrical design with specification"



D

Critically important to complete all design work in time → "**Engineering resource**" is essential

Summary

- Significant progress since the Jan. 2025 symposium
 - Facility:
 - Construction has begun, and pit excavation is ongoing
 - Detector
 - Structure: engineering design work is about to be completed
 - Sub-system: integration activities are underway with "small design work" that needs to be done urgently
- IWCD construction will peak in one year from now
 - Be prepared!