

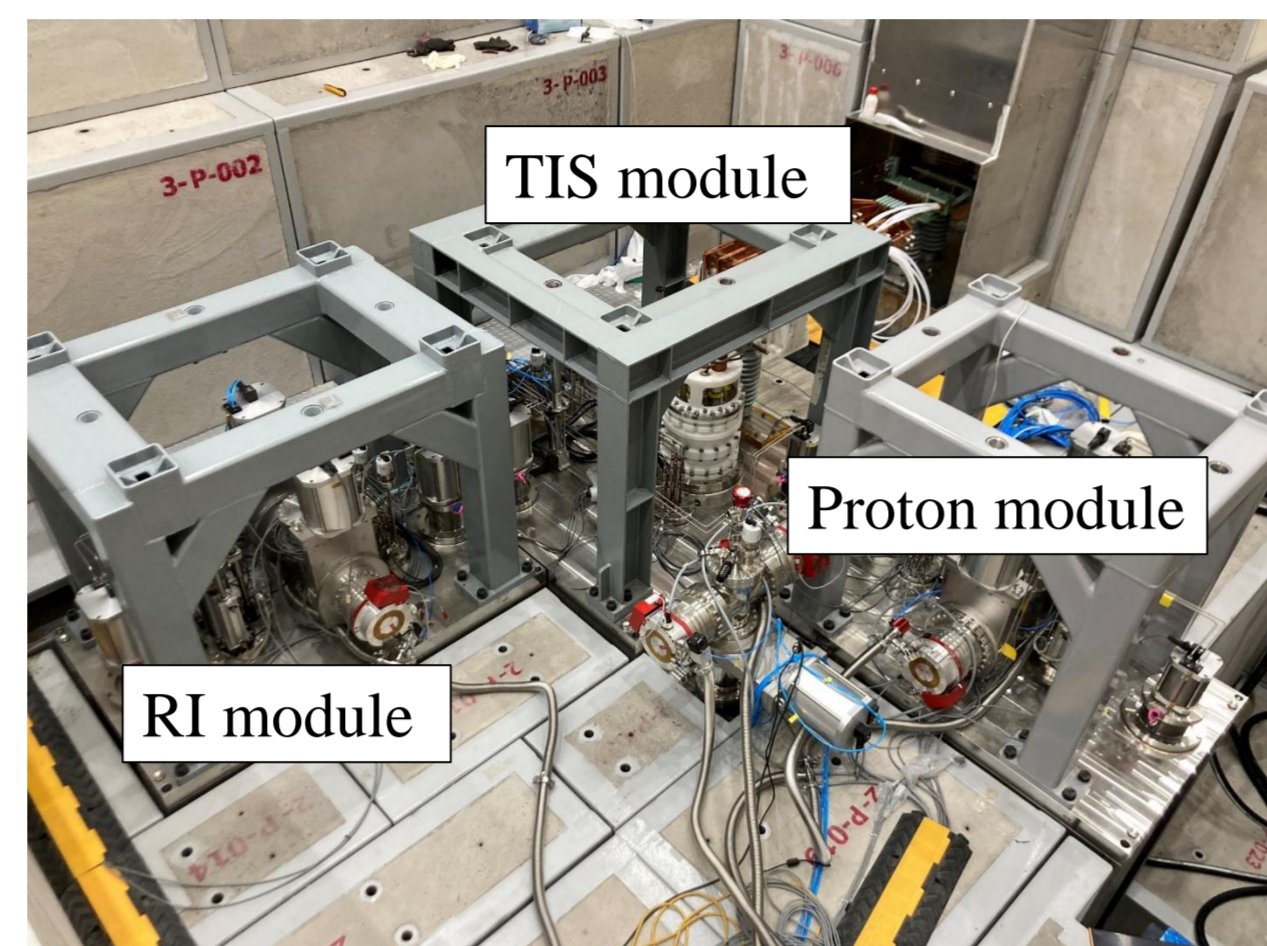
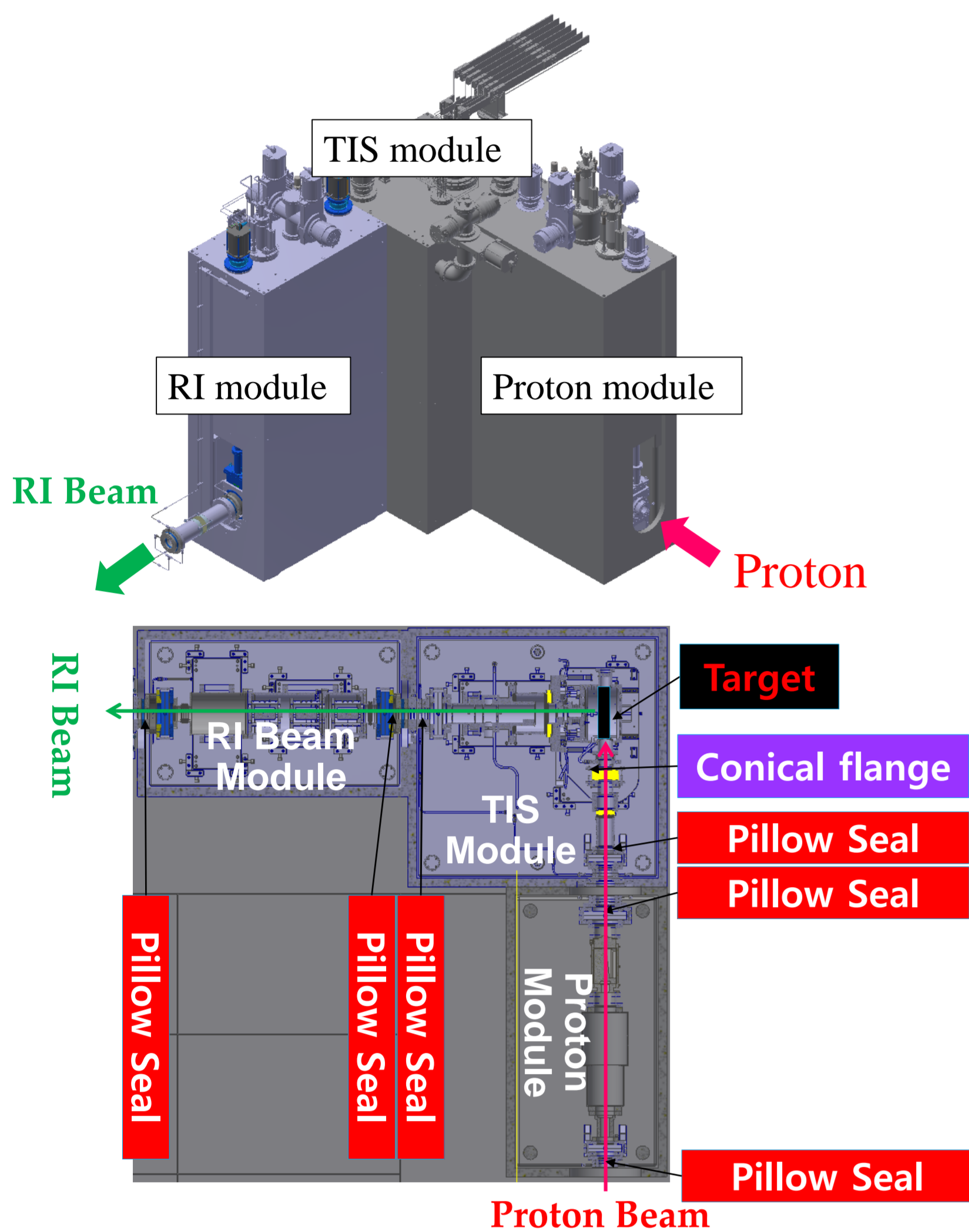
The present status of ISOL module & RH system for Isotope Separation On-Line in RISP at RAON

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The Rare Isotope Science Project (RISP) plans to produce rare isotope using Isotope Separation On-line (ISOL) facility. The rare isotopes are produced in Target Ion Source (TIS) system by a 70 MeV proton beam incident on target via the proton-induced fission. RISP adopt module system controlled by remote handling system to handle and maintain the TIS system. The module system consists of proton beam diagnostic, TIS and RI module, and was designed to be applied high voltage and current, water cooling system, beam optics and diagnostic. The key components of remote handling for module system are a remote crane, hot-cell & manipulator, TIS storage and etc. In this presentation, the current status of ISOL module system are introduced, along with remote handling system.

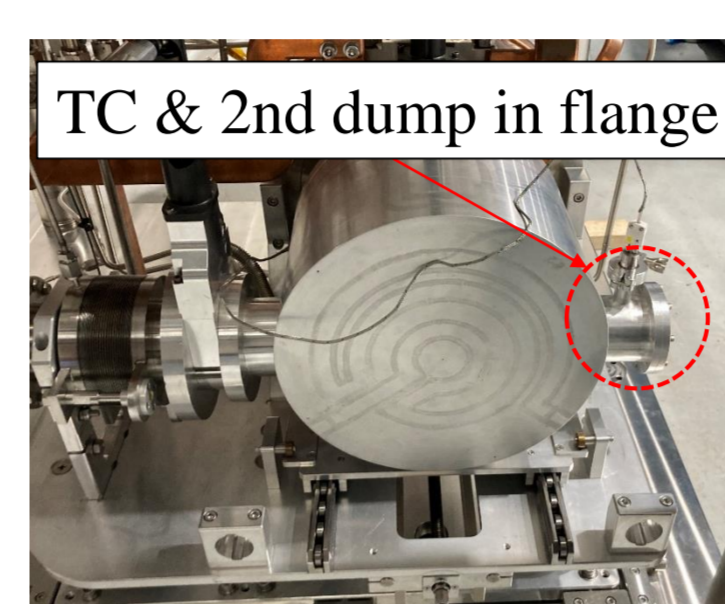
Introduction



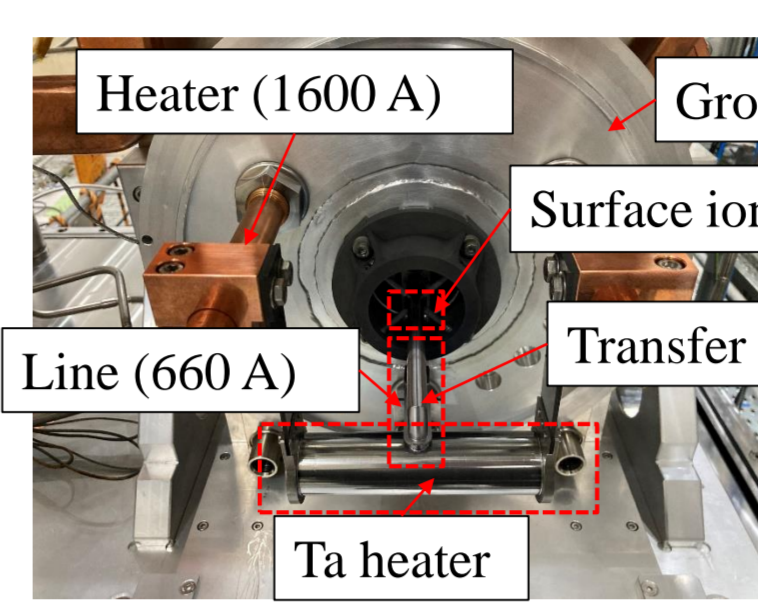
ISOL module system in bunker

- The module system consists of 3 parts (Proton, TIS and RI).
- The beam line is connected with pillow seal.
- The modules are surrounded by shielding block.

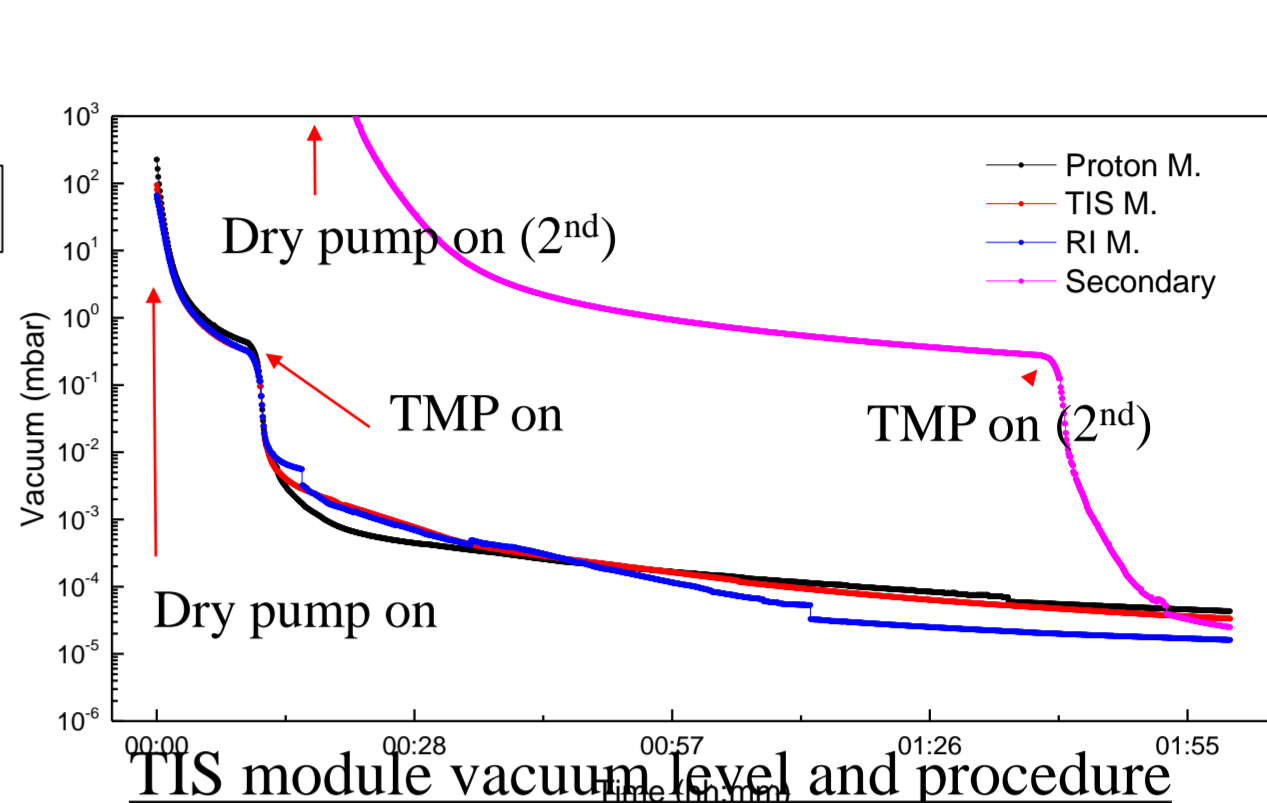
Stable beam extraction



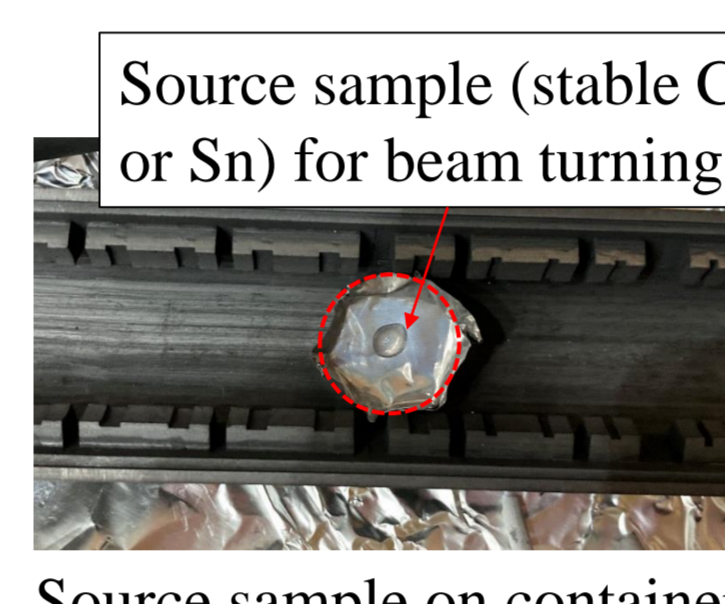
TIS chamber



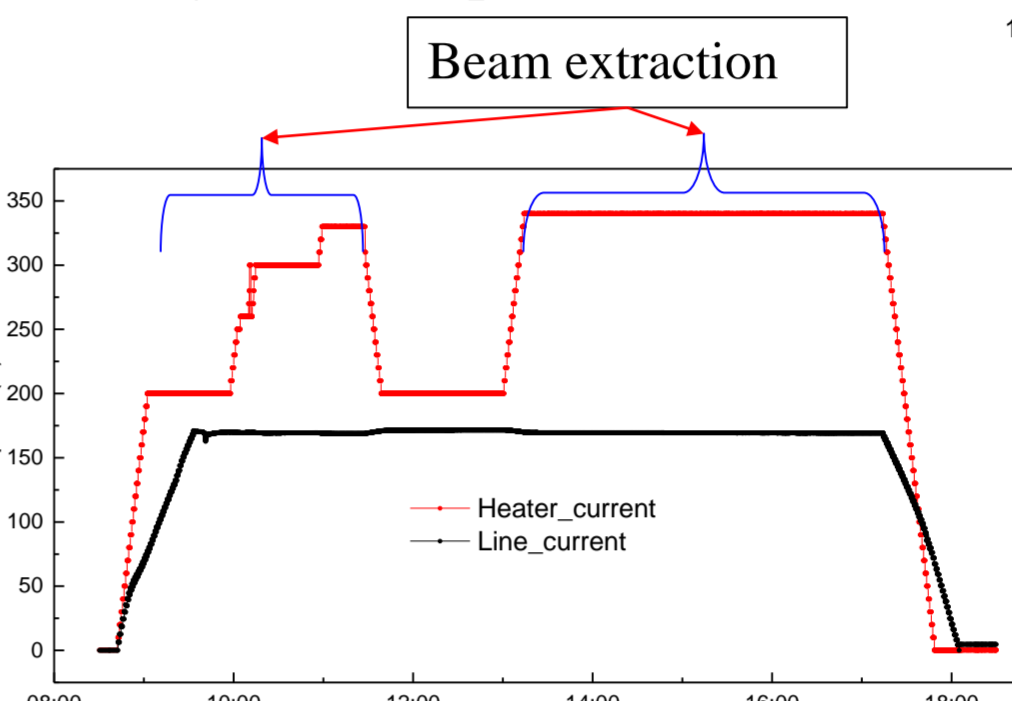
TIS system component



- Ta heater and line are controlled by constant current and voltage mode, respectively.
- The temperature of 2nd dump is about ~300 °C when the temperature of low power Ta heater is ~2000 °C

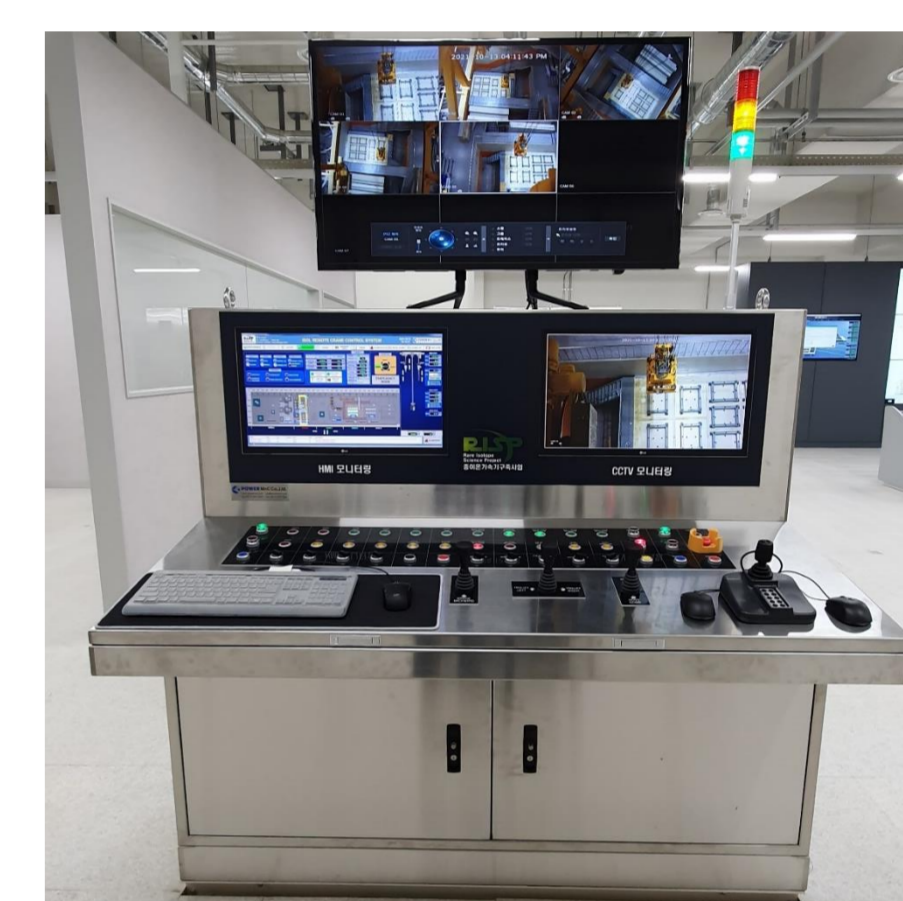
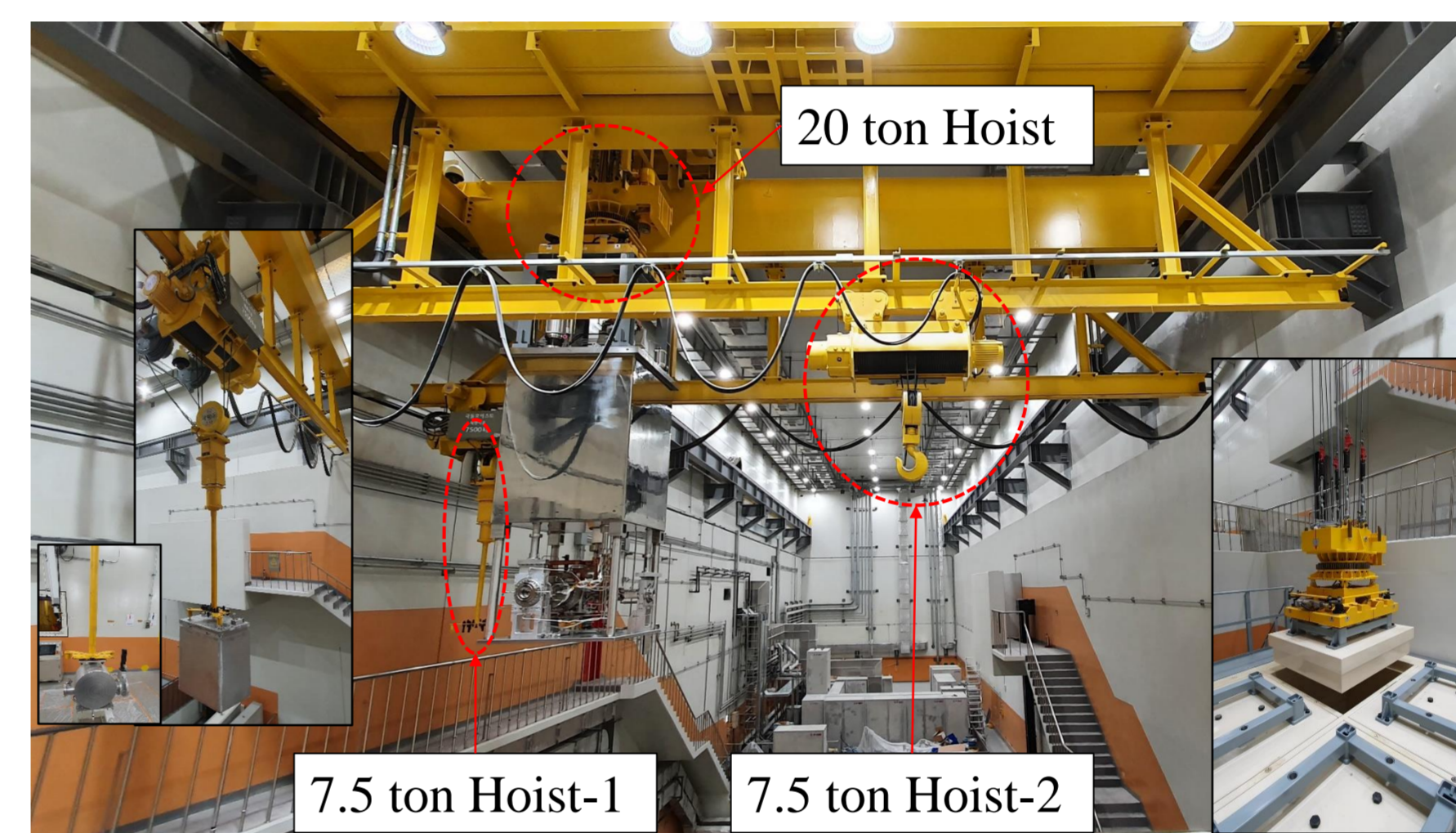


Source sample on container



TIS module vacuum level and procedure

Remote crane system



Crane system Controller

ITEM	SPECIFICATION	REMARK
Lifting capacity	20 ton / 7.5 ton / 7.5 ton	
Actual Lift	15.9 m / 13 m / 13 m	
Lifting speed	0.45 m/min to 4.5 m/min	Speed variable
Operation Mode	Normal / Emergency	Redundancy
Rotation	270 °	20 ton hoist
Rotation speed	1.2 rpm	20 ton hoist
CCTV Camera	Rotation / Tilt / Zoom	5 Set
Position accuracy	5 mm	Redundancy

20 ton hoist

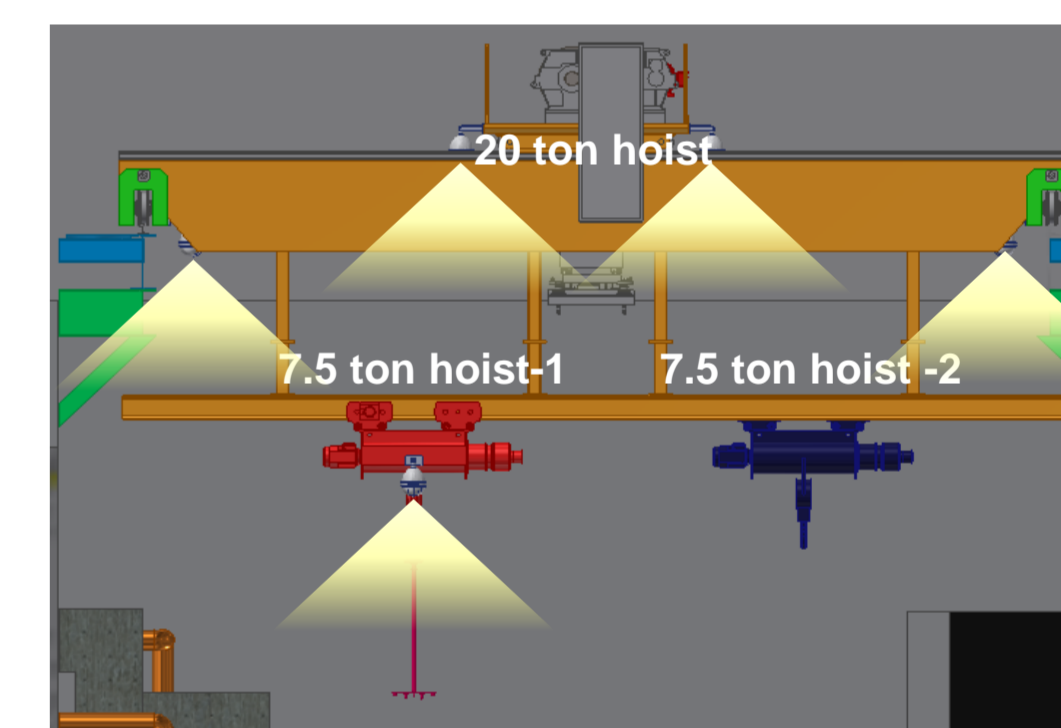
- TIS Module transfer (Bunker ↔ Hot Cell)
- TIS Storage Cover removal & replacement
- Shield block removal & replacement

7.5 ton hoist-1

- Fresh TIS Chamber transfer (Operation Room → Hot Cell)
- Pail transfer (Hot Cell → TIS Storage)

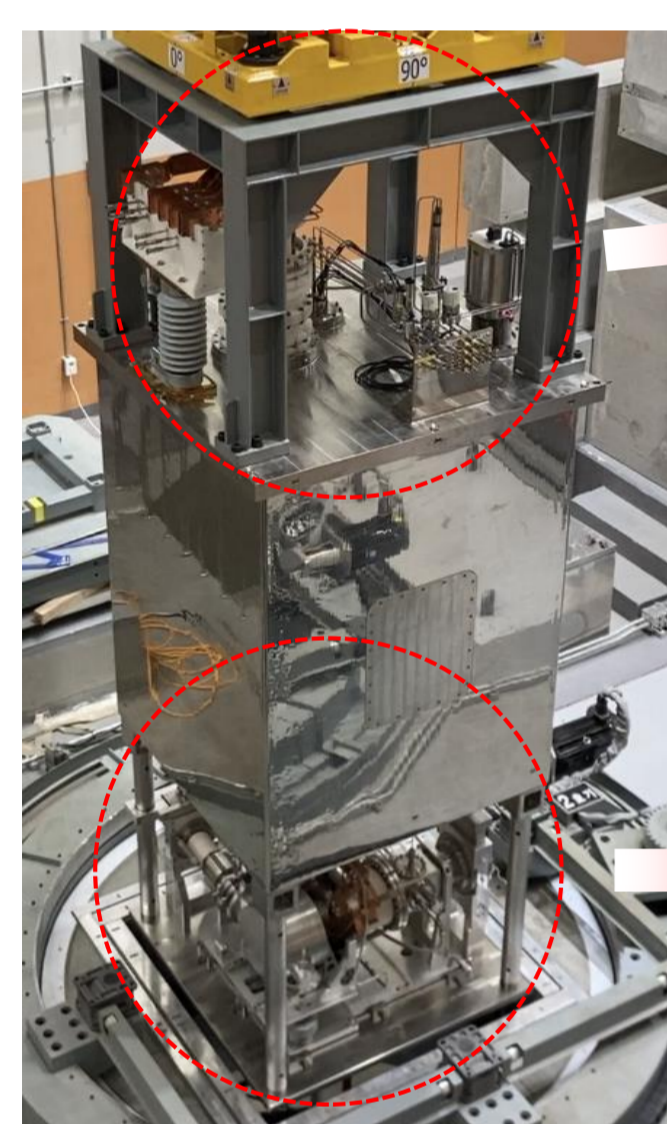
7.5 ton hoist-2

- Maintenance



CCTV Camera Position

TIS module

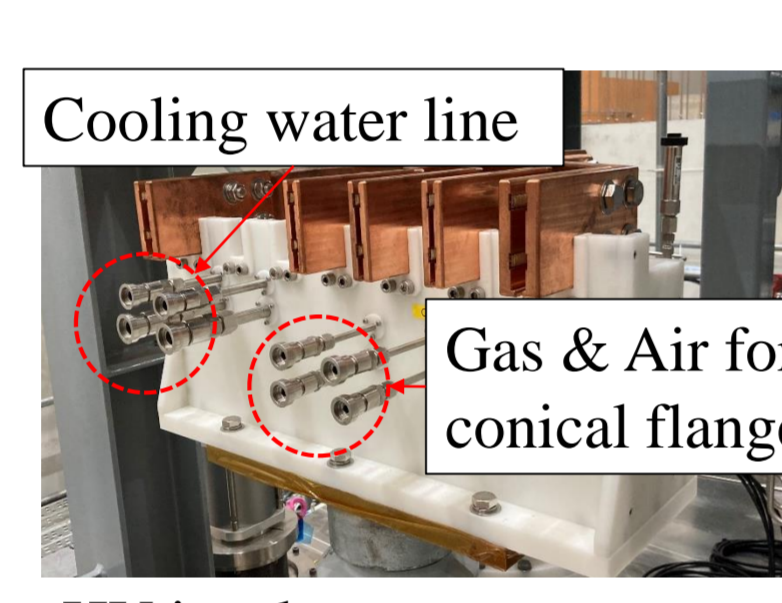


※ Top of TIS module

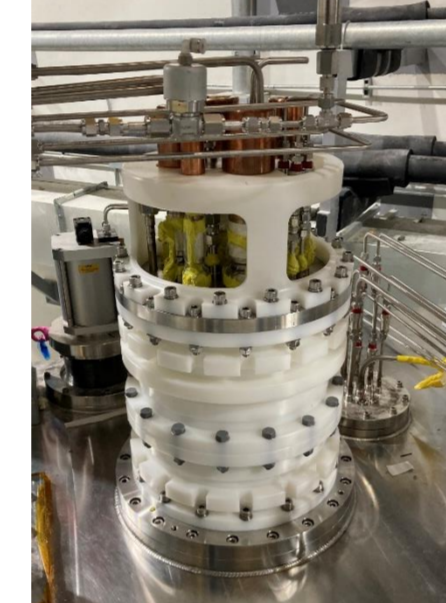
- HV/LV. Duct
- Utility panel
- Air motor
- Actuator of G/V.
- Lift frame

※ Bottom of TIS module

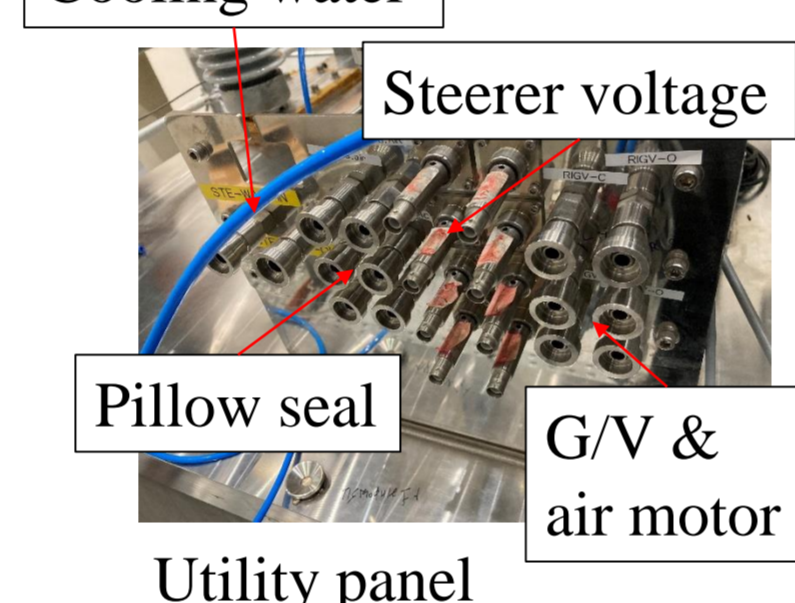
- TIS chamber
- HV. platform
- High current bus bar
- Ceramic breaker for HV.
- Steerer chamber
- Beam slit (not yet)



HV insulator support



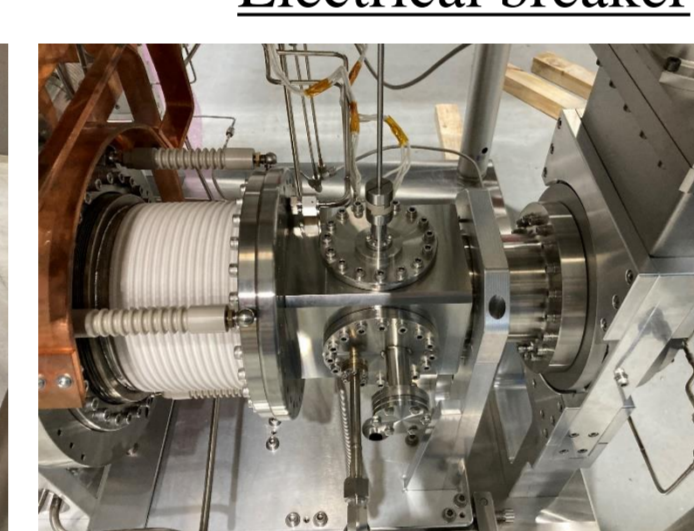
Electrical breaker



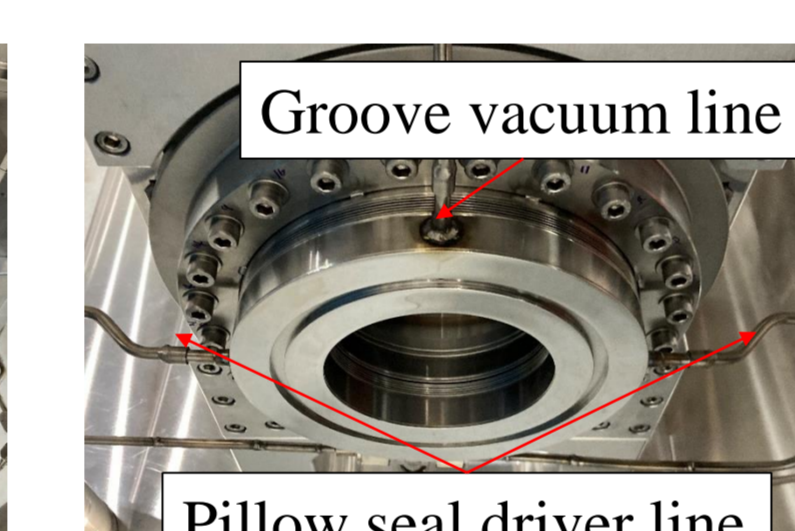
Utility panel



TIS chamber



Steerer chamber



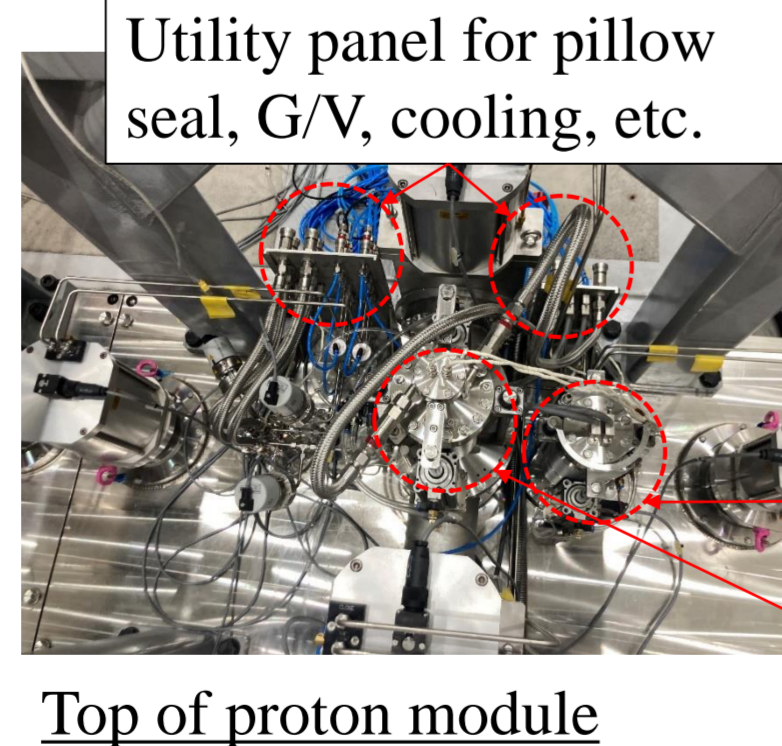
Pillow seal

- TIS chamber is supplied with high voltage, high current and cooling water through HV transfer bus bar and HV duct.
- Thermocouple line is installed for measuring temperature of 2nd dump.
- Gas line is installed for FEBIAD ionsource.
- Arocy L 10 resin and borosilicate glass beads are insulating lines inside HV duct from module body and shielding from radiation of front-end in bottom of module.

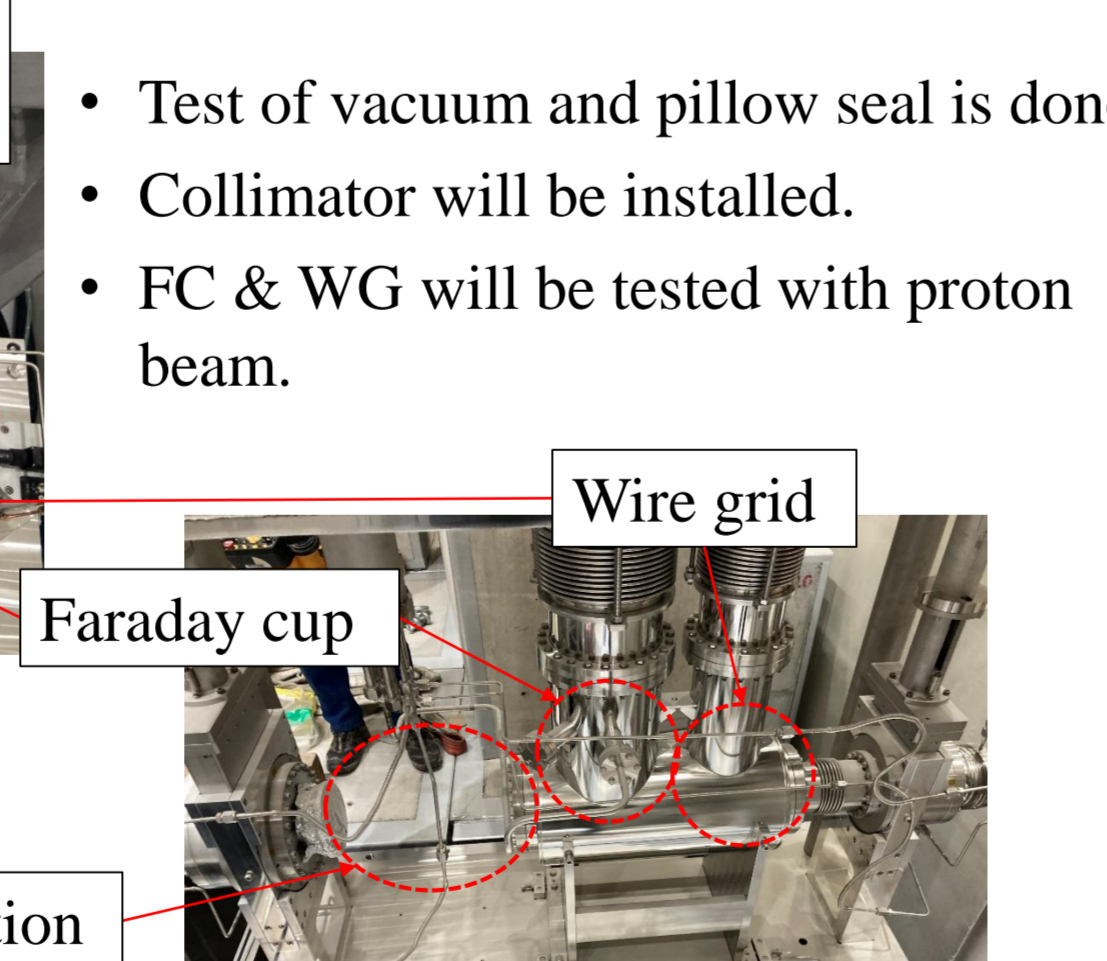
Proton & RI (rare isotopes) module



Proton module and module chamber

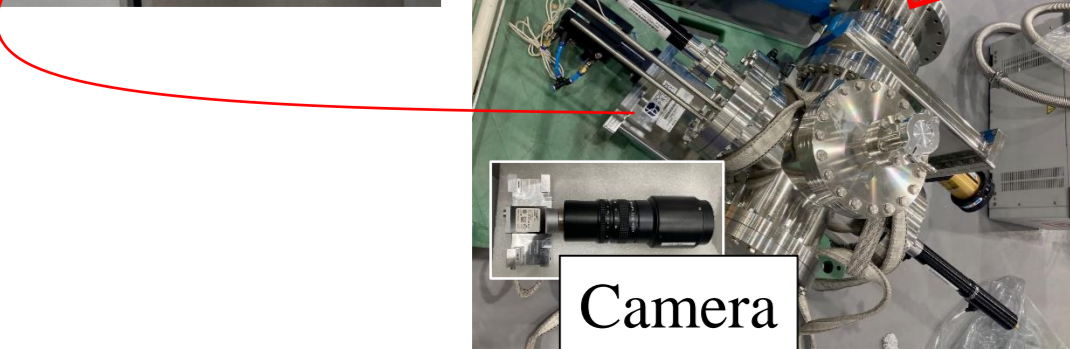
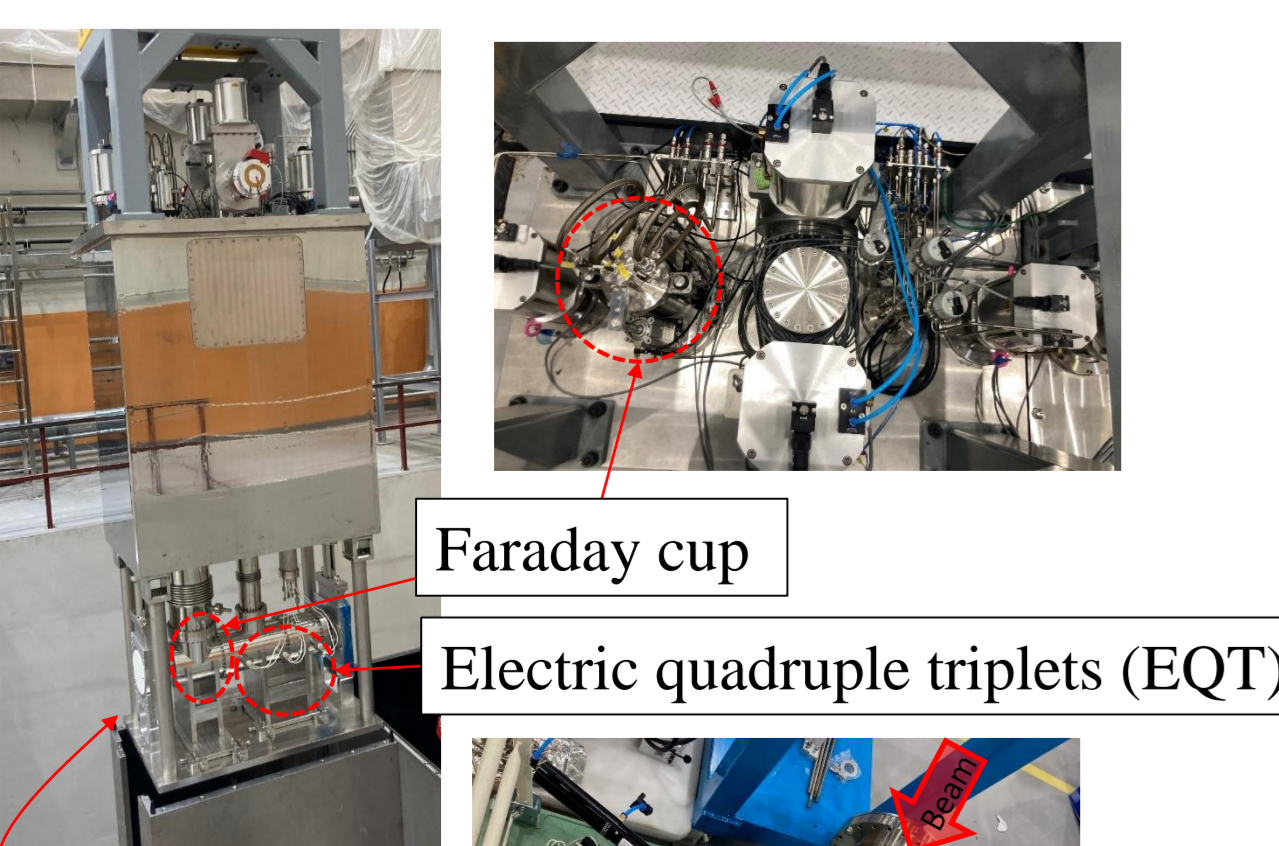


Top of proton module

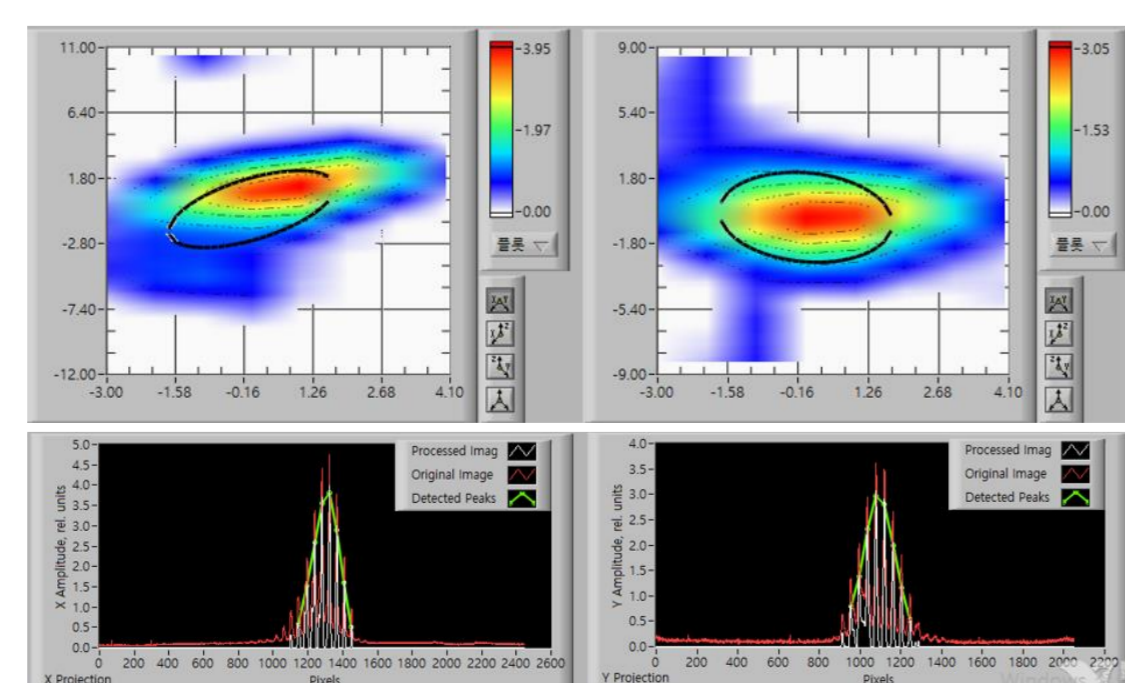


Bottom of proton module

- Test of vacuum and pillow seal is done.
- Collimator will be installed.
- FC & WG will be tested with proton beam.

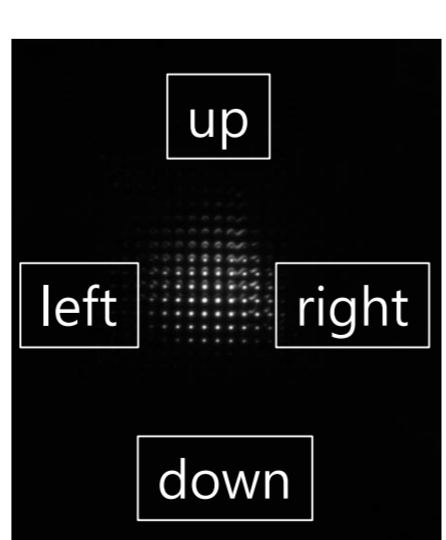


Pepperpot aperture & MCP & Phosphor screen



Test beam Emittance

- In the beginning, pepperpot set up at end of RI module, so as to do see the beam shape and test the EQT/FC.
- RMS X,Y Emittance 3.79, 4.28



Test beam shape.

Hot-cell and RH system

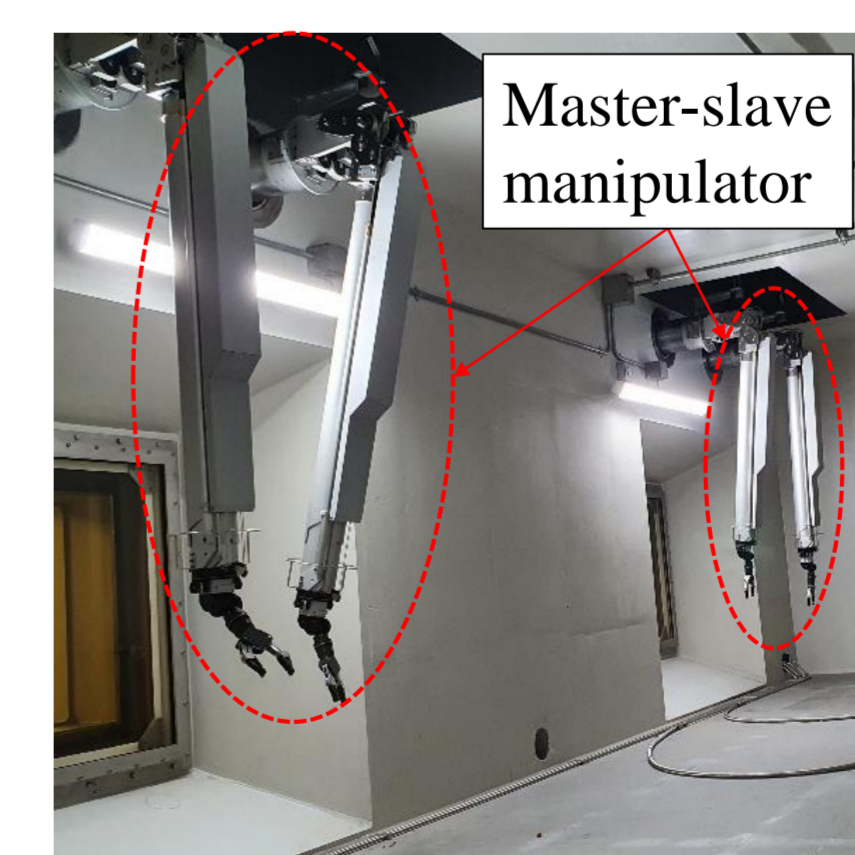
- TIS module driving unit, Master-slave manipulator, TIS chamber exchanging table



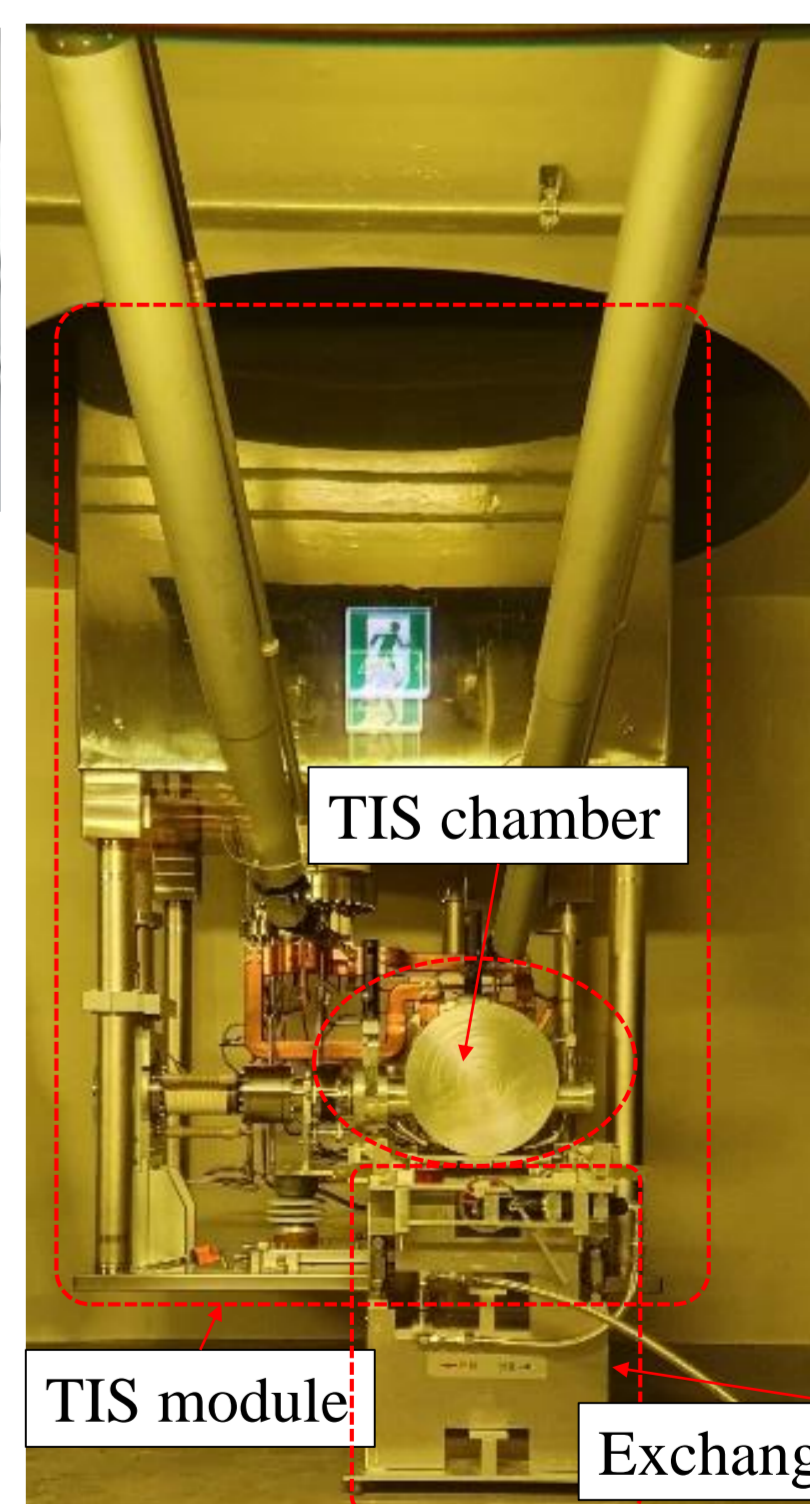
TIS module driving unit (top)



Operator room



Hot-cell



TIS chamber exchanging Test

Summary

- ISOL module system was installed in bunker.
- The stability of TIS system and beam transmission using stable beam (Cs, Sn, Na) was confirmed.
- We have a plan to set up TC at TIS module for measuring temperature of target disk.
- The beam slit will be installed between TIS chamber and ceramic breaker.
- Collimator will be installed in proton module and tested.
- ISOL RH system is installed in target hall.
- RH system have be repeatedly tested according to the remote handling scenario.
- We have to improve operating system more stable, continuously.
- We need to train a man for remote handling.