



**MYRRHA phase 1
implementation**
MINERVA



The ISOL facility of MYRRHA: current status

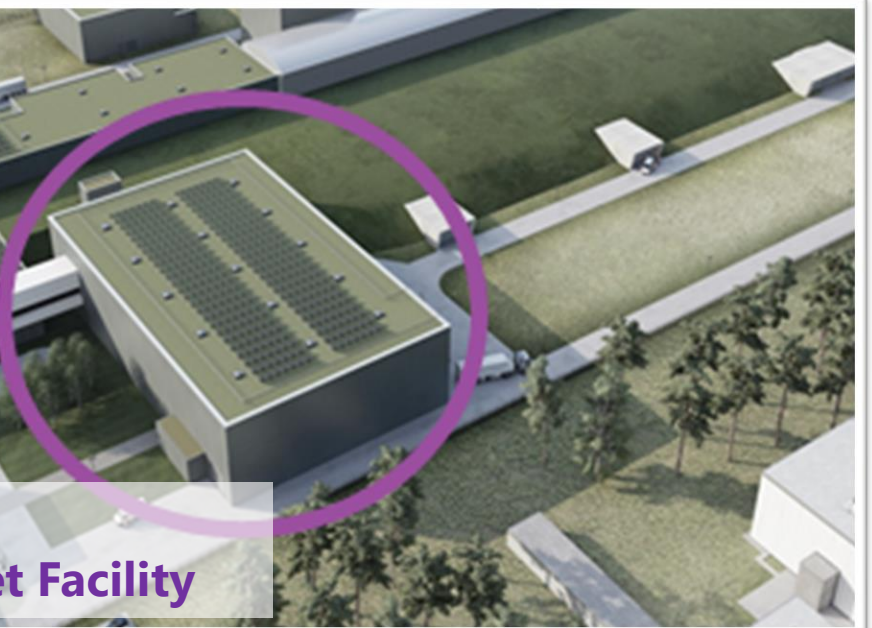
J.P. Ramos on behalf of PTR/ANS*

1st December 2022

*Physics and Target Research group of the
Advanced Nuclear Systems institute at SCK CEN



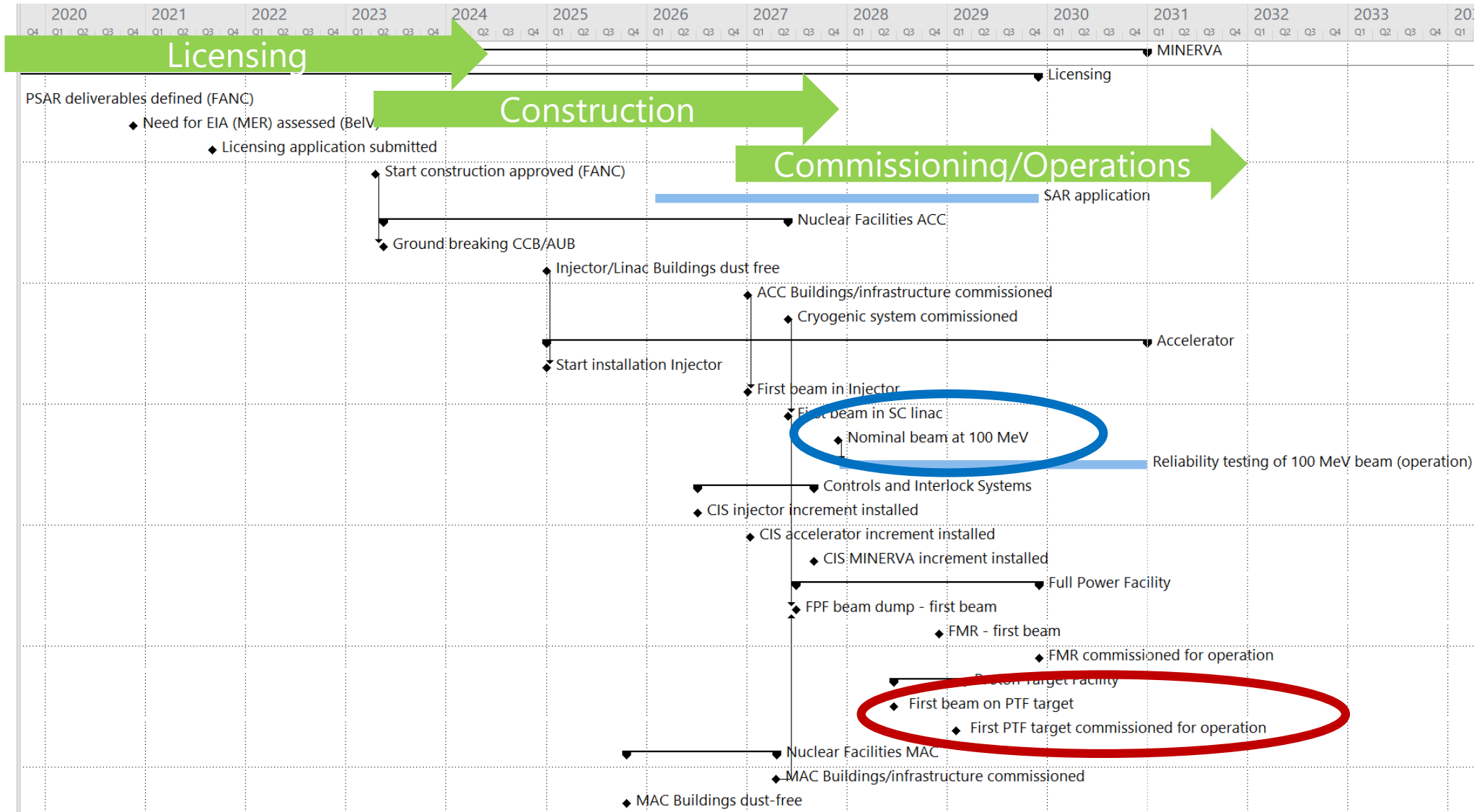
towards MYRRHA



... MINERVA

ISOL@MYRRHA
Implemented in the Proton Target Facility

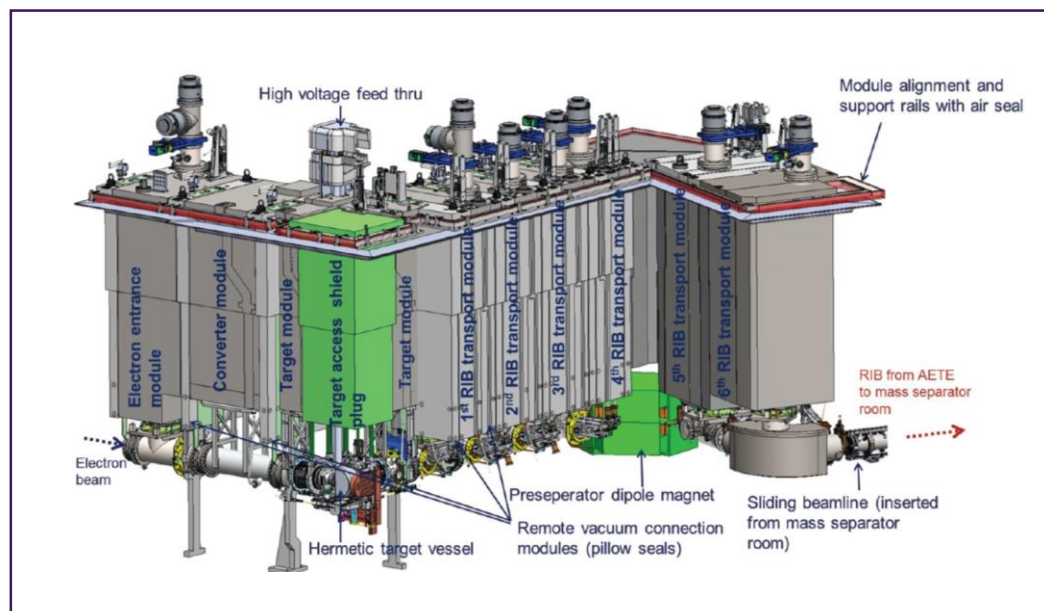
MINERVA Planning ref June 2022



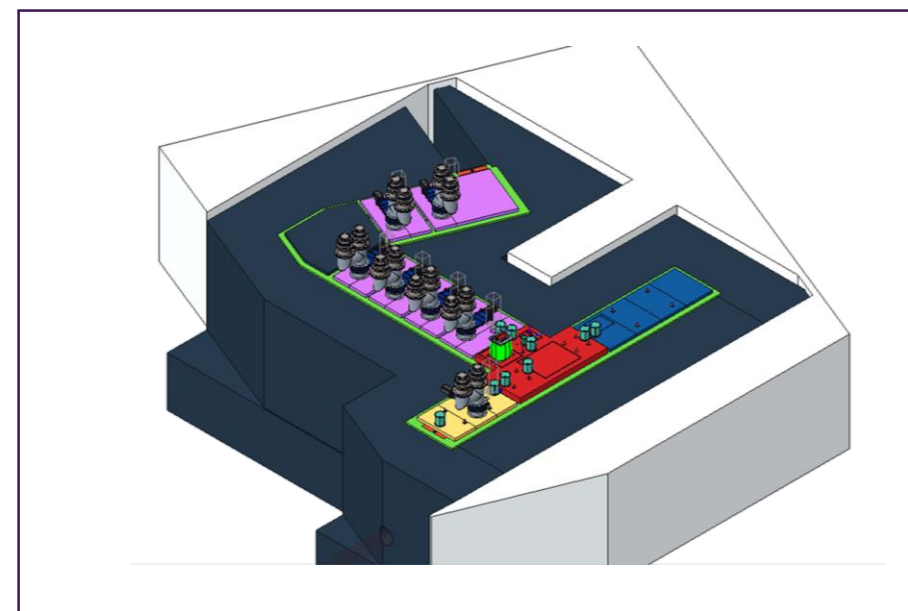
ISOL@MYRRHA in PTF

- Operating parameters:
 - 100 MeV protons
 - 250 Hz pulse-repetition rate
 - Up to max 0.5 mA beam current on ISOL target
 - Up to 25 kW in-target power deposition
- Design based on ARIEL at TRIUMF – dedicated Project Agreement

High-power ISOL facility



ARIEL/TRIUMF target station

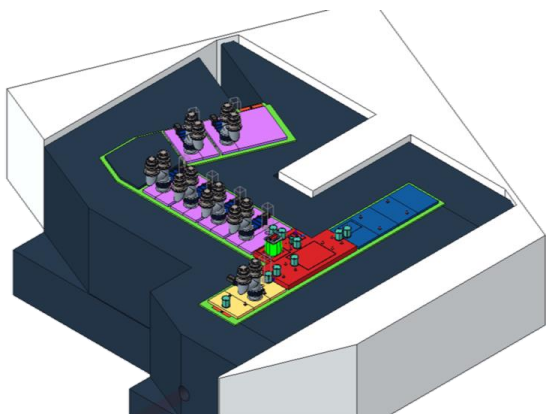


Baseline ISOL@MYRRHA target station

ISOL@MYRRHA in PTF

- Layout – work in progress – ref. June 22 (lv10)

Important: to incorporate input from Users Community to define requirements & specifications for user facilities/installations!!



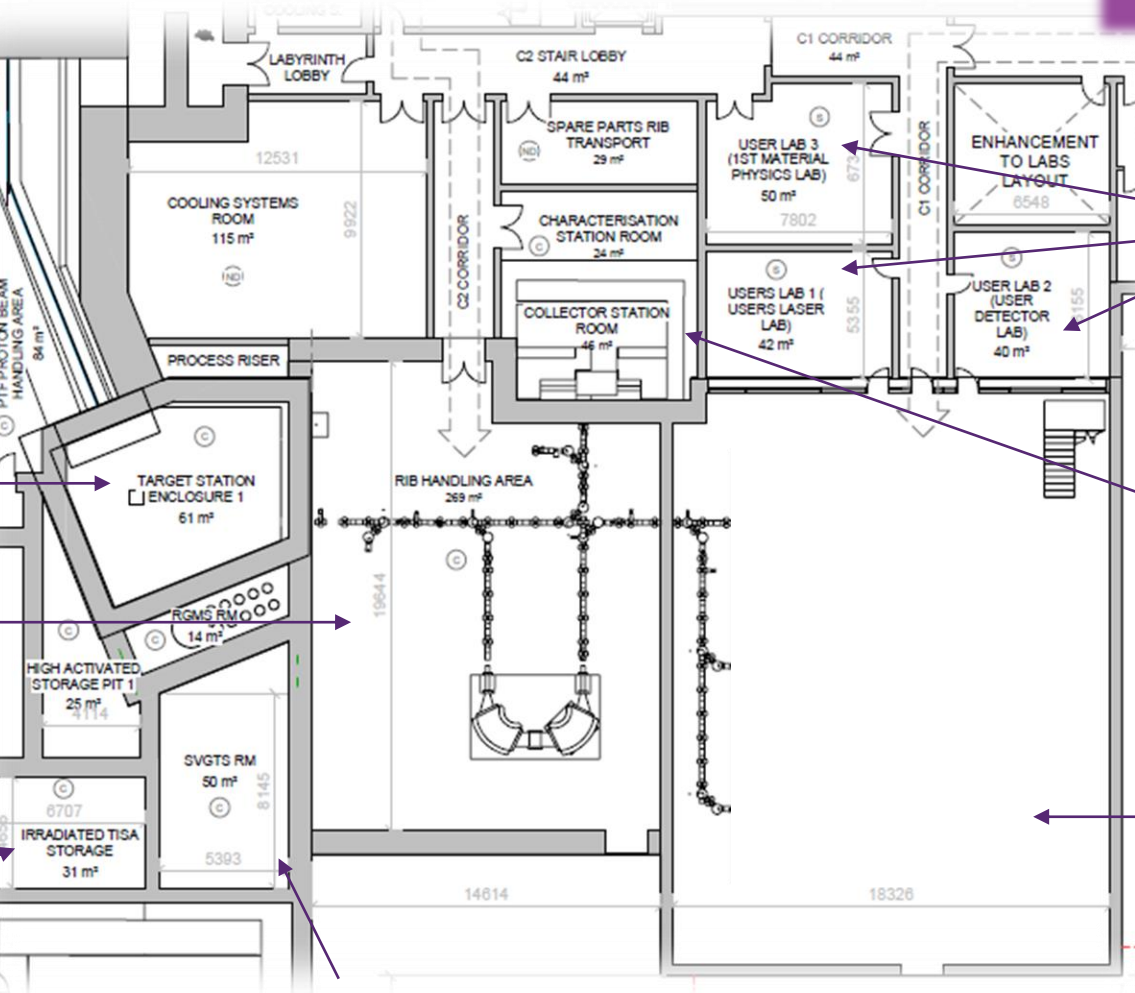
Target Station

RIB Handling area

including:

- MRMS (M/DM~1500)
- Yields station
- Off-line ion source

Irradiated intermediate target storage



Hot cells

Radioactive gas handling

User laboratories:

- Laser lab
- Materials studies
- Detector lab

Isotopes collector station (+ characterization, packaging and shipping)

Experimental Hall
Including 3 experimental areas

ISOL@MYRRHA in PTF

- Layout – work in progress – ref. June 22 (lvl1)

Important: to incorporate input from Users Community to define requirements & specifications for user facilities/installations!!

TISA Assembly laboratory

TISA Parts Storage

High Voltage Room

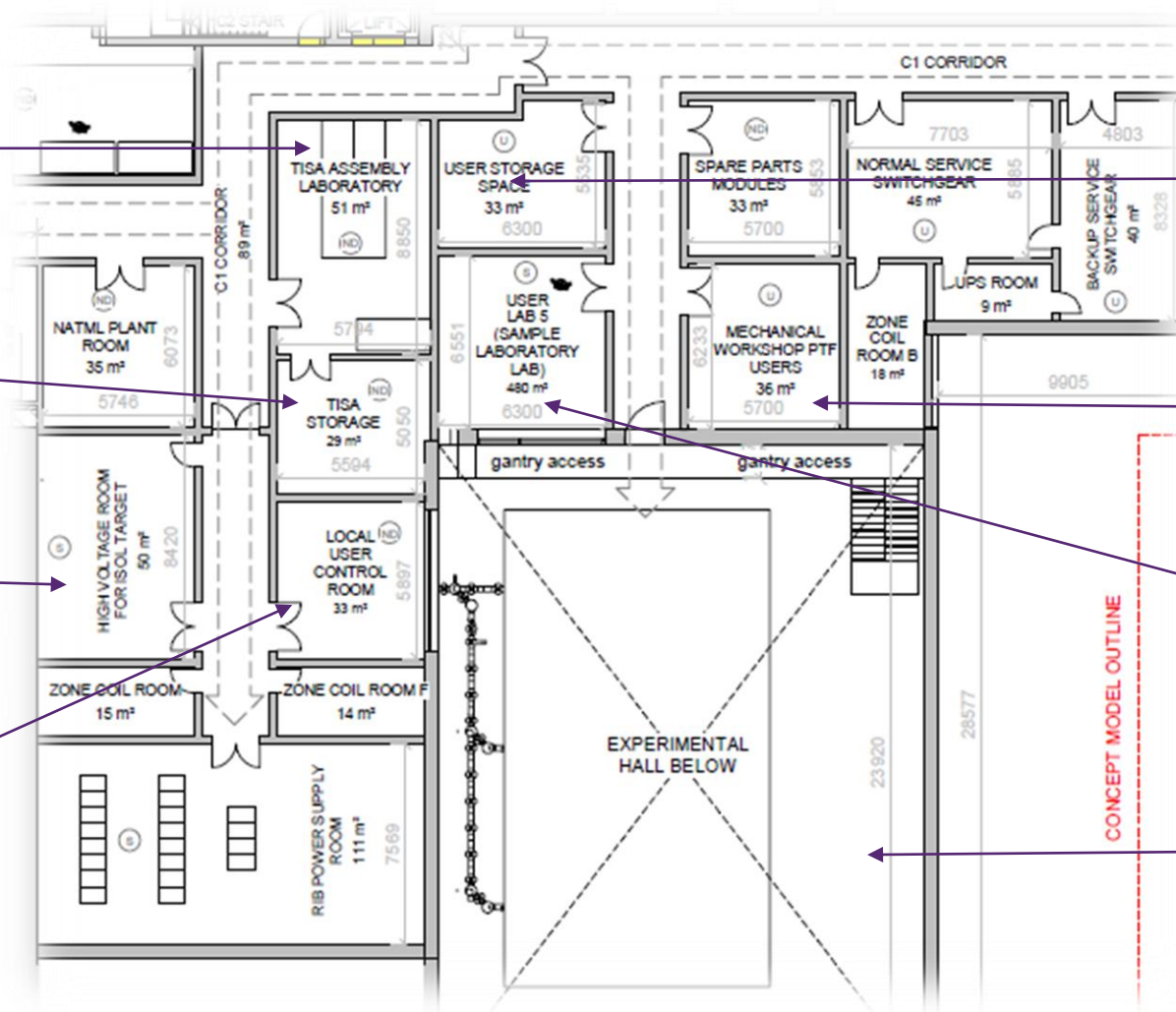
User Control Room

User storage space

Users mechanical workshop

User laboratory

Experimental Hall



ISOL@MYRRHA in PTF

- Layout – work in progress – ref. June 22 (lvl2)

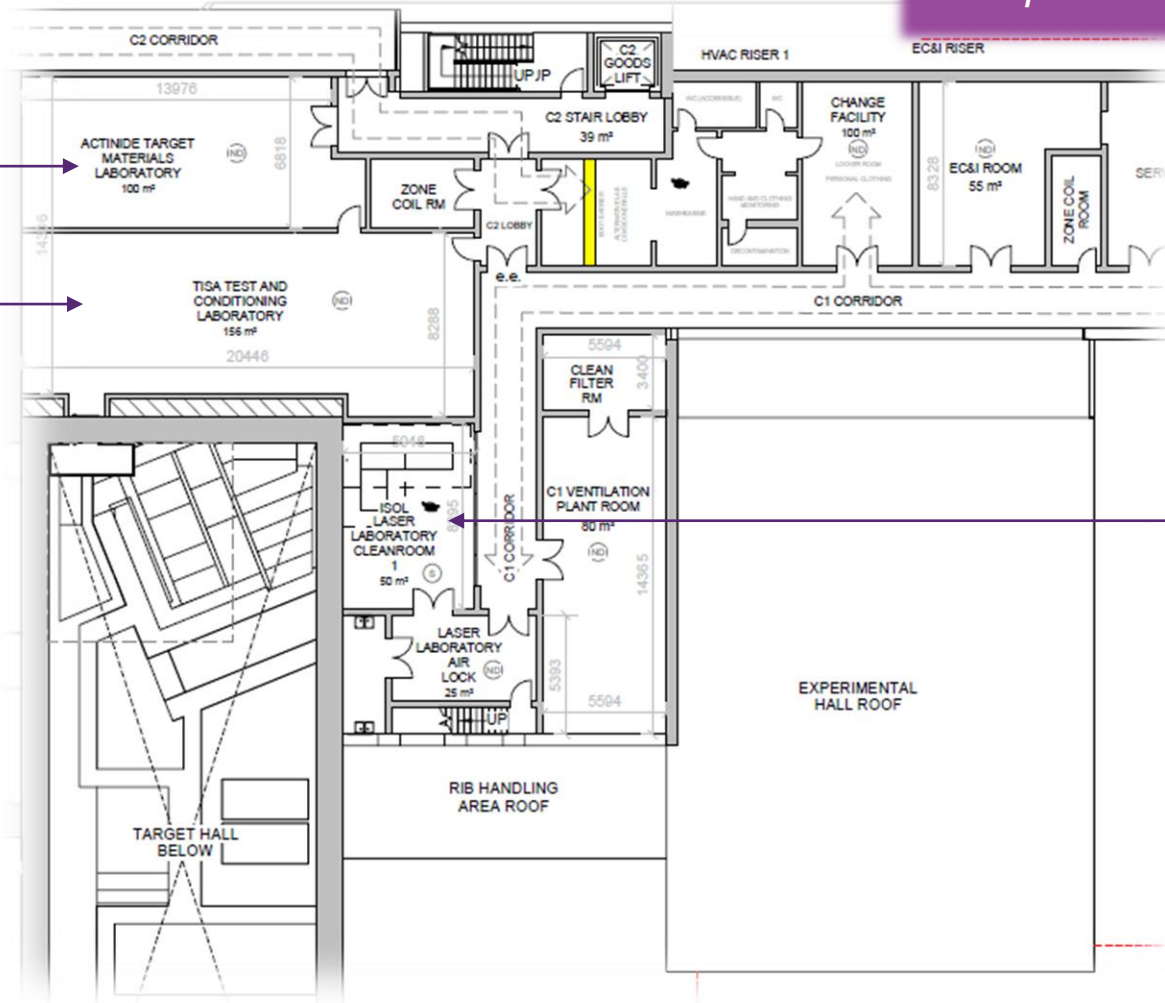
Important: to incorporate input from Users Community to define requirements & specifications for user facilities/installations!!

Actinide-target laboratory

Target test & conditioning

Including:

- Off-line ISOL system
- Pumping, High-Voltage and Thermal testing/conditioning



IMRILS laser lab

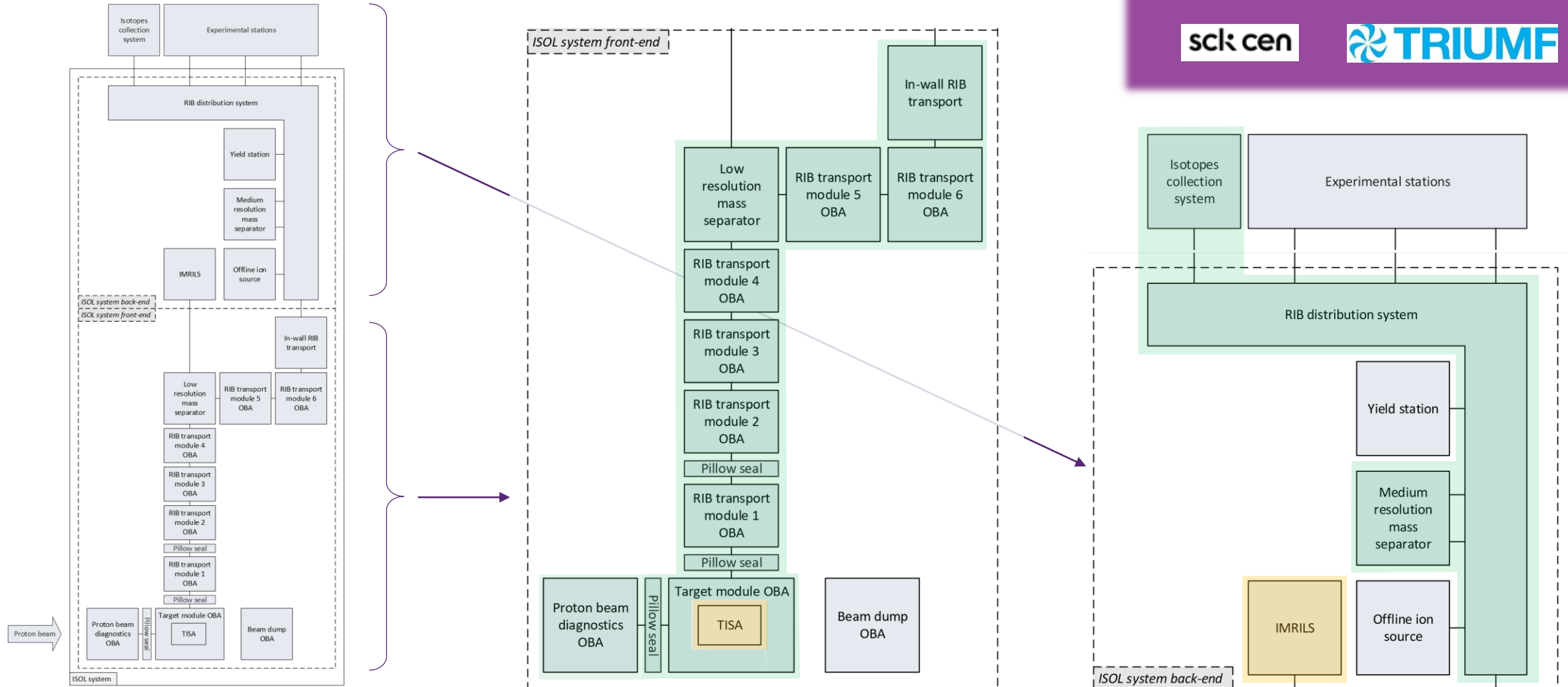
Technical developments – design activities

■ Conceptual design complete
■ Conceptual design ongoing

Conceptual Design and Documentation of the ISOL system nearing completion (*thanks to importing ARIEL design*)

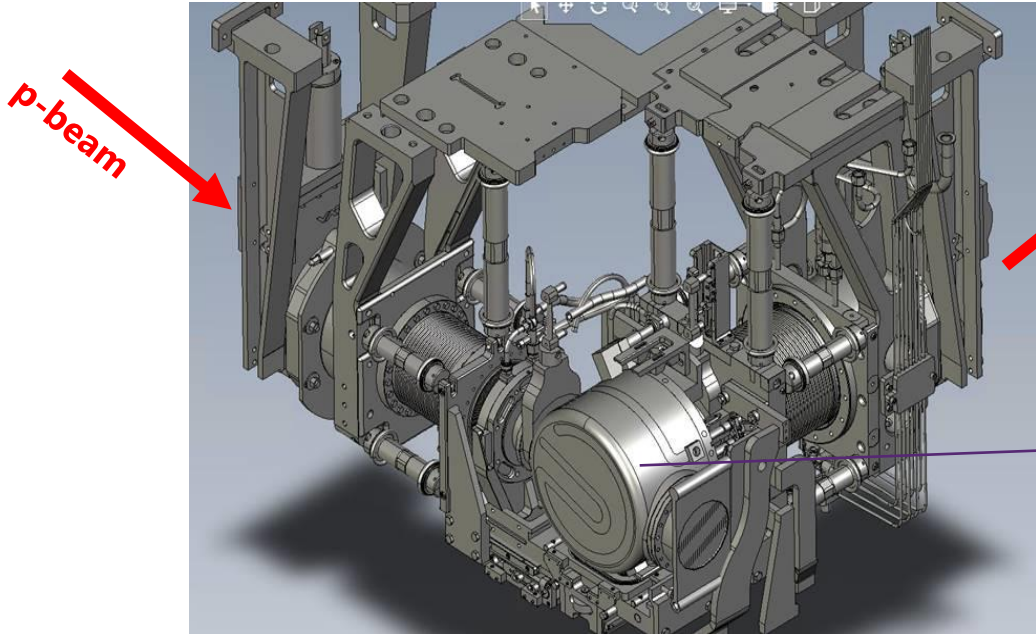
Dedicated Project Agreement for ISOL system & facility design

sck cen



Technical developments – Target module and target unit

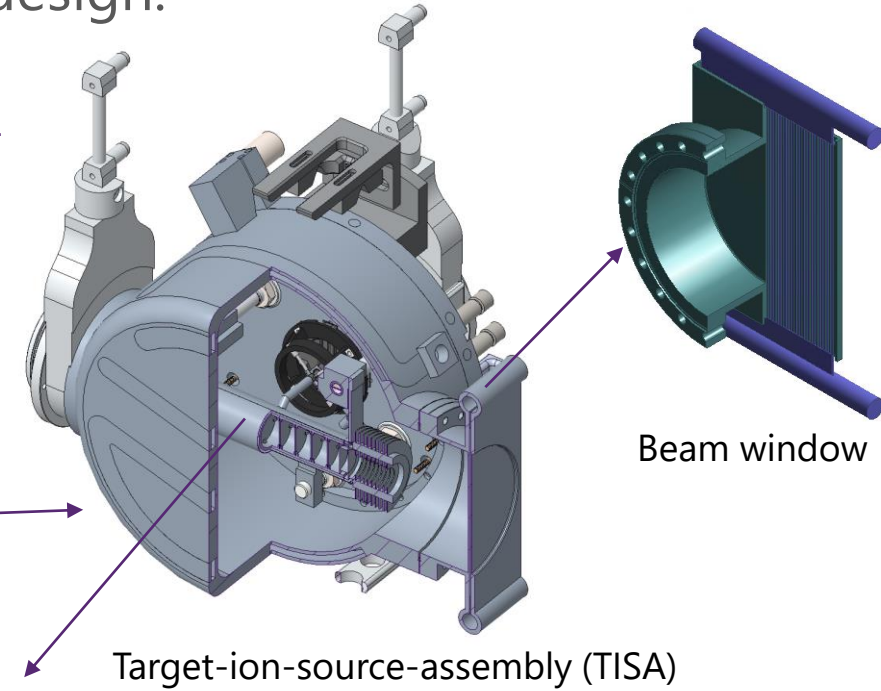
- ISOL@MYRRHA R&D and prototyping effort is focused on the systems directly affected by the difference in driver beam with respect to the ARIEL design:



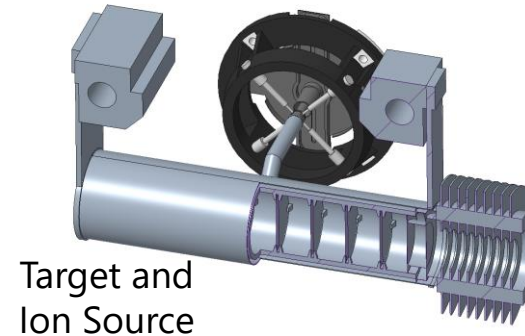
Target module On Board Assembly
(incorporating technical solutions from
ARIEL)

TISA Design based on ARIEL one:

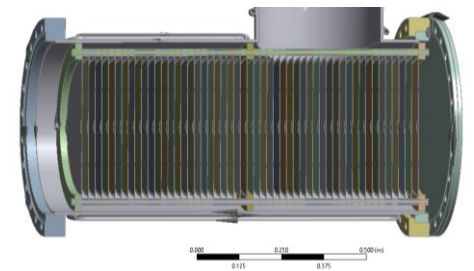
- Different beam energy/intensity
- Different target
- Same services
- Need beam windows (low energy)
- Different dose on seals



Target-ion-source-assembly (TISA)



Target and Ion Source



Beam dump

Technical developments – prototyping activities

Prototype of the ISOL system under construction at SCK CEN

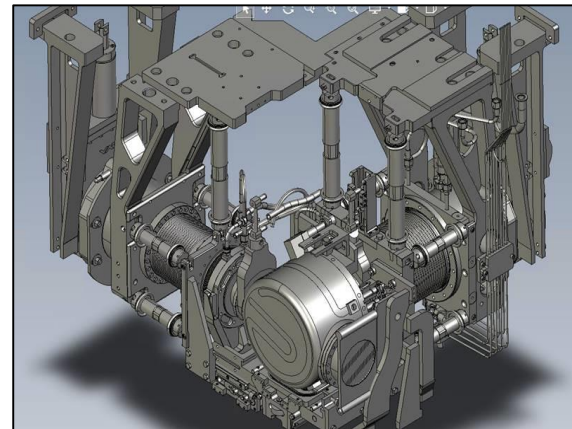
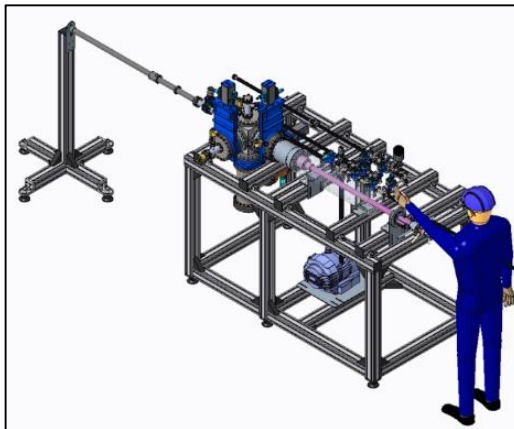
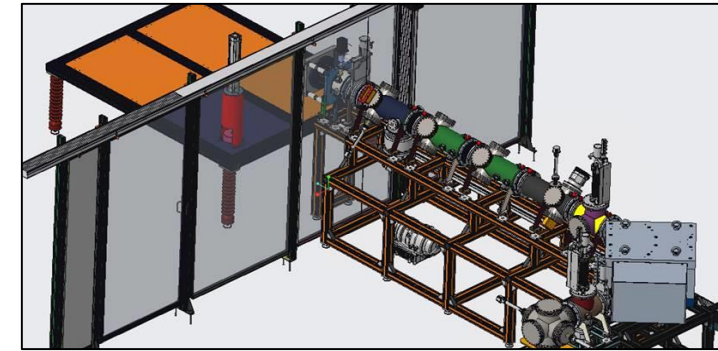
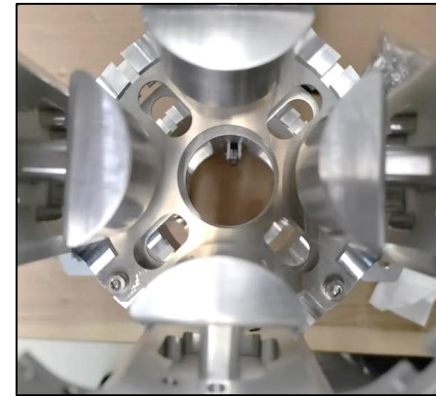
ISOL beam line- Installed components:

Frames, High-voltage cage, High-voltage platform, Vacuum chambers, Beam-optics components, Mass separator, Electrical racks, Cooling skid, cable ducts...

Laser lab – ready (see next slide)

Prototype **collector station** under manufacturing

Target Module onboard assembly prototyping planned in collaboration with TRIUMF



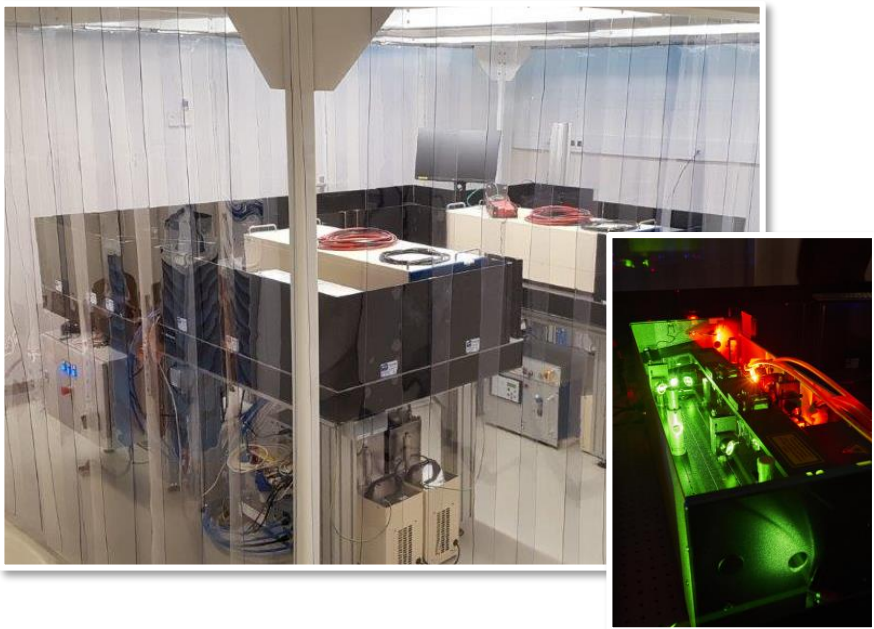
Technical developments – Research activities

Operational systems for RIB development at SCK CEN

- Laser laboratory – laser ionization development
- Target container thermal validation
- Target material development
 - Isotope release
 - Thermal tests

*Dedicated Project Agreement
for ISOL/RIB development*

sck cen



Laser system to drive the laser-ion source



Thermal test stand



Isotope-release setup

ISOL@MYRRHA Applications – Towards an Effective Users Community

Fundamental research

- Connected to NuPECC community
- MYRRHA became member of NuPECC in 2019

Medical Applications

- Connected to important consortia
- Tb-IRMA-V consortium
 - PRISMAP consortium
 - ...

Solid-state physics and Biology

- Community approached
- e.g. ISOL@MYRRHA Workshop – June 2022
 - ...and see below

Expert group I@M Applications

- Frederik Cleeren (KU Leuven)
- Thomas Cocolios (KU Leuven)
- Ruben de Groote (KU Leuven)
- Gerda Neyens (KU Leuven)
- Lino Pereira (KU Leuven)
- Lucia Popescu (SCK CEN)
- *Agota Koszorus (KU Leuven & SCK CEN)*

- Contact relevant experts in the various fields of applications
- Identify the most promising experiments/isotopes
- Create collaborations around specific scientific cases and experimental setups
 - Be the link between these collaborations and the (ISOL@)MYRRHA project
- Active contribution to the realization of letters of interest (Lols)

Copyright © SCK CEN

All property rights and copyright are reserved.

This presentation contains data, information and formats for dedicated use only and may not be communicated, copied, reproduced, distributed or cited without the explicit written permission of SCK CEN.

If this explicit written permission has been obtained, please reference the author, followed by 'by courtesy of SCK CEN'.

Any infringement to this rule is illegal and entitles to claim damages from the infringer, without prejudice to any other right in case of granting a patent or registration in the field of intellectual property.

SCK CEN

Belgian Nuclear Research Centre
Studiecentrum voor Kernenergie
Centre d'Etude de l'Energie Nucléaire

Foundation of Public Utility
Stichting van Openbaar Nut
Fondation d'Utilité Publique

Registered Office:

Avenue Herrmann-Debrouxlaan 40 - 1160 BRUSSELS - Belgium

Research Centres:

Boeretang 200 - 2400 MOL - Belgium
Chemin du Cyclotron 6 - 1348 Ottignies-Louvain-la-Neuve - Belgium