



ISOLDE Technical Report

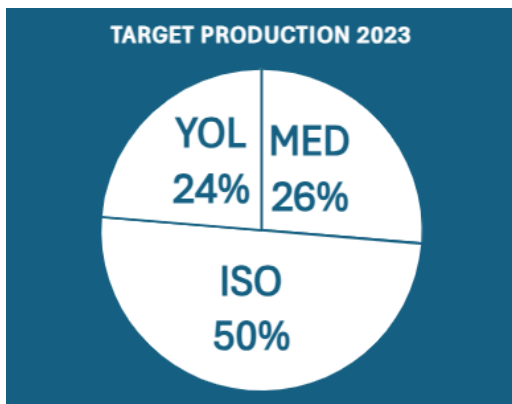
75th Meeting of the INTC – 06/02/2024

Joachim Vollaire (Technical Coordinator) on behalf of ISOLDE Technical Teams

Outline

- **Target “lifecycle” in 2023 : production and elimination**
- **MEDICIS 2023 report**
- **Quick summary of YETS activities**
- **ISOLDE Improvement Program – Update**

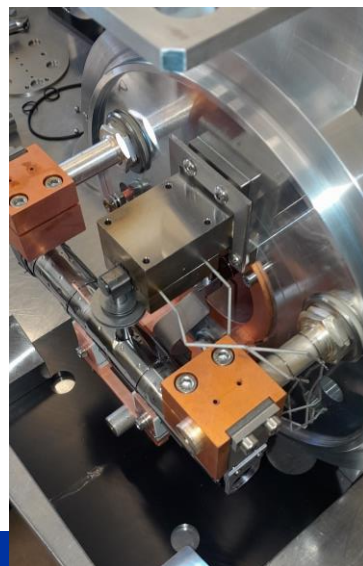
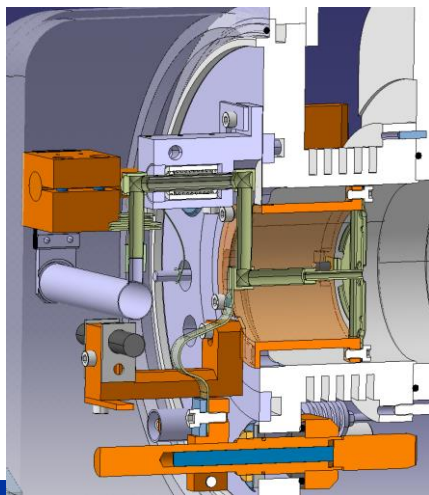
Target production



40 target and ion source units produced for ISOLDE and MEDICIS operation as well as for offline developments

Several nonstandard units successfully operated

Example of cold quartz target: new insulation material and improved cold block fixation.



07/02/2024

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24-05-2023 09:53:44

LOI244 finished very successful experiment,
many new/interesting results were obtained within 5 shifts,
some can probably be published already now :) (after some
extra off-line analysis).

We could see 206-211Hg, with rates sufficient for future
measurements of decay spectroscopy/masses/hfs and others.

We also did some measurements for a few neutron-deficient isotopes around 180Hg.

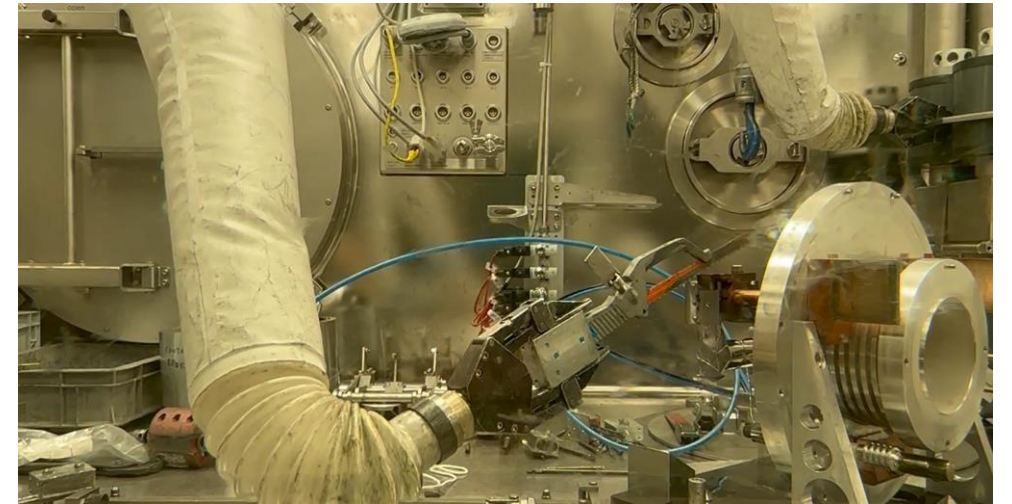
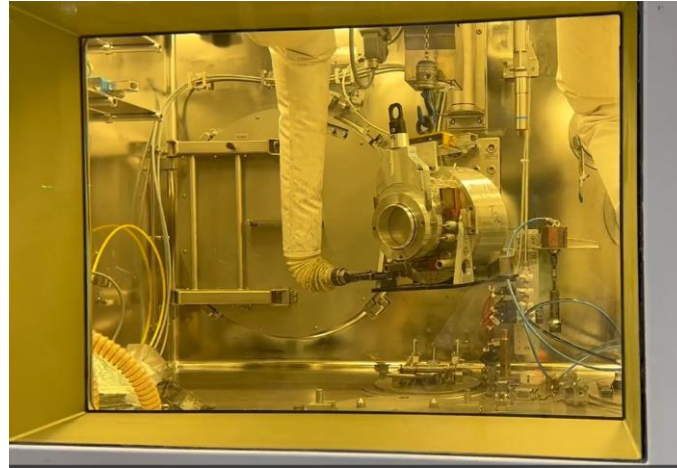
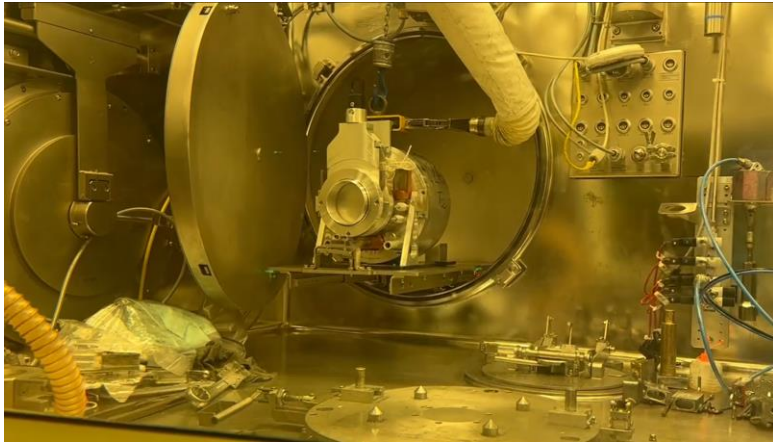
Overall, a very good run, the target+quartz line perfomed above all expectations,
no Fr's were seen (albeit some Tl/Pb's are there).

We thank the target/separator/ISOLDE team who made this happen
(special thanks to Emiliano for helping us to recover the target/line heating
on several occasions, also early in the morning).

CHEERS!

Andrei on behalf of LOI244 (I assume our colleagues from Cd IS685 will join
our BIG THANKS!)
    
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Target Elimination (ISOLDE Hot Cell)



Back of cell interventions (target transfer and drums)

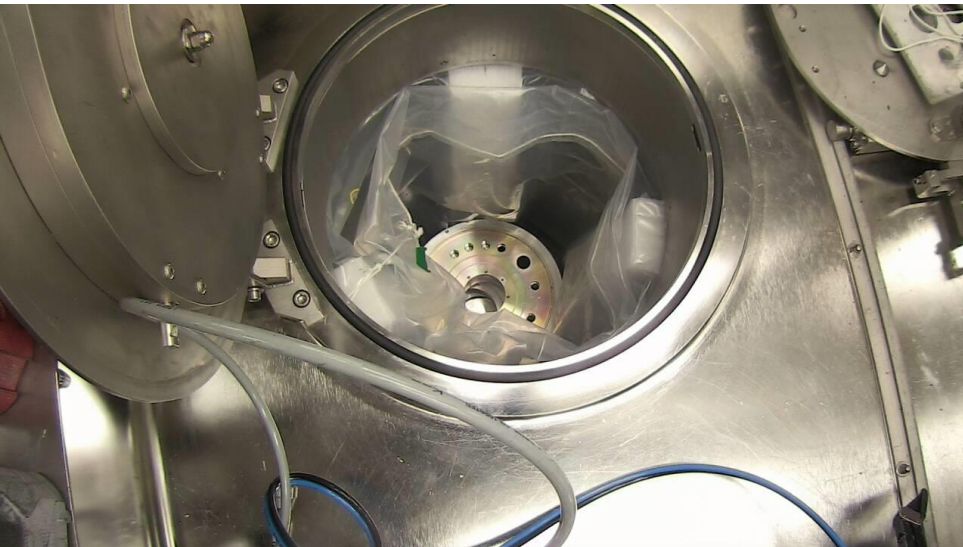
Target to be dismantled



Disconnecting small and large drums

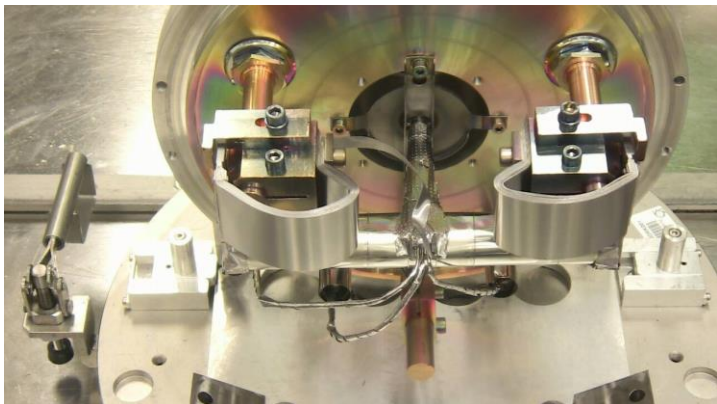


Drum filling (view from inside the hotcell)

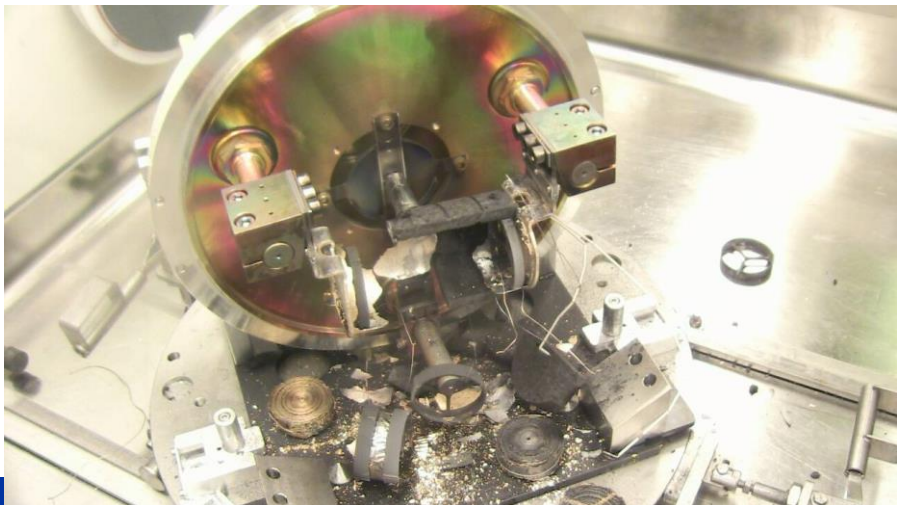
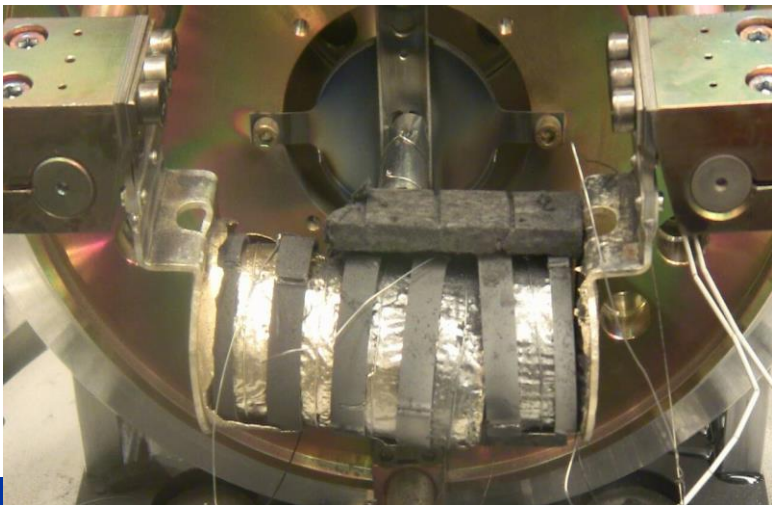
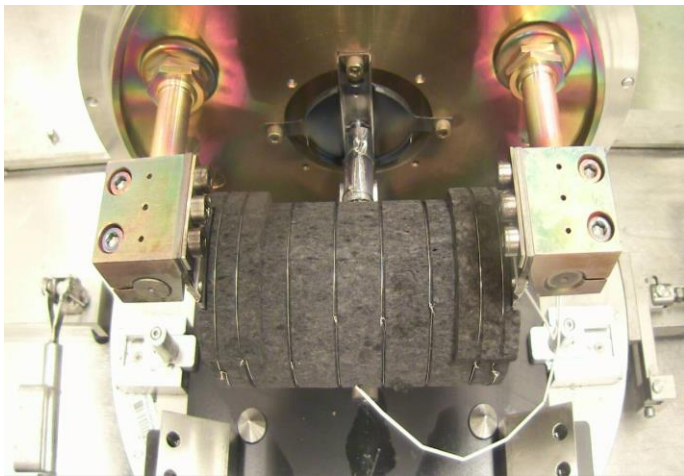


Target Elimination

Separation of materials (all done with telemanipulators and adapted tools)



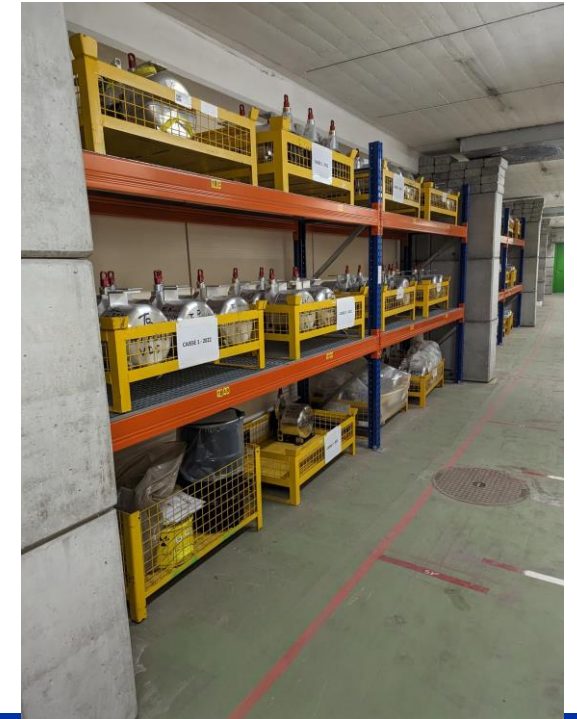
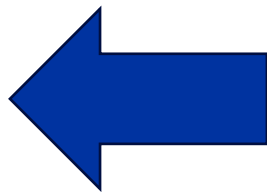
PIE opportunity (example of large container prototype 673M)



Elimination Campaign

- 37 targets dismantled and conditioned in drums ready for elimination during the coming years (elimination of 24 targets budgeted for 2024).
- Pilot batch of 12 tantalum targets dismantled end of 2022 successfully eliminated to PSI (previous elimination campaign took place in 2010 !).
- Ongoing development for actinide targets elimination – Process integration inside hot cell (uranium and thorium carbide to be re-oxidize)

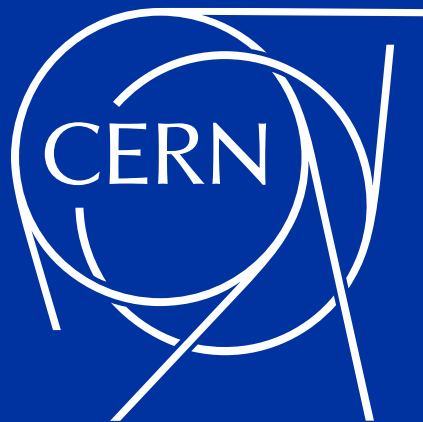
To PSI (CH)



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CERN-MEDICIS DASHBOARD 2023



TARGETS

9 new targets built
6 reused from previous years



PROTONS ON TARGET

(excluding external sources)
2.4E19



ACTIVITY

3.8 GBq collected and
distributed to end users



DISPATCH TO PARTNER INSTITUTES

25 radioactive transports
Sm-153 shipped 1h after foil retrieval



EFFICIENCY

Up to 41% (Ra)



DOSE

Maximum 41 μ Sv individual (1 GBq batch)
179 μ Sv collection over the year

CERN-MEDICIS – view of 2023 productions



Cs-129
 1x 91 MBq
 1x 140 MBq
1x 1 GBq

CHUV,
 Lausanne, CH

Ba-128
 1x 60 MBq
 1x 340 MBq

All values presented are at the time of the End Of Collection (EOC)

Ra-225/Ac-225*
 1x 60 MBq Ra-225
 +
 1x 11 MBq Ac-225

PAEC, Pakistan
 KUL, Belgium
 IRA, Lausanne, CH

Ra-225/Ac-225*
 1x 35 MBq Ra-225
 +
 1x 4 MBq Ac-225

KUL,
 Belgium

Ra-225/Ac-225*
 1x 15 MBq Ra-225
 +
 1x 140 MBq Ra-225

NPL, UK

PAEC,
 Pakistan

**J. Johnson PhD thesis*

40% efficiency repeated twice for elemental Ra !

Tm-167
 1x 20 MBq
 1x 92 MBq

NPL, UK
 PSI, CH

Tm-165
 1x 12 MBq
 1x 180 MBq

NPL, UK
 DTU, Denmark

Er-169
 1x 150 MBq
 1 x 30 MBq
 1 x 20 MBq

PSI, CH

Sm-153
 1x 130 MBq
1x 1.2 GBq

Heidelberg Hospital, GE

Kicking off the 1st clinical trial !

In development:

Tb-155
 1x 4 MBq
 1x 2 MBq*

Univ. Bordeaux, FR
 NPL, UK

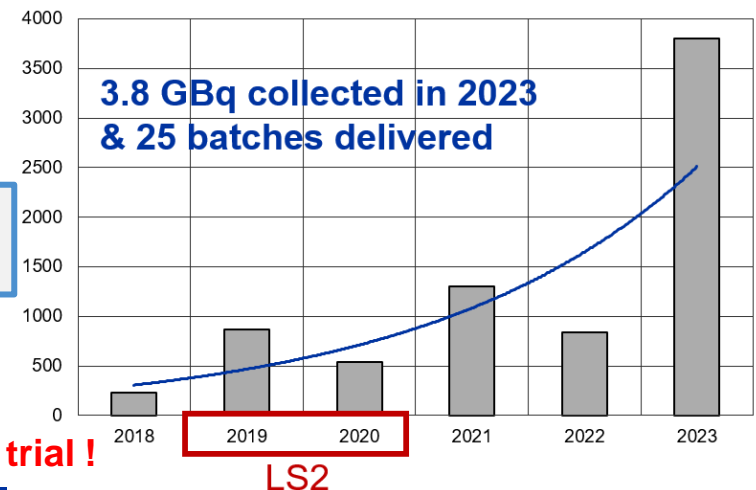
**W. Wojtaczka PhD thesis*

Sc-47 (+Sc-44m)
 1x 4 MBq
 1x 3 MBq

Sc-46
 1 x 2.5 MBq
 (>2% eff. ! *)

**E.Mamis PhD thesis*

Total activity collected and provided to users (total - in MBq)



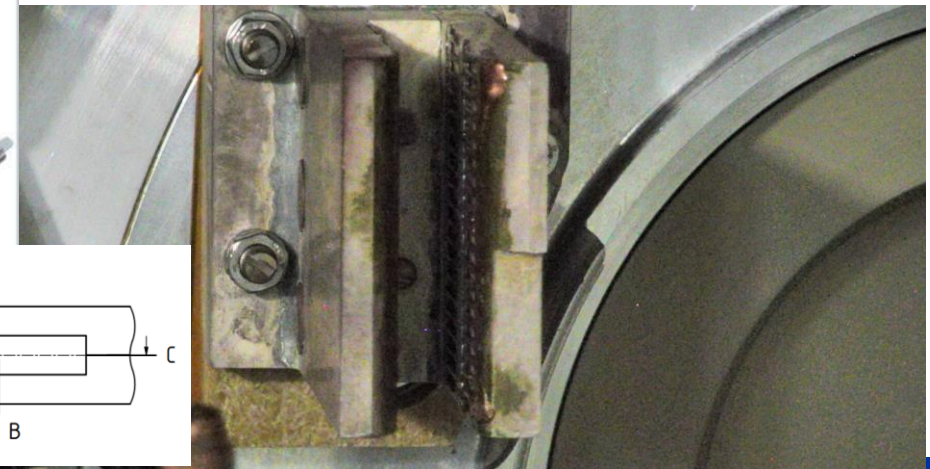
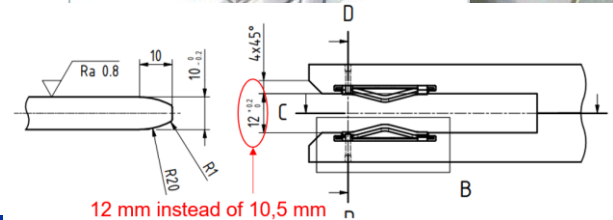
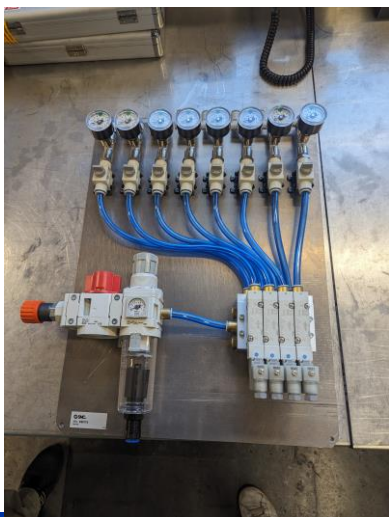
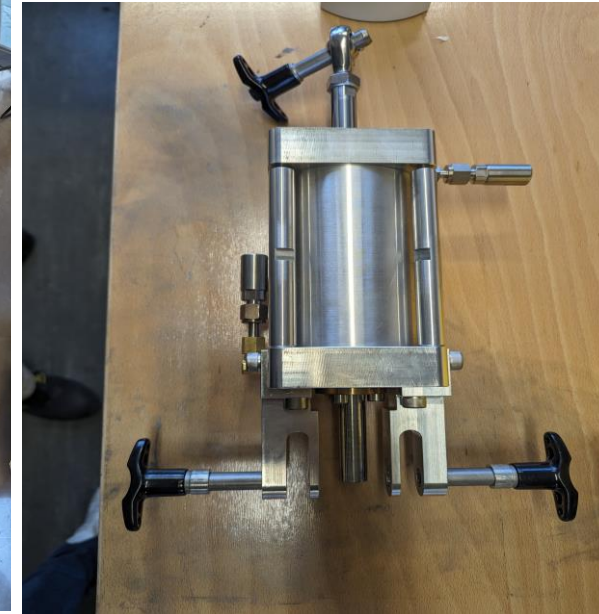
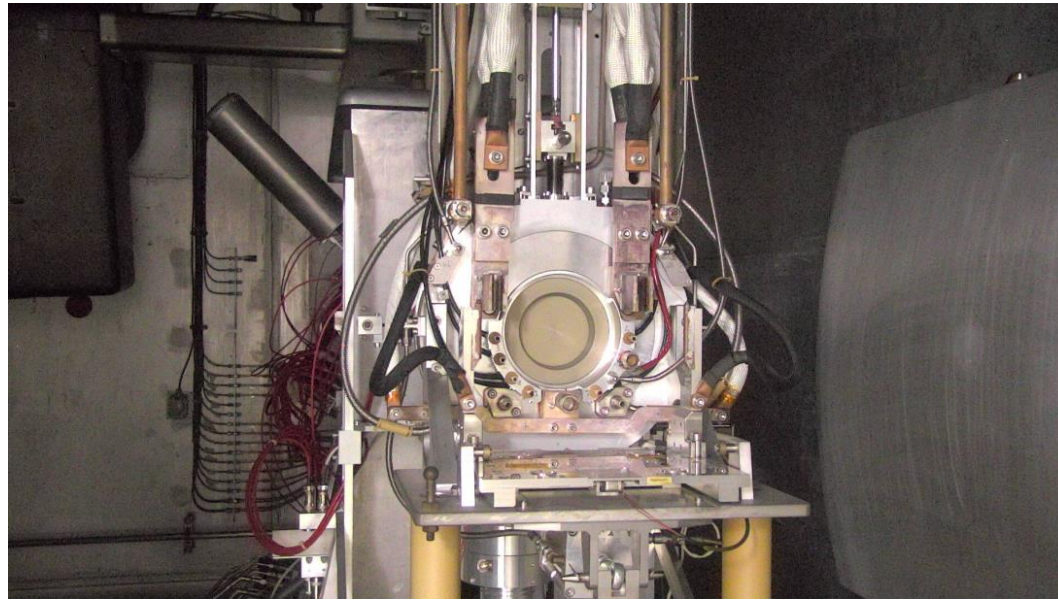
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YETS Activities – target and separator areas

- Targets handling end of December and beginning of January. All targets removed from target area (needed for standard interventions)
- Several technical visits for LS3 projects (beam dumps exchange, BTY line 2.0 GeV upgrade....)
- Electrical consolidation work during the last 10 days in Building 179 (no access to building and target area)
- Frontends maintenance and consolidation work will start next week.
- Focus on target coupling issues encountered during the last years (new compressed air actuator, compressed air distribution, new electrical forks...)
- Fixed SEMGRIDs at the end of the BTY line will be exchanged
- Faulty (vacuum leak) HRSFC0600 instrument exchange

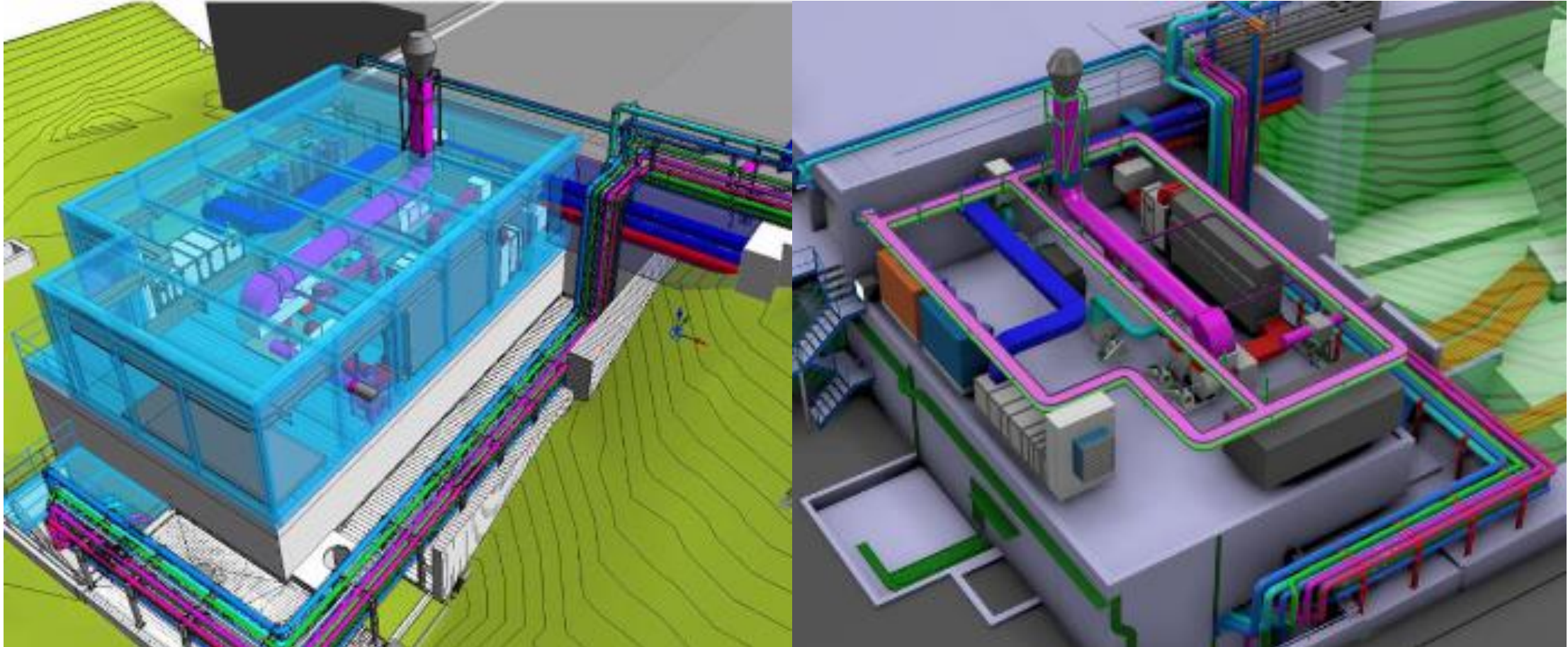
YETS Activities – target and separator areas



YETS activities (Building 197 extension) – Fire safety

- Preparatory work for the Building 197 extension ongoing (started in November). Relocation of services on top of Building 197
- Construction of extension to start Q3 – 2024. Installation of EN-CV equipment in 2025. Connection to primary areas ventilation ducts as early as possible during LS3 (overlap with beam dump exchange worksite)
- New building will host consolidated ventilation systems (charcoal filters, fire dampers). All critical equipment removed from Build. 170
- Fire detection installed in separator areas (GPS and HRS)
- Fan coil unit installed in the HRS separator zone (host primary pumps – temperature well above 40°C during operation)

YETS activities (Building 197 extension) – Fire safety



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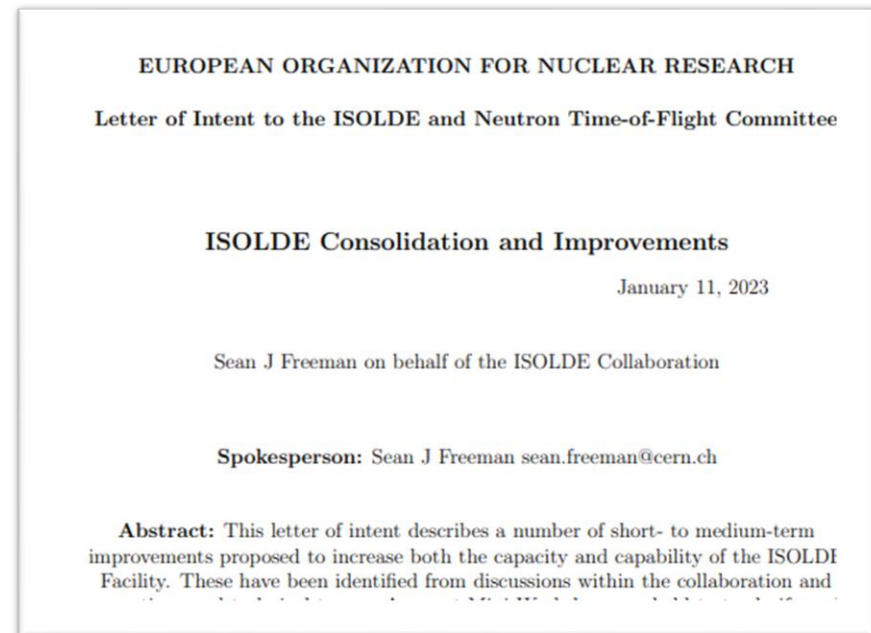


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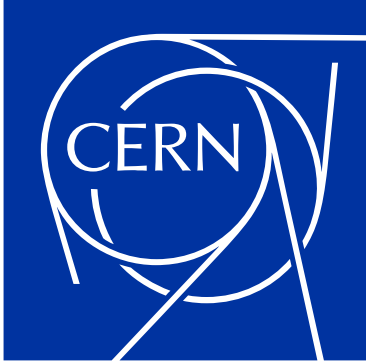
Improvement program Update

- Cost, Scope & Schedule review held mi-December. Asked equipment groups to present their plans their plans (budgets, resources, schedule) to address the list of improvement identified during the last years and summarized in LOI from Sean (Jan. 2023)
- Review and arbitration process ongoing within CERN ATS sector – MTP2024 preparation



Conclusions

- Excellent year for targets performances including several non-standard units. Ramping-up target elimination activities (backlog)
- Excellent year for MEDICIS operation and isotopes production. Future of MEDICIS beyond LS3 discussed (endorsement by the community)
- YETS activities ongoing including REX HIE ISOLDE. SC Linac was kept “cold” (shield of CMs at ~ 85 °K) for a couple of weeks end of 2023. Part of the study to decide on the implementation of a dedicated cooling with LN during the cryoplant maintenance period. Analysis ongoing – further tests needed with RF group.
- Building 197 extension work ongoing. Activities impacting operation on schedule for restart of the facility. Construction to continue in 2025 (Q3)
- ISOLDE Improvement Program put forward. Approbation process ongoing



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