



ISOLDE Technical Report

70th Meeting of the INTC – 22nd of June 2022

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

22/06/2022

Outline

- **Facility restart and operation (low energy physics)**
- **Target Production and RILIS highlights (PI-LIST)**
- **REX-HIE ISOLDE status**
- **Update on some projects**
- **Conclusions**

Low energy lines commissioning and operation

- Stable beam commissioning of low energy lines started on the 04/02
- Reference configurations saved for both Frontends, different target types and for all beam destinations. Facilitate beam tuning during operation period.
- Protons to the BTY line on the 07/03 (~2 weeks of online commissioning before physics)
- Physics started end of March.

Low energy lines operation

GPS schedule 2022														
March		April					May					June		
12		14	15	16	17	18	19	20	21	22	23	24	25	26
21	28	4	11	18	25	#534 Sn VD5 2	9	16	23	30	Pentecost 6	13	20	27
	IS688 (nights)	#756 UC q n	IS685				#734 UC VD7 (TBC)	Tech Stop					#758 UC q n	
#627 Ta			#634 LIST					#752 LIST	Ascension CERN Holiday (for May 1)	TBC				TAS
	#734 UC VD7			LOI 219 (LOI 217)		IS647 IS652 IS679 IS703	IS659 IS668		IS664 LOI216		IS668 + Colls		IS671 + tests	IS684
RILIS : Dy	RILIS : Dy	RILIS : Cd	RILIS : Cd	RILIS : Ti/Tb		111Cd	8He/6He		RILIS : Ac	RILIS : Ac	RILIS : Sn			RILIS : Zn

Several previously irradiated targets used

Non “standard” targets:

- 2 PI LIST targets online
- 2 quartz line targets

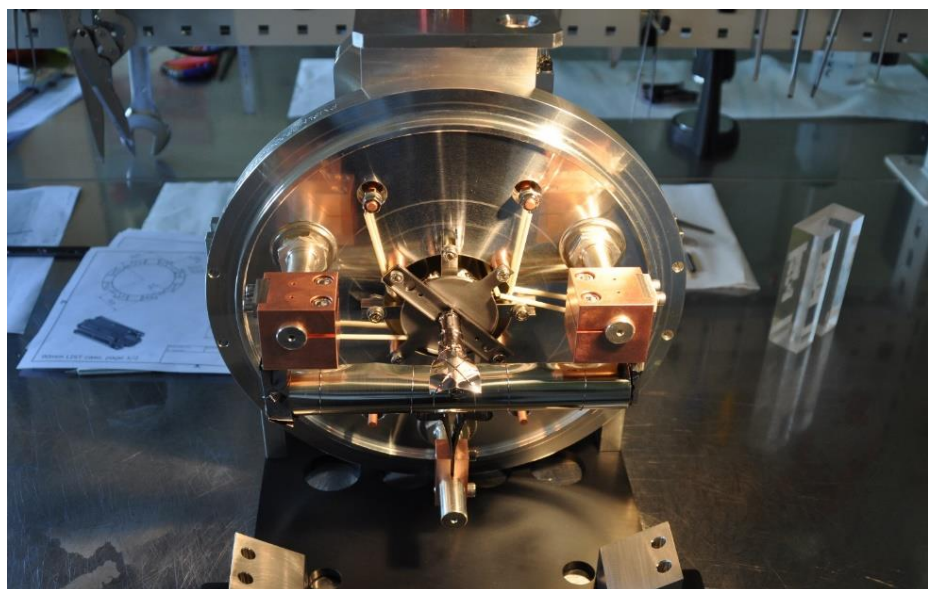
RILIS laser schemes high demand

~5E19 protons received so far

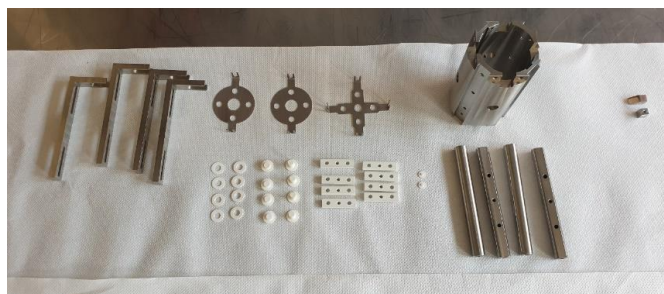
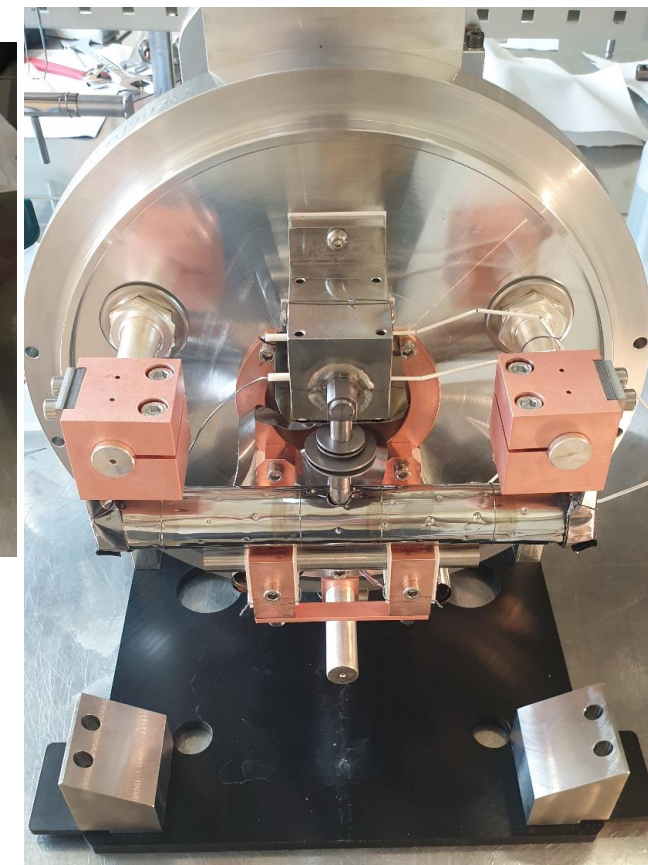
HRS schedule 2022														
March		April					May					June		
12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
21	#654 UC W 28	4	11	18	25	2	9	16	23	#755 UC n 30	6	13	20	27
	MD + VITO tests		#753 UC			#751 UC VD5		Tech Stop				#752 LIST		
			CPIS						Ascension CERN Holiday (for May 1)	CPIS		LA1	CPIS	#757 UC n
			Good Fri	#754 UC n	COLLAPS	TSD (LISA) and/or MD	#754 UC					LA1	CPIS	
			IS700		IS667			IS666		IS660		IS456 & LOI225		
			RILIS : Al	RILIS : Al	RILIS : Te	RILIS : Te		49K		RILIS : Ag	RILIS : Ag	RILIS : Po	RILIS : Po	

Quartz line and PI-LIST targets production

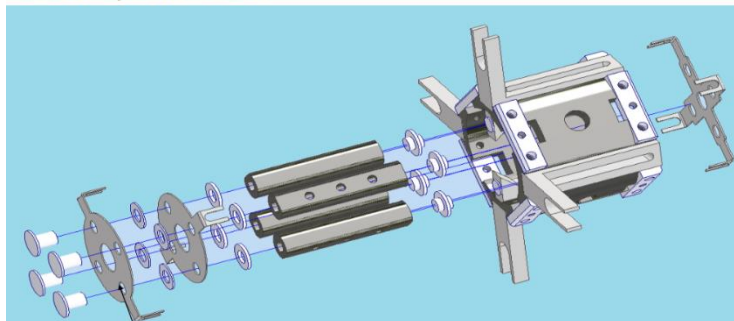
Two PI-LITS targets online



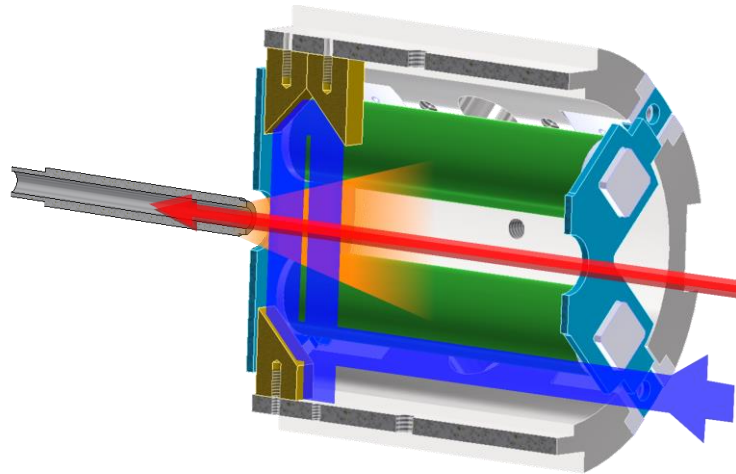
Two quartz line targets produced (hot and cold line)



Assembly visualization



PI-LIST: High-resolution in-source spectroscopy



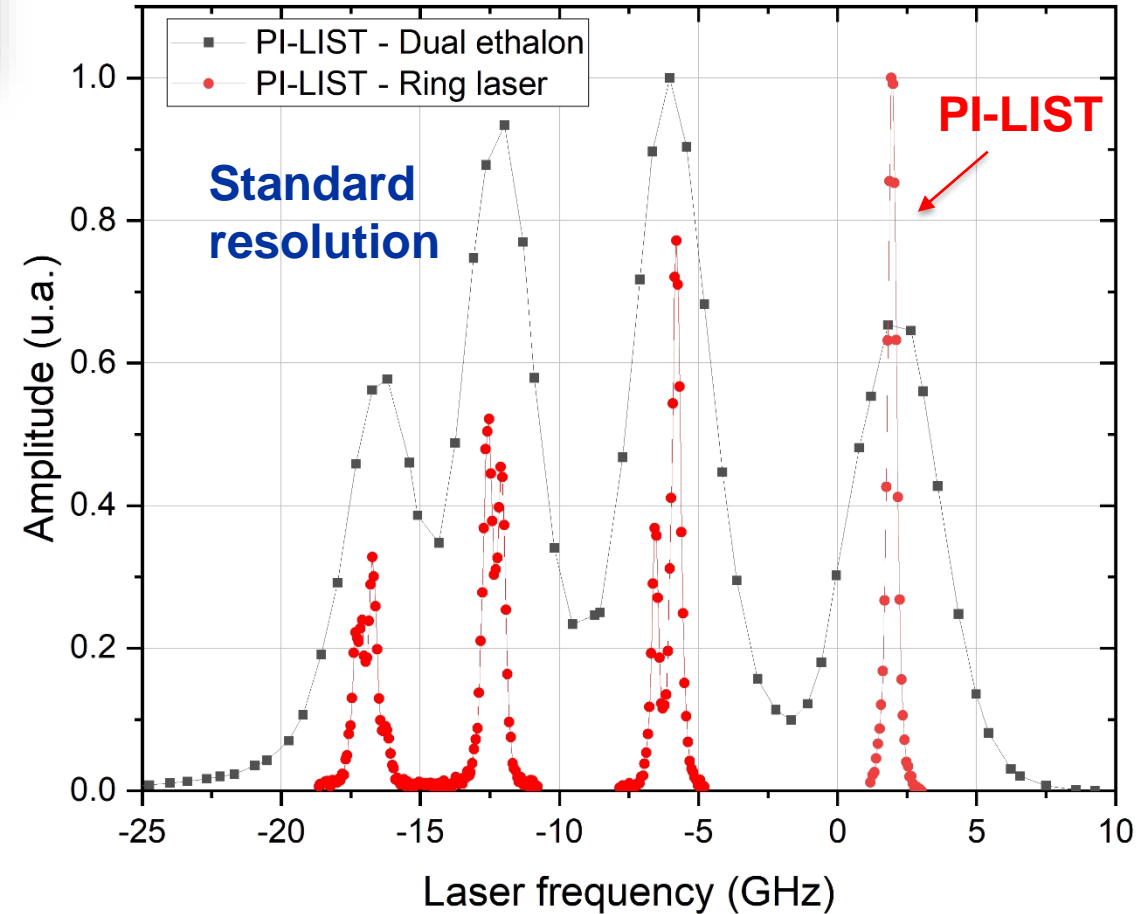
Standard
laser

Spectroscopy
laser

Slides from R. Heinke

IS664, 05/2022: First experiment using PI-LIST at ISOLDE

- Additional operation mode of the LIST ion source featuring perpendicular laser/atom interaction
- Reducing spectral linewidth from few GHz to ~200MHz (at cost of efficiency loss)
- Application for high resolution spectroscopy and isomer-pure RIB production
- New data on nuclear shapes in Ac isotope chain



RILIS + CRIS + COLLAPS + LISA network: Joint development of **high-resolution versatile laser systems**

Status of REX-HIE ISOLDE

Foreseen commissioning plan

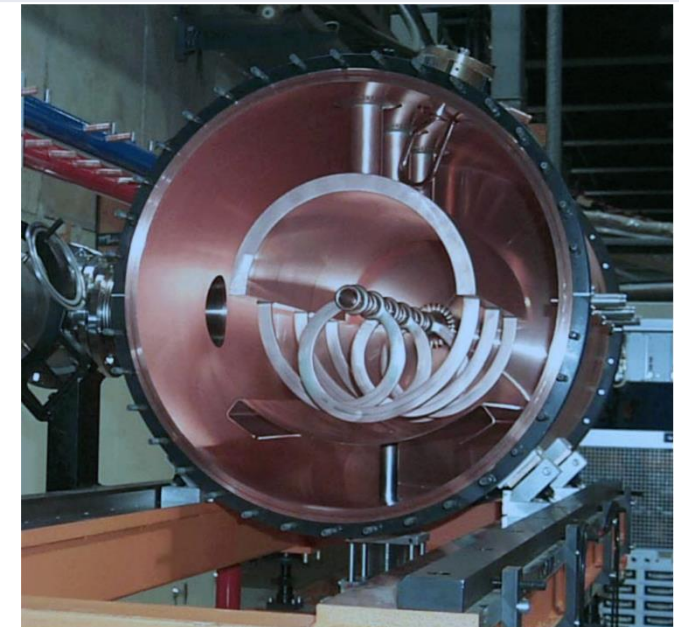
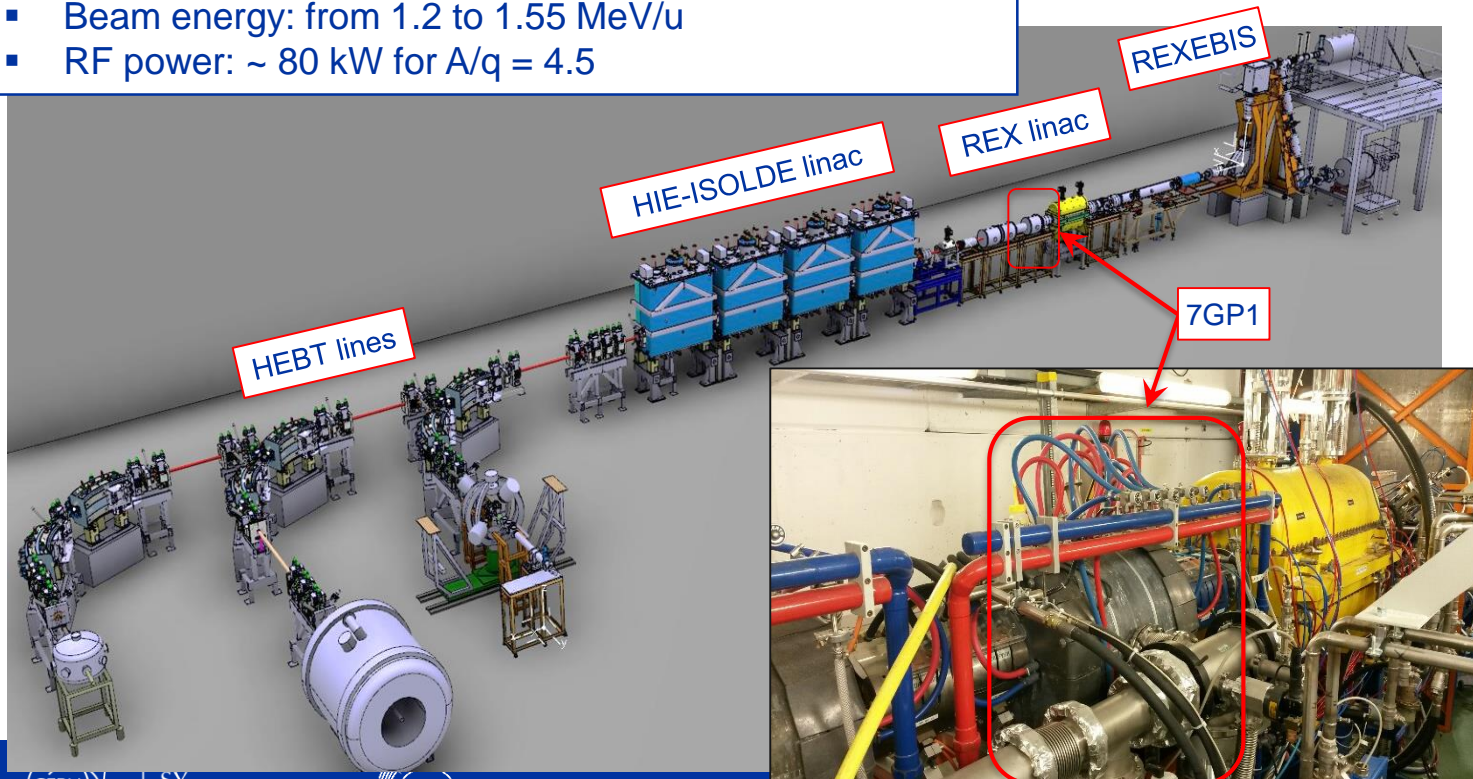
Difficult recommissioning of REX-HIE ISOLDE Linac:

- 3 compressor station cuts (reconditioning required)
- End of May: 7GP1 (NC accelerating structure) can't hold the required accelerating gradient

wk. number	21	Beam through cryomodules (ahead of time thanks to D. Valuch who completed the hardware commissioning of the SRF cavities)
	21, 22	Beam commissioning of REX linac (phasing, reference set-ups...)
	23, 24	Beam commissioning of HIE-ISOLDE linac
	25	Beam commissioning of the HEBT lines
	26	First stable beam to users
	28, 29	Setup and first Radioactive Ion Beam (RIB) to users

The 7GP1 spiral resonator:

- Accelerating structure of the REX linac
- In operation for ~ 20 yrs
- Beam energy: from 1.2 to 1.55 MeV/u
- RF power: ~ 80 kW for $A/q = 4.5$



Input: J.-A. Rodriguez Rodriguez, E. Siesling
S. Ramberger, C. Gagliardi

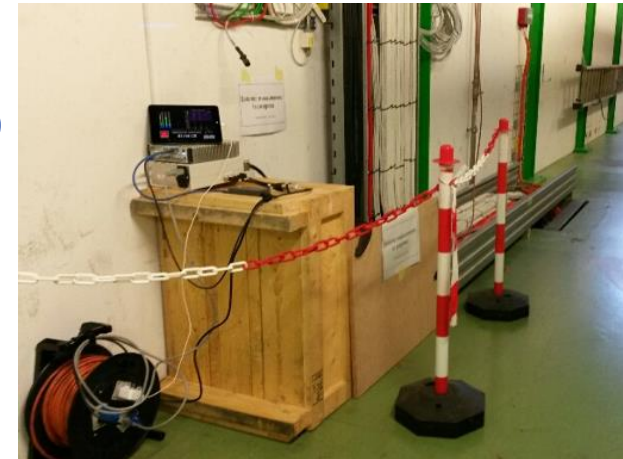
REX-ISOLDE 7gap1 investigations

- Extensive RF measurements to validate proper functioning of the amplifier and status of RF cables
- Cavity opened twice (endoscopy inspection). No defect found.
- Several external vibration measurements. Permanent measurement setup (data logging)
- Strong vibrations felt end of May in the tunnel have disappeared (most likely caused by cryogenic compressor in nearby building)

Cavity inspection



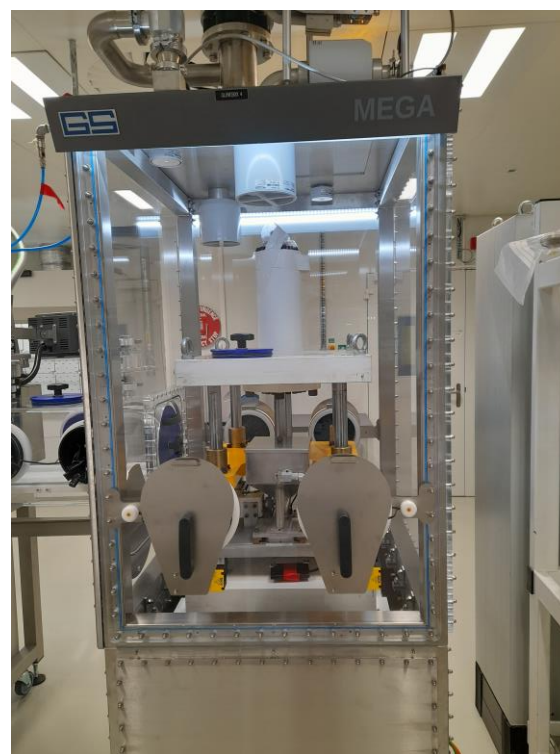
Vibration meas. setup



**With low external vibration (for the moment) operation possible as is (not further investigations)
Focus on beam commissioning**

New nano-laboratory (actinide target production)

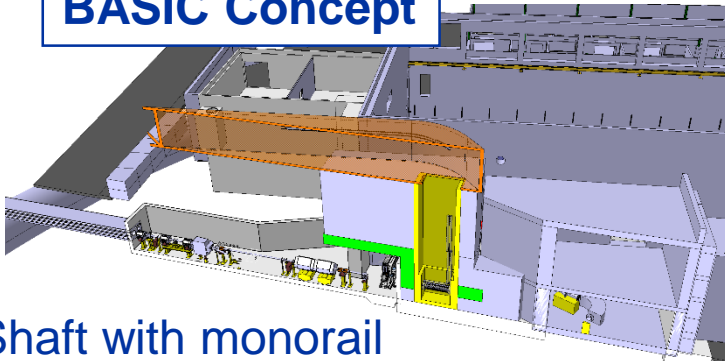
- Glove boxes for the new nano-laboratory installed in MayNew laboratory for actinide target production (uranium and thorium).
- Fully enclosed process (currently done under fumehoods.)



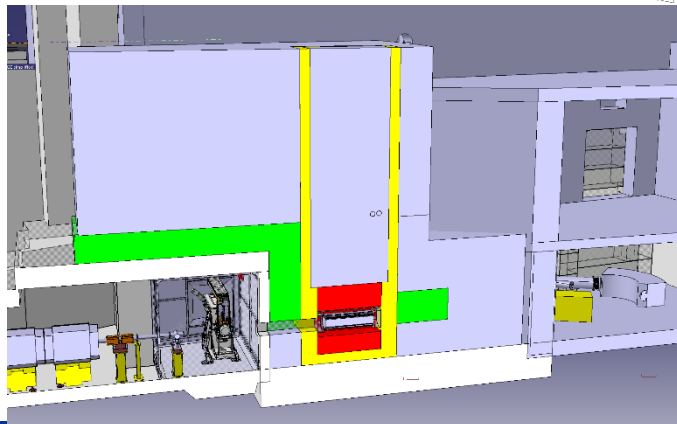
ISOLDE Beam Dumps Replacement Study

- Project focuses on two concepts (BASIC and FLEXI)
- More detailed study for FLEXI ongoing (include costing)
- Detailed dismantling study launched (external consultant)

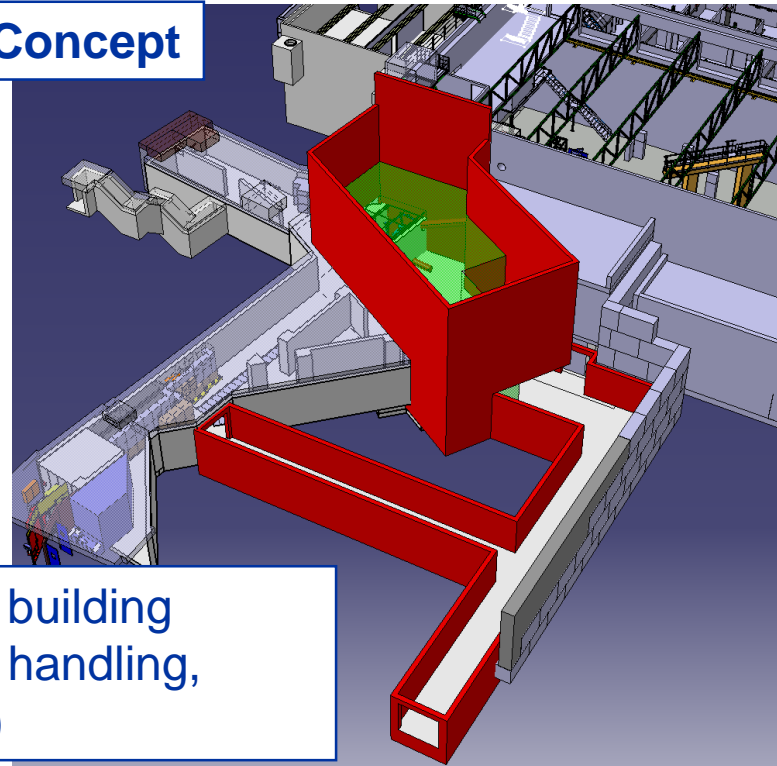
BASIC Concept



Shaft with monorail

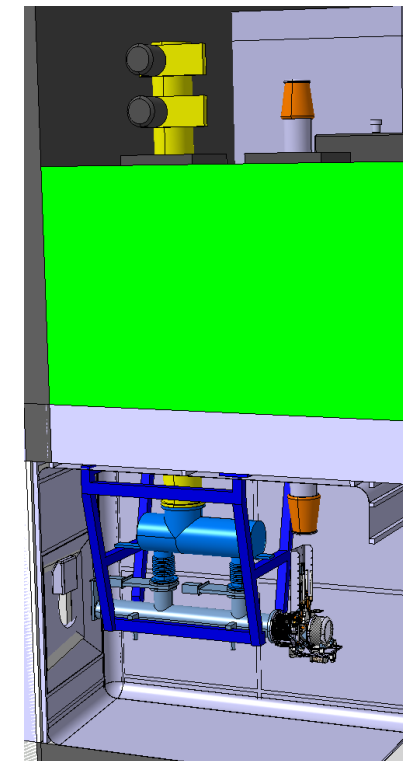


FLEXI Concept



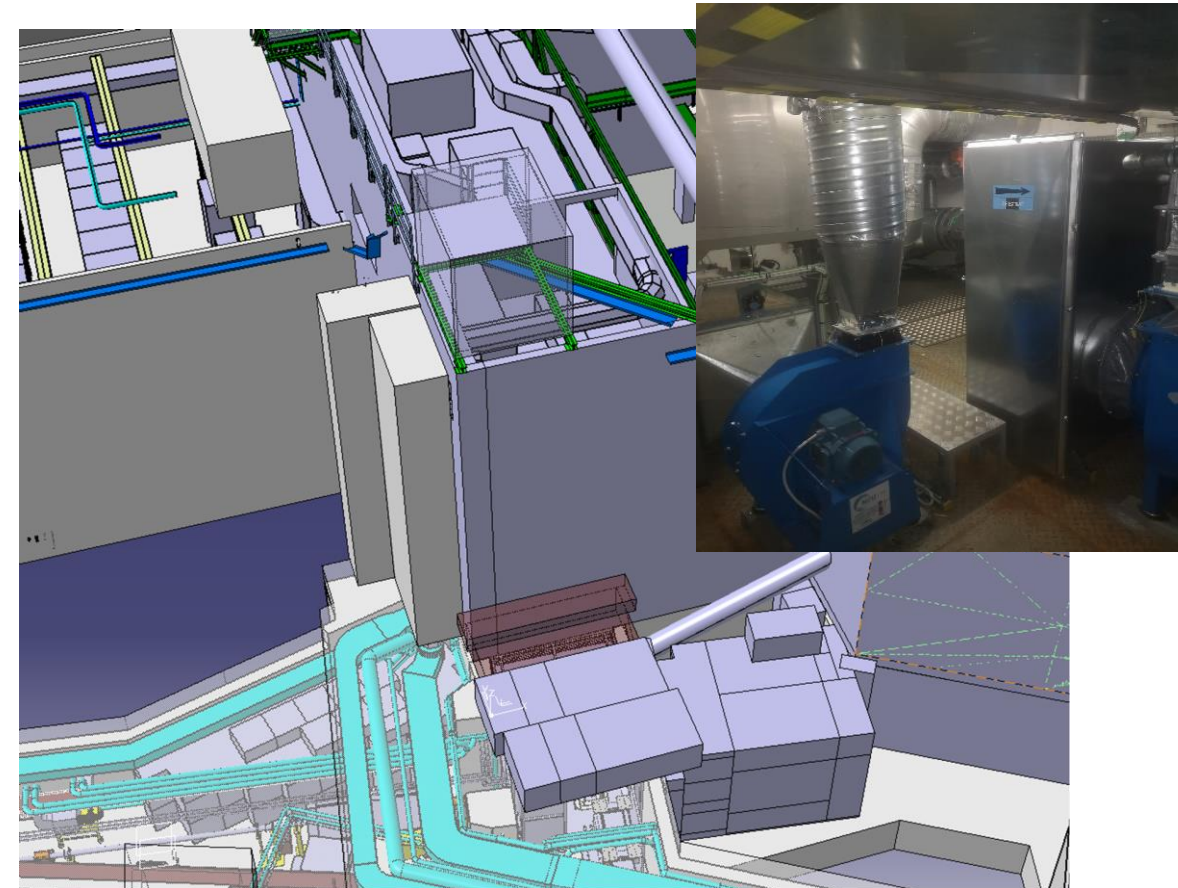
Technical building
(services, handling,
access...)

Upgraded Frontends
(beyond LS3)



Fire Safety upgrade (primary areas ventilation)

Follow-up of HSE recommendations to limit the radiological consequences of a fire in ISOLDE target area
 Implementation of iodine retention system (release of radioactive iodine during target changes)



Conclusions

- Commissioning (extensive) and operation of low energy lines with no major problem
- Demanding physics program (targets diversity and RILIS schemes)
- First High-resolution in-source spectroscopy with the PI-LIST target/
Excellent synergies between RILIS/CRIS/COLLAPS/LISA network
- Recommissioning of REX-HIE ISOLDE Linac on the critical path:
 - 7gap1 instability seems to be under control since the last days
 - Different technical problems encountered have reduced the time allocated for beam commissioning (tunnel access, cavity reconditioning after cryo problems...)
- Other parallel activities for consolidation and upgrades (nano-lab, beam dumps, safety consolidation, PUMA@ISOLDE, target elimination....)



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