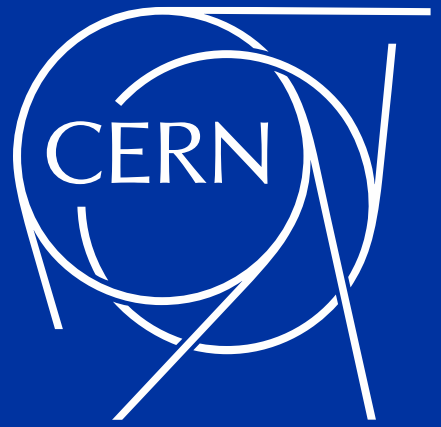


Update on YETS Activities and Improvements Programme

99th ISOLDE Collaboration Committee meeting– 21st of February 2024

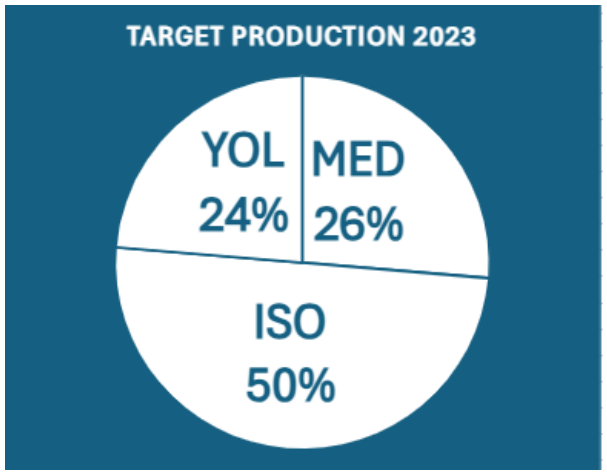
Joachim Vollaire

Outline

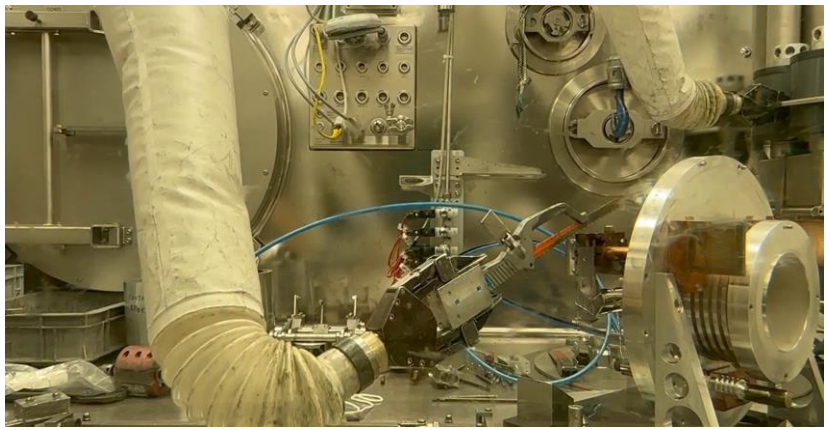
- **Update on YETS Activities for the primary areas**
- **Strategy for the ISOLDE Improvement Program**

YETS: Targets storage – Targets Statistics

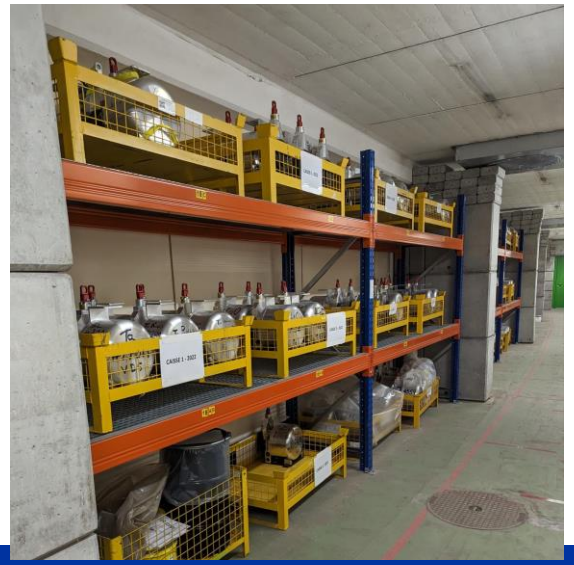
- Transport/transfer of targets to the ISR/MEDICIS storage areas. Sixteen targets send for final disposal to the ISR. Seventeen targets used in 2023 stored in MEDICIS shelves (possible re-use or serve as back-up units)
- **Statistics:** 40 target units produced and operated in 2023 (includes offline and MEDICIS)
- Dismantling (Radioactive Waste packaging) of 37 units in 2023 (non-actinide). Elimination (PSI, CH) of 14 units dismantled in 2022 (pilot batch).



Targets dismantling (hot cell and packaging)

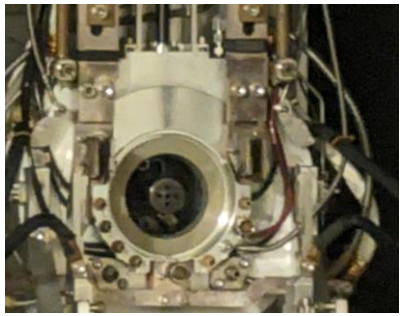


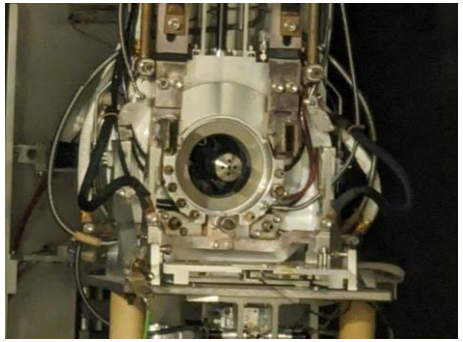
ISR storage



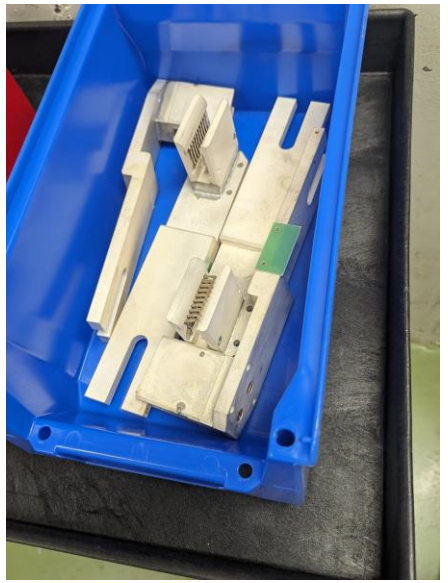
YETS : Frontends (target stations)

- Exchange of the two extraction electrodes (standard maintenance)
- Exchange of the electrical contact (interface Frontend/target) for the target heating (reduce the required force to couple and uncouple the unit)
- Exchange the compressed air actuator. All metal version (performance degradation observed over time with previous design – led to two interventions during run in 2023)





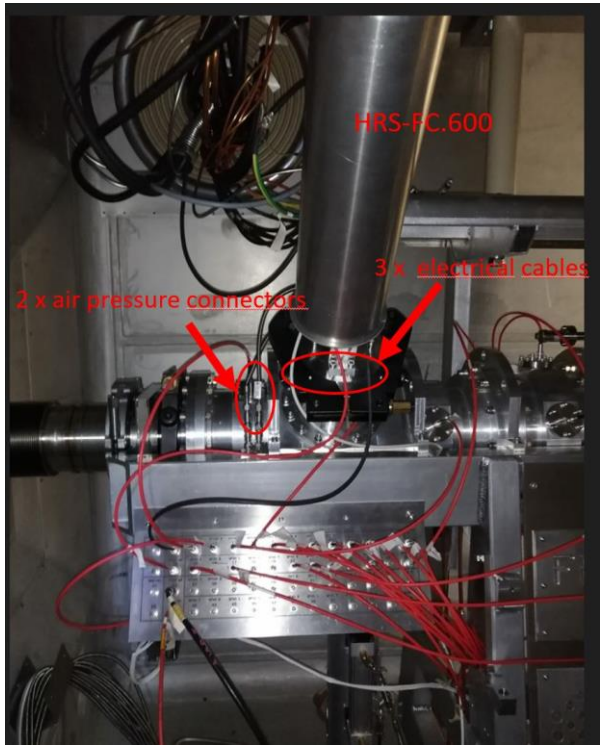
YETS : Frontends (target stations)

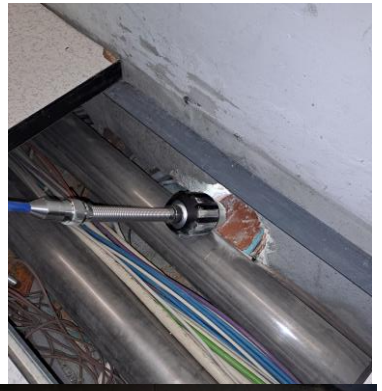


Intervention done on HRS
Electrical contact still to be exchange on GPS
Collective dose: 1.8 man.mSv so far

YETS: Beam instrumentation interventions

- Installation of two new SEMGRIDs at the end of the proton beam lines (broken wire)
- Re-cabling for all proton beam SEMGRIDs (electronic in old ICR)
- Exchange of HRS-FC.600 (leaking bellow – kept out of beam for most of 2023 run)



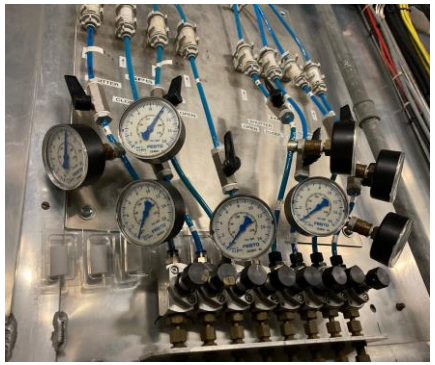


YETS : HV room and separator areas

- Consolidation of compressed air distribution for the Frontend movements
- New patch panels for the target electrical connection (floating HV rack)
- Fire detection installed in the separator areas (GPS and HRS)
- Fan coil unit installed in the HRS separator zone (host primary pumps – temperature well above 40°C during operation)

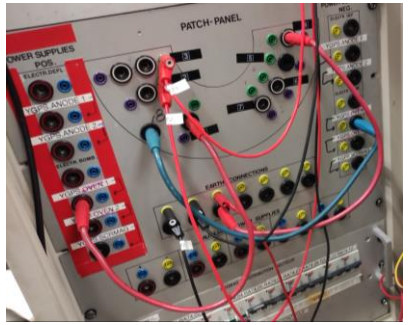
Compressed air distribution

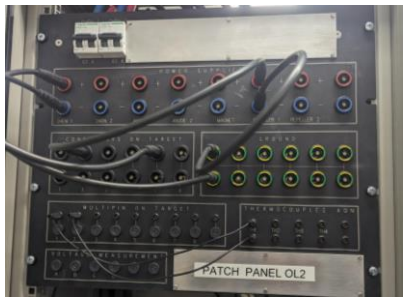
Old



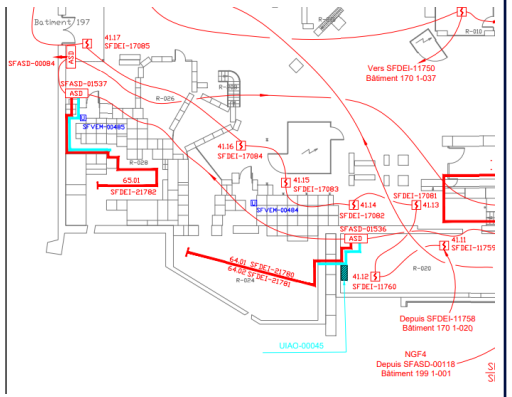
New

New patch Panels





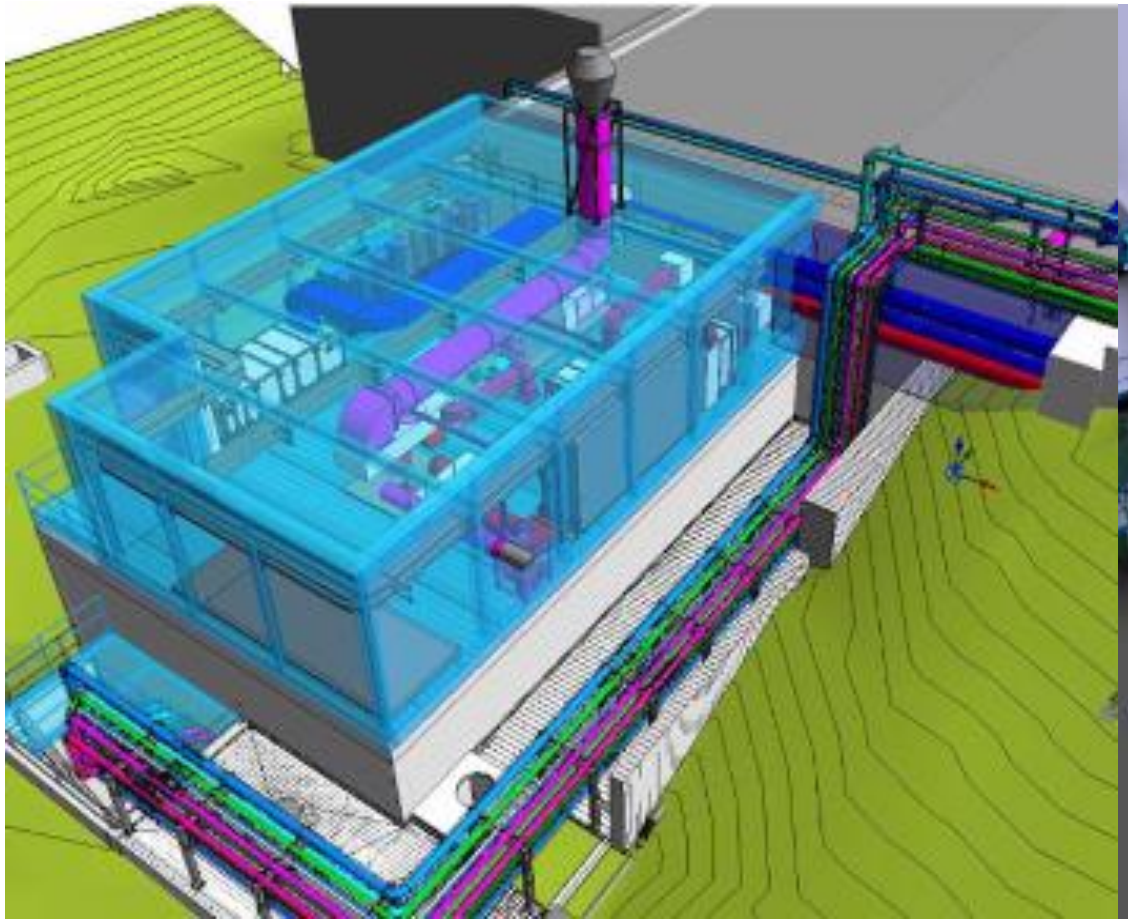
FCU (**HRS**) and fire detection

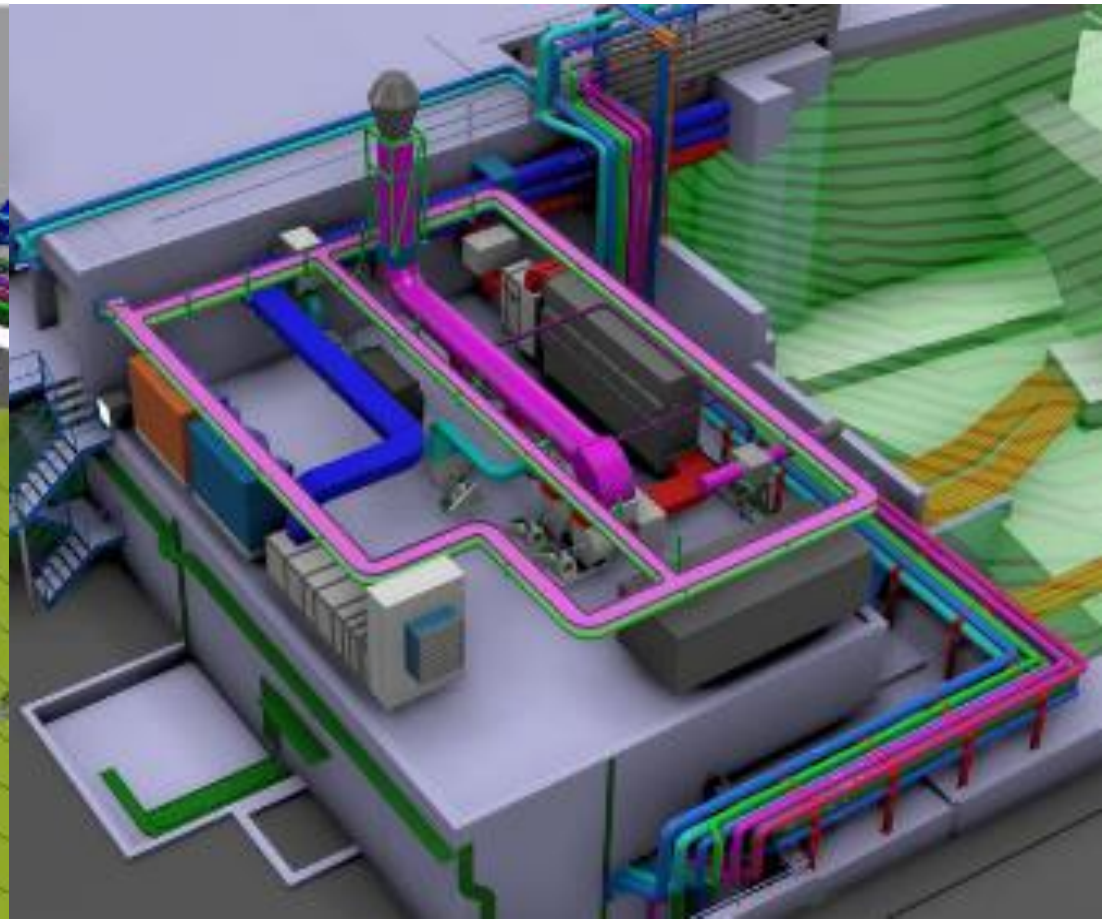


YETS activities (Building 197 extension) – Fire safety

- 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

YETS activities (Building 197 extension) – Fire safety





YETS activities (Building 197 extension) – Fire safety

YETS activities (Building 197 extension) – Fire safety

Outline

- **Update on YETS Activities for the primary areas**
- **Strategy for the ISOLDE Improvement Program**

ISOLDE Improvement Program

- Cost, Scope & Schedule review held mi-December. Asked equipment groups to present their plans (budgets, resources, schedule) to address the list of improvement identified during the last years and summarized in LOI from Sean (Jan. 2023)
- Two new lines requested in MTP2024 (beam dumps and energy/intensity upgrade for the BTY line)
- ISOLDE fire safety improvement (upgraded ventilation) cost to completion covered by MTP2023 allocation (2.4 MCHF Building extension + EN-CV hardware)
- Other items (related to infrastructure or obsolescence) to be collected and put forward as consolidation requests (with clear scope/deliverables). Review existing CONS requests. Once list established : endorse/prioritize with INTC/ISCC/IEFC

ISOLDE Improvement Program

- Task Force for SC Linac: short-term objective is technical solutions to maintain nominal SC cavities performances (related to next presentation). Mandate, reporting will be formalized in the coming weeks (Erwin appointed task force leader). Important input to go ahead with the 5th CM production.

- NC Linac: status, update and strategy to be defined (BE-OP, BE-ABP and SY-RF). Actions (LS3 and beyond) to be re-evaluated during the coming months.

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Conclusions

- YETS activities ongoing in the primary areas. Stable beam commissioning will start on the 18/03. BTY line commissioning with protons before easter.
- Activities taking place outside (services relocation on top of B. 197) on schedule for restart of the facility (HV cabling to cryo systems for HIE ISOLDE)
- LS3 preparation (consolidation and improvements) ongoing. MTP2024 requests for the beam dumps and energy/intensity upgrade.
- Task force for the SC Linac being established (first short term action defined)
- Strategy for the NC Linac to be reevaluated during the coming months

Components of the program

1. Upgrade of the BTY line to deliver protons of 1.4 GeV or 2.0 GeV from the PS Booster to the two ISOLDE target stations. The proposal should also include a review of the beam line reliability and spares management.
2. Replacement the two ISOLDE beam dumps for the GPS and HRS target stations with actively cooled and instrumented systems. Consolidate the shielding (or reserve the space) to ensure safe operation with an increased beam power in the future. Construct a technical building on top of the target area to access the dumps and the surrounding shielding and host targets and beam dumps related subsystems.
3. Modernization of the primary areas ventilation to address the recommendations from the FIRIA review exercise. The recommendations include the implementation of fire dampers and charcoal filters for the target area ventilation.
4. Definition of a plan to ensure the availability of the REXTRAP and REXEBIS and enhance the performance and reliability of the systems according to the needs of the HIE ISOLDE users. The defined plan includes improvements of the existing setup that will be implemented before Run4. In parallel, the need to define a spare strategy for the REXEBIS and REXTRAP solenoid magnets has been identified. EDMS 2975844
5. Definition of a plan to ensure the availability and reliability of the normal conducting section of the REX-LINAC and its related systems.
6. Definition of a plan to ensure the long-term availability and performances of the SC part of the HIE ISOLDE Linac. The solutions identified during the Mini-Consolidation workshop include the production of a spare cryo-module as well as the implementation of a liquid nitrogen supply to keep the cryo-module shields cold during the entire year.
7. Review and consolidation of the ISOLDE target systems and low energy beam lines equipment (including timing and ISCOOL RFQ cooler buncher). Upgrade of the power supplies for the electrostatics elements to allow for beam switching of the central beam line elements for simultaneous beams delivery from GPS and HRS.
8. Review of the infrastructure status and space allocation. Proposal to rationalize use of space.

ISOLDE Improvement Program

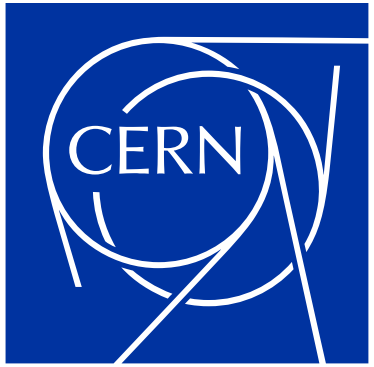
			2023	2024	2025	2026	2027	2028	2029	2030	Total (kCHF)
	Beam Dumps	Dismantling (E58)			924,096	3,359,548	316,136	-			
		Civil Engineering		250,000	250,000	200,000	400,000	1,210,000			
		Shielding and Handling		30,000	84,000	1,099,000	770,800	-			
		Infrastructure & Services		68,000	357,000	513,000	831,200	93,000			
		Dump including water cooling		65,000	301,000	291,000	97,000	-			
		Radioprotection		-	-	316,000	200,000	-			
		Personnel		183,000	270,000	217,000	162,000	106,000			
		Total (kCHF)		**596**	**2,186**	**5,996**	**2,777**	**1,409**			**12,964**
	FIRIA Implementation - Ventilation Upgrade for primary areas	Civil Engineering	40,000	630,000	360,000	100,000					
		EN-CV	40,000	800,000	570,000	230,000					
		EN-EL and IT-CS		35,000	65,000	30,000					
		Access and alarms		35,000	25,000						
		RP & services		30,000	50,000	20,000					
		Total (kCHF)	**80**	**1,530**	**1,070**	**380**	**-**	**-**			**3,060**
	BTY upgrade (wo BTY PC)	Magnets		50,000	320,000	520,000					
		Vacuum		20,000	40,000	60,000	40,000				
		Handling			30,000	40,000	40,000				
		Civl Engineering				25,000					
		RP & Integration & survey		5,000	10,000	20,000	20,000				
		PS ring powering			50,000	100,000	50,000				
		Total (kCHF):		**75**	**450**	**765**	**150**				**1440**
	EBIS Upgrade 1st Phase	Hardware	20,000	95,000	135,000						
		Manpower	20,000	165,000	315,000						
		Total (kCHF):	**40**	**260**	**450**						**750**
	Beam Instrumentation	Spare consoldiation		20,000	80,000						
		Total (kCHF):		**20**	**80**						**100**
	Beam Switching	Stud and Implementation		20,000	60,000	60,000	60,000				
		Total (kCHF)		**20**	**60**	**60**	**60**				**200**
	Infrastructure (RILIS space...)	Study and Implementation		10,000	80,000	170,000	165,000	75,000			
		Total (kCHF):		**10**	**80**	**170**	**165**	**75**			**500**
	Cryo Study & modifications	Study									
		Implementation									
		Total (kCHF):									
CONS (approved)	REX HLRF & LLRF (CONS)	From CONS Day (Material)			450,000	1,150,000	450,000				
		From CONS Day (M2P)			45,000	45,000	40,000				
		Total (kCHF):			**495**	**1,195**	**490**				**2180**
CONS submit.	TRAP Solenoid spare	Review Presentation		50,000	200,000	250,000					
		Total (kCHF)		**50**	**200**	**250**					**500**
CONS submit.	Spare HIE ISOLDE CM	From CONS Day (Material)		50,000	350,000	450,000	150,000				
		From CONS Day (M2P) - check prof.					250,000	250,000			
		Total (kCHF)		**50**	**350**	**450**	**400**	**250**			**1500**

Picture from Matthieu Deschamps

Some terminology

- **CONSOLIDATION: Partial or complete replacement of a system to be performed to maintain the present level of performance/availability**
- **UPGRADE: Replacement or addition of a system to improve the performance, which would otherwise**
- **PERFORMANCE IMPROVING CONSOLIDATION (PIC): Replacement or upgrade of a system justified by consolidation but with the additional goal of improving performance**

Slide from S. Gilardoni



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