ISCC Technical Report

Richard Catherall EN-STI-RBS

ISOLDE Technical Coordinator

82nd ISCC meeting 26th June 2018

Outline

- Recent developments
  - Start up
  - Tape station
  - HT upgrade

- Long Shutdown 2
  - Activities postponed
  - Target area
    - Frontend replacement
  - ISOLDE Hall
    - Scanner and FC upgrade
    - HT upgrade
    - Slits
    - REX
    - HIE-ISOLDE
  - Building 179
    - Nanolab construction
  - Overall Planning

Start-Up 2018

- Water back on 26th February
- Cold check out from 26th February till 26th March
- SEM Grid tests done in week before and during Easter
- HT tests on new modulator done in week after Easter
- First experiment as from 9th April
- Lots of initial beam diagnostics and controls issues during cold check out
- Too many co-activities…
  - RFQ Cooler tests
  - Cold check out
  - RILIS developments

Fast Tape Station check out

- Two days of beam time allocated in week 20 but not very conclusive
- The local control screen has been removed. Managed to operate it through FESA navigator
- Triggering found not to be working. T. Feniet came and eventually got it working.
- Beamgate wired up by T. Giles and working, timing still needs to be tested.
- The collimator was not working. Apparently this is still not implemented. Thierry temporarily forced the movement.
- I tuned beam from the GPS to the tapestation. There are a number of faults with the GPS and beamlines, including X/Y inversions in the GPS and LA0. A number of scanners were not working. HT was unstable at 60kV, likely because it has not been operated at nominal voltage this year.
- The detector counters are incorrectly configured.
- A new NIM module caught fire and damaged the crate power supply, causing one of the rails to over-voltage. The supply was replaced, but it looks as though the discriminators were damaged.
- Further testing will be required during the summer.

New HT modulator

HT (kV)	1E13ppp	2E13ppp	3E13ppp
30	350	370	370
40	400	480	550
50	530	650	750
55	-	-	870
60	620	780	980

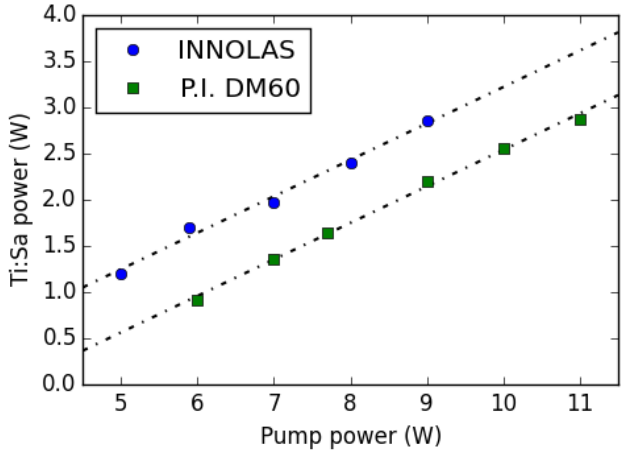
Recovery time (µs) of HT (+/-0.6V) with protons on convertor
Specification < 2ms
Compares to ~8ms on the previous Astec supply

TE-ABT-EC request to install a new modulator and power supply on the GPS in Q1 2019.
Benefit from the existing FESA controls and not put resources into making a new FESA class for the very old Astec supply
Drawback – no negative ion run in 2021. Bi-polar power supply needs further testing before being integrated.

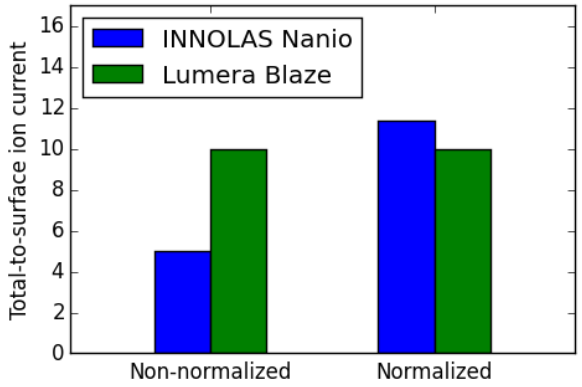
New RILIS pump laser

- New DPSS laser **Innolas Nanio** for Ti:Sa pumping and other applications
  - TEM00 – mode
  - 18W outpout @ 10kHz pulse rate, 30ns pulse length
- Simpler cooling mechanism → decreased risk for chiller failures
- Proposed laser for CERN-MEDICIS (Tender underway)

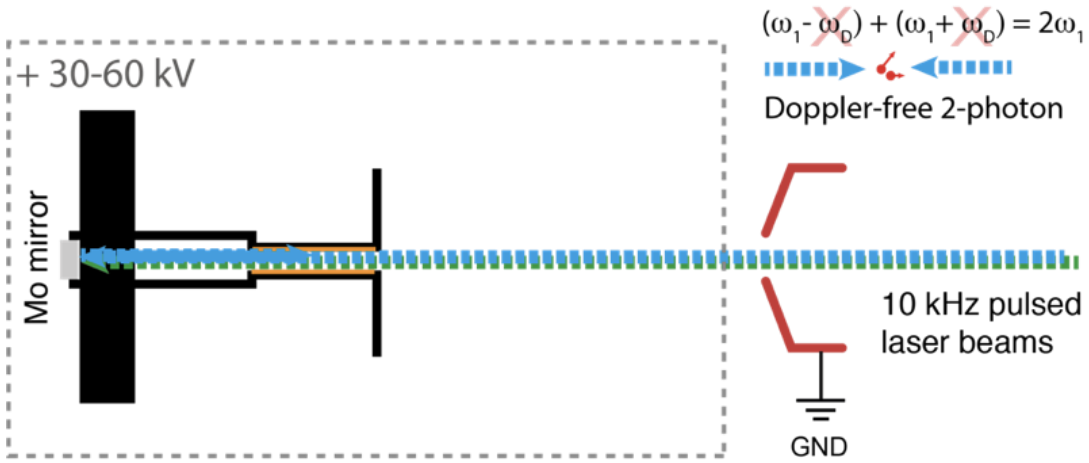
Ti:Sapphire pumping test:
Increased efficiency:
lasing at <5W pump power



Non-resonant ionization test: Demonstrated to be effective for non-resonant ionization



1St Demonstration of Doppler-free RILIS ionization at ISOLDE

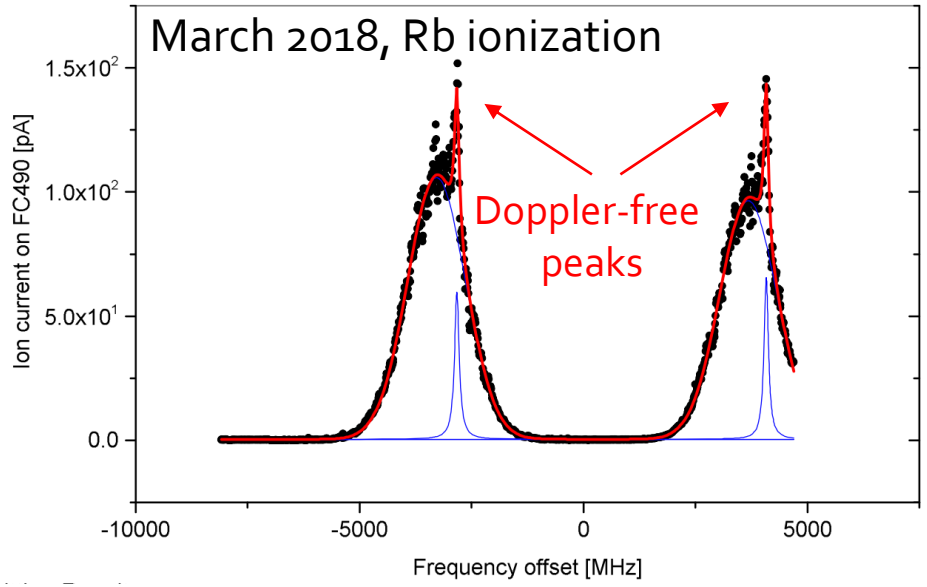


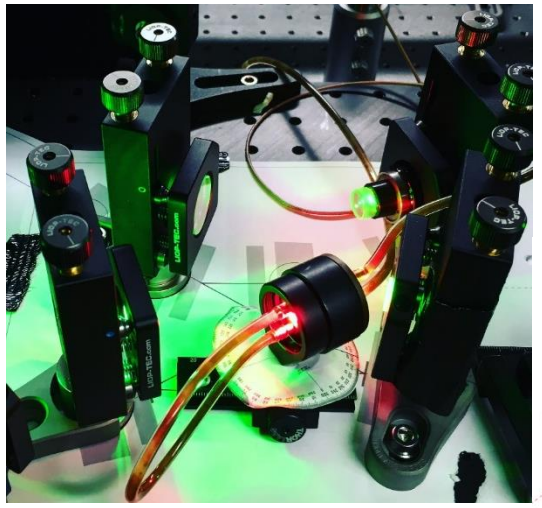
Main objective-
Use pulse-amplified single-mode narrow linewidth laser to make RILIS capable of:

1) High-resolution laser spectroscopy for nuclear physics studies

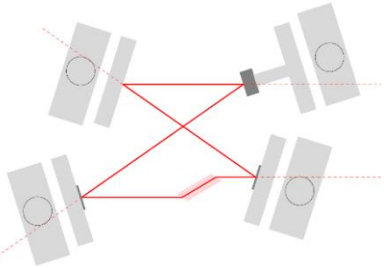
2) Enhanced selectivity – isomer selective ionization

3) Laser ionization of non-metals





Miniature Ti:Sapphire ring cavity amplifier now operational



PhD study of Katerina Chrysalidis

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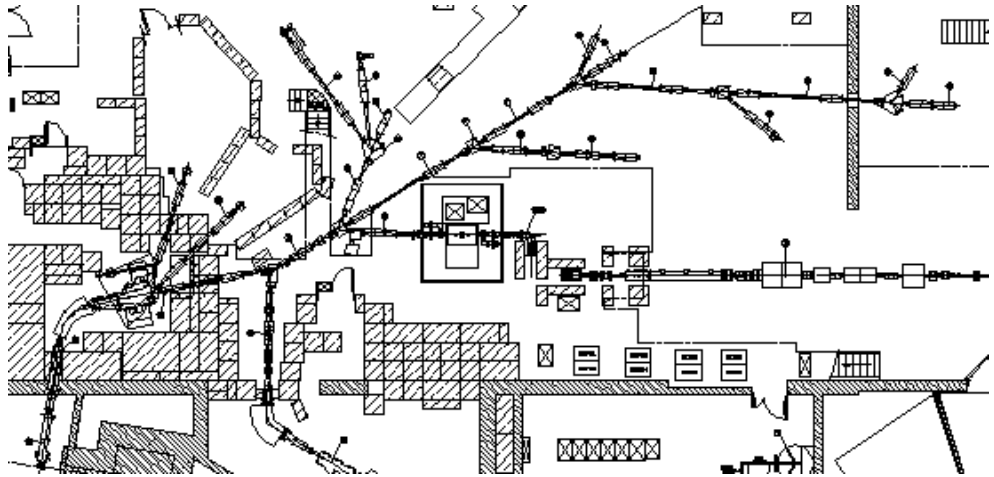
Activities postponed

- ISOLDE hall beam line re-alignment
  - Decision by ISCC to postpone this activity. Risk analysis revealed that start-up in 2020 could be jeopardized.
  - Verification of alignment to be done.
- Replacement of beam line power supplies
  - Not foreseen during LS2
  - Cables and interlocks to be verified.
- Ventilation controls upgrade
  - Budget available only in 2023
  - Might be possible during 2022-2023 YETS

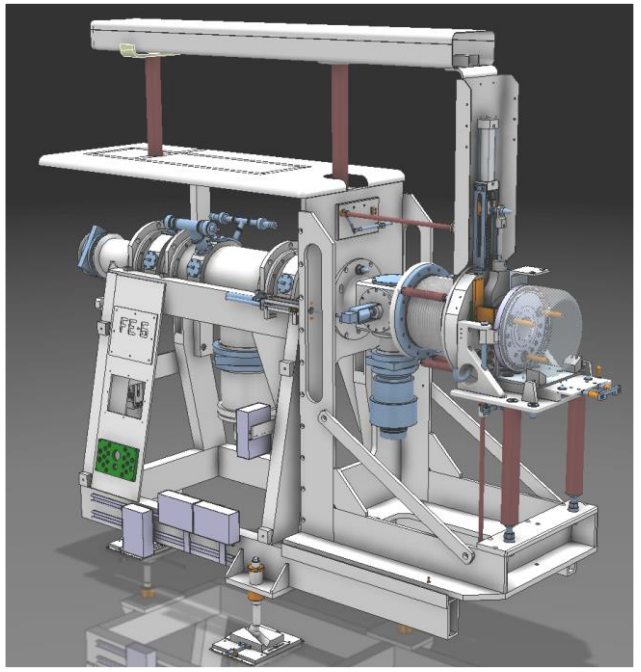


Target Area: Frontend replacement

- The two existing Frontends (GPS & HRS) will come to the end of their expected lifetime during the LS2 period.
- LS2 will provide a significant cool down period to minimise collective dose rates.
- The opportunity will be taken to improve on design features and upgrades
  - Beam instrumentation
  - Extraction electrode mechanics
  - Local cable replacement
  - Beam line modification

Main groups involved:
EN-STI-RBS/ECE
TE-VSC
EN-SU
TE-EPC
DGS-RP
Assembly and installation to be done mainly by
EN-STI-RBS

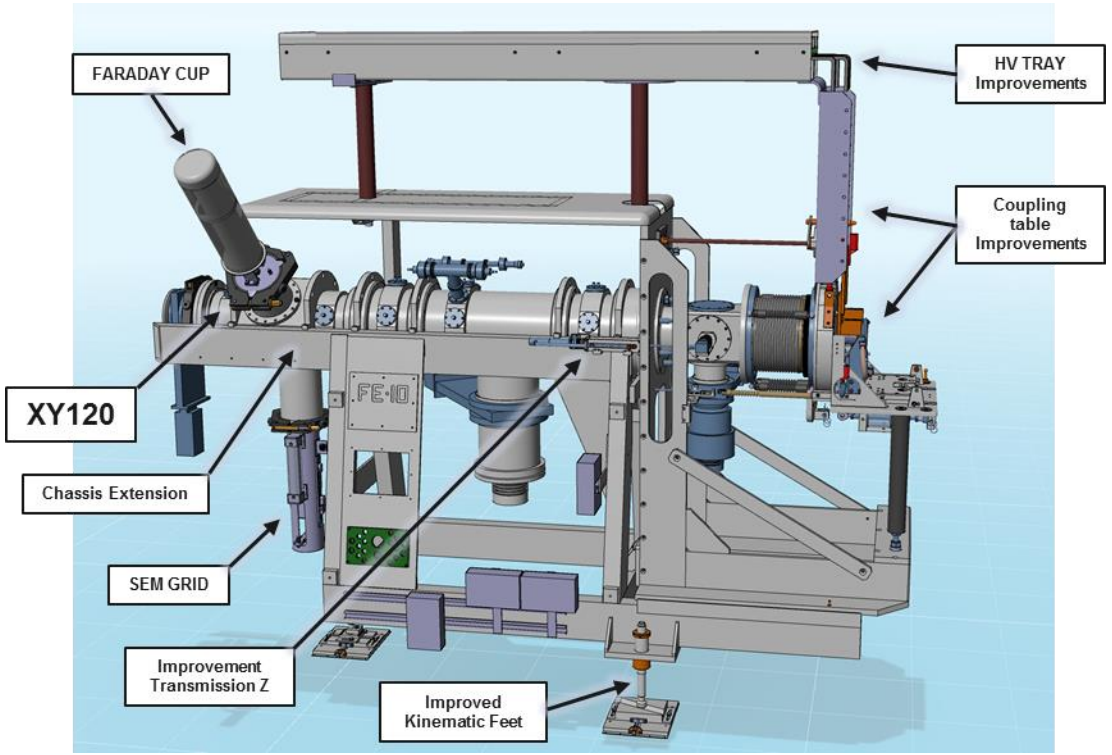
Projection
2018: procurement & assembly
Q4 2019: testing
Q2-Q3 2019: installation
Q3 2020 - commissioning



FRONTEND 10 & 11

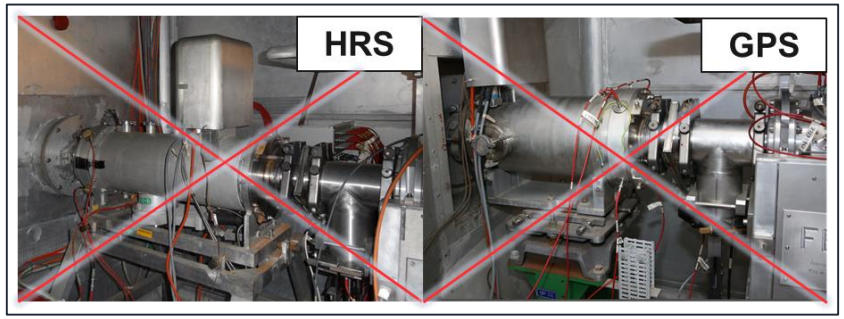
FRONTEND 10&11 modifications:

- **XY120 Vacuum vessel - Extension**
  - XY Deflectors
  - Faraday Cup
  - SEM Grid
- **Coupling table**
  - New metal seals piston
- **Cable Tray**
  - Aluminium Conductors
  - Improved layout
- **FRONTEND Chassis**
  - Extended chassis
  - Improved stability/Weight distribution
- **Faraday Cage**
  - Removal of XY120 Vacuum Vessel



Manufacturing/Assembly

- Complex pieces and vacuum components ordered
- Finalizing orders of small components (June 2018).
- Assembly to begin August 2018 in 3/R-035
- Testing in October/November 2018 on OFFLINE 2



In Development

- Aluminium flexible Conductors
- FRONTEND Removal System
- Metal Seal Piston

J. Cruikshank

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ISOLDE Hall: Separator upgrades

- Mechanical slits on HRS
  - Revise the mechanics (EN-STI-RBS)
- Replacement of flexible compressed air lines
- Installation of Fast Tape Station in CA0 beam line
- Target and ion source gas system to be refurbished
- Beam gate controls in ICR
- Beam diagnostics
  - BE-BI group to procure 20 FC/scanner units by Q1 2019
  - Also new scanner units for the separators are under procurement
  - To be installed in Q2 – Q4 in 2019
- N2 supply line for experiments
- CRIS platform integration and installation?
- Installation of second HT modulator…?

REX/HIE-ISOLDE: RF List of activities (I)

- Design and install a new cooling system for IH structure (beyond LRF team capacity: external resources are required)
- 90kW Bertronix amplifiers: profound status evaluation
  - Disassemble one amplifier
  - Define the strategy for the others and execute
- Purchase of two 101MHz 5kW solid-state amplifiers
  - One to be used to supply the Buncher
  - One spare

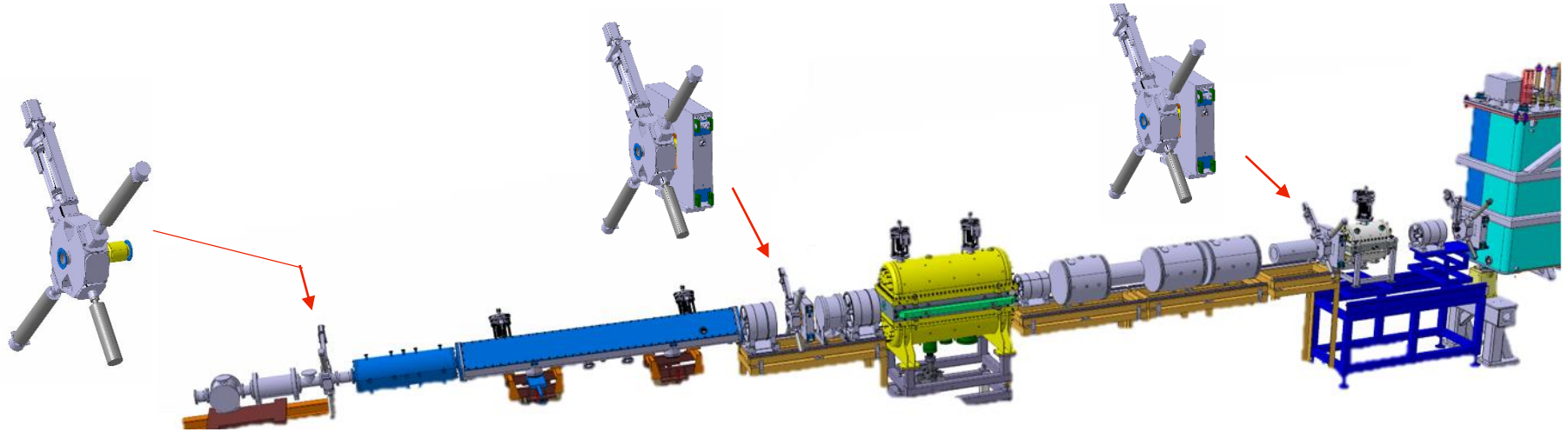
Luca Timeo, Suitbert Ramberger (BE-RF-LRF)

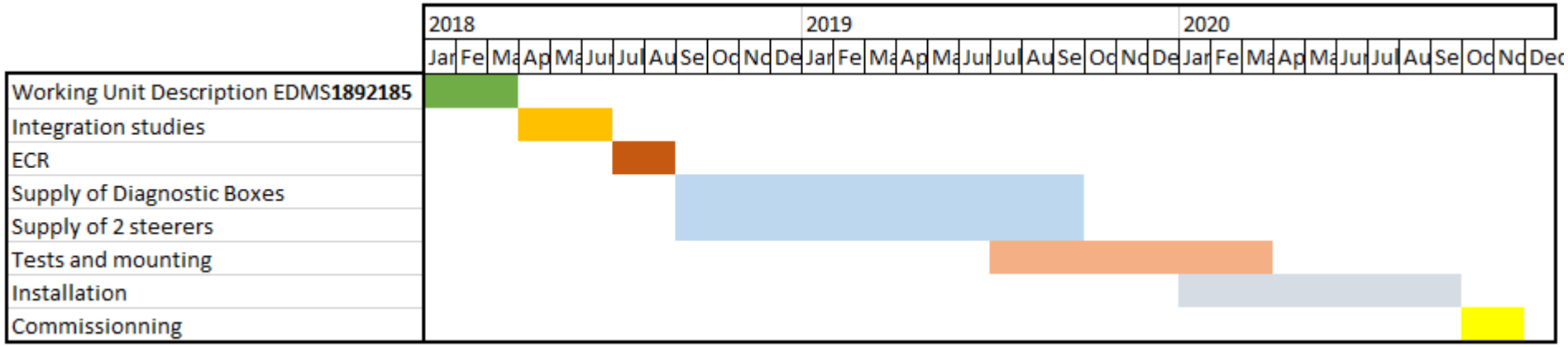
REX/HIE-ISOLDE: RF List of activities (II)

- Consolidate the 202MHz Dressler solid-state amplifier used as tube amplifier pre-driver (obsolescence of some strategical components)
- Develop new FESA 3 classes for remote control of power amplifiers
  - Implement the automatic ramp-up of the equipment after “reset”
  - Improve the monitoring/logging (e.g., critical interlocks, tube gain)
- Replace the optical links in the power amplifiers
  - Consolidate the “Measurements Units”
- Replace Grid1 and Grid2 variacs with solid state modules

Request for **3 beam diagnostic boxes** & **2 steerers** between REX and HIE-ISOLDE

Around 20% of beam is lost between the REX separator and the HIE-ISOLDE LINAC





Meetings indico 9995 and Activity declared in PLAN ID 11617.

ECR will be written in July and circulated for comments and approvals at the end of summer

HIE- ISOLDE activities

- Cryogenics
  - Preventive maintenance of the cryogenic system including major overhauling of rotating machinery
  - Cryo operation: Setup of the automatic controls for transient modes
- Installation of fixed radiation monitors for each CM (4x) in the HIE tunnel connected to the monitoring system in the ICR
- HIE-LINAC
  - Possible repair of CM 4
    - RF coupler issue on cavity 3 of CM4
  - W. Venturini investigating the possibility of repairs during LS2
  - E. Siesling has provided a planning for the removal of CM4 straight after the last physics run this year

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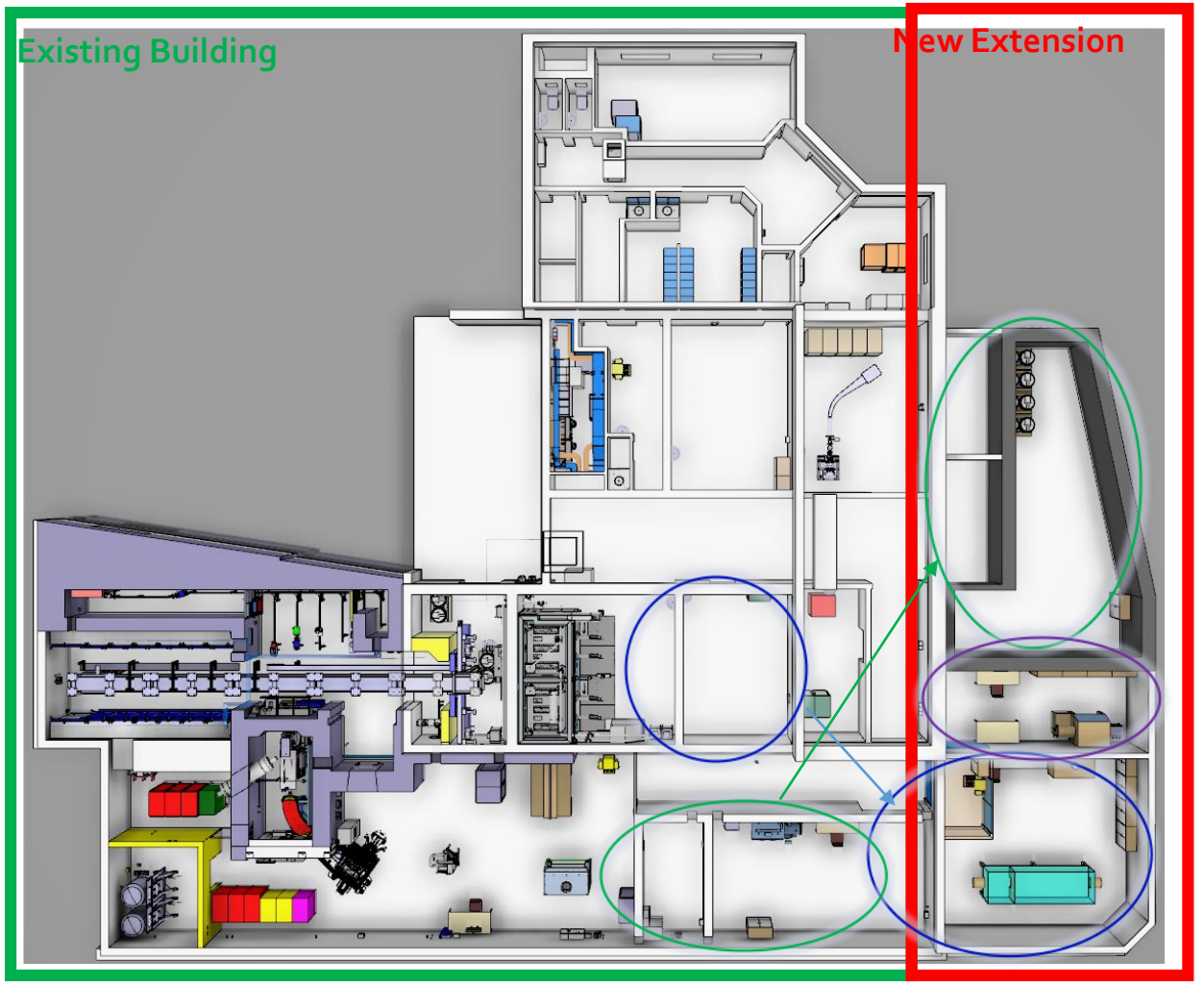
Layout of the Class A Extension (nano-lab)

- Produce actinide nano materials targets by having a laboratory equipped for Uranium Nano target production
- Provide a safe working environment for the manipulation of actinide nano-materials - confinement
- Having a specific laboratory equipped for the validation of the oxidation process (target dismantling)
- Move the buffer area and increase its capacity

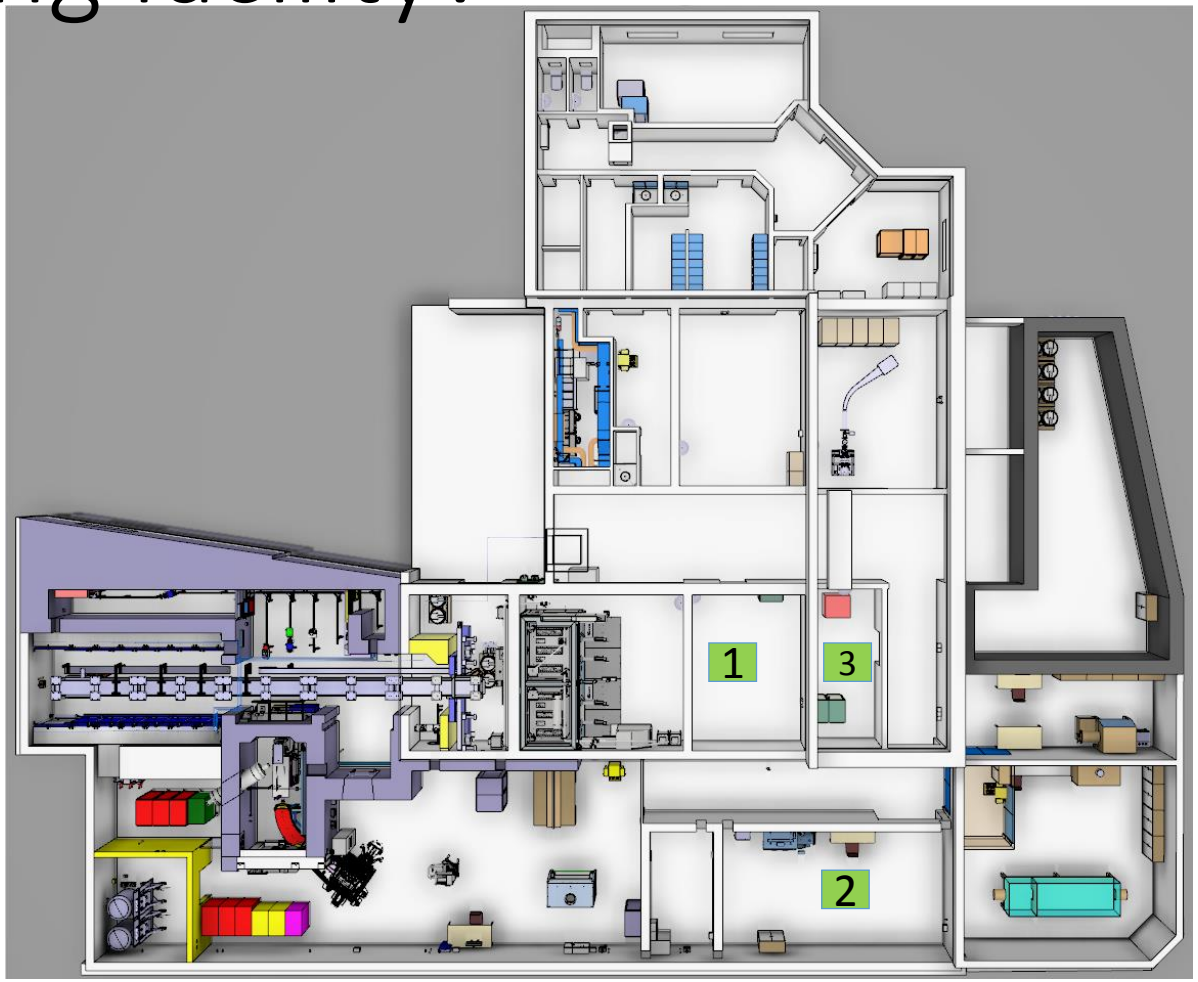


Impact on existing facility?

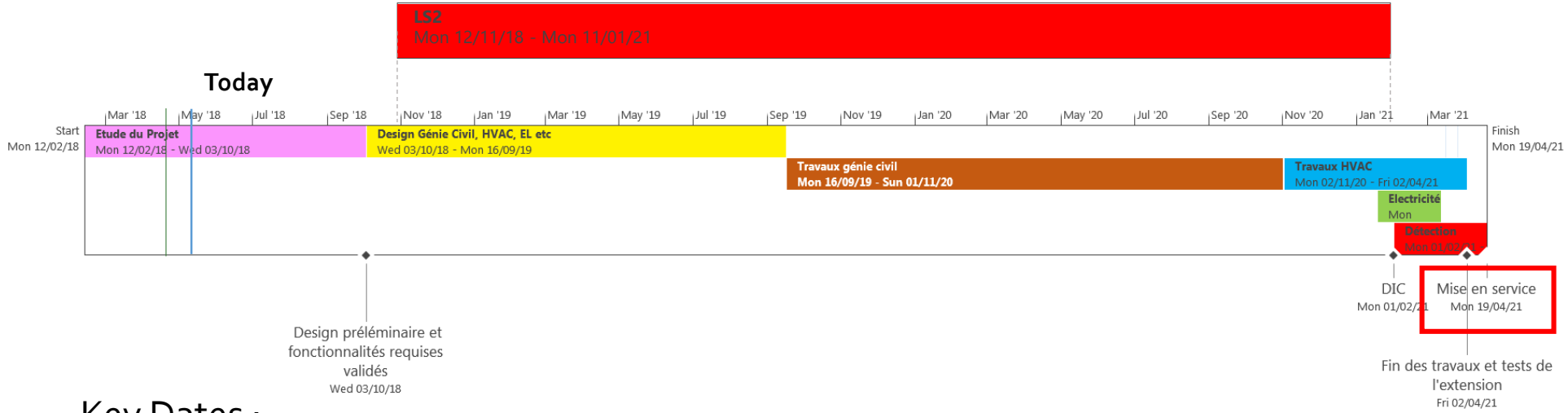
1 Existing Fumehood will be dismantled in 179-R-001

2 Buffer area 179-R-021 will be transformed in type A laboratories with similar activities to 179-R-025 (replaced by new buffer area)

3 New attribution of room 179-R-005 for electrical equipment



Nano-lab Preliminary Schedule



Key Dates :

- Launch of the design in October 2018
- Beginning of LS2 in November 2018 until January 2021
- Beginning of civil engineering works in September 2019
- Installation of the remaining infrastructure from November 2020 to the end of March 2021
- **Commissioning of the extension April 2021**

E.Fontaine & R.Catherall
27/04/2018

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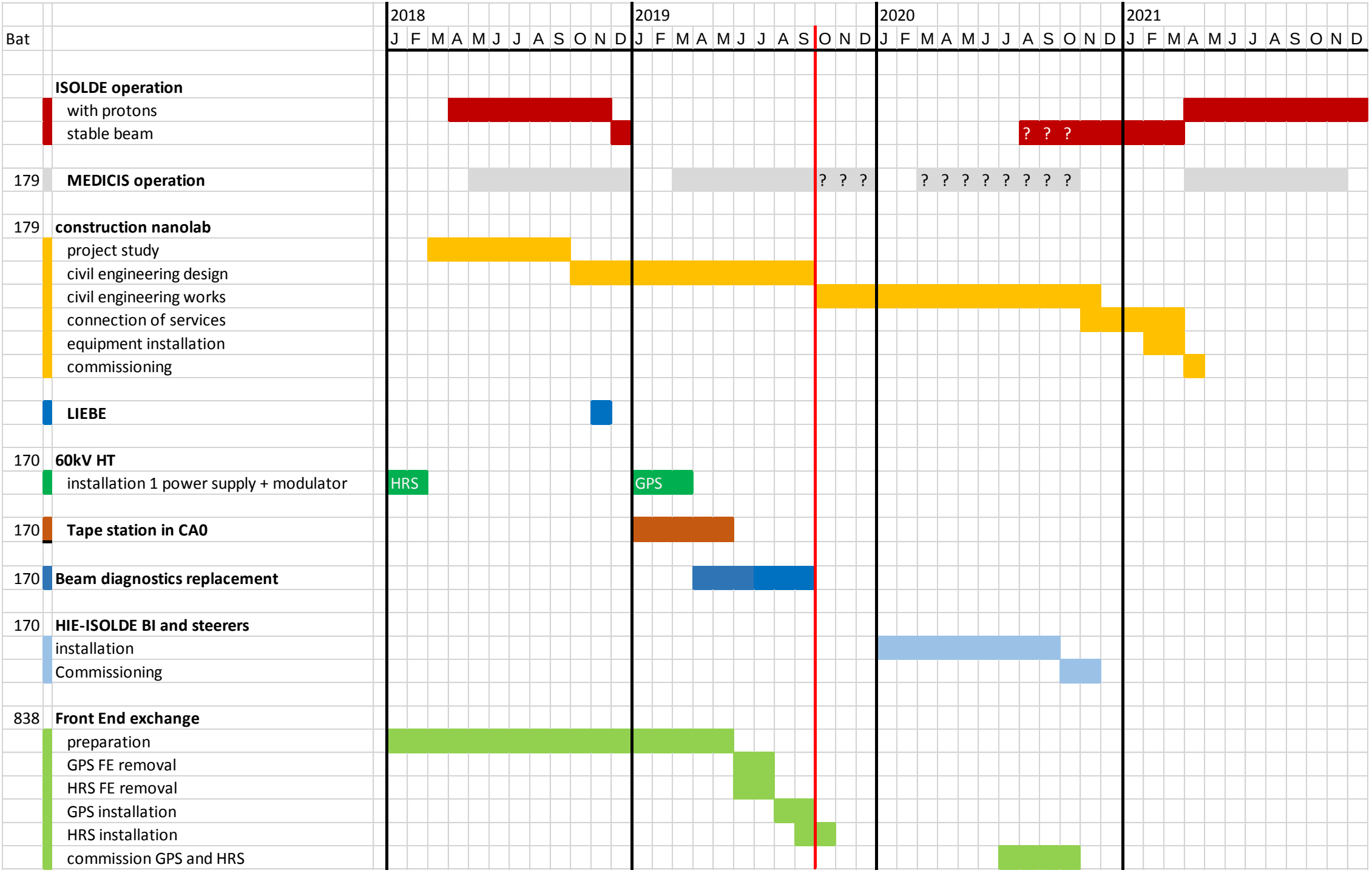
2018
2019
2020
2021
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ISOLDE operation
with protons
stable beam
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179
MEDICIS operation
? ? ?
? ? ? ? ? ? ? ?
179
construction nanolab
project study
civil engineering design
civil engineering works
connection of services
equipment installation
commissioning
LIEBE
170
60kV HT
installation 1 power supply + modulator
HRS
GPS
170
Tape station in CA0
170
Beam diagnostics replacement
170
HIE-ISOLDE BI and steerers
installation
Commissioning
838
Front End exchange
preparation
GPS FE removal
HRS FE removal
GPS installation
HRS installation
commission GPS and HRS