

YETS (Year End Technical Stop) Activities at ISOLDE

Richard Catherall EN-STI-RBS
ISOLDE Technical Coordinator

81st ISCC meeting
6th February 2018

Outline

- ISOLDE hall
 - Power supply consolidation
 - GPS.MAG 70 power supply and REX power supplies
 - Operations – 94Rb Issue
- Target area
 - Telescopic camera
 - Robot and Montrac testing
 - Frontend maintenance and LIEBE/LIST preparations
- MEDICIS
 - Operations 2017
 - YETS activities
- Planning
- EN-STI-RBS activities
 - Off-line 2
 - Nano laboratory

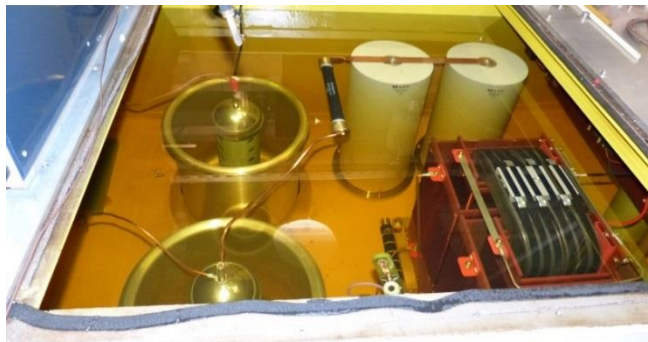
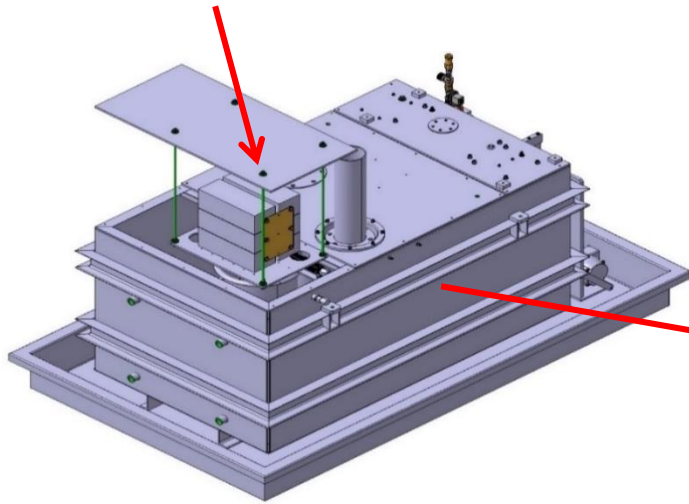
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Power supply consolidation

- GPS + REX Power converter replacement
 - Consolidation of the following GPS and REX converters:
RPSEV.197.YGPS.SEP70, XSEP.RB.1000, XL9GP.RCV.0400 and XL9GP.RCH.0400.
- 60kV HT power supply and modulator
 - To be used mainly for the HRS
 - Includes new controls so will have 2 separate control applications for the different HT power supplies.
 - Depending on operational experience, 2nd new PS and modulator to be installed in 2021/2022 shutdown

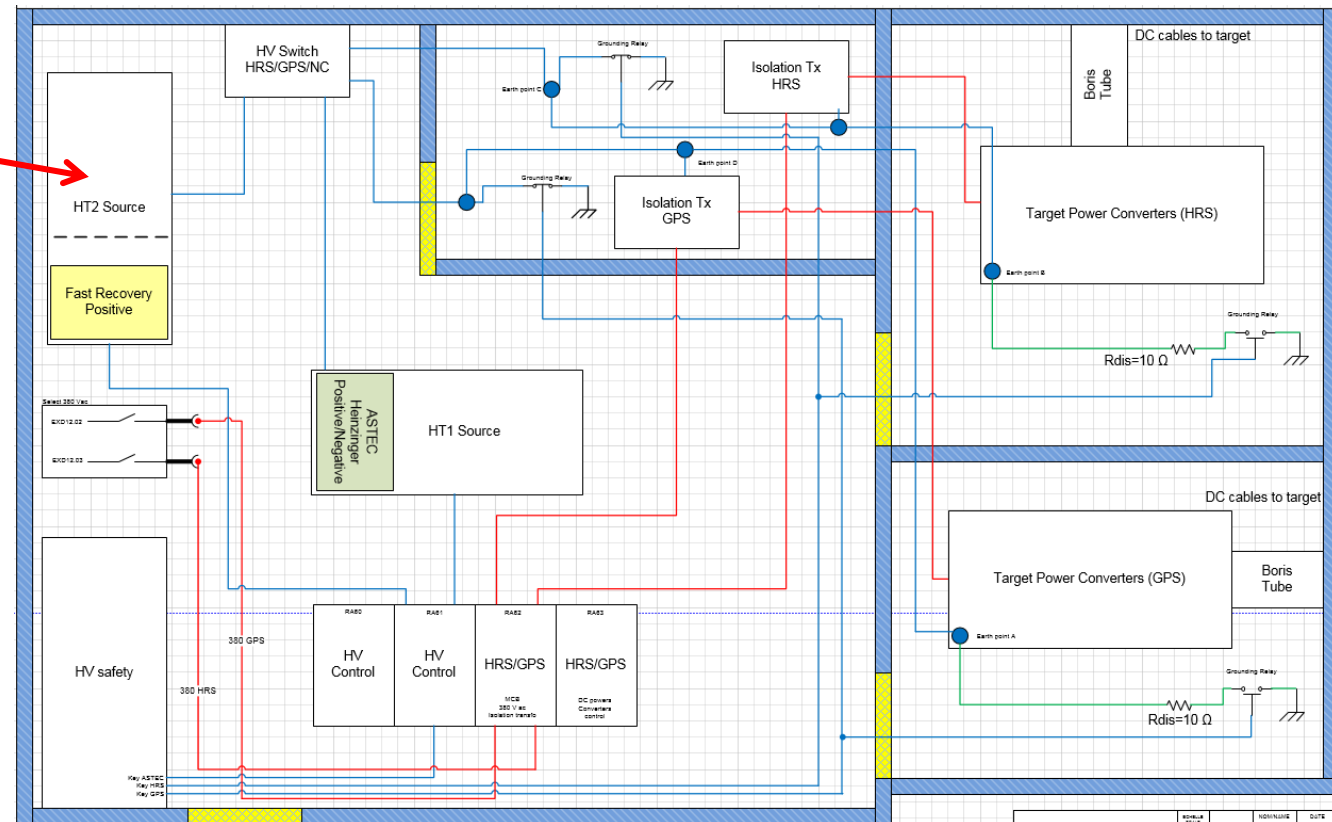
New device sits
in existing housing



Re-use of the ROSS dividers

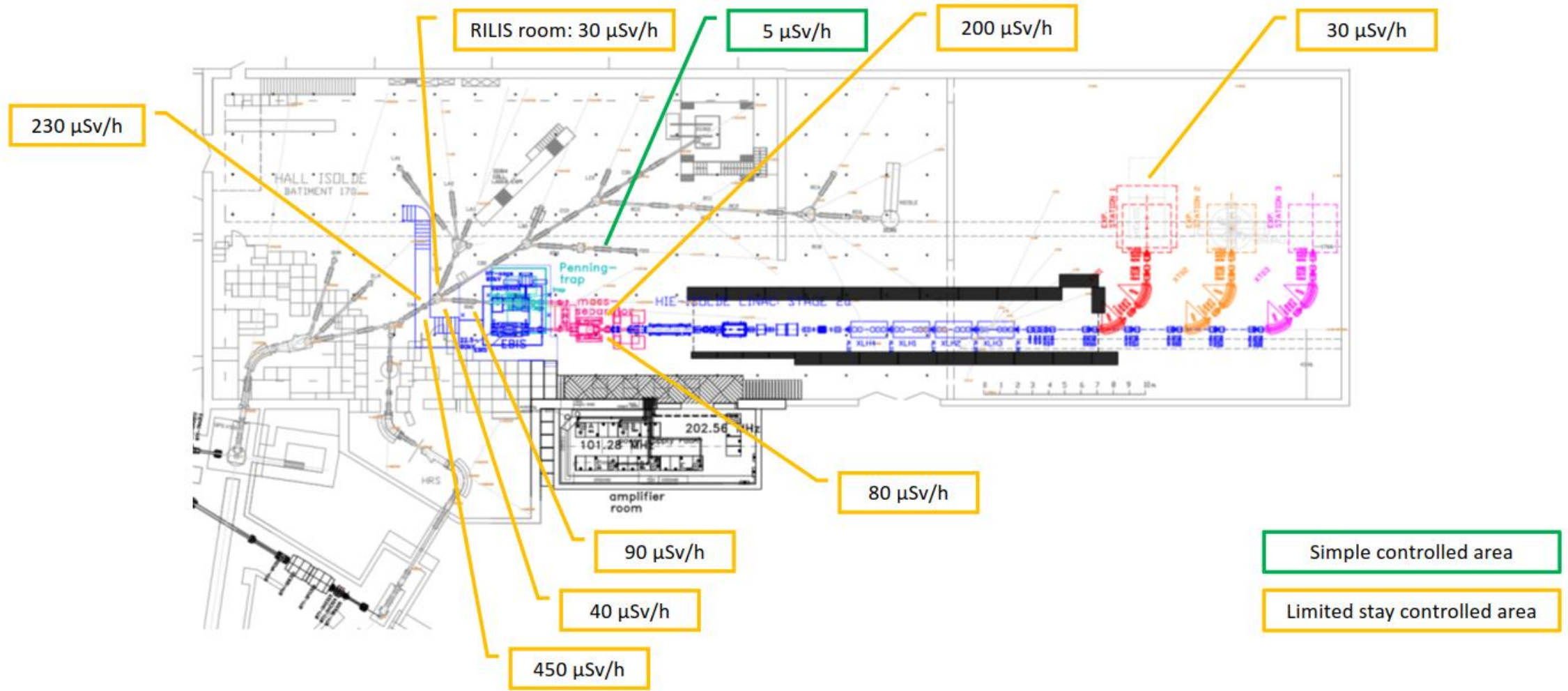
- ❑ Install the fast recovery system only on HT2 during YETS 2017/2018
- ❑ Easy reversal to present configuration system in case of major problems
- ❑ As a negative solution is not yet available, better to keep HT1 unchanged
- ❑ Full consolidation of both modulator during LS2 with positive and negative HT

ISOLDE HT room - Building 170



Radiation survey on 14/09/17, proton beam intensity : $2 \mu\text{A}$

Ambient dose rates $H^*(10) \sim$ at 40cm from the beam lines



Operations -94Rb Issue

- After an initial working group meeting to explore the possibilities, the following action plan has been outlined
- Proposition
 - Identify and flag high intensity RIB during TAC and schedule
 - Inform ISOLDE community that hall will become a Limited Stay Controlled Area for the duration of the experiment
 - Change panels and monitoring thresholds the day before the experiment starts
 - Put in place mobile alarms (balise) at entrances to hall
 - Do a visual inspection to:
 - Inform occupants that the lab has changed classification
 - Identify “hot spots” along the beam line
- Proposition to be refined and presented to the PS-CSAP

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RILIS team in 2018



Valentin Fedosseev
*Section Leader
EN-STI-LP*



Bruce Marsh
*Staff Member
EN-STI-LP*



Shane Wilkins
*CERN Fellow
October 17 onwards*



Camilo Buitrago
*CERN Fellow
April 17 onwards*



Katerina Chrysalidis
*Doctoral student, 2nd year
Univ. Mainz*

Support from PNPI:
Dima Fedorov, Pavel
Molkanov, Maxim
Seliverstov

LARISSA group, Mainz:
Dominik Struder, Reinhard
Heinke

RILIS YETS equipment / upgrades

RILIS Pump lasers



Ti:Sapphire pump laser failure
To be repaired/ replaced ASAP



RILIS Air quality issue:

Proposal by CV to improve fresh air exchange and reduce dust

Important for laser performance reliability

Estimated cost 20 kCHF - save for LS2?

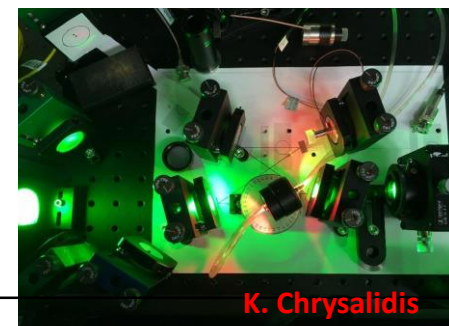


- annual window changes on separators, plus HRS alignment and power transmission checks with power-meter target.

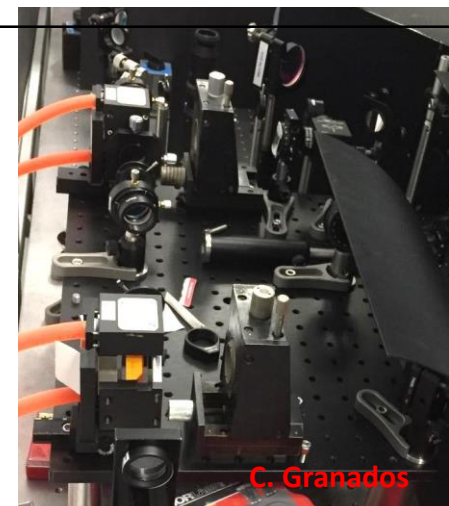
RILIS tunable lasers

Ready before on-line period

Injection-seeded
NB Ring Tisa

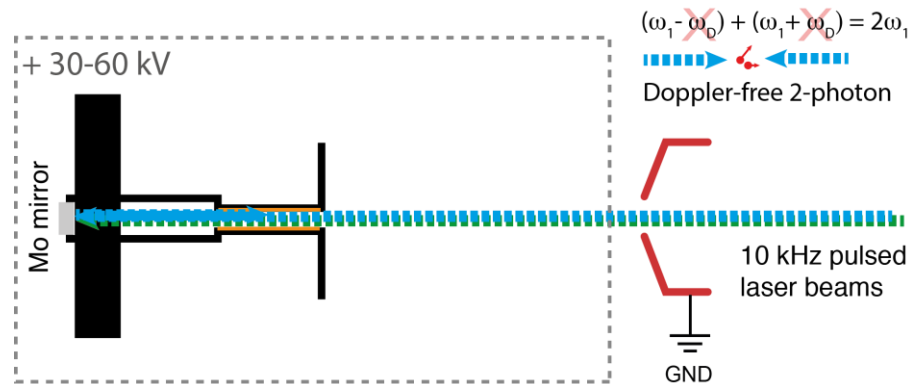


Pulsed dye amplifier



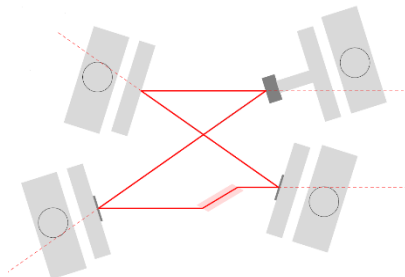
RILIS Developments before 2018 physics:

1) 2-photon spectroscopy of stable Si and Rb.

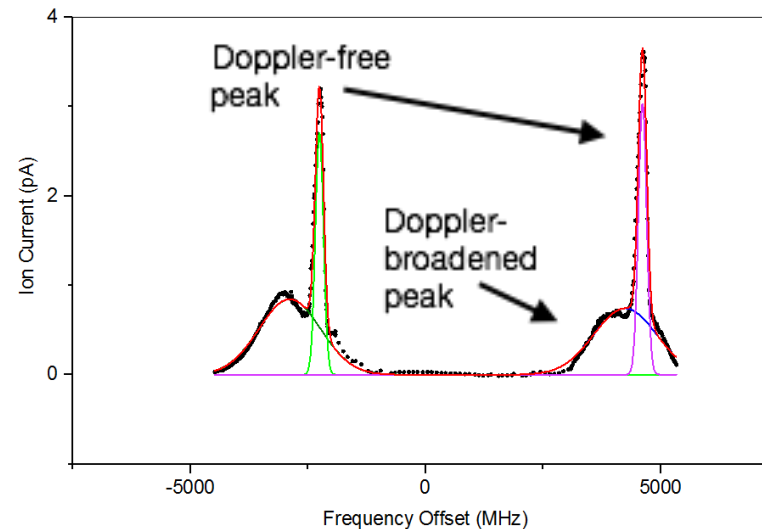


PhD project: Katerina Chrysalidis

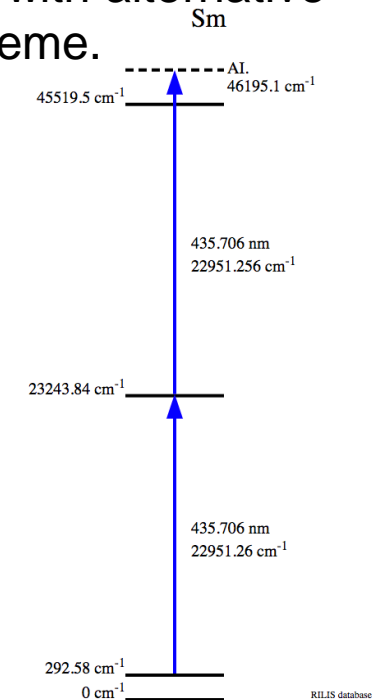
Injection-seeded NB Ring Ti:Sa



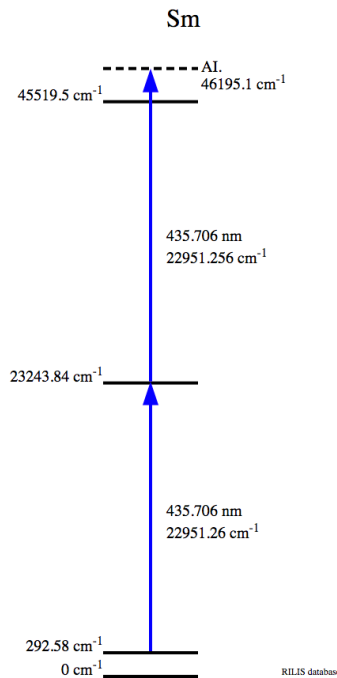
Tests planned in March



2) Samarium Efficiency measurement with alternative Blue-Blue scheme.

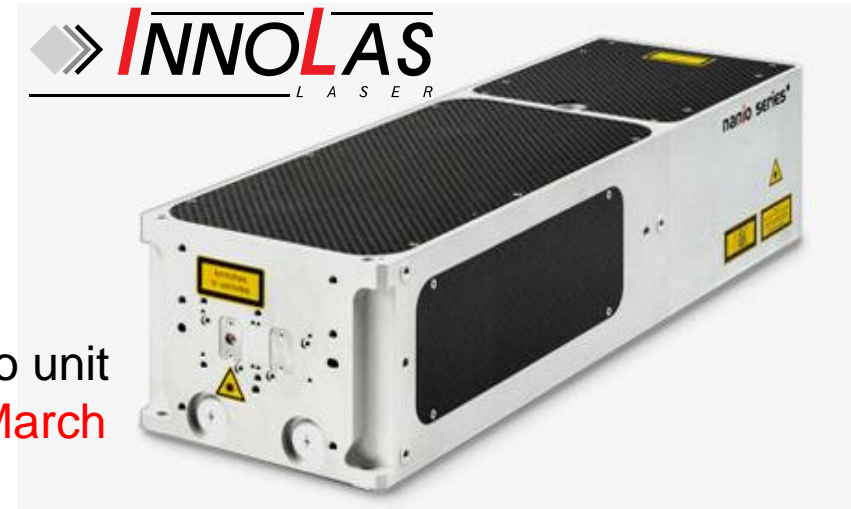


RILIS @ Offline 1



1 laser, blue-blue TiSa scheme for Sm will be prepared.

- Pump laser will be a demo unit from INNOLAS – arrival **March 2018**
- This doubles as a trial for **RILIS@MEDICIS** and possible RILIS Ti:Sa pump laser replacement



RILIS Fellow: Shane Wilkins will perform these tests

- **CERN LIST tests** will be carried out with Reinhard Heinke
- Further tests of **VADLIS** and **laser-induced molecular break-up** are foreseen (a loan of a high-energy ps laser from Edgewave has been agreed).
- Ongoing work on **high-resistance LIS cavities** (SIGRADUR)

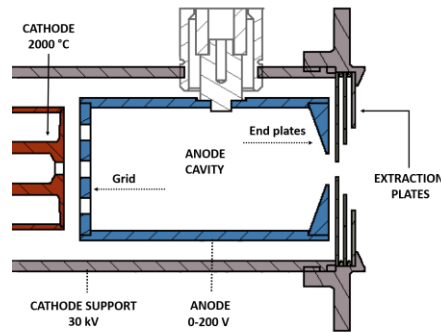
RILIS laboratory @ Offline 2

Offline 2 is essential for the many long-standing RILIS development goals presented to the GUI

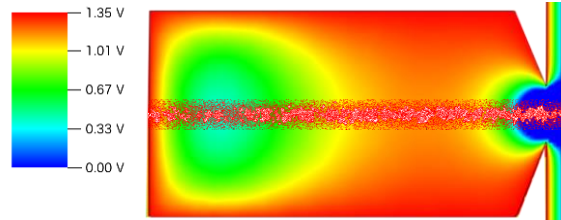
Significant investment is still needed to equip the laser laboratory

- Laser tables
- Air conditioning - CV installation estimated at ~20kCHF
- Laser interlock system - BE-ICS will install a demo of a new type of system from LASERMET
- Pump lasers - Funds requested but spare RILIS lasers are available
- Ti:Sapphire lasers - Old Ti:Sa cavities are available
- Dye lasers - Funds requested for new dye lasers
- Other laser hardware - additional ~ 70 k CHF needed (wavemeter, optics etc)

Ongoing VADLIS development



$$V_{\text{extraction}} = 0 \text{ V}$$

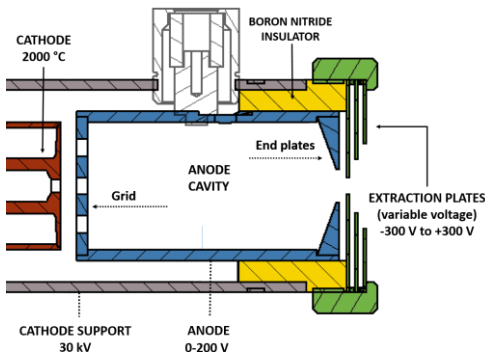


PhD work: Yisel Martinez

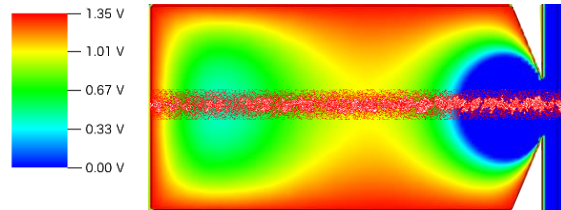
Standard VADIS

=

FEBIAD MK5 (but with Mo anode)



$$V_{\text{extraction}} = -100 \text{ V}$$



Prototype tested for Ga at
OFFLINE 1

At least 2 X efficiency
improvement

Tested at ISOLDE for Hg, Mo, Mg

Factor of >2 improvement in RILIS-mode efficiency for all cases

Proposal For 2018:

More VADIS sources equipped with adjustable extractor?

Ongoing investigation at offline (inverted polarity cathode, further optimization of construction of anode holder)

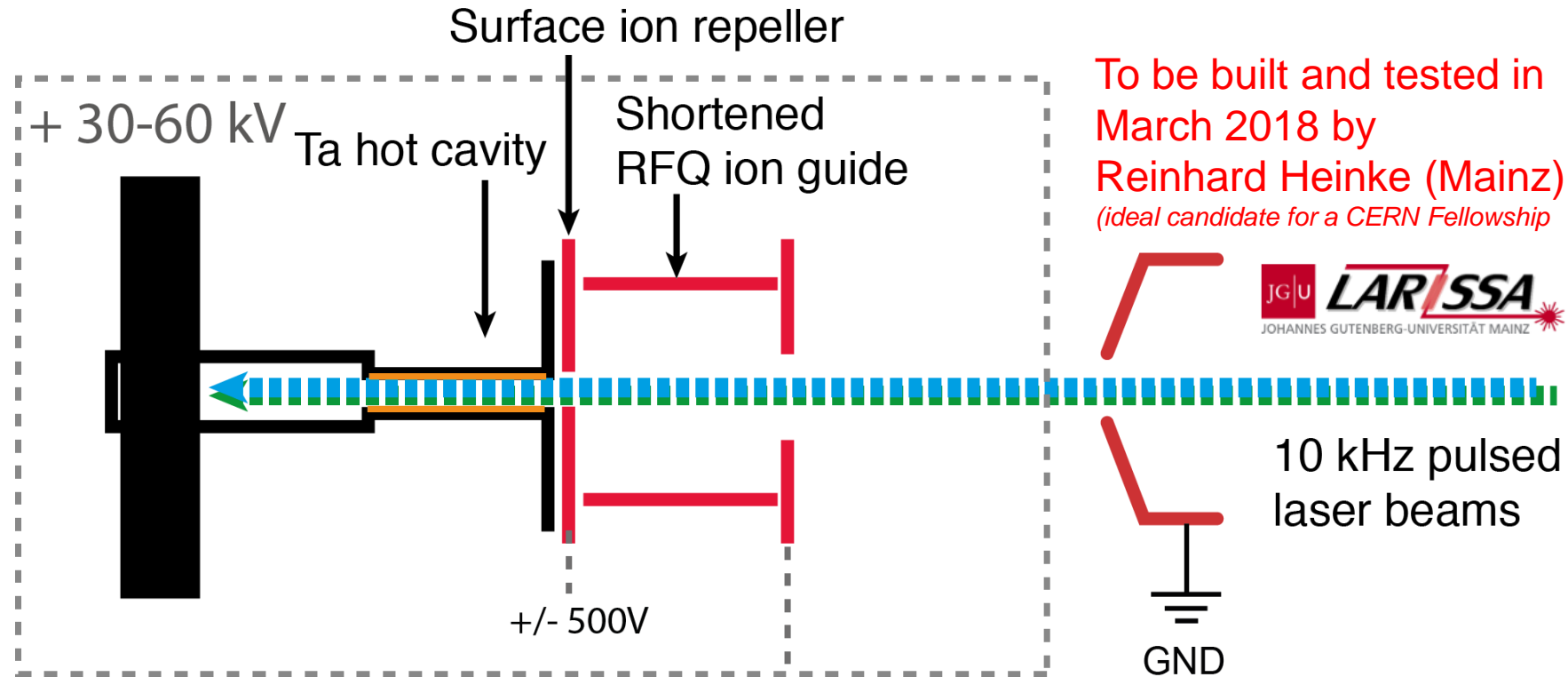
Use VSIM to optimize geometry for RILIS-mode operation (VSIM workshop in Leuven next week)

*Continued work of PhD student
David Leimbach*

Bruce Marsh

CERN LIST

– Shortened LIST for future compatibility with RILIS development plans



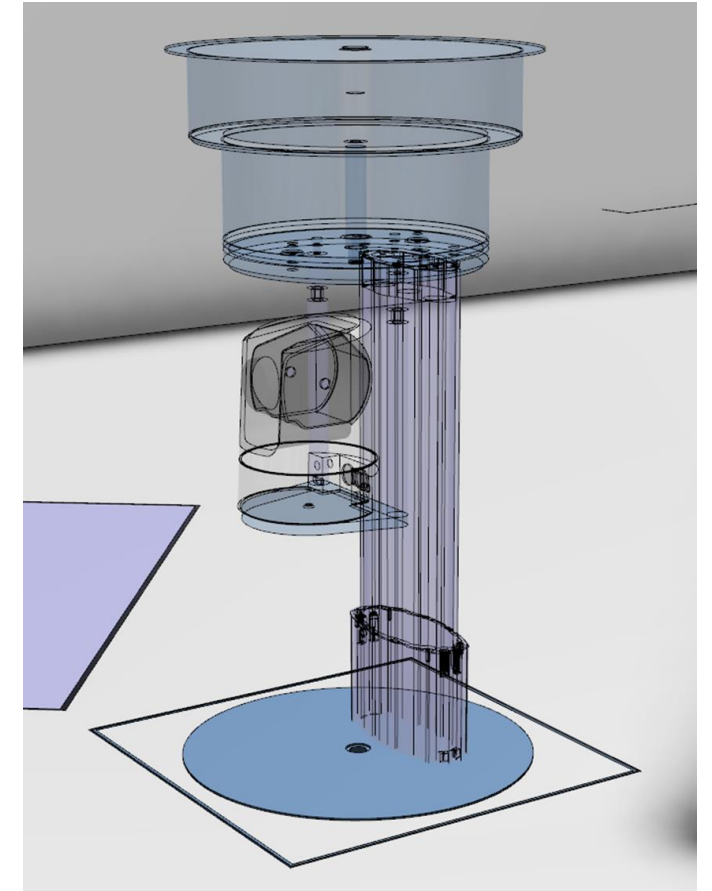
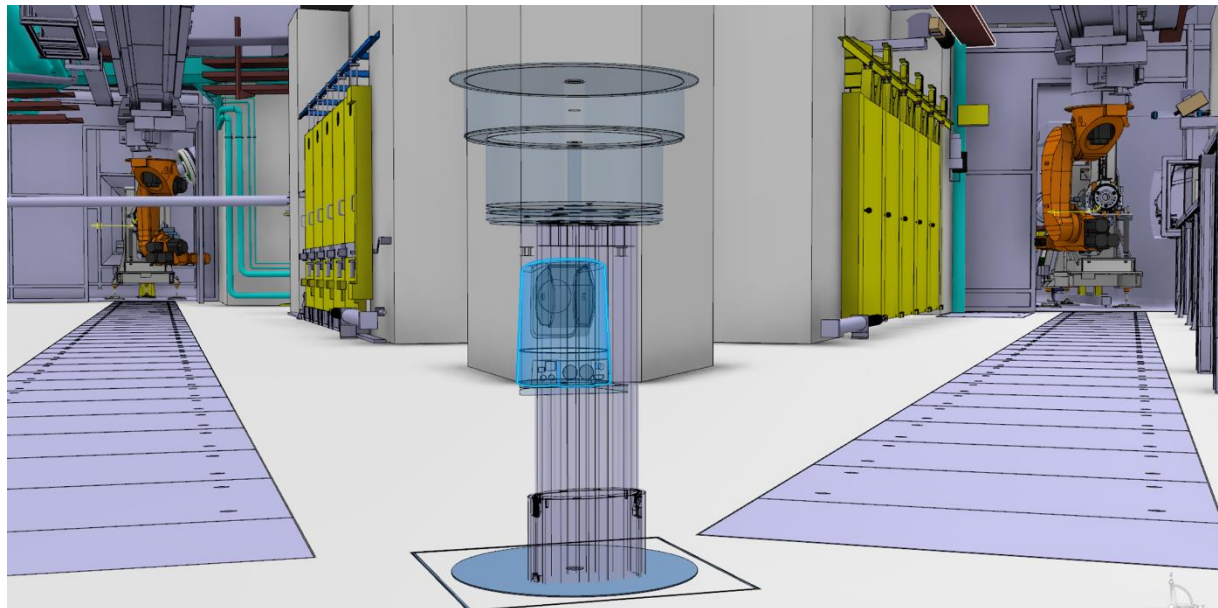
- New size enables compatibility with quartz line for extra selectivity
- No additional efficiency loss factor
- Accepted proposal for Tl, Po
- Quartz line suppression of Fr, Ra and transmission of Tl, Po unknown
- Investigate options such as removal of transducer box and DC-offset

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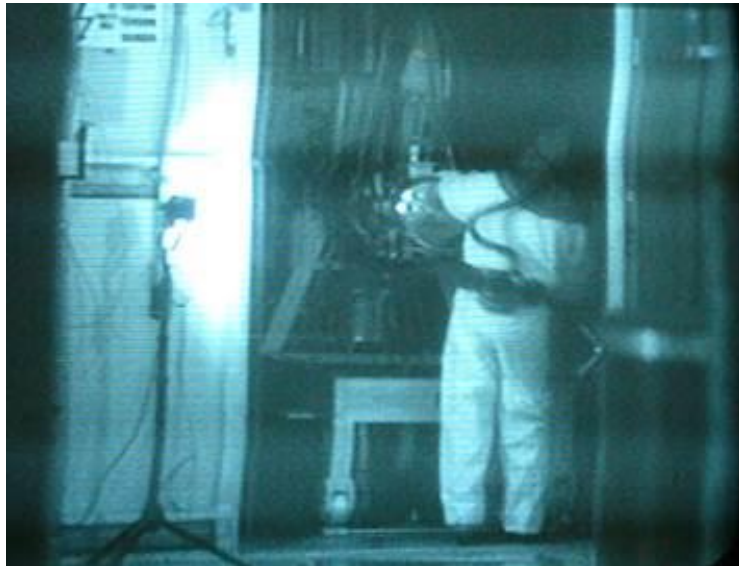
A telescopic camera for the target area

- To provide an overall view of the target area (in the absence of protons)
- Visualize target changes over internet
- Screens to be placed in target entrance
- Partially eliminates the need to call upon the Telemax robot in the event of a failure – quicker diagnostics



As presented in 2017

Telescopic camera in images



Existing camera
← images



Telescopic camera
in position →



Zoom →

Robot and Montrac testing

- Verification of all shelf positions and interface with Montrac system
 - 2 shelf positions were a cause for concern during operations in 2017
- Tests with LIEBE target transport and handling.
 - Last opportunity before going on-line in 2018
- Tests with planned LIST target operation
 - First time this robot system has handled a LIST target since its implementation
- Montrac finalisation
 - Modifications due to risk analysis scenarios and feedback from operations last year
 - Issue with corrosion on Montrac near irradiation point currently under investigation

Frontend maintenance

- Cleaning and verification of different parts
- HT extraction electrode tip exchange
- HT room cleaning
- RF cable verifications for LIST target
- Last verifications for LIEBE connections
 - New pump power cable to be pulled through HT transfer tube.

Outline

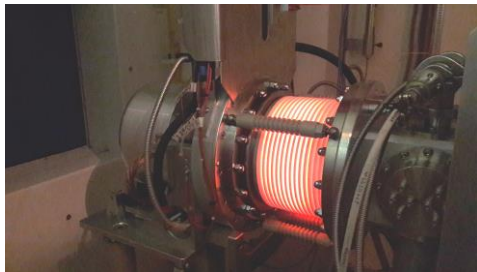
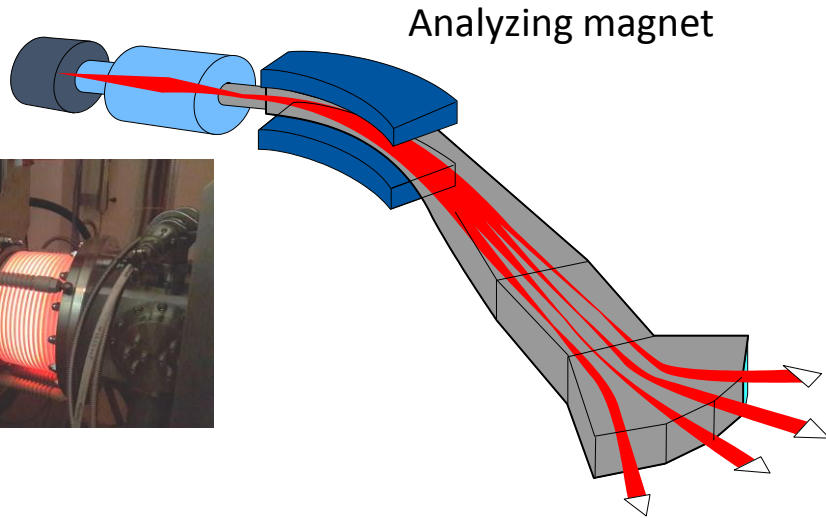
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New isotopes can be delivered to Partner biomedical institutes where they synthesize new drugs and test them for precision imaging or treatment



1st isotopes produced in ISOLDE HRS beam dump and separated in the lab during commissioning Dec 2017



$^{149}/^{152}/^{155}/^{161}$ Terbium ions collected in metal foils



La lutte anti-cancer se prépare au Cern

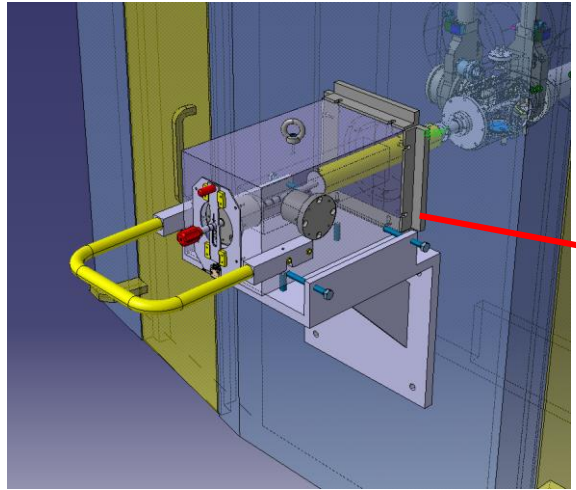


Large Collaboration with regional and European Institutes

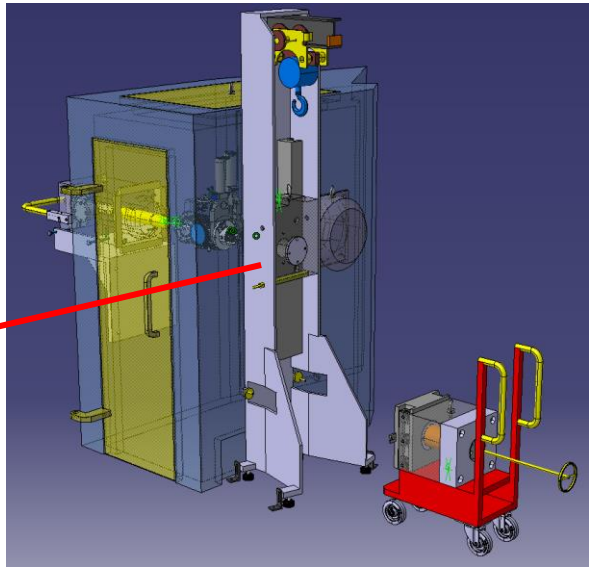
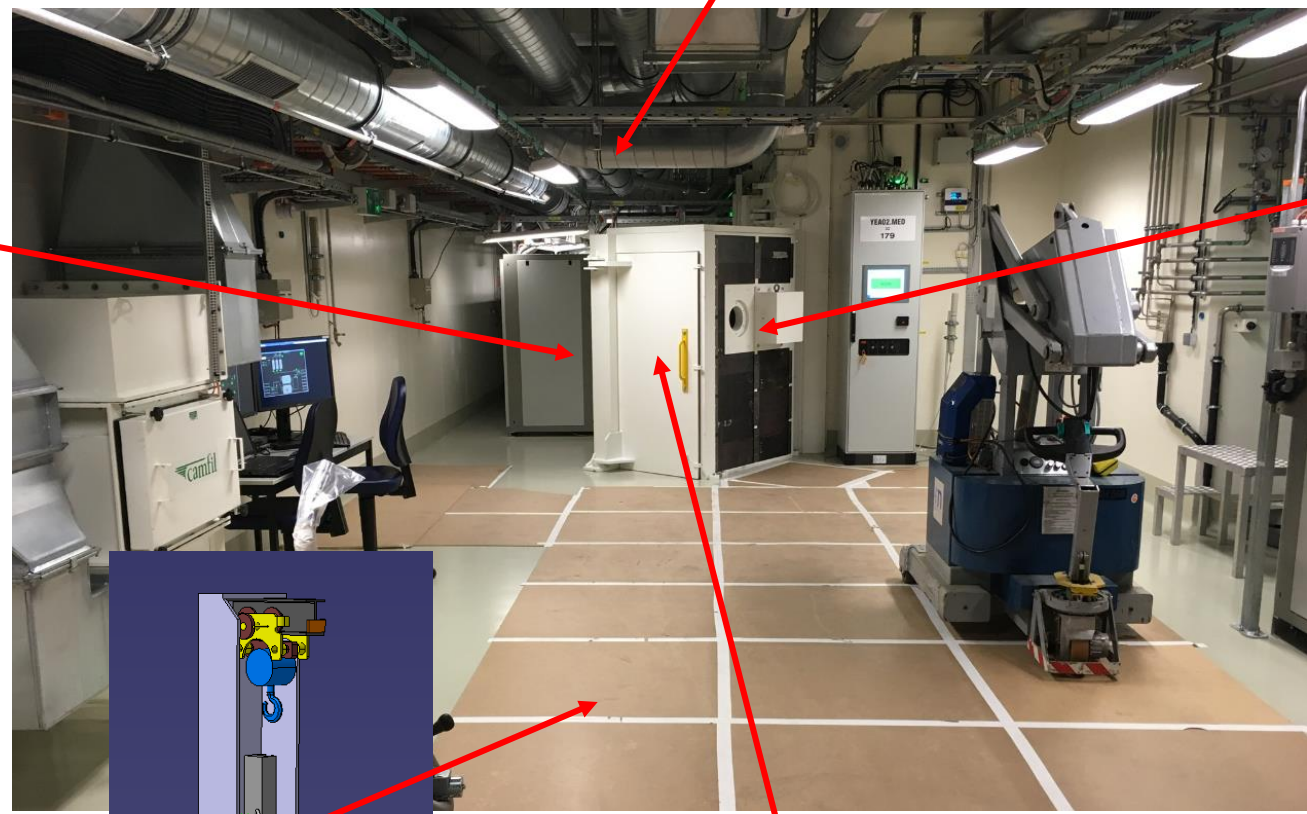


Yets 2017-2018 main works in MEDICIS

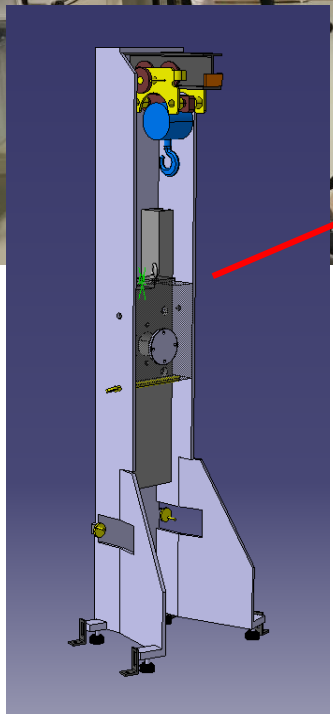
Ventilation process
dismount and upgrade



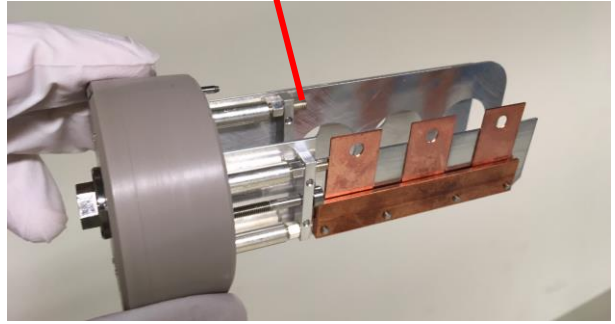
Collection box **movement control** alignment and completion



First transfer port and shielded **trolley** delivery, alignment and installation. **Slits motorization** and control completion



Second transfer port delivery and installation



Outgazing **vacuum and collection sample** design optimization

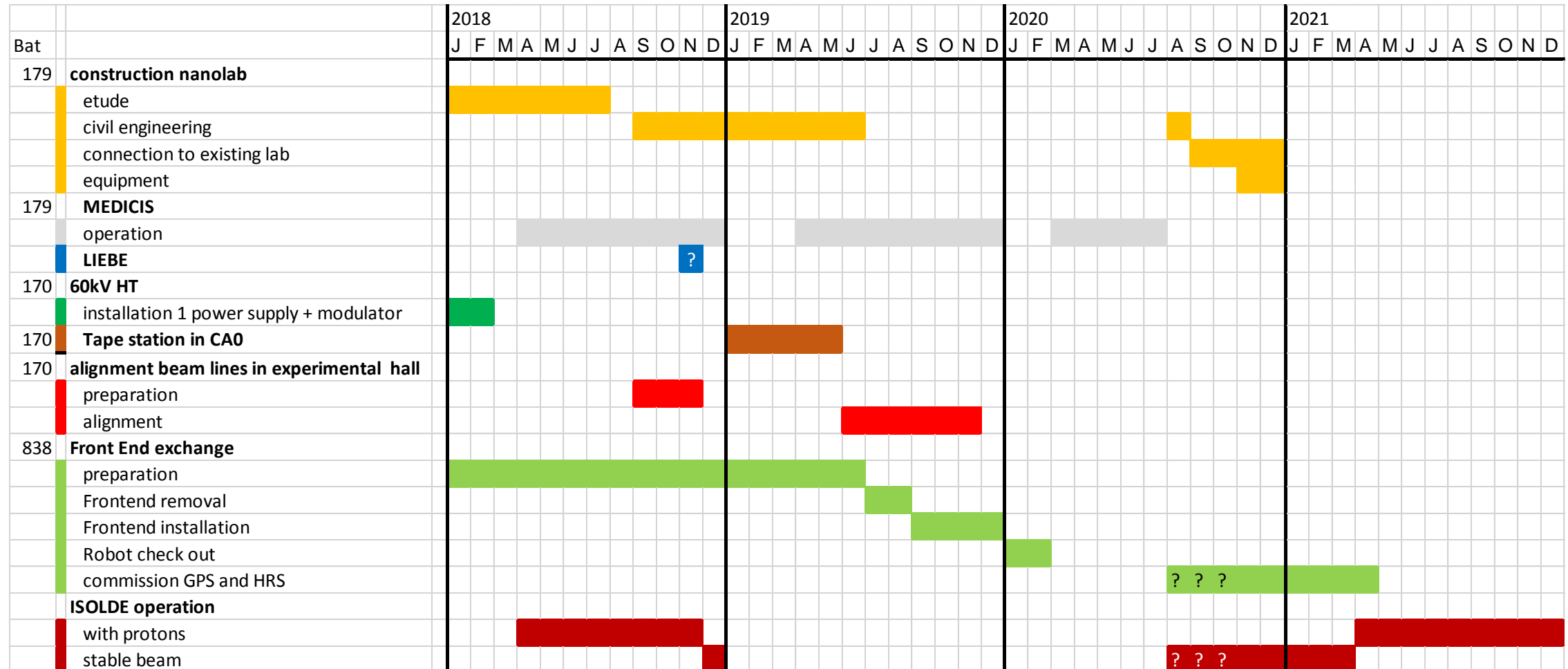


RCS Montrac upgrades and tests completion

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Overall 3 year planning



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A new broad-purpose laboratory for machine development studies

- New generation of frontends for high-power beams and improved robotic handling
- Realistic beam conditions
- New target designs
- Longitudinal cooling for laser-spectroscopy experiments
- Beam instrumentation development
- Beam dynamics studies
- Ion-source studies
- Time-of-flight studies
- Molecular beam studies
- Laser laboratory

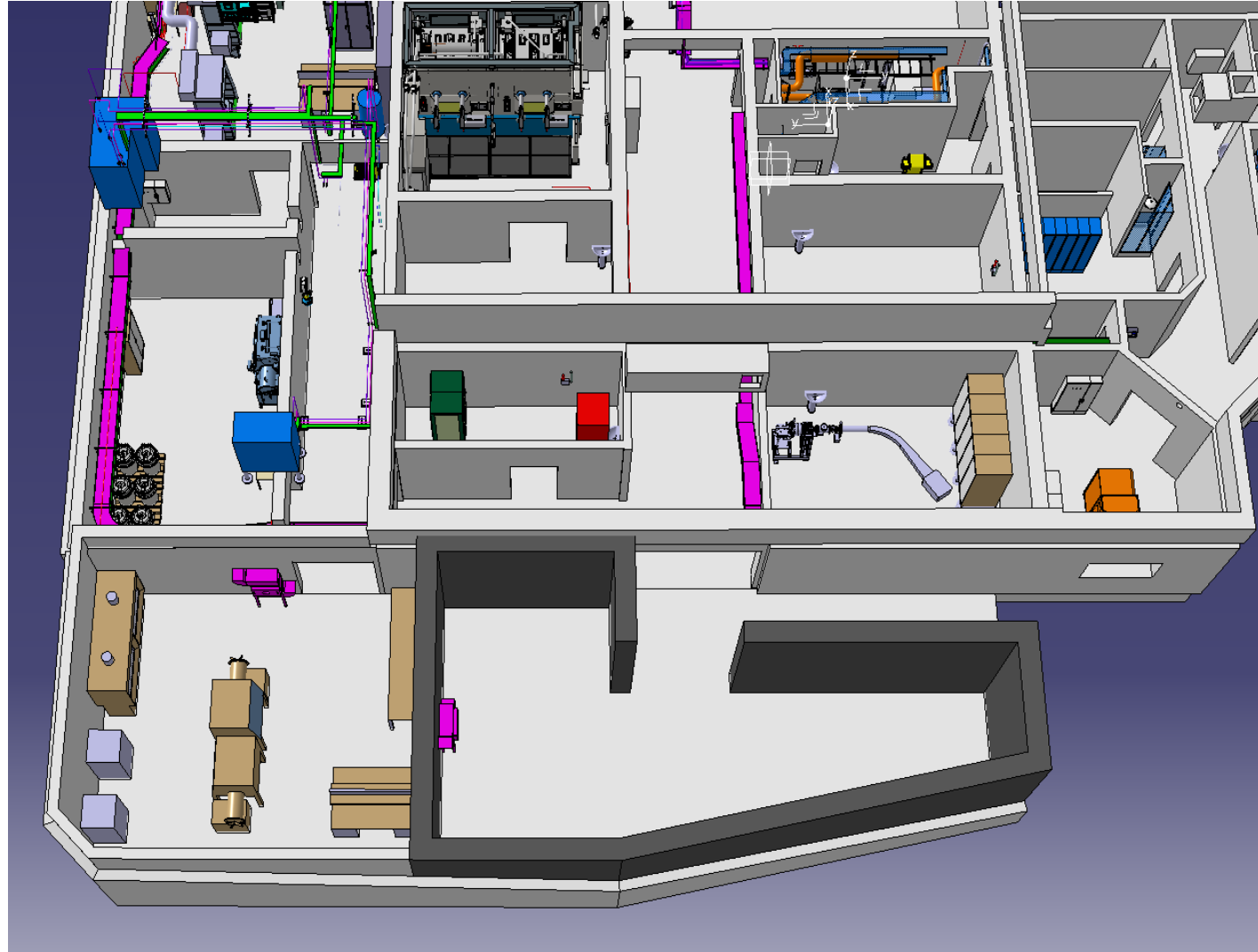
Status: Lab infrastructure 90% complete
Separator section 80% complete ; commissioning started
RFQ section under construction
Emittance measurement station TBD

Budget: 228kCHF spent in 2017
Request 318kCHF in 2018 (47kCHF allocated, remainder to be confirmed)

Off-line 2 – First beam before magnet

The screenshot displays the ISOLDE SCANNER 1.0 control interface. On the left, the 'Expert Settings' panel includes parameters such as acceleration (20.0), channel (1), clock_divider (462), and various speed and sensitivity settings. The main area contains four plots: 'Data 1' (blue line), 'Data 2' (red line), 'Scan' (yellow line), and 'Image' (blue heatmap). The 'Action' panel at the bottom shows the scanner status as 'STOPPED' with 'START', 'STOP', and 'INITI' buttons. The 'Status' panel includes indicators for PLUS, BUSY ADC, BUSY STEP, and MINUS. The 'Time Information' panel shows the acquisition time as Jan 17, 2018 5:43:20 PM and 55 scans remaining.

Nano lab



Nano Lab

- Finalisation of IPP document for end of February
 - Cost analysis, functional specs, risk analysis
 - Combines nano, pyrophoric, radiological and chemical risks
- Start construction ~September 2018
 - Conflict with access to Class A labs and MEDICIS
- Civil engineering ends June 2019
- 3 months required for ventilation coupling and minor civil engineering work during the last quarter of 2020

- Thank you for your attention