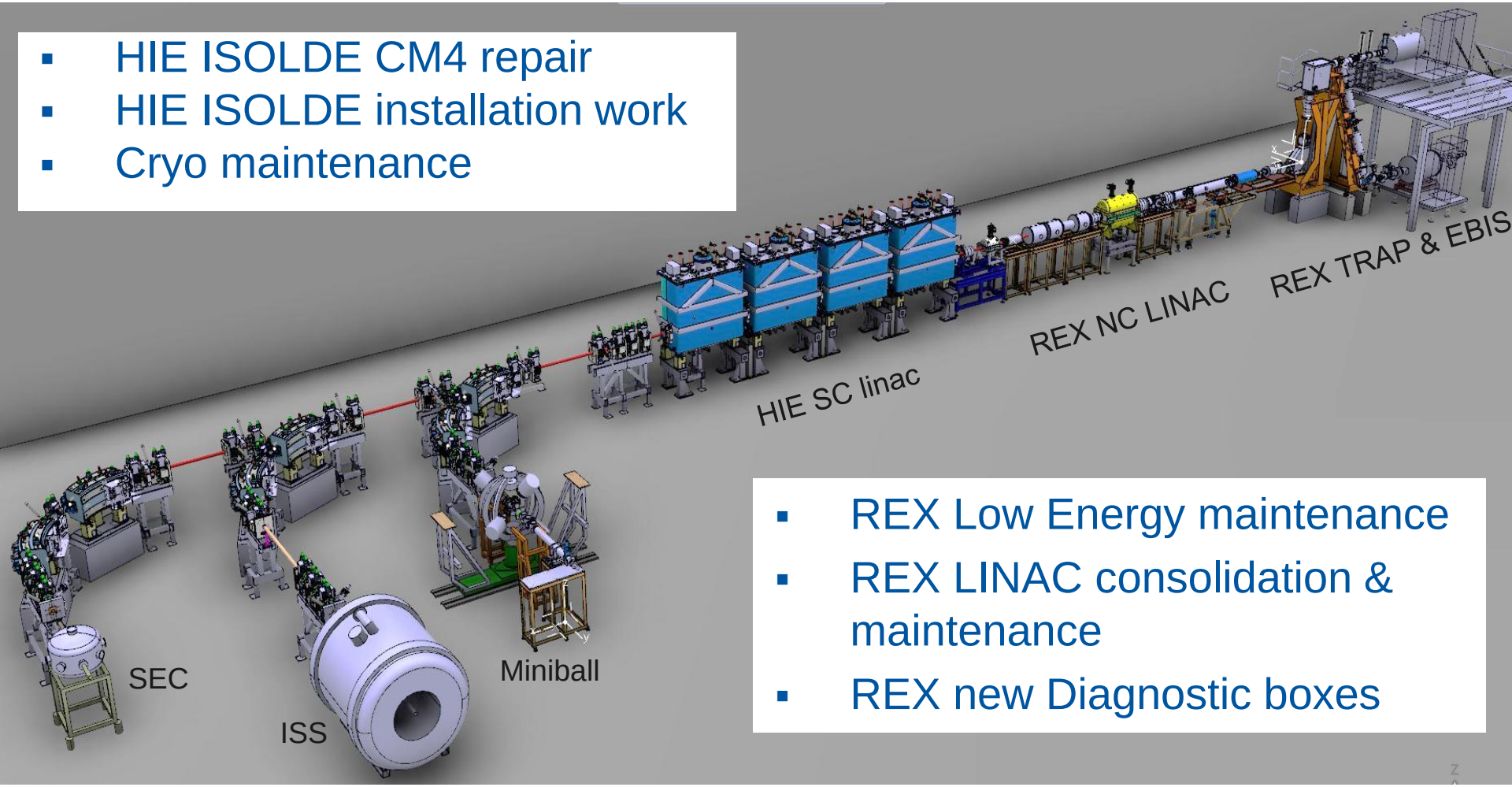
REX and HIE ISOLDE post-accelerator Long Shutdown 2 work

ISOLDE Workshop and Users meeting 5-7 DEC 2018, CERN

Erwin Siesling

Outline:

- HIE ISOLDE CM4 repair
- HIE ISOLDE installation work
- Cryo maintenance

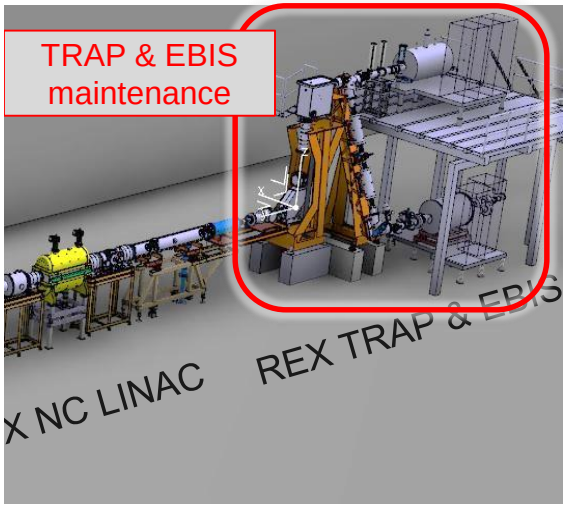


- REX Low Energy maintenance
- REX LINAC consolidation & maintenance
- REX new Diagnostic boxes

REX Low Energy maintenance

REXTRAP:

1a. Verify insulation of all internal electrodes, use HV tester
  b. If faulty, open up REXTRAP, produce new insulators, exchange inside trapping structure
2. Instability of XTRAP.ST_EJC (and INJ)
    open up REXTRAP, probably redo some of the Macor insulator rings
3. Measure RF amplitudes on the 8 central electrodes for different frequencies
4. Exchange the generation of the RF signal from CVORG for an 8-ch DDS card,
    not decided yet if during LS2
5. Revise power supplies for REXTRAP solenoid
6. Exchange zeolithe powder for the local ion source
7. Make sure all three Scope-in-the-box for the RF electrodes work correctly
8. Mark timing cables for REXTRAP
9. Clean REXTRAP HV platform and cage



REXEBIS

10. Revision of motor-generator, complete over-haul
11. Rebuild electron gun (electron current losses, stability, vacuum, ion injection)
    construct a more sturdy cathode assembly & gun with higher current compression
    12 months, A. Pikin, F. Wenander, EN/MME or outsourced
    design and construction before Dec 2019, tests during 2020
12. Exchange water cooling tubes EBIS
13. Clean water flow meters EBIS
14. Perform necessary bakeouts at each electron gun test
15. Clean HV platform and cage
16. Controls
    'standardize' application for slow extraction?
    correct readback of EBIS HV, Lens1 and Lens2 voltages

BE-ABP F. Wenander,
C. Mastrostefano, J. Thiboud
BE-OP-ISO M. Lozano Benito,
BE-RF M. Paoluzzi
TE-EPC N. David
TE-VSC J. Ferreira Somoza

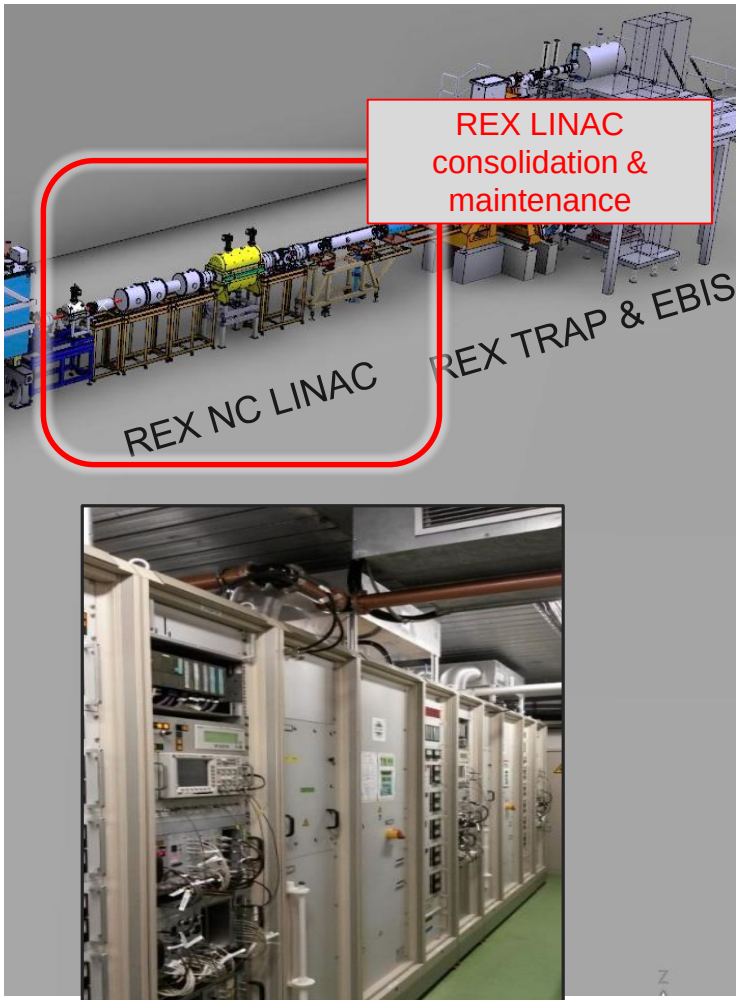
Common tasks

17. Vacuum work
    Service all turbo pumps
    Verify status of tubes for compressed air
18. TE/EPC work?
    input from N. David
19. BE/BI?
    Verify status of tubes for all compressed air

REX LINAC consolidation & maintenance

- Maintenance of the 90 kW 101 MHz amplifier resonators (full disassembly)
- Installation 5kW 101MHz solid-state Buncher amplifier (plus one purchased as spare)
- Replace the optical links in the power amplifiers
- Consolidate the “Measurements Units”
- Replace Grid1 and Grid2 variacs with solid state modules
- 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 an automatic ramp-up of the equipment after “reset”
  - -Improve the monitoring/logging (e.g. critical interlocks, tube gain)
- REX RF validation tests can be carried out during LS2 (CV-OP: the 20 degree cooling water will be made available during Q2/3 2019)

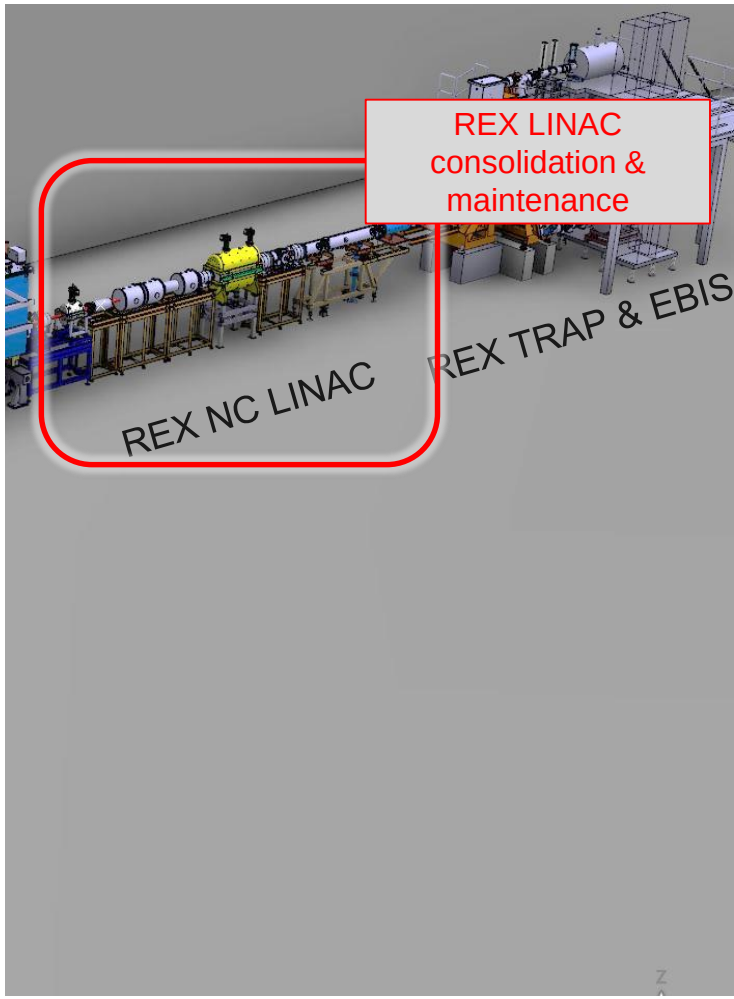
(Luca Timeo, Cristiano Gagliardi & RF team)

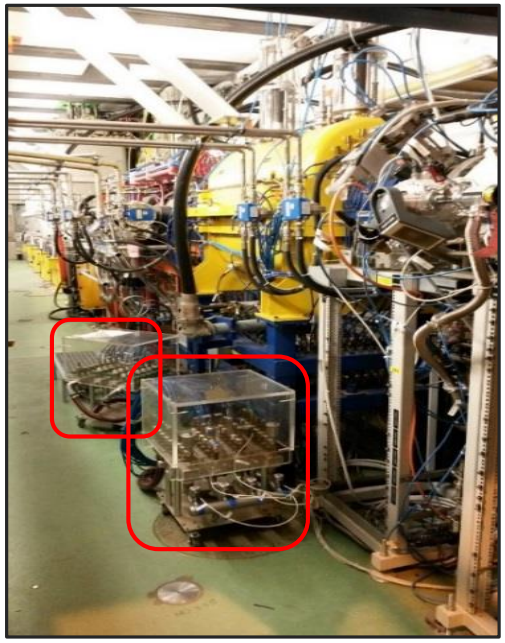


REX RF amplifiers in the REX RF room

REX LINAC consolidation & maintenance

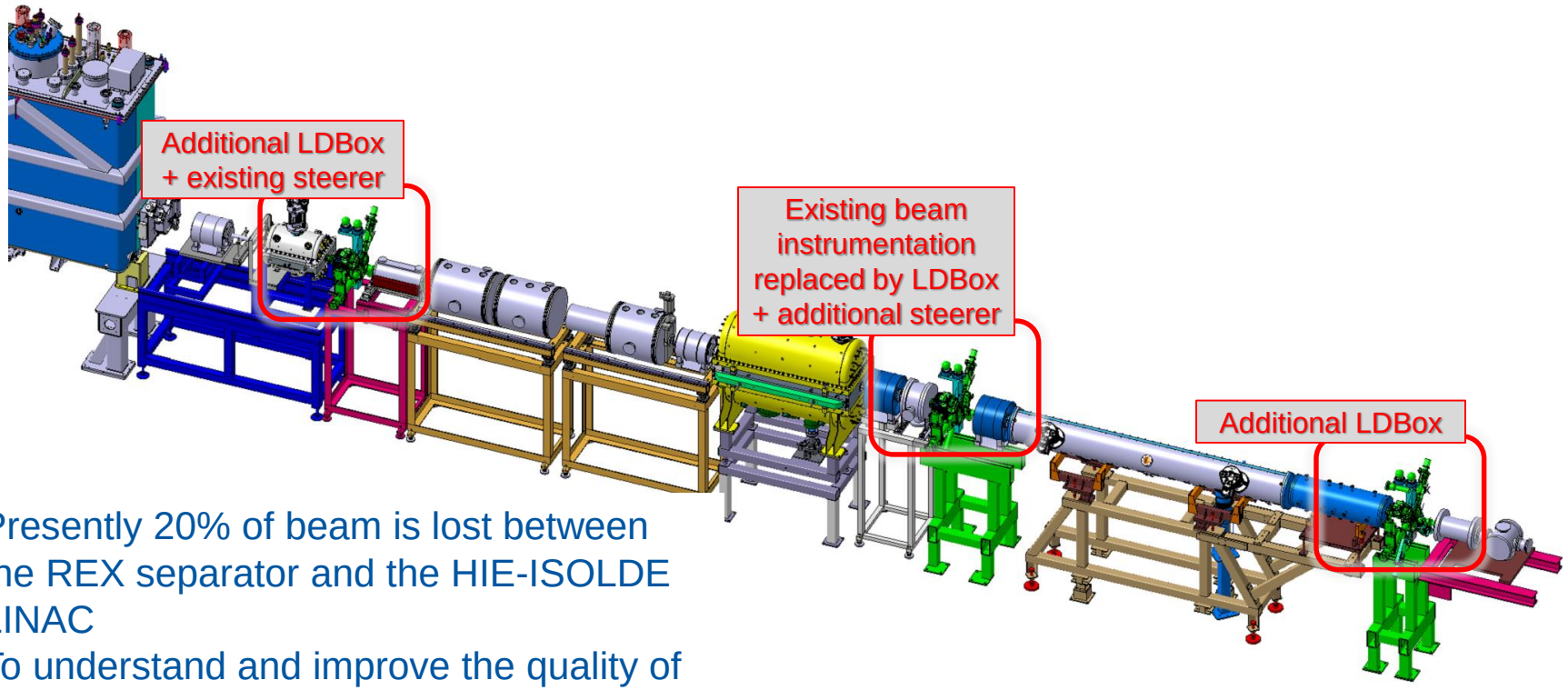
- Full vacuum system maintenance (Jose Ferreira Somoza & Vacuum team)
- new cooling system for IH structure (contractor)
- Water cooling hoses of some cavities need a complete overhaul
- Check of all flow and thermal interlock switches (magnets & NC cavities)





IH structure cooling water distribution

REX 3 new diagnostic boxes + additional steerer



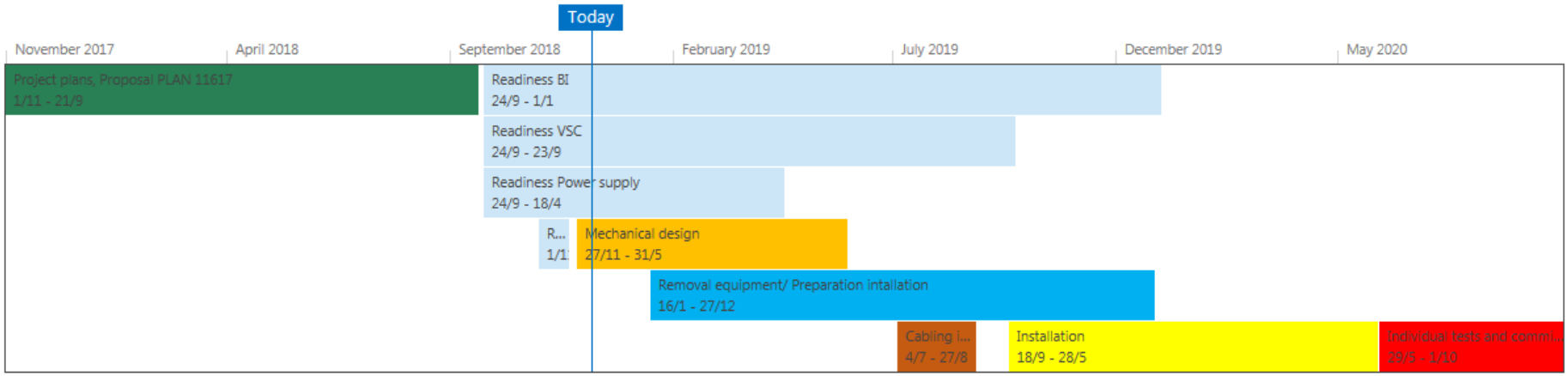
Presently 20% of beam is lost between the REX separator and the HIE-ISOLDE LINAC

To understand and improve the quality of the beam, and reduce losses beam diagnostics are required (+ an additional steerer REX-ISOLDE type).

3 new standard Long type HIE-ISOLDE diagnostic boxes with modified vacuum chambers will be installed keeping future consolidation of REX in mind.

Courtesy: Nicolas Joannon EN/MME

REX 3 new diagnostic boxes + additional steerer



3 new REX Dboxes + steerer:

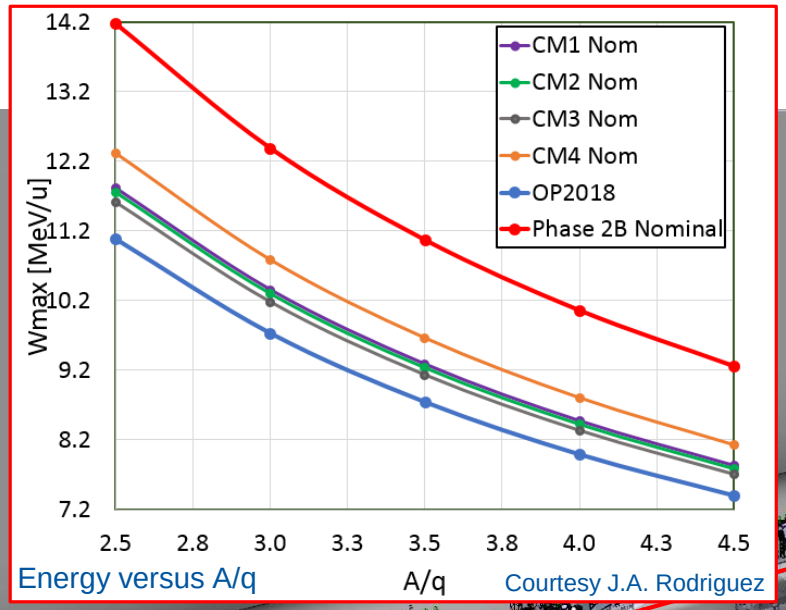
- Project initiated by Jose Alberto Rodriguez (BE-OP). The ECR has been written and planning done by Simon Mataguez (BE-OP) covering costs & manpower, modifications and integration points
- Integration ongoing (Nicolas Joannon EN-MME)
- Will require severe modifications of vacuum chambers and supports
- Budget has been allocated (Richard Catherall EN-STI)
- Manpower during LS2 has been allocated by the different groups (BI, Magnets, Vacuum, Transport)
- Installation foreseen Sept ’19 – May ’20.

Slowdown but not showstopper:

- New manufacturer of the HIE ISOLDE Dboxes

HIE ISOLDE CM4 repair (CAV 3 RF coupler issue)

Very nice results booked with the completed phase 2 of HIE ISOLDE in 2018,
but.. things could be better



Energy versus A/q

Courtesy J.A. Rodriguez

REX TRAP & EBIS

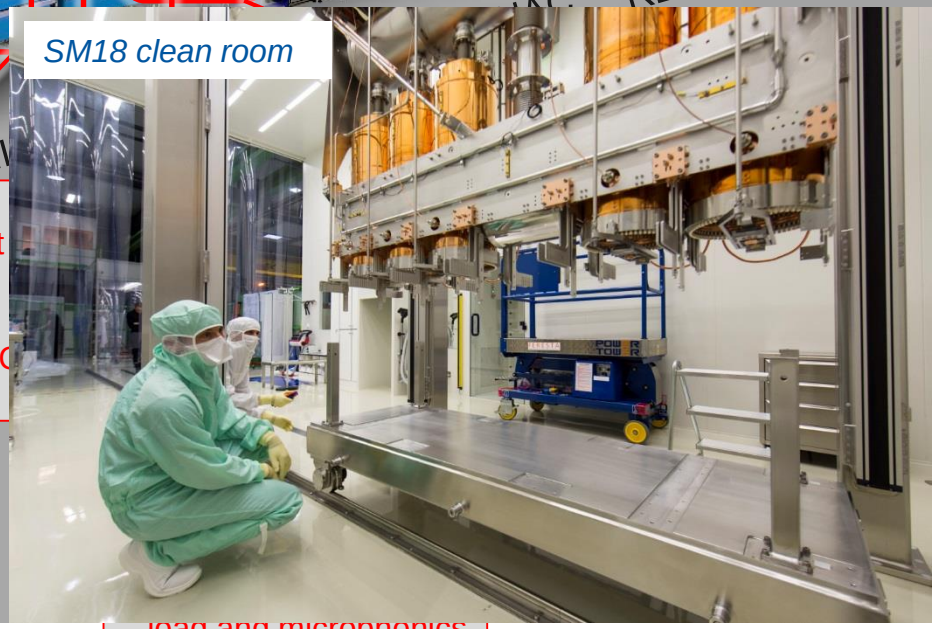
SEC

CM4:
- Non-conformity for CAV 3 (SRF18) – RF coupler issue
- Two other cav… h low Q
- All c…

CM3:
- Close to specs at 5.5MV/m
- Very stable
- Best operational C…

CM4 Repair scheduled for LS2 (Walters Venturini, RF team)

SM18 clean room



load and microphonics. Not understood.

HIE ISOLDE CM4 repair

Dis- and re-mounting CM4:

- Warm-up of the HIE SC LINAC as of 7th December until max 18th December (cooling water stop)
- Gives enough time to finish all planned 'Winter-Physics' + TRAP, EBIS & REX tests (Niels Bidault)
- Preparations CM4 dismount as of January. It involves dismounting:
  - BCAM survey system (survey team)
  - Top-plate RF cabling, instrumentation and motors (RF team)
  - Vacuum pumps & chambers (Vacuum team)
  - Cryo flexibles, He release and Solenoid leads (Cryo team)
  - Steerer magnets (Magnet team)
  - Diagnostic Boxes (BI team)
  - Tunnel roof (Transport)
- A planning is in place taking availability (LS2 workload) of the different groups in account. The transport of CM4 is foreseen mid-March 2019 to SM18 (cleanroom)

CM bottom & top-plate infrastructure:

Vacuum underneath

Cryo conn. top-plate

Cryo flex.& He exhausts

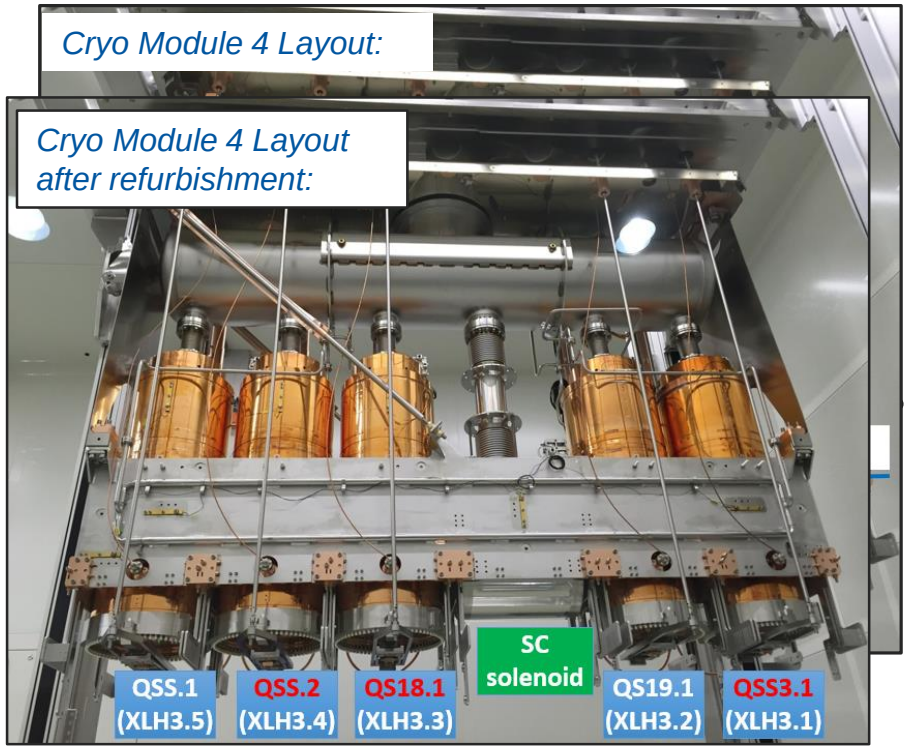
Top-plate RF, motors, instr.

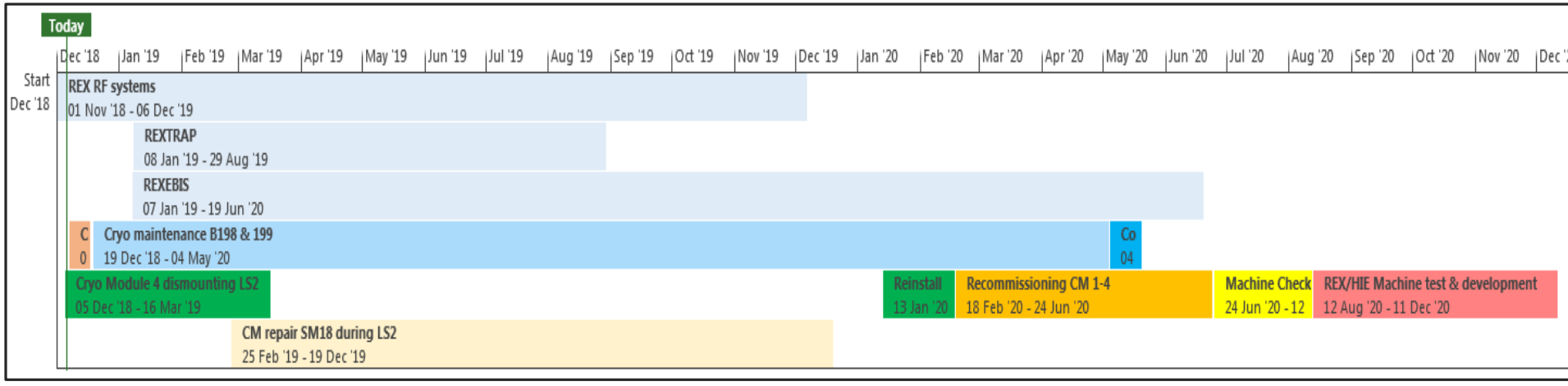
CM transport and handling:

HIE ISOLDE CM4 repair

Steps for CM4 refurbishment during LS2 in SM18 cleanroom (Walter Venturini & RF team):

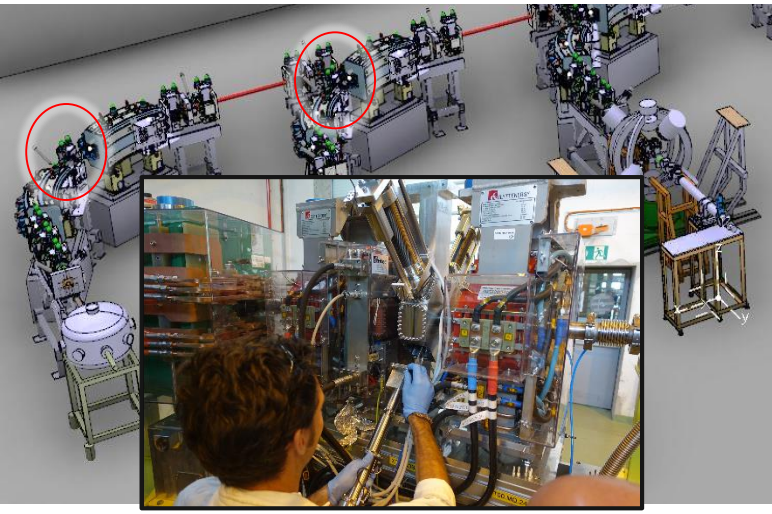
- Re-deployment of “logistic area” in the SM18 extension building (available in Jan 2019)
- Finalize set of 3 spare cavities, prepare them and store for installation (Nov 2018-March 2019)
- Open CM4 in clean room, remove all cavities, rinse 2, replace the others (window between April- August 2019)
- Closure, cold test in M9 (Bunker) (September-December 2019)
- Re-install CM4 in the HIE ISOLDE linac as from January 2020 followed by a period of recommissioning. Restart of the cryo plant in April and cooldown the CMs in May. Machine check out, beam commissioning and machine tests & develeopment with stable beam till Dec 2020.

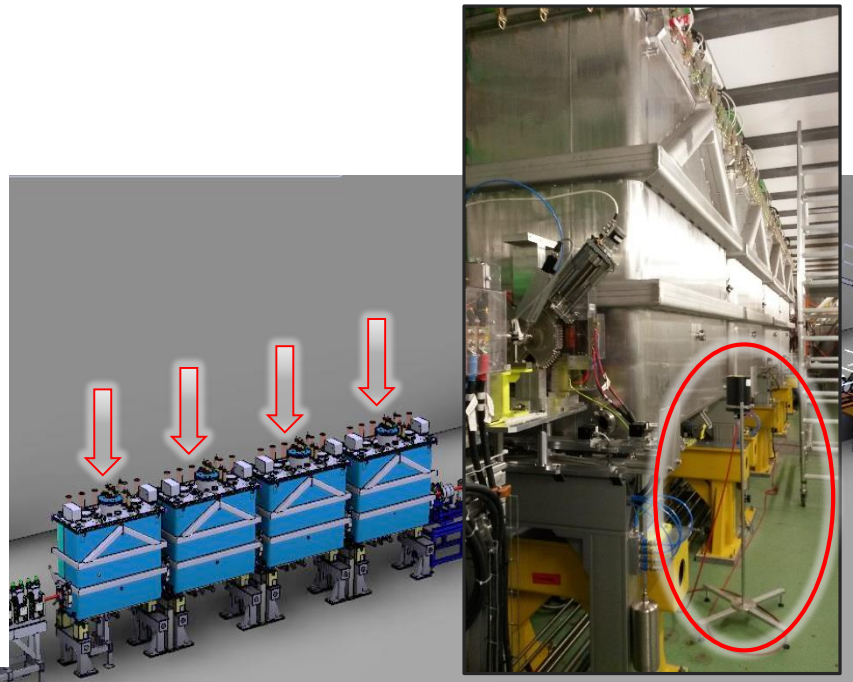




Other HIE ISOLDE installation work

- Installation of 4 RAMES radiation monitors type IAM (Induced Activity Monitor), one for each CM (Alexandre Dorsival, RP team, Pawel Burdelski, Cabling team)
  - This will significantly improve the analysis of SRF cavities field emission issues during RF conditioning and during the run





Presently: Mobile radiation monitor

- Survey scan of the complete SC LINAC and REX (Antje Behrens, Survey team)
- Installation of Silicon detectors in the XT02 & XT03 Dboxes (between the dipoles) for energy measurements (William Andreazza, Sergey Sadovich, BI team)

Cryo maintenance

Cryogenics

- Preventive maintenance of the cryogenic system including major overhauling of rotating machinery
- Cryo operation: Setup of the automatic controls for transient modes
- Due to the adequate repair this year (YETS 2018) by CRIOTEC of the Cryo Distribution System, no CDS intervention will be needed
- All maintenance work will be carried out through 2019. The cryo plant will be operational and ready for re-start before April 2020 for cooldown and re-commissioning of the HIE LINAC

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- EN/HE : JEAN-LOUIS GRENARD, FRANCK SCHNEITER and the entire Transport Team

ISOLDE End-Of-Run 2 Party

- Building 508 at 16:30 today!