



Update on Mid-Term-Planning requests for ISOLDE Improvement - LS3 planning for ISOLDE

ISOLDE Workshop and Users meeting 2024 – 27/11/2024 to 29/11/2024

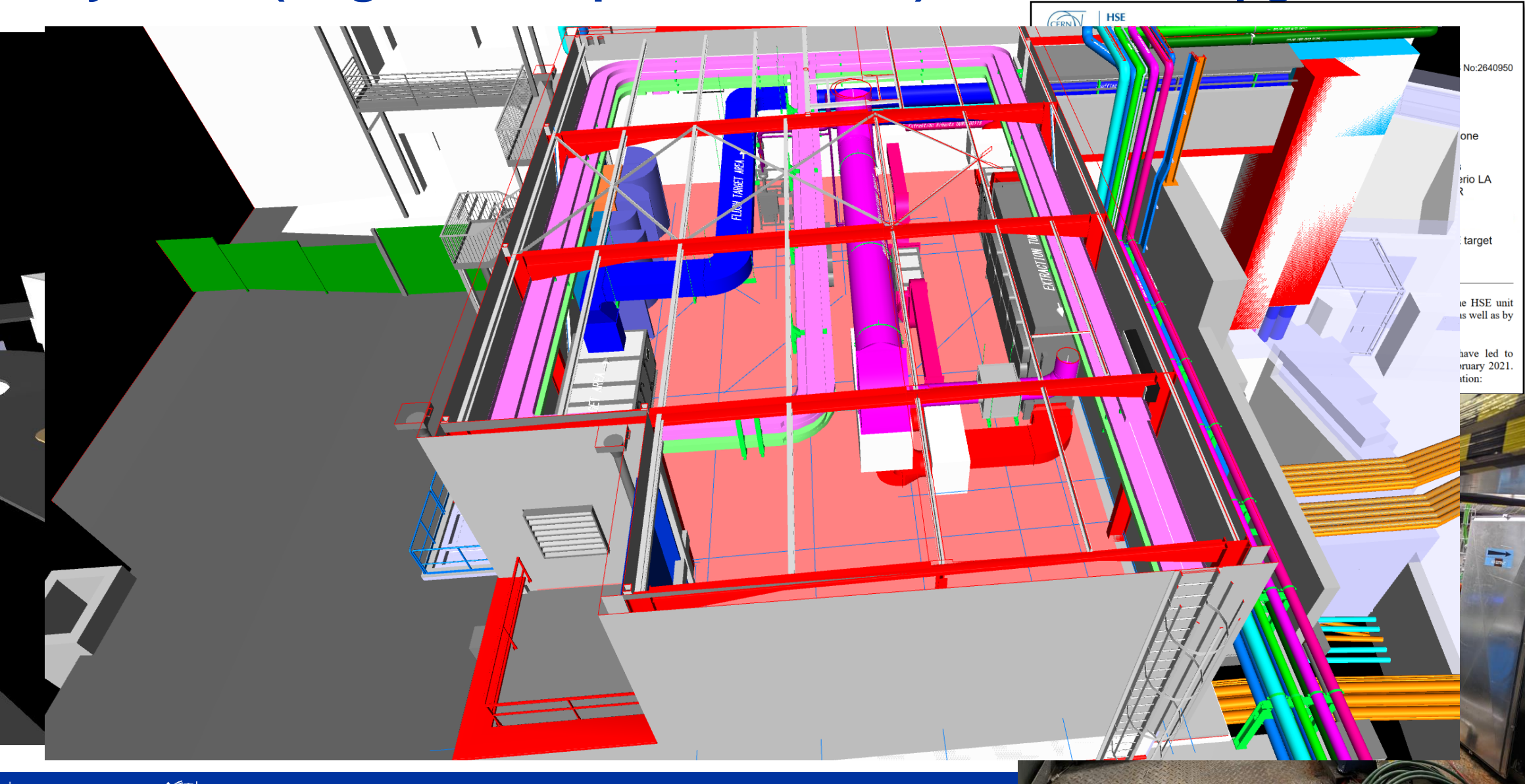
Joachim Vollaire on behalf of many teams supporting ISOLDE operation, consolidation and improvements

Outline

- Ventilation upgrade (ongoing) and ISOLDE Beam Dumps replacement (approved)
- BTY line upgrade for 1.4 GeV and 2.0 GeV operation
- Improvements targeting LE beams delivery
- Improvements for the REX Linac (NC)
- Improvements for the HIE ISOLDE Linac (SC)
- LS3 planning
- Summary

Primary areas (target and separator zones) ventilation upgrade

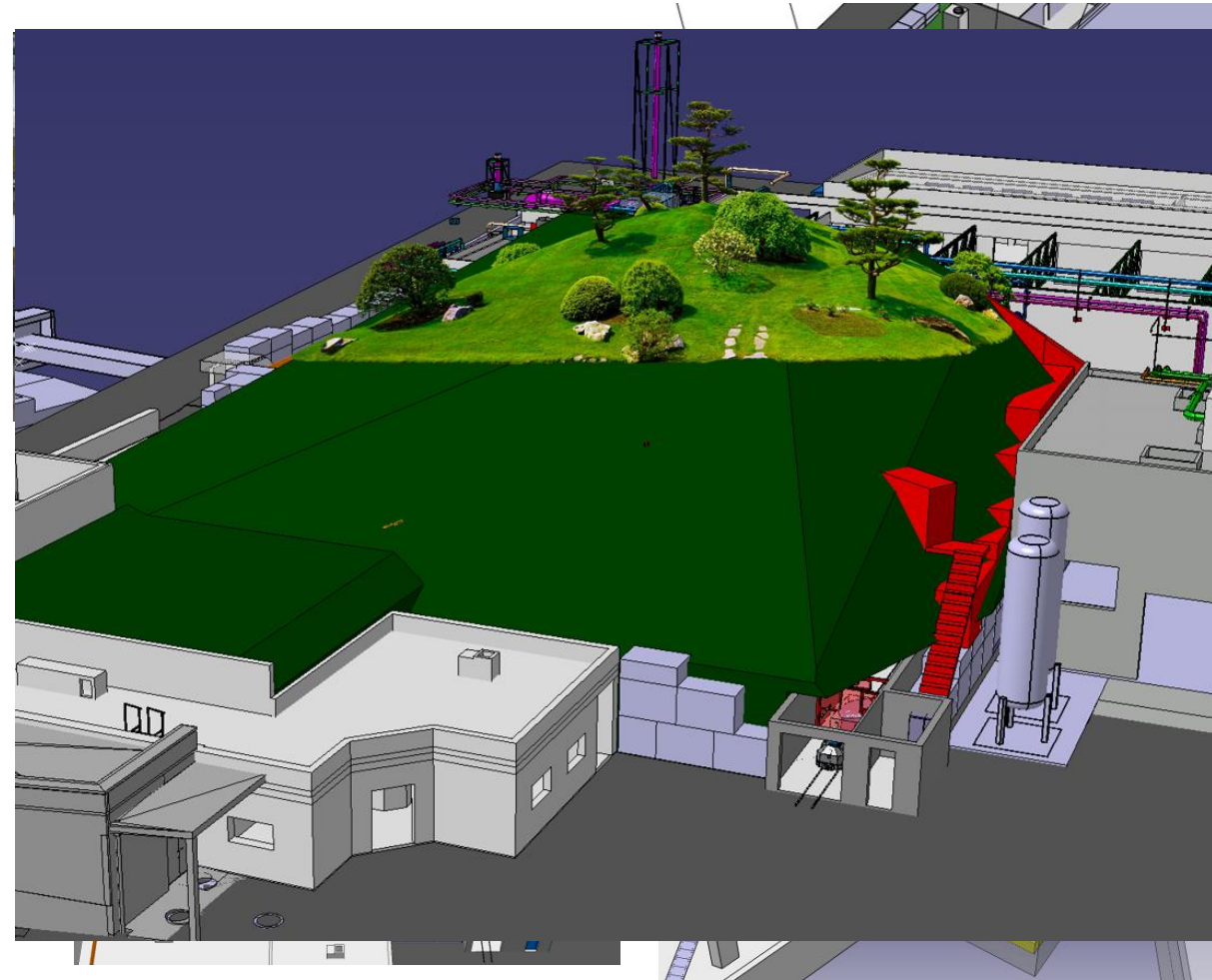
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ISOLDE Beam Dumps Replacement and Sustainability

- Technical details in the next presentation from Ana
- **Motivation:** Long term operability of the facility with higher energy and intensity
New technical building on top of the target area (not accessible during operation)
- Recovery of current systems (HRS separator area access, BORIS tubes...)
- ~24 months long activity
- Opens perspectives for the future (LS4)



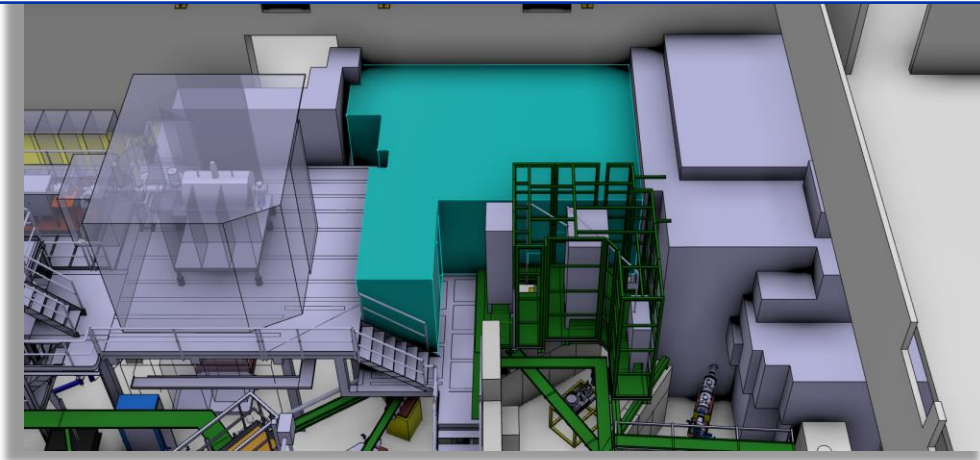
BTY line upgrade for 1.4 and 2.0 GeV operation

- Motivation: higher production yields for some parts of the nuclear chart when increasing the beam energy (validation with FLUKA calculations and operating GPS at 1.7 GeV). 1.4 GeV beam will be kept.
- Status of the projects:
 - Power converters consolidation during LS3 compatible with 2.0 GeV upgrade
 - New magnets to be designed and produced (budget provided for the design)
 - Geometrical reconfiguration of the beam line studied in detail
- MTP request to be put forward for the project completion during LS3 (work in the PS Booster and ISOLDE target area side).

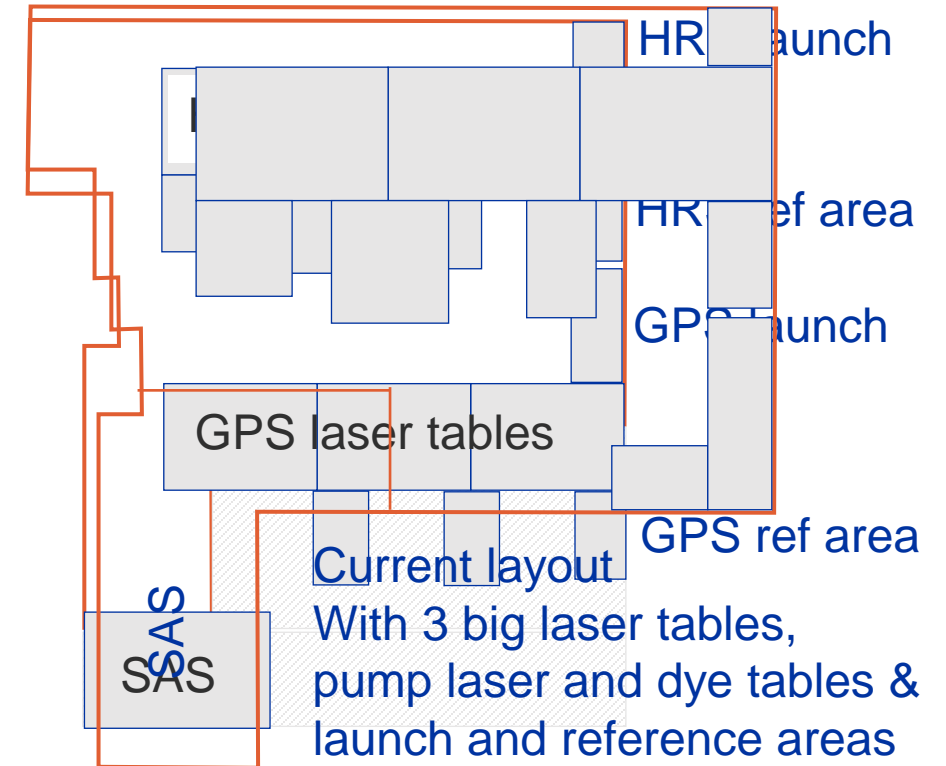
RILIS Laboratory upgrade

- Motivation: Address the growing demands for laser ionized beams by implementing separated laser launched areas for GPS and HRS. Address ergonomic and safety issues in the laboratory

RILIS Laboratory in a very crowded area
Must be close to GPS and HRS separator zones



Budget request submitted to CONS program.
To be included to the MTP request depending on CONS arbitration



Central Beam Line pulsing and Beam Gates

- Motivation: Develop a pulsing system to allow fast changes of the configuration of the central line (alternate between GPS and HRS) which is possible with the power converters upgrade (bipolar system)
- Status of the projects:
 - Specification for the Beam Gates completed and technical solution tested at ISOLDE during 2024
 - Beam Switching prototyping tests performed at offline2 for pulsed control of the electrostatic elements.
 - Quotation request to vendors, contributing groups on board. Software to be developed by BE-OP during LS3

See poster from Line: Beam Switching at CERN-ISOLDE

Contribute : Ion Beam Manipulation Physicist (SY-STI-LP-2024-159-LD), apply before the 12/12/2024 !

Other improvements for the LE Lines (MTP requests)

- Consolidation of the field probes in the HRS dipole magnets (replacement of power converters already approved by CONS)
- Several improvements for the ISCOOL cooler buncher (buffer gas supply, management of pumped gases, alignments...)
- New MagneToF detectors for low yield beams and time structure measurements and consolidation of beam instrumentation spares

Improvements for the REX Linac (NC)

- Improve performances of the REX/TRAP by working on discharge issues. Study of a possible new design (GRAD for the MTP request)
- Reminder: Replacement of REX-ISOLDE 101 MHz 90kW RF power amplifiers and LLRF already approved and planned during LS3 (CONS program)
- New request for the MTP: consolidation of the 202 MHz RF amplifier. Replacement by solid-state technology and new digital LLRF (similar to the 101 MHz ones)
- Opening of the 9GP RF structure and repair of the vacuum leak during LS3 (groups have confirmed their availability)
- Other activities considered as improving the cooling of the inner triplet of the HIS structure or recalibration of all collimators and slits in the Linac

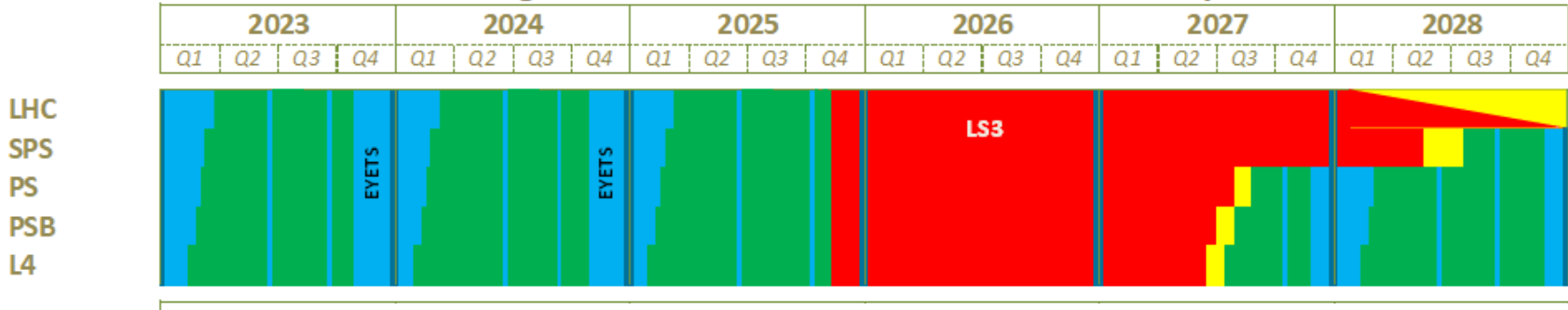
Improvements for REX-HIE ISOLDE SC Linac

- Proposal based on the “HIE ISOLDE SC LINAC performance Task Force Executive summary and conclusions” (chaired by Erwin Siesling)
- MTP requests:
 - Refurbishment of CM1 (prototype) with most of the field emission issues (availability of clean room and manpower)
 - Produce a spare CM to have a swappable spare (rotation for refurbishment of other CMs)
 - Implement a 2 kL LHe dewar & He recovery line in case of cryo plant failure (power cut)
 - Resources to study the implementation of a heat-exchanger based LN2 / GHe system for CM shields cooling as back-up system in case of power cuts
 - improve vacuum in the vicinity of CM1 to avoid degradation of the cavities (NEG cartridge, new vacuum chamber.....)

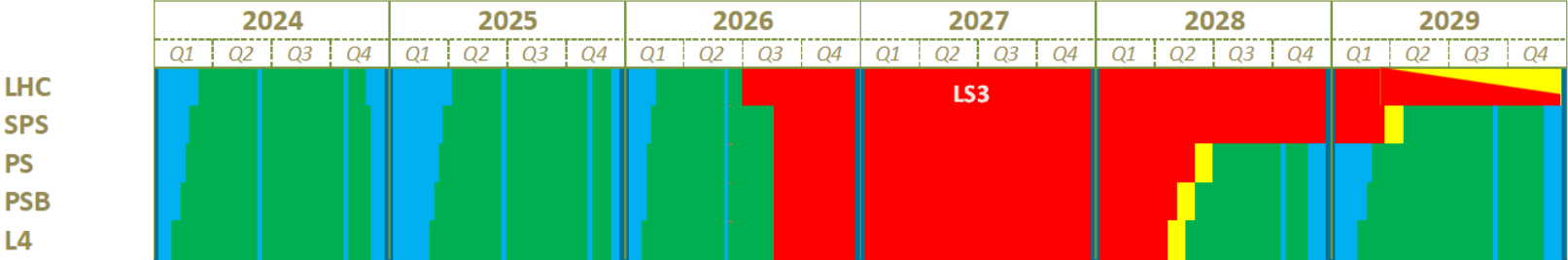
LS3 planning for ISOLDE

- LS3 (availability of protons/services) has shifted by ~8 months for the PS Booster
- Reminder: 24 months required for the beam dumps replacement vs ~19 months stop of the PS Booster.
- Options: align ISOLDE activities with the start or with the end of the PS Booster work

Long Term Schedule for CERN Accelerator complex



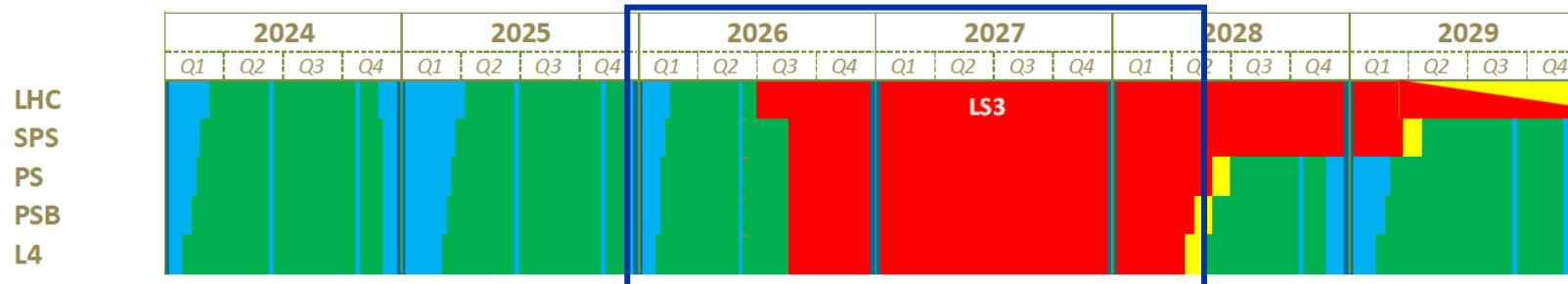
Long Term Schedule for CERN Accelerator complex



LS3 planning for ISOLDE

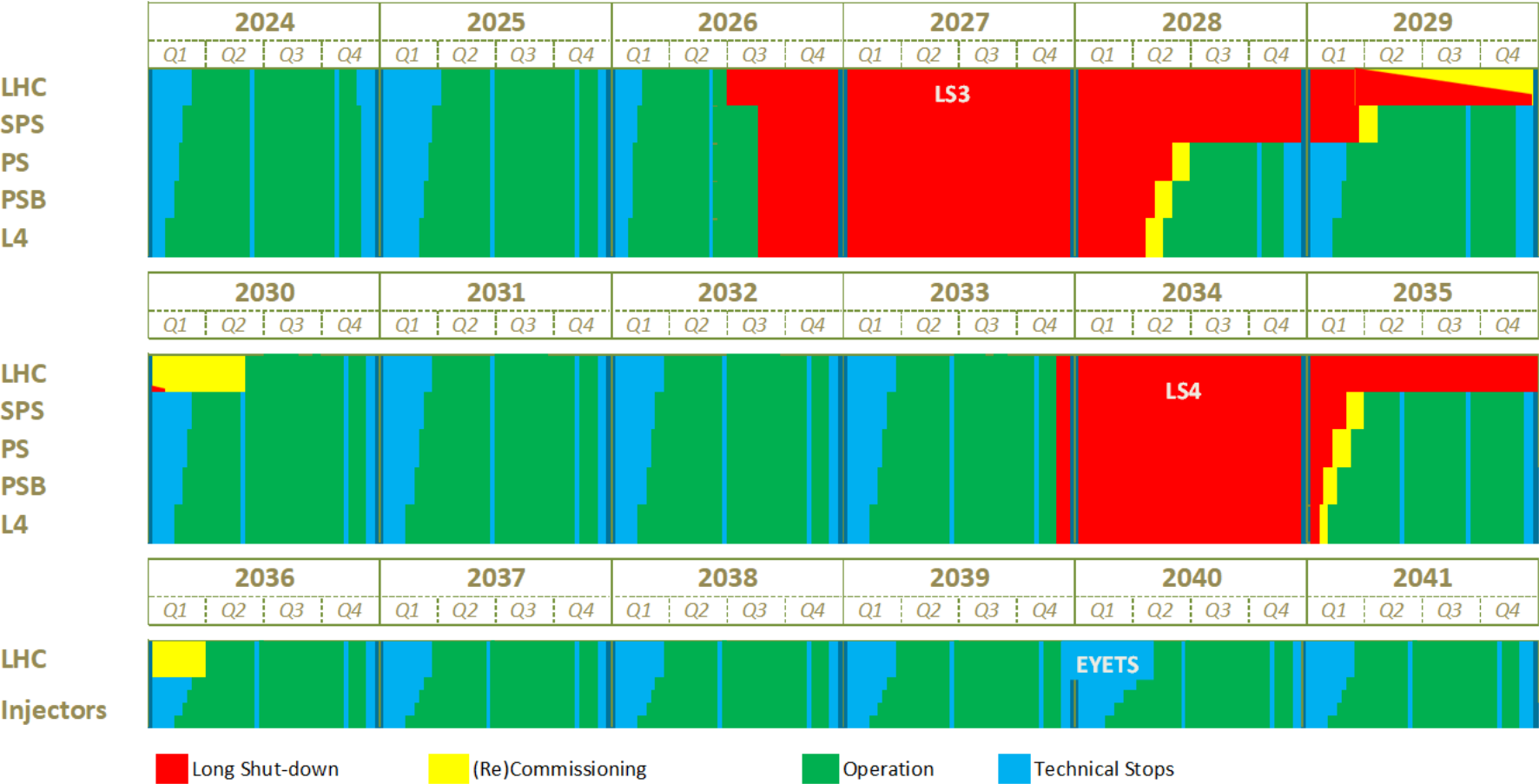
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- Reminder: 24 months required for the beam dumps replacement vs ~19 months stop of the PS Booster.
- Options: align ISOLDE activities with the start or with the end of the PS Booster work
- The options were analysed with the objectives of maximising the physics time (post-accelerated beam) and identifying opportunities (availability of support groups for critical activities....).
- Baseline solution retained is to start ISOLDE activities end of 2025 (“old” LS3 date) to have all activities completed in 2028 and start physics in 2028 with the PSB beam

Long Term Schedule for CERN Accelerator complex



Long Term Schedule for CERN accelerator complex (Draft)

Long Term Schedule for CERN Accelerator complex



Summary

- Several opportunities for improvements (on top of already approved consolidation requests) during LS3 identified with very good support from concerned groups and management. Spanning from the proton driver to the post-accelerator.
- MTP requests being collected (budget, manpower, infrastructure...) for arbitration in May 2025 (compatibility with overall budget and other LS3 projects)
- Planning analysis had to be done ahead of the MTP (arbitration) and was done considering the most favourable scenario for having resources available.
- Baseline is to perform the beam dumps exchange in 2026 and 2027 and resume with physics in 2028 when beam becomes available from the PS Booster.
- Risk of not having some critical activities (CM1 refurbishment) not approved can't be excluded (alternative plan for post LS3 to be elaborated in that case).



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