

SUMMARY OF SESSION 7: ACCELERATORS AND NON-LHC EXPERIMENT AREAS CONSOLIDATION UP TO LS3

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Abstract

The session on non-LHC consolidation aimed at establishing a coherent view of the main consolidation activities planned until end of LS2 (2019), with an outlook on major activities until 2023, grouped by machine(s) or experimental area(s), across all the technical groups and covering all accelerators and experimental areas, except the LHC. The session did not include items covered by the LIU or other construction projects. A focus was put on the analysis of consolidation requests per machine/facility, as seen from operations. Therefore the analysis was limited to technical systems and system groups closely linked to machine operation.

This paper summarises Session 7 on the non-LHC accelerators and experimental areas consolidation up to LS3. The main topics covered during the presentations are briefly recalled.

SESSION PROGRAM

The program of the session included 6 talks addressing ongoing, planned and longer-term consolidation activities for the non LHC accelerators and experimental areas:

- “Linacs” by Richard Scrivens (BE).
- “PSB and PS consolidation for LS2 and beyond” by Simone Gilardoni (BE).
- “SPS consolidation for LS2 and beyond” by James Ridewood (BE).
- “AD and LEIR” by Tommy Eriksson (BE).
- “North Area and East Area” by Adrian Fabich (BE).
- “ISOLDE and n_TOF consolidation” by Richard Catherall (EN).

To enable the fact-finding in the preparation phase, the different technical groups concerned with consolidation activities have been asked to present their planning in IEFC meetings, with the request to address in particular the following aspects:

- A complete overview of already planned consolidation work units together with those considered necessary, but that are not yet planned.
- A tentative and realistic planning for all consolidation work units.
- Identification of the amount of manpower required as a function of the planning.
- Estimation of the financial resources required for the planned or proposed spending profile.
- Identification of “consolidation” requests that might interfere with or fall under a construction project to enable discussion and clarification.

TALKS SUMMARY

Linacs

The consolidation requests for Linacs 2 and 3 were summarised and prioritised, as well as the requests for the transfer line between Linac2 and the PSB which will be reused for Linac4 beams in the future.

PSB and PS Consolidation for LS2 and Beyond

The consolidation activities proposed for the PSB and PS until the end of LS2 were revised. Particular attention was given to the activities with direct impact on machine operation and machine performances. An analysis on the interventions and priorities proposed was done on a system basis (e.g. injection, extraction, RF, beam instrumentation, etc...), with the goal of verifying that the consolidation activities of a specific item or system are consistently taken into account by the different technical groups.

SPS Consolidation for LS2 and Beyond

This presentation gave an overview of the consolidation plans concerning the SPS and its transfer lines as provided by each of the equipment groups to the IEFC committee. The overview was presented from a perspective of machine operation. These proposed consolidation activities were reviewed, focusing principally on the impact on operation with beam, with the aim to highlight any of the works which are of particular interest or represent a particular concern for SPS machine operations.

AD and LEIR

As the AD programme now faces a renewed lease of life following the start of construction of the ELENA project, it is essential to ensure best possible reliability and performance for the next 20 years or so. The AD machine, which was started in 1999, is based on the Antiproton Collector (AC) ring of the Antiproton Accumulator Complex (AAC) which in turn was constructed in the mid-80ies meaning that there is a significant amount of 30-year old technical equipment to deal with.

The situation is similar for LEIR, having started life in the 80-ies, supplying antiproton beams at various energies for the PS physics programme. After having been transformed into a heavy ion accumulator in 2004 and subsequently used in operation, some consolidation needs became apparent. LEIR is expected to keep delivering heavy ions to the North Area and to the LHC until 2035.

The consolidation programme for both machines was discussed, focusing on the main items of ongoing and planned activities from an operational point of view.

North Area and East Area Consolidation

The PS East Area (EA) and the SPS North Area (NA) are world-wide unique facilities of CERN that provide secondary beams to numerous different experiments every year. They represent a core activity of the laboratory and are beside LHC, the main reason for continuous operation of the injector complex to high energies.

The amount of technical installations related to the experimental areas is large, in terms of km of tunnels, installed equipment, infrastructure needs, etc., comparable to that of SPS machine. The relevant consolidation items identified by the technical groups as presented in the IEFC sessions were summarized in the presentation.

ISOLDE and n_TOF Consolidation

While progress continues on the upgrade of the REX-ISOLDE post-accelerator within the HIE-ISOLDE project, assuring the production of RIB for an approved and demanding physics program will require extensive maintenance of the existing facility. The main consolidation requests driven by operation include: replacement of the ISOLDE target stations, more commonly known as Frontends, renovation of the Resonant Laser Ionization (RILIS) equipment and operation of the REXEBIS and REXTRAP - the low energy systems of the REX-ISOLDE post-accelerator.

CLOSING REMARKS

The session dedicated to non-LHC consolidation turned out very beneficial to discuss and understand priorities for consolidation requests from machine operation point of view. It completed input for decisions on consolidation budget allocations in autumn 2014.

Amongst the issues that came up in discussions were e.g. the responsibility for DC cables that was assigned to EN-EL group. Other important technical aspects were the cable cleaning campaigns for PS and SPS complex that deserve major attention because of the large impact on many systems to be installed during LS2. Another major point that needs to be addressed is the apparent incompatibility of North Area consolidation with LS2 planning in terms of personnel availability for the LHC injector consolidation and LIU project. In a more general context it was noted that there is a divergence between the identified areas requiring consolidation and the available (personnel) resources to execute the work packages, leading systematically to too high requests on material budget for consolidation and constant carry-forward.

To enable adequate planning and coordination, a centralized documentation of all consolidation requests is being created using APT, CERN's standard management tools for resources allocation. This will be complemented

However, the radiation protection issues associated with the present performance of ISOLDE and the potential consequences associated with a possible increase in p-beam power should be considered. Consequently, consolidation of the overall shielding of the ISOLDE target area was presented along with the need to replace the ISOLDE beam dumps, both crucial to the exploitation of ISOLDE after the commissioning of Linac 4.

The n_TOF Facility also successfully started its physics program in July 2014 making more efficient use of the neutron flux following the commissioning of EAR2, the second experimental area above the n_TOF target. However, installed in 2008 and with a projected lifetime of approximately 10 years, the present n_TOF neutron spallation target is already showing initial signs of surface corrosion. The monolithic Pb block along with its cooling system cannot be repaired due to both its design and expected dose rate after removal and will therefore have to be replaced during the LS2 period to ensure reliable physics after LS2. Further major consolidation requirements include the dismantling of the first n_TOF target cooling station and the replacement of the power converter and controls of the sweeping magnet in EAR1.

Finally, common to both facilities is the radioactive environment of each target area and the need to intervene within a given time window to benefit from a maximum of radioactive cooling. This implies that all preparation and construction of replacement equipment be ideally completed before the start of the LS2 period.

by standardized documentation for all consolidation requests in EDMS, containing a brief technical description of the system concerned, a risk analysis, estimates of budget and personnel resources as well as considerations on impact on operation and maintenance and other relevant information.

This approach is also expected to provide a clearer picture of the support required from other groups, which should ease the prioritization and planning process as well as the execution of the work in line with the approved resources allocations. However, consolidations activities need also to be reviewed in co-ordination with the progress of the HL-LHC, LIU and other construction projects, in particular in view of the very limited available personnel resources until and during the LS2 period.

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