

## LIU project team meeting

### Notes from the meeting held on 10 August 2017

Present: F. Baltasar Dos Santos Pedrosa, J. Coupard, H. Damerou, G.P. Di Giovanni, A. Lombardi, M. Meddahi, G. Rumolo, R. Scrivens, E. Shaposhnikova

Excused: D. Carloni, A. Funken, B. Goddard, K. Hanke, B. Mikulec, S. Prodon

#### • Arising matters (M. Meddahi)

- Budget: The updated figures from Sylvie were sent around with the machine-by-machine indicators. The 2017 spending is at 40% (paid) with a 90% commitment. The curves sent by Sylvie show that we should be able to meet our yearly goal, which is very important for our requests in the coming years. Looking in detail machine by machine, the PSB is now slightly behind schedule mainly due to BE/RF, TE/ABT and TE/EPC. In the PS, the situation is similar, but here the difference from planned values is more substantive. In the SPS there is a commitment above expected value with actual spending slightly below (due to TE/ABT, BE/RF and EN/STI). The spending for ions is right on the planned curve with lower commitment than expected. Reprofilings of the LIU spending for TE/ABT and TE/EPC have recently been made, which will be implemented in the baseline by Sylvie. The machine coordinators need to make sure that the EVM reporting is made correctly for all the WUs, because in September 2017 Sylvie will extract the data and will check with all the machine coordinators/WP holders that the extracted data does reflect the upcoming budget needs.
- The LS2 committee meeting took place two weeks ago. The important message from Miguel Jimenez is that the logistic organisation of LS2 activities will also focus on space management in general, including storage, waste, workshop and base-de-chantier. Templates will be sent around to all equipment groups for space requests and will have to be filled. Projects, including LIU, will rely on the groups to make the correct declarations. The FLEX building will also become available just before LS2 (October 2018) and it can be used for storage space but not as workshop. A reminder on the deadline for DICs/DECs and DIFs, which is mid-September 2017, was also given.
- Giovanni has been invited to give the talk on “Update on the HiLumi/LIU parameters and performance ramp up after LS2” at the [7<sup>th</sup> HL-LHC Collaboration Meeting](#) hosted by CIEMAT in Madrid, from 13 to 16 November 2017. Dedicated meetings will be organised sufficiently in advance to discuss and agree on the contents of the presentation.

#### • Update on LIU-PLI activities (J. Coupard)

- PLAN: There are now already finished activities and there are only two ‘approved if’ activities (by EPC), waiting for functional specification to be approved:
  - Activity 10316 - Supply new converters for Booster Ejection Transfer Bending Magnets. Functional spec being validated within EPC and then the ECR will

be produced in September. Once the Functional spec is approved, EN-EL will be contacted.

- Activity 11103 - Relocate the e-cloud test bench power converters. EPC will use this relocation to change two power converters that were over dimensioned. The Functional spec is being written by EPC. Once the Functional spec is approved, EN-EL will be contacted.

They will then be included in PLAN v3.

- Fernando Baltasar Dos Santos Pedrosa is replacing Simon Mataguez as LIU-PLI deputy. The new organigram of the PLI coordination team has been updated and includes also Blanca Vazquez, fellow in Anne-Laure's section, in the layout database and configuration management.
- Getting back to the recommendation of the C&S Review to create an integrated schedule for LS2 and show the critical path, Julie proposes creating first of all an EDMS document, which collects all the dates received from all the equipment groups for the installation readiness (of their equipment) in order to feed back then this information into the schedule and evaluate the critical path.
- LS2: Julie presents a proposal, following from LS1 experience, to have dedicated persons in charge of the day-by-day in-situ management and supervision, in particular:
  - Two people would be needed for the SPS RF and beam dump upgrade.
  - One person would be needed for the mechanical removal and installation of the PS Complex transfer lines.

**Action: Malika to discuss with groups concerned and department heads to identify the suitable people.**

LS2 space management: We need to make sure that all LIU requests have been sent to the equipment groups. A dedicated LS2 Team has been set up and the surface space management will be linked to the facility coordinators schedule.

- [LIU-PLI meetings](#) have restarted, as there are many ECRs to be approved. They have been resumed on a weekly basis from 17 August onwards. The agendas of the next three meetings are available with items to be discussed defined (ions + PS on 17 August, Linac4 connection + PSB on 24 August, SPS on 31 August).
- Tomorrow Julie will give a presentation on the need for injector TS3 at the IEFC.
- LS2 schedule: In brief, work is in progress for the different machines, more details will be provided at the next meeting.

- **Linac4 progress and Reliability Run (A. Lombardi)**

- The Reliability Run is proceeding fully satisfactorily.
- Tracking faults with AFT system was put in place as from 16 July after a bumpy start on the previous 48 hours due to the pre-chopper problems discussed at the last meeting.
- The operator training is advancing very well. PSB operators are willing and enthusiastic to take over this task. For the AFT system to work properly, it is important to input the correct information in the e-logbook, and this seems to be going well so far both on ABP and OP sides. First statistics can be checked and extracted.
- The tools provided by RF to restart cavities are also working well.
- There are of course details to be changed that are being discovered all the time, but with no showstopper for the moment.

- In parallel, lots of measurements are being made on the source test stand concerning current and emittance. The present plan is that the source will be then exchanged around 10 September, possibly combining this exchange with the debuncher intervention (the coupler is now leak-tight and it can be installed at the first occasion). In roughly a month time, we can foresee to have a dedicated presentation at the LIU-PT on the progress on the beam intensity delivered by Linac4.

- **Round table on progress on the various activities**

**PSB + PS – G.P. Di Giovanni and H. Damerou**

- PSB:
  - At the last LIU-PSB meeting there was a general report on CV
    - Received all the information and generally only need confirmation.
    - EN-CV work planning is such that BE-RF should be able start their commissioning in LS2 (in fact they need cooling for some test).
    - Planning is anyway very tight and did not consider co-activities for the time being.
    - Possibly start some of the work during the YETS. Need the next TS to perform a visual investigation to decide what work could be advanced.
  - General progress with MD activities at the PSB:
    - Andrea Santamaria performed a detailed study of the emittance evolution along the cycle for LHC25-type beam. No blow-up is measured along the cycle. The analysis is being finalised.
    - General effort across groups from BE-RF, TE-ABT, BE-OP, BE-ABP is going into preparing and testing the BCMS 1.5 eVs, as proving the use of large longitudinal emittances against space charge in the PS (with no undesired side effects) is critical for the achievement of the LIU parameters. E. Shaposhnikova mentioned that the 1.5 eVs was achieved with phase noise injection on C02, which now opens the question on what should be specified for the future LLRF with Finemet cavities. Actually, the general question on the need of C16 functionalities in the future is raised. This however needs to be discussed with all the relevant experts and taking into account all the aspects (e.g. generation not only of LHC beams but also of FT physics beams, including the high intensity ISOLDE beams for the future). There is a general need to create a platform to discuss specific beam dynamics questions for PSB (with their possible hardware implications). Action: **LIU-PSB management** to propose a solution.
- PS:
  - The LIU-PS meeting on 25 July was dedicated to PS activities scheduled during Injector TS2.
    - The new powering scheme with separate supplies for central and compensation coils for BGI magnet was fully successful and 6.25% percent current difference is required to cancel effect on orbit.
    - The alignment of straight section vacuum chambers during TS1/2 reduced losses at these specific points. During ITS3 it will be attempted to move the BGI (without opening the vacuum). This important activity is also on the Injector TS3 list sent by Klaus to Julie.
  - The LIU-PS meeting on 7 August was mainly devoted to the 2 GeV injection. Jan Borburgh presented the status of the septum with integrated septum

bumper. Following the external review in 2016, several important design changes have been implemented, e.g., ion pumps are now below the septum. The reduction of the leak fields using magnetic shielding is still ongoing. The updated planning foresees installation during the 2nd half of 2019.

- Validation measurements following EYETS modifications of KFA45 (operation in short circuit mode) have been made by Vincenzo. Results are promising, but many details are still to be understood, e.g. jitter, LC-filter, etc. However, the fact that we are smoothly running now in this mode is a confirmation that there is no major problem.
- There was also a presentation on TT2, focusing on the electrical power distribution renovation for TT2 power converter (building 269): 2 redundant transformers are needed, one paid by LIU and the other by CONS.
- A new working group is being set up for beam dynamics in the PS to discuss ongoing measurements and simulation work, steer MD priorities and propose improvements for LIU-relevant beams. This WG will be co-chaired by Heiko and Alexander Huschauer and plans to meet once every four weeks.
- Budgets: 1 month schedule delay accumulated since last review with Sylvie, mainly due to TE/ABT and TE/EPC. However, updated information has been already received by Sylvie, which will be integrated in the EVM. There might be some more problems with EVM reporting.

### **SPS – E. Shaposhnikova**

- In the framework of the SPS losses working group, lots of dedicated MDs in the last few weeks were devoted to the study of the losses at the SPS injection. Simulations are also being done with a more refined model of the LLRF, which is important to reproduce the transient beam dynamics in the first ms after injection and to define its role in the losses. Besides, there is also a suspicion that there is uncaptured beam directly injected into the SPS from the PS.
- There is now an important update on the instability thresholds concerning LIU beams. Including beam loading requirements, the curves appear to be much flatter as a function of the bunch length. These results need to be discussed in the LIU Beam Parameter WG, because they have an impact.
- There is the good news that a design has been found that allows for a factor 2 damping of the HOM in 200 MHz RF system. This is essential for the impedance reduction of the flanges to be effective and not fall in the shadow of other instability sources (specifically the 200 MHz HOMs). The implementation of this solution implies a redesign of HOM couplers and the installation of additional ones. It needs to be discussed within the RF group.
- There was also a first dedicated MD with Q22 optics. Lower losses were observed with Q22 up to intensities of  $1.3e11$  p/b, but then losses sharply increased. Another MD session is planned for next week with better prepared beam from PS with higher intensities (already  $1.4-1.5e11$  p/b)
- The power limitation for the 200 MHz mentioned at the last LIU-SPS coordination meeting has been removed, which means that there is no intensity limitation.
- The 800 MHz control is not yet fully operational, in particular there is no user friendly interface to be able to control the two cavities. This could be a problem of resources, but it needs to be again reviewed because this system was supposed to be fully operational long ago.

## Ions PS Injectors – R. Scrivens

- MDs: A high intensity was reached with multiple injections in LEIR with Xe, and now there is enough intensity to do space charge studies. RF are making a plan to work on the longitudinal plane to minimize losses at capture.
  - LEIR orbit: BE-BI start to get some data from the new electronic acquisition system for commissioning. The old system will be dismantled at the end of the year.
  - Injection Pick Ups: The baseline plan for the next installations will have the electrode voltage bias, but not the systematic installation of any solenoid field as its effect is not clear and marginal. Nevertheless we keep the first one equipped with a solenoid and may improve its design for possible change in LS2. We also have simulation effort on this to understand why the first is so much more affected.
  - Linac3 RF: The RF group are proposing to change the 101 MHz amplifiers in LS2 to a solid-state type amplifiers. This is using CONS money (~80% of the required budget should be available), but there are doubts on the time scale of that budget allocation at present. Resources should be available coming from the Linac RF team. Richard proposed to review this as the timescale is short to LS2 better time windows could be identified later on. Richard has meetings planned with RF.
  - Next LIU-ions PS injectors activity meeting will take place in September. The YETS schedule will be reviewed and Fernando Pedrosa will be added to the mailing list.
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- AOB
    - The [next LIU-PT meeting](#) is scheduled on next Thursday 17<sup>th</sup> August 2017 and it will again take place in **866-1-A04**.

Minutes by G. Rumolo