

## Minutes PSB Upgrade WG Meeting 4<sup>th</sup> June 2015

**Participants:** E. Benedetto, T. Birtwistle, S. Bertolasi, J. Betz, A. Blas, L. De Mallac, G.P. Di Giovanni, A. Findlay, R. Froeschl, G.M. Georgiev, D. Grenier, M. Haase, K. Hanke, J. Hansen, D. Hay, B. Mikulec, B. Riffaud, W. Weterings.

**Agenda** (<https://indico.cern.ch/event/397477/>):

- [1. Approval of Minutes](#)
- [2. Communications](#)
- [3. Follow-up of Open Actions](#)
- [4. Progress on LIU-PSB Upgrade Work Activities](#)
- [5. Collect Needs for Cooling And Ventilation](#)
- [6. Requests to EN/EL for LIU-PSB](#)
- [7. PSB Finemet Cavities LS2 Rack Space Request](#)
- [8. Status of the Readiness for End-2016 Deadline for Linac4 Connection](#)
  - [8.1 Beam Interlock System](#)
  - [8.2 PSB RF Bypasses and PSB TFB Electronics](#)
  - [8.4 Controls](#)
  - [8.5 Applications](#)
- [9. AOB](#)

### 1. Approval of Minutes

- The minutes of the last LIU-PSB WG meeting #149, available [here](#), were approved.

### 2. Communications

- **LIU Budget:**
  - M. Meddahi is trying to get the overall budget to be of about 180 MCHF. Currently the allocated budget is 171 MCHF.
- **LS2:**
  - As announced during the last meeting, **LS2 has been postponed to start at the end of 2018.**
  - **It should last about two years, for all the accelerators. \*The LS2 duration is not yet official, but all the people involved are currently working under this assumption.**
  - E. Benedetto asked how long the commissioning of the PSB is supposed to last. B. Mikulec replied that the exact duration is to be checked, but it should be of the order of 4 months and half.
- **HL-LHC/LIU Day:**
  - The agenda is being prepared.
  - **The tentative date is the 17<sup>th</sup> September 2015.**
- **Finement Review:**
  - **A Finement review is tentatively scheduled for the 15<sup>th</sup>/16<sup>th</sup> September 2015.**
  - M. Meddahi will contact M. Paoluzzi as a full report on the first review should be received before holding the second (and final) review.

- **Safety:**
  - All the machines have to be organized in safety packages.
  - **K. Hanke presented the proposed packages for the PSB, divided in "geographic" regions, see [here](#).**
  - At the LIU-PT meeting, it was proposed to merge the "Injection Line" and the "Injection Region" in a single safety package.
  - The proposed editors for the safety documents, not yet officially requested, would be:
    - Injection: W. Weterings.
    - PSB Rings: D. Hay. D. Hay replied that he would likely not be able to take this charge.
    - Extraction: J. Borburgh.
    - B245: F. Boattini.
  
- **B245:**
  - As announced during last meeting the construction of B245 has started.
  - **K. Hanke posted few photos of the current status of the work, see [here](#).**
  
- **LIU-PSB Budget Spending:**
  - A table has been circulated to be filled by the WP-holders in order to update their spending profile for 2015, available [here](#).
  - **The deadline for completing the table has been set to end of the current week.**
  - Responses are missing from BI, LLRF, CV, EN-EL, Survey, Beam Intercepting Devices and Magnets.

### 3. Follow-up of Open Actions

- All the WP-holders are reminded to verify that their group requests for EN-MME have been propagated to B. Riffaud.
- All the WP-holders are reminded to verify that their group requests for EN-EL have been propagated to G.M. Georgiev.
- All the WP-holders are reminded to verify that their group requests for CV have been propagated to S. Moccia.
- All the WP-holders are reminded to verify that their group requests for work activities during the technical stops have been propagated to D. Hay.
  
- A. Findlay on "Make sure that the ECR to clean-up the PSB from the unused pick-ups for is submitted." → The ECR is being worked on.
- J. Tan/B. Mikulec on "Provide specifications for the wire-scanners" → B. Mikulec reported that the specifications for the wire-scanners have never been published by J-J. Gras. B. Holzer is organizing the work to provide the documentation. The action is postponed to the end of the year and re-assigned to B. Holzer and J. Tan, as contact person for the BI group within the LIU-PSB project.
- J. Hansen on "Investigate if a re-sectorization of the vacuum in section 11 is needed due to the installation of the wire-scanners" → J. Hansen replied that he plans to present few slides in one of the upcoming meeting, but first an access is needed during the technical stop of the 15<sup>th</sup> June to investigate the area and have a better understanding of the possible issues.
- D. Hay on "Prepare and submit an ECR to describe the proposed new rack layout in BRF2/BAT" → The document is being written.

- D. Aguglia on "Approve document with the functional specifications of the rack space for both the LIU-PSB and the Half-Sector Test in Linac4 addressing the open issues from v0.2" → D. Aguglia did not attend the meeting, so a reminder about the action will be sent to him.

#### 4. Progress on LIU-PSB Upgrade Work Activities

- D. Hay reported that the table is not changed with respect to last meeting.
- **There is a current issue concerning the racks space in BRF2. D. Hay is struggling to get the integration models. Y. Muttoni is working to unblock the situation.**
- Without the 2D and 3D models of rack integration, D. Parchet (GS-CE-SEB) cannot start his work.
- K. Hanke will contact Y. Muttoni and an open action will be assigned to him.

Assigned to	Due date	Description
Y.Muttoni	2015-06-18	Provide the 2D and 3D models for the integration of the metallic structure needed for rack space organization in BRF2.

#### 5. Collect Needs for Cooling And Ventilation

- S. Moccia reported that there is no update with respect to last presentation.
- S. Moccia will now work on the re-baselining of the cooling:
  - There are still some open questions about the cooling of the C16, but some measurements will be taken during the upcoming technical stop to clarify the needs for cooling for the C16.

#### 6. Requests to EN/EL for LIU-PSB

- G.M. Georgiev presented the updated version of the cabling requests received, see [here](#).
- Despite several entries marked in red, EN-EL is collaborating with the different groups on the different requests, so the work is well advancing.
- G.M. Georgiev personally contacted all the relevant expert reported in the table.
- Concerning the issue of the DIC for interlock (C. Martin), there is a better understanding of the needs and the DIC is getting prepared.
- K. Hanke asked when the table should be filled. **G.M. Georgiev estimates that in about two weeks the table should be completed.**

#### 7. PSB Finemet Cavities LS2 Rack Space Request


- M. Haase presented the rack space requests for the PSB Finemet Cavities for LS2, see [here](#).
- A total of 39 racks are needed:
  - Each cavity (12) will need 3 racks: 2 racks for the power supplies and 1 rack for the control and monitor chassis and RF pre-driver, splitter and combiner.
  - 3 additional racks are needed for interlock (one per period).
- Originally the idea was to **place the racks in BRF1, but the cable length for the power supplies is sometimes too long:**

- **For period 7L1 the distance from BRF1 to the ring is 100 m, resulting in a power loss in cable of ~18% (~30 kW).**
  - Different solutions could be:
    - Installing the racks for the power supplies in BRF2 and the cable length would be ~70 m (power lost in cable ~13%).
    - Installing the racks for the power supplies in BAT and the cable length would be ~40 m (power lost in cable ~7%).
- **For period 10L1 the distance from BRF1 to the ring is ~60 m (power lost in cable ~11%).** If some space is found in BAT the cable length would be ~40 m.
- For period 13L1 the distance from BRF1 to the ring is about 40 m.
- The current layout foresees:
  - The power supplies for the Finement C02 for period 7L1 to be installed in BRF2.
  - The power supplies for C16 with transistor bank to be installed in BRF2.
  - The power supplied for Finement C02 for period 10L1 and C04 for 13L1 to be installed in BRF1.
  - All the racks for control and interlock to be installed in BRF1.
  - Concerning BRF1, with the proposed new configuration a lot of space will be freed in BRF1.
- The proposal layout would be to:
  - Keep the power supplies for C04 for period 13L1 in BRF1.
  - Move the power supplies for C02 for period 10L1 to the BAT.
  - Move the power supplies for C02 for period 7L1 to the BAT.
  - **This layout would allow minimal power losses in the cables, which would all end up being ~40 m long.**
- K. Hanke commented that the layout and needs of BRF2 has been approved and it could be not so easy to shuffle racks around:
  - M. Haase replied that for instance for the needs of CV, BRF1, BRF2 and BAT share the same line and have similar needs, so it should not pose too much of a problem to move around few racks.
- The proposed design offer clear advantages for the Finement Cavities and should be considered:
  - **K. Hanke suggested to M. Haase to check the integration with G.M. Georgiev and D. Hay and verify its feasibility.** → Action opened.
  - **If the new layout can be implemented, it should be anyway presented in the LIU-PSB WG meeting and approved. Possibly at the next scheduled meeting.**
  - B. Mikulec asked if there is a similar issue with power losses for the cavities for C16. M. Haase replied that in principle there is no major issue with them.
  - J. Betz invited M. Haase to send him the details of the racks allocation and needs for control (Ethernet connection, timing, etc, etc) as soon as they are finalized.

Assigned to	Due date	Description
M.Haase	2015-06-18	Check the integration with G.M. Georgiev and D. Hay and verify the feasibility of the proposed racks layout of the Finement cavities.

## 8. Status of the Readiness for End-2016 Deadline for Linac4 Connection

### 8.1 Beam Interlock System

- B. Puccio presented the readiness for end-2016 deadline for Linac4 (L4) connection, see [here](#) .
- The main issue is to collect the cable requests for the Beam Interlock System and submit the DIC.
- The missing requests are:

<u>User System</u>	<u>Group</u>	<u>Contact person</u>	<u>User Permit (short name)</u>	<u>BIC name</u>
Watch Dog	BE/BI	Franco Lenardon	BI WD	PSB injection
BLM	BE/BI	Christos Zamantzas	BLMs in BI line + PSB injection BLMs in PSB extraction/transfert	PSB injection PSB (rings)
Dumps	EN/STI	Christophe Mitifiot	H0/H- dumps OK Head & Tail dumps OK	PSB injection
Charge-exchange injection foil	TE/ABT	Pieter Van Trappen	Injection Foil Status	PSB injection
Magnet Interlocks	TE/MPE	Richard Mompo	WIC LT + LTB WIC BI Line	L4 Transfer Line PSB injection
Power Converter	TE/EPC	Serge Pittet (was David Nisbet)	AQN LT.BHZ20 AQN LT.BHZ30	L4 Transfer Line

- G.M. Georgiev reported that C. Zamantzas sent him the requests yesterday and he will forward them to B. Puccio and C. Martin.
- B. Mikulec mentioned that for the watch dog also the information from the BCT (P. Odier) should be added in the list.
- Concerning the magnet interlock, a presentation about the WIC is foreseen at the LIU-PSB WG meeting of the 25<sup>th</sup> June 2015. At that point the needs should be clarified to complete the request.
- W. Weterings asked which is the information missing for the TE/ABT group:
  - C. Martin replied that the request is a bit unclear and this is general for many WP. The main issues are about the rack positions and about which signal is to be provided to chose the destination. It is important to make sure that the original design is respected.
- K. Hanke asked if there is any issue for the end-2016 readiness for the L4 connection:
  - **B. Puccio replied that currently there is no showstopper for the Beam Interlock System to be ready at the end of 2016.**

## 8.2 PSB RF Bypasses and PSB TFB Electronics

### PSB RF Bypasses:

- A. Blas presented several slides about the status of the PSB RF bypasses and PSB TFB electronics, available [here](#).
- The current installed bypasses in the PSB are  $1\Omega/1W$  and they could sustain something in between 20 W to 200 W.
- L4 will produce a current of about 50 mA. This means that the resistor should sustain 1150 W in pulsed mode. Moreover, the dimensions have to be compatible with present setup.
- It is generally difficult to find specifications about the surge loading of the resistors commercially available, but for some rare components this is specified.
- In particular for **the PSB bypasses the CRCW chips produced by Vishay has been chosen. It could sustain 3000 W during 1  $\mu$ s, which is more than enough to accommodate the PSB needs.**
- **Currently there is no such current in the PSB to test these components. So the idea is to install a test setup in the PS. The installation of two chips is planned for the next technical stop, the 15<sup>th</sup> June 2015.**
- The reason to install two set of chips is because the first test bypass, mounted just after LS1, showed some issue:
  - The soldering melted, but the resistor did not burn.
  - The corresponding vacuum flange was in short-circuit. This means that the bypass was in parallel with a short-circuit.
  - It is not clear what happened.
- The bypasses will be tested in the PS and if the test are successful they should be ready for the possible Linac4 connection at the end-2016.
- **On the other hand, the installation will be long and should be coordinated with the vacuum experts.**
- Moreover there is probably not an urgent need for these bypasses as, at the beginning, L4 will not deliver beam higher than what is currently running in the PSB.
- A proposal could be to install few chips in the injection region on few flanges before LS2.
- **A. Blas mentioned that the RF group does not have the appropriate expertise to mechanically install the chips. His group would prefer the TE-ABT-FPS to perform the installation.** The RF group will certainly take care of the measurements. → This issue is to be discussed and reviewed offline by the groups involved.
- **On the other hand, the RF bypasses are the responsibility of the RF group.**

### PSB TFB Electronics and Amplifiers:

- **New low-level electronic circuits is to be delivered in October 2015.**
- **There is a current issue with the 800 W power amplifiers:**
  - The designer was not available for a long time and he is now available for limited time.
  - A crash program should be started. One of the idea is to hire a technical student.
  - **The first prototype for the 800 W amplifiers was expected for end July 2015, but the project is not converging quickly enough.**
  - These power amplifiers may not be needed for the damping, but they are also requested for MD studies.
  - **One temporary solution could be to use one of the spare power amplifiers from SPS in one ring/plane at the PSB. But the installation would be not-PPM.**

- E. Benedetto reported that last week M. McAteer presented her recent results and it turned out that a power of about 2 kW would be needed:
  - A. Blas mentioned that the design of the power amplifiers should be modular enough to allow to connect them in series and get multiple of 800 W, if needed.
  - For instance the PS would need a 5 kW power amplifiers, which will be obtained by summing up the contribution of several amplifiers.
  - **K. Hanke recommended E. Benedetto to prepare a formal request for the upgrade with the power amplifier specifications.**
  - It was agreed that before detailing the specifications, tests will be carried out in September/October with the 800 W power amplifier from the SPS. → Action opened.
  - **A. Blas mentioned that in order to properly set the TFB, he would need the tune values during the PSB cycle.** → Action opened.

Assigned to	Due date	Description
E.Benedetto	2015-12-03	Report about the tests on the 800 W power amplifiers for tune measurements and provide specifications to A. Blas.

Assigned to	Due date	Description
E.Benedetto	2015-06-30	Provide to A. Blas the tune values during the PSB cycle for the TFB configuration.

## 8.4 Controls

- J. Betz presented the status of the requests received for controls, see [here](#).
- There is no general problem to fulfil all the requirements received.
- CO infrastructure for OP:
  - The pending item is the installation of OASIS channels to connect L4. The details of this channels have not been completely defined yet, but this is followed up.
- CO infrastructure for ABT:
  - 3 OASIS signal request. No problem to implement them.
- CO infrastructure for EPC:
  - Request to install several gateways in several locations. Some clarification are needed about the type of gateway requested.
- CO infrastructure for BI:
  - A discussion is currently ongoing about the work to be coordinated. There is not a clear distinction in the BI group between the work to be done for the LIU-PSB and ACCOR.
- CO for Beam Intercepting Devices:
  - Clarification needed from the EN-STI group about the possible work to be carried out for interlock for 'Head & Tail dumps' and 'H<sup>0</sup>/H<sup>-</sup> dump'.
  - For the time being there is no request for the PSB collimator/scraper, but the project is still being developed.
- CO infrastructure for TE:

- Remaining delivery of 4 VME crates with MENA20 and 8 CTRP timing modules for beginning of 2016. But this is not an issue.
- In conclusion:
  - **None of the works to be carried out should consume a lot of time or need access to restricted areas.**
  - **If there is unexpected urgent work coming up, CO should be able to carry that out in a time of 2 weeks.**
- G.M. Georgiev asked about issues related to the cabling. J. Betz replied that this could be an issue, but from the CO point of view, the group is there to provide the front-end and not the cabling. And the former should not be an issue.

## 8.5 Applications

- J. Sanchez-Alvarez did not attend the meeting, but he provided slides to be looked at, available [here](#).
- K. Hanke invited all the group members to go through the list, check the requests and provide feedback.
- K. Hanke reported that he discussed with J. Sanchez-Alvarez and for all the applications, the expectation is that the FESA classes should be prepared on time by the different groups.
- B. Mikulec mentioned that the current issues to tackle are about finding the man-power and defining the timeline for the application readiness.

## 9. AOB

- E. Benedetto reported that following C. Zanini's departure from the BE-ABP-HSC group, B. Salvant started collecting the missing requests for the PSB. As first priority, during the summer, B. Salvant will revise the PSB injection region, including the BSW magnets and the dump. **The updated drawings are needed.**
- The next meeting is tentatively scheduled for the 18th June 2015.