



Summary of the LIU-PS Meeting 115

Held on Tuesday 17th May 2016

Agenda (<https://indico.cern.ch/event/531202/>)

- 1. Approval of Minutes of Last Meeting*
- 2. Communications*
- 3. Follow-Up of Open actions*
- 4. Beam dynamics specification of the 2 GeV injection*
- 5. Septum and kickers of the 2 GeV injection*
- 6. Bumpers and low-beta quadrupoles of the 2 GeV injection*
- 7. Power converters for the 2 GeV injection*
- 8. Instrumentation of the 2 GeV injection region*
- 9. Inventory of the EN-EL requests (J. Devine, P. Lelong)*
- 10. AOB*

PRESENT: Y. Beraud, D. Bodart, J. Borburgh, D. Cotte, J. Coupard, J.-M. Cravero, H. Damerou, J. Devine, S. Deleval, L. De Mallac, T. Dobers, A. Floriduz, V. Forte, M. Fraser, J. Hansen, L. Horrein, A. Guerrero, T. Kramer, P. Lelong, S. Mataguez, S. Pittet, G. Sterbini.

1. Approval of Minutes and follow-up of the previous meeting

The minutes of the last LIU-PS meeting were approved. The minutes of the Joint LIU-PSB/PS were not yet out for approval.

2. Communications

K. Hanke reported that a meeting on the TE-MSD activities was held on the 10 May. The minutes are available at <https://indico.cern.ch/event/517296/>. The points raised for LIU-PS will be discussed in the LIU-PS meeting of the 31st May. One conclusion of the meeting was that all new magnets (injection bumpers, low energy quadrupoles, vertical correctors, low-beta quadrupole, IPM V magnet) with the exception of the IPM H magnet will be installed during LS2. The IPM H magnet is expected to be installed for the EYETS16-17. The MSD-CONS including the renovation of the PS main magnets and the renovation of the TT2 quadrupoles is approved and underway.

The last LIU Project Team meeting minutes can be found at <https://indico.cern.ch/event/523693/>. The spending profile of the LIU budget were discussed and **J. Coupard** presented an update of the Linac4 and Half Sector Test planning.



In this LIU-PS meeting the different groups will present the status of the 2 GeV Injection activities.

3. Follow-Up of Open actions ([Annex 0](#))

1. Concerning the TGM external condition for the new EPC PC, **D. Cotte** informed that the activity is on going. **The action stays open.**
2. Concerning the EN-EL inventory for LIU-PS installations, **J. Devine** informed that the picture is almost complete. **K. Hanke** suggested to close the after having solved the BLM cabling issue. **The action stays open.**
3. Concerning the ECR for the BGI magnet design, **D. Bodart** informed that the design activity is going on. **The action stays open.**
4. Concerning the mechanical drawings of the BGI magnet integration, **D. Bodart** commented that it will be addressed only after the BGI magnet design finalization. **The action stays open.**
5. Concerning the installation of the test Sirius PC for F16.QFO215 (TT2), **S. Pittet** informed that the activities are going on. **The action stays open.**
6. Concerning the estimate for the cost of the PS cooling station upgrade considering the direct connection to TT2, **S. Deleval** informed that investigations are ongoing. **The action stays open.**
7. Concerning the organization of a meeting for the BGI magnet status, **K. Hanke** reported that the discussion took place in the LIU/TE-MS meeting. **The action is cancelled.**
8. Concerning the request to complete with the plan number the EN-EL cable request inventory, **H. Damerou** informed that was partially done. **The action stays open.**
9. Concerning the request to take reference measurement from the present MU42 magnet chamber, **H. Damerou** sent an email to **T. Dobers** with an official request. **The action was closed. An action is opened for T. Dobers to report the analysis of the measurement (15th of June).**

4. Beam dynamics specification of the 2 GeV injection

M. Serluca summarized the beam dynamics specification of the 2 GeV injection ([Annex 1](#)).

The present configurations for the LHC-type and high intensity beams were recalled. The maximum kick provided presently by the bumper is about 15.5 mrad with the septum blade positioned at 64 mm. The kick provided by the septum and the kicker is respectively 55 and 4.3 mrad.

K. Hanke commented that the new hardware has to be compatible also with the injection at 1.4 GeV.

With the new injection at 2 GeV, the injection bump will be faster (1 ms instead of 2 ms), there will be 5 bumpers instead of 4, the kicker in SS45 will work in short circuit mode. By lowering the septum position to 54 mm, the maximum bumper kick is reduced to about 11.5 mrad. The kick provided by the septum and the kicker will be respectively 55 and 4.3 mrad (as in the present situation).

Concerning the high intensity beams, the beam envelope will be horizontally squeezed at the PS aperture restriction (septum in SS42) using a doublet (in SS33 and SS49). The gradient of the quadrupoles has to be tunable in the range between 0 and 1.3 T/m. The nominal gradient is 1.14 T/m.



G. Sterbini commented that is important to test the proposed approach (lowering by 10 mm the septum blade) with the present injection at 1.4 GeV.

5. Septum and kickers of the 2 GeV injection

J. Borburgh presented the status of the septa and kickers for the PS 2 GeV injection ([Annex 2](#)).

Concerning the eddy current septum in SS42, the magnetic simulations are completed. Measurements using the old eddy current magnet are ongoing together with the mechanical design.

Parts for the prototype bumper septum were ordered to be ready for the first prototype in summer 2016. A review is going to be organized in autumn. **K. Hanke** asked if LIU or TE-ABT is going to organize the review. **J. Borburgh** answered that is not yet decided and it can be discussed offline.

The septum displacement system will be almost entirely re-used. Discussions with TE-VSC are ongoing.

The septum SSR is still to be finalized (EDMS 1551627, final layout of transformers is to be defined). The septum and BSW42 engineer specifications, the cooling and bake out, the electrical connection and ECR need to be finalized.

The kicker in SS45 will be used in short circuit mode instead of terminated mode. This device is been used since 40 year. Mitigation against its aging has been undertaken (spare magnet, cable purchase, renewal electronics). Direct measurement of the magnetic field signal is not possible: simulations and current waveform measurement were performed. The engineering report is planned for June 2016. The SF6 cables procurement is still a challenge. **H. Damerau** asked about the dependency on the SF6 cables. **J. Borburgh** answered that is a critical item.

The partial upgrade of the existing system will be done during next EYETS. **V. Forte** commented that it is important to perform MD before and after the modifications planned during the EYETS to quantify the impact of the interventions.

The upgrade of the KFA45 will be cheaper than originally foreseen and, more in general, the budget has to be realigned.

J. Borburgh asked to have a separate budget code for the kicker control. **K. Hanke** and **H. Damerau** answered that it can done during the next re-baselining.

6. Bumpers and low-beta quadrupoles of the 2 GeV injection

D. Bodart presented the status of the bumpers and low-beta quadrupoles of the 2 GeV injection ([Annex 3](#)).

A preliminary 2D design has been made in accordance with the 700 V/ 4000 A limit of the power supply and the requirement of 16 mrad kick (30% margin with respect the operational value). In SS40 a solution has to be found to integrate the 600 mm long magnet (an octupole is presently installed and has to be removed). **An action is opened for K. Hanke to report the problem to the LIU integration meeting.**



Concerning the low-beta quadrupole, the two magnets are ready to be installed. One spare magnet can potentially be recovered from the CT extraction sequence if CT will be replaced by MTE. If needed, all technical documents are available to reorder a spare magnet.

K. Hanke commented that the production phase of the bumpers is approaching the installation phase (LS2). **D. Bodart** commented that the priority was given to the activities for the next EYETS (MU41, MU42 and horizontal BGI).

G. Sterbini asked if a SRR for the quadrupole has been circulated. **D. Bodart** answered negatively. **K. Hanke** explained that the hardware responsible has to prepare the SRR and asked **D. Bodart** to prepare and submit it.

7. Power converters for the 2 GeV injection

J. M. Cravero reported the about the status of the power converters for the 2 GeV injection ([Annex 4](#)).

The needs of power converters for the new injection region are the following

- 1 power converter for a septum magnet (SMH42)
- 1 power converter for 'under vacuum' bumper magnet (BSW42)
- 4 power converters for 'out of vacuum' bumper magnets (BSW40-41-43-44)
- 1 (or 2) power converters for the Low Beta Quadrupole magnets (QLB33-49)

The 2 GeV injection powering requirement are very challenging and a lot of technologies that were never used before are involved. Even if standardization is an EPC goal (almost mandatory to meet the LS2 target), a lot of power converters studies/developments are ongoing as these requirements are very specific. Several specifications/operational requirements are still missing and urgently needed. **K. Hanke** invited **J. M. Cravero** to ask to contact the involved groups to define all missing specifications and report to the next meeting. **An action was opened.**

Integration studies are on going. **G. Sterbini** asked if there are already diodes in the PS tunnel. **J. M. Cravero** answered negatively.

8. Instrumentation of the 2 GeV injection region

A. Guerrero presented the status of the BI instrumentation for the 2 GeV injection ([Annex 5](#)).

The injection SEM grid will be installed in LS2 together with the septum. The space has been reserved. The mechanical designed will start in June 2016. No additional cabling is needed.

The design of the BTV (upstream of the SMH42) will not be done this year (the budget will not used). No additional cabling is needed.

A. Guerrero presented the spending profile of the BI budget.



9. Inventory of the EN-EL requests (J. Devine, P. Lelong)

J. Devine and **P. Lelong** presented the last version of the EN-EL request ([Annex 6](#)). There is still not a solution for the cabling of the BLM. **S. Mataguez** reported that inspections were carried out but no specific location satisfying all requirements could be suggested. **An action was opened for K. Hanke to define with the specialist the BLM racks position.**

10. AOB

Concerning the protection of the Low Energy quadrupole, **D. Bodart** asked if it has to be independent for each quadrupole. **D. Cotte** and **G. Sterbini** answered positively. **D. Bodart** commented that this is not the case in the present situation and it is a major activity. **An action was open for K. Hanke to discuss this item with TE-MTE (B. Puccio).**

S. Deval informed that, after discussion with **C. Rossi**, the hypothesis to test four 10 MHz RF cavities equipped with the new amplifiers after EYETS16-17 has to be discarded since incompatible with the present cooling system capacity.

K. Hanke reported about the special LIU meeting with the EPC group. **K. Hanke** and **S. Pittet** presented the list of power converters ([Annex 7](#), slide 7) that are not going to be upgraded. **K. Hanke** confirmed that these devices are not within the LIU-PS scope and are expected not to impact the LIU beam performance. A written confirmation not to upgrade these devices in the LIU-PS framework is not necessary.

G. Sterbini informed that the next LIU PS meeting will be organized for 31st May on the status of the LIU-PS magnet activities.

Next Meeting: Tuesday 31st May

Minutes reported by [G. Sterbini](#) the 28th May