

Beam Commissioning Working Group

Minutes for 17 May 2019

Present: V. Kain, R. Alemany Fernandez, F. Antoniou, H. Bartosik, J. F. Comblin, D. Cotte, G. P. Di Giovanni, M. Fraser, K. Hanke, A. Lasheen, K. Li, B. Mikulec, P. Skowronski

Meeting objectives

Presentation of the equipment integration for the LINAC4 and PSB. The presentation of the equipment integration for the PS will follow next week.

Approval of Minutes and Matters Arising - V. Kain

V. Kain opened the meeting and approved the minutes of the previous meeting. No comments from the attendees.

R. Alemany gave a follow up on the Quad scan application. A first meeting will take place with all people involved in order to start the discussions and define common features to be implemented.

V. Kain went through the list of upcoming milestones (link). Those should be discussed within the individual working groups.

V. Kain informed the attendees that one of the important subjects that needs to be prepared is the HW commissioning planning of the LBE run.

Equipment Integration Linac4 - B. Mikulec (link)

Presentation

- B. Mikulec mentioned that BE-CO and TE-EPC promised to provide feature of "transactional settings" for class FGC62 to be tested during the LBE line run. V. Kain asked if this fix will be applied only to this class. B. Mikulec replied that in principle it should be applied to other classes as well, but she does not know the timeline. V. Kain commented that it is very important that this is followed up and corrected for all the injectors.
- V. Kain asked if the principle of continuous ceasiation has been verified experimentally. B. Mikulec replied that in principle this works, they now have to prove that there is no cesium contamination of the RFQ.
- On the RF list, V. Kain asked if on top of all these subjects there are applications already ready. J-F. Comblin replied that there are inspector applications developed by the RF group.
- H. Bartosik asked how the energy spread will be controlled. B. Mikulec replied that for the moment everything is through knobs. H. Bartosik added that ultimately we would need to define only the energy spread and chopping factor as high level parameters. The knobs can be prepared in principle based on simulations. B. Mikulec agreed and added that the table with the simulations is available from ABP. Needs to be rechecked if indeed everything is ready.
- V. Kain commented on the big outstanding subject of interlock threshold management. Ideally the first version is ready for the LBE run. B. Mikulec replied that there will be first

discussions soon with all the experts in order to define how much work is needed. It is a good aim to find a solution but this will depend on the proposed solution.

- H. Bartosik asked what is the sampling rate of the BCT for the pulse flatness calculation. B. Mikulec replied that this is $1\mu s$. For very short bunches it will not be very precise. But also no big variations are expected - to be verified however.
- H. Bartosik asks if the goals that need to be achieved during the LBE run are defined in the beam commissioning checklists. B. Mikulec replied that there is a list of goals which is included in several presentations but not into the checklists. H. Bartosik proposed to have the goals in some checklists as well to make sure that the list of goals is complete and all the goals will be worked out.
- Following H. Bartosik's comment V. Kain wants to know whether the beam commissioning follows commissioning different operational scenarios or the aim is simply to commission various equipment with beam. B. Mikulec replied that in the case of the Booster this is how it is defined but in the case of LINAC4 there are not many different scenarios to be tested. But yes, the beam commissioning of low intensity and high intensity beams are two distinct cases and the goal of the beam commissioning is to achieve these two cases according to parameter specifications.

Discussion

- V. Kain asked if there are enough people available for all the applications. B. Mikulec replied positively.
- V. Kain enquires whether there are other aspects that still need a concept or feasibility study such as the interlock threshold management? B. Mikulec replied that in principle is the threshold management and the longitudinal painting are the only two items.
- V. Kain asked if in terms of matching with the Booster they rely on the model working or to automated matching. G.P. Di Giovanni replied that they will have to measure first of all (i.e. the matching monitor will have to work). Right now this cannot be answered.
- V. Kain asked what is the priority on preparing automated matching. B. Mikulec replied that this is something that needs to be discussed after the results from the LBE run. The plan is not to rematch at the beginning but only if it comes from the LBE run that the differences are very big. V. Kain suggested that then it will very late to provide an operational implementation of an appropriate algorithm. B. Mikulec proposed that a discussion should take place to clarify the necessity automated matching algorithms.

Equipment Integration PSB - G.P. Di Giovanni ([link](#))

Presentation

- H. Bartosik asked if the 4 BSW are on the same circuit. G.P. Di Giovanni replied that there are 4 separate circuits. H. Bartosik added that then there could be variations from magnet to magnet. G.P. Di Giovanni replied that this is the reason a high accuracy was asked for.
- R. Alemany pointed out that there is a weak point on the B-train from the LEIR experience which is the white rabbit diagnostics. B-train specialists are working on a solution to this and once it is operational it will be available for other machines as well.

- On the POPS-B, V. Kain asked if it is a good idea to keep and maintain both the new and the old MPS with all interfaces having to be compatible with both systems. G.P. Di Giovanni agreed that indeed there is a big amount of work and complication involved. On the other hand, there was the example of the PS last year, where if the second system would not have been available, the injectors would not have been able to deliver beams for weeks. V. Kain argued that the switching time to the 1.4 GeV extraction in the future will probably take a similar amount of time as the typical repair time for a POPS-like failure (2 weeks were estimated to step up LHC beams for PSB and PS for 1.4 GeV cycle).
- V. Kain asked if the RF limitations will be integrated in the cycle generation tool for POPS-B. G.P. Di Giovanni replied that this is now under discussion but the desire is to include all limitations for ramp rate.
- V. Kain asked if the tune and chroma application will be the same as in the past. G.P. Di Giovanni replied that they consider changing a bit the application and there will also be new features.
- G.P. Di Giovanni mentioned that for the TFB for the time being knobs in working sets are the baseline solution for control. If there is time available, the desire is to develop an application. Synergy should be envisaged between PSB, SPS and PS as is the same hardware person is responsible for both machines. H. Bartosik asked if the plan is to use the transverse blow up with the TFB in operation after LS2. G.P. Di Giovanni replied that even though there was no time to test it last year, they would like to apply it. V. Kain asked why the old system is kept also in this case. G.P. Di Giovanni explained that last year the new system was commissioned in a hurry and it was not given that the commissioning would advance far enough to rely only on the new one for post LS2.
- H. Bartosik asked if they are planning to have a steering autopilot for the injection. G.P. Di Giovanni replied that ultimately yes, they would like to have now an optics of LINAC4 + transfer line + 1st PSB turn. H. Bartosik advised that the hole mechanics of the injection should be included. This will be discussed with J. Wenninger.

Discussion

- V. Kain commented that integration status is well advanced and the open questions well defined. Application developers are available, but FESA readiness dates should be collected.
- R. Alemany asked which application is used for the tune control. G.P. Di Giovanni replied that for the PSB there are many ways to define the tune and is more complicated. The plan is to re-write the existing application. Marcel who will do this is a python and not a java developer. As there is sharing between machines it will only start next year for the PSB. V. Kain proposed that LEIR should be included as well.