

Beam Commissioning Working Group

Minutes for 5 October 2018

Present: V. Kain, G. Rumolo, S. Albright, H. Bartosik, H. Damerau, G. P. Di Giovanni, M. Gourber-Pace, K. Hanke, A. Huschauer, K. Li, B. Mikulec, G. Papotti, F. Tecker, F. Velotti

Meeting objectives

Second in a series of meetings to discuss the integration of LIU equipment, this meeting focuses on the PS injection region and the SPS RF upgrade.

Approval of Minutes and Matters Arising - V. Kain

The minutes of the 31st of August and 21st of September are reviewed and accepted without comment.

Some follow up points are emphasised:

- The need for distributing real time information on beam intensity, number of injections in the SPS for both the RF and the Beam Dump.
- Contingency planning in the commissioning schedules for all machines.
- Careful organisation of the schedules for dry runs and reliability runs during the shutdown, especially to overlap those that require common services.
- Availability of equipment experts during commissioning, dry runs, and reliability runs to ensure they are both available and not overbooked.

LIU-SPS RF - K. Li

Presentation

- HLRF is being upgraded to increase available power, complete renovation of LLRF to digital system with integration between LLRF and LSA to allow direct control from the CCC.
- LLRF feedback loops and transition crossing will be improved and more control will be available to OP. The phase loop will require newly injected bunches to be masked to avoid disrupting circulating beam, which will require real time information of parameters of each injection.
- Ongoing discussion over required diagnostics information available in the CCC, a lot of data will in principle be available with the new LLRF, to be decided what is useful for OP.
- First beam required for SPS will be an LHCINDIV to allow setting up RF.

Discussion

- H. Damerau asks about distinctions between timings e.g. RF ON/OFF is a discrete status, whereas debunching is a process taking many ms. K. Li explains that as they are timing events, which are start/stop the distinction is not needed. H. Damerau points out that a process like bunch rotation is related to extraction so a simple timing may not suffice, K. Li says that in these cases relative timings can be used, so bunch rotation can be triggered 30ms before extraction with a “load event”, exactly how they will be controlled is still to be decided.
- M. Gourber-Pace asks if timing and requirements for real time information has already been discussed. V. Kain says that for certain beam types such as LHC some of the required aspects are already partially available but not for other beam types.
- H. Bartosik asks if the information for the filling pattern will come from the PS, K. Li says yes. V. Kain explains there will be a predetermined configuration that indicates the expected number of bunches and their spacing. There should be a discussion about what parameters should be available at PS extraction, just intensity or the number of bunches also. H. Damerau says that in operational conditions every PS cycle provides a fixed number of bunches, so this can be made available. V. Kain explains that an important question is how much it will matter if it is wrong since it will just require a beam dump if it is. H. Bartosik says it could be combined with the PS BQM, if the bunch number is wrong it can be broadcast to the SPS and trigger a dump after the injection.
- V. Kain asks if there’s a time scale for when parts of the system should be implemented and tested, K. Li says not yet.
- B. Mikulec asks about the priority list for commissioning cycles and if it can be made available. K. Li says that the list requires confirmation with experts, it will be distributed as soon as possible. B. Mikulec asks if it includes all cycles, not just those required for RF. V. Kain says it is detailed and should have all the information but this will be checked.
- H. Bartosik asks if the diagnostic measurements usually done in the cage can be made available in the CCC. G. Papotti says that with the currently available signals it would require digitisation, but this will be automatic in the future as it is a digital LLRF. H. Bartosik says it would be useful to have everything available in the CCC equivalent to in the cage so that there is no fundamental reason to go to the cage unless it is desired. G. Papotti agrees and will investigate how this should be implemented. V. Kain says that there needs to be a list of required tools to see what can be done during LS2 and it should be discussed in SPS LLRF meetings.
- H. Damerau reiterates that processes should be distinguished from events and asks if the number of timings is sufficient, in the PS they generally have 16 available. K. Li says that the default length of the vector is 8. H. Damerau says that it depends on where the timing is generated, some trigger generating devices have a limited number of events available.
- H. Damerau says that in the PS they have specific naming conventions to organise thousands of timings, something similar might benefit the SPS.

LIU-PS Injection Region - F. Tecker

Presentation

- The new injection region will involve a lot of new equipment due to the higher energy, but the functionality will not change. There will also be additional devices throughout the ring for general diagnostics and to improve the quality of injection.
- Significant hardware changes are planned during LS2, but in most cases there will be no change to logic or functionality therefore the standard checklists will be sufficient.
- SEM grids, wire scanners and the transverse feedback will have significant changes in functionality and therefore are expected to require extra commissioning time.

Discussion

- M. Gourber-Pace asks if new controls are required for the new TFB, such as a new interface, F. Tecker says no.
- H. Bartosik asks what the benefits of the new BLM system are compared to the old one, A. Huschauer says the timing resolution is better and it standardises BLMs across the complex to the LHC style, the current BLMs also do not have uniform calibration, whereas the new ones will allow accurate measurement of the dose.
- G. P. di Giovanni asks if there is any predicted integration problems or if it should be relatively minor changes such as modifying optics files in YASP. F. Tecker thinks it will be small changes.
- V. Kain asks if the current approach to commissioning will also be applicable after LS2, or if there will be some new systems requiring new tools. F. Tecker thinks that for injection matching something new will be required as it is currently an MD style item and is not done operationally, a suitable procedure will be desired after LS2. The TFB is also not currently optimised for damping injection oscillations so this can also be improved and will require discussion with experts. A. Huschauer says that for the TFB they have been relying on experts for setting up in the past, after LS2 it would be useful to have an expert to assist in commissioning.
- V. Kain asks about physical integration of hardware such as power supplies. F. Tecker says this is well controlled by LIU-PS.

General Discussion

- B. Mikulec suggests getting all machine coordinators together to finalise a list of any required applications or controls for new hardware, K. Hanke agrees.
- V. Kain suggests preparing a list of all interventions and modifications, and software development that is required within OP to enable a detailed understanding of the number of man-hours required.