

Table of Contents

LIU Commissioning Coordination Committee.....	1
Deliverables from sub working groups for 2019/2020.....	1
Follow Up From Previous Meetings (2019).....	2
2018:.....	6
Follow Up From Previous Meetings (2018).....	6

LIU Commissioning Coordination Committee

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Mandate (2019): [Link to presentation](#)

- Ensure readiness of plans/procedures for commissioning preparation and commissioning
- Ensure readiness of tools
- Establish teams
- Organize and analyze beam commissioning
- LIU beam commissioning objectives from post LS2 until end of 2021:
 - ◆ Recover the pre-LS2 LHC beam type parameters, including beams required for LIU setting-up (and/or according to schedule): LIU intensity PSB, PS.
 - ◆ The LIU-CCC mandate will be reviewed (in the course of 2021, pending commissioning progress) and remaining activities will be merged into a new body together with other on-going activities (e.g. beam dynamics) to ensure the overall approved Beams Performance milestones.
- The LIU-CCC will report directly to the LIU project and when required the IEFCLMC
- Identify required checks/commissioning activities for old and LIU equipment across the injectors
- Review the tools/applications/simulations/monitoring/pre-HW checks/CO required for the commissioning phase, identify outstanding/missing items and fix delivery deadlines, and follow-up progress
- Establish the detailed commissioning time line for LHC and FT beams
 - ◆ Define the LHC beam parameters to be reached throughout the injectors chain as a function of time for: LHCINDIV, LHC run2, each LIU commissioning step, LIU
- Ensure definition of necessary LS2 dry runs and HWC, including planning of tests with EN/ACE
- Establish a draft time line for the the beam commissioning to the final LIU beam performance

Deliverables from sub working groups for 2019/2020

Topic	Details	Deadline
Integration of LIU Systems	Prepare lists of new systems to be integrated: * Identification and definition of items * Identification and definition of processes/procedures * Required algorithms * Software readiness * Definition of integration meetings with equipment groups where required	April 2019
List of Software	Identification of software needs: * Either for integration of new systems or improved integration of existing ones * Additional software requirements: algorithms, processes * Resources: sufficient man power available / potential synergies between machines to be exploited?	June 2019
Planning HWC + Dry Runs	* Planning + check lists for LBE run * Planning for the rest of the complex (including DSO tests, power permits, resources,) * HWC check lists	June 2019 December 2019 3 Months before start of HWC
List of performance tracking parameters	Definition of observables to be tracked: * machine-specific or already beam centric (cross-machine) if available	July 2019

	* Collection of analysis algorithms/tools	
IST Plannig	Establish lists of ISTs in collaboration with equipment groups EN-ACE + OP: final IST lists and conditions (e.g. access system SPS, CV availability,)	June 2019 September 2019
Injector schedule: List of beam readiness and FT facility start up dates	Focus on FT community. Define: * readiness dates with initial beam parameters * timeline for intensity ramp-up in 2021 * max. intensity required in 2021 First iteration Refined version	July 2019 December 2019
FESA Class readiness dates	* Establish list based on software needs. * Negotiate readiness dates with groups * Estimate for OP developments required	August 2019
Christmas shutdown 2020/2021	* Identification of critical items * Identification of piquet requirements * Definition of equipment state during Xmas period * ...	December 2019
Beam commissioning planning	Detailed planning with resources	February 2020

Follow Up From Previous Meetings (2019)

Origin	Follow-up	Status
29 - November - 2019 https://indico.cern.ch/event/865764/		
YETS 20/21	The availability of experts for the restart of beam needs to be confirmed	
	Confirm necessary Linac4 maintenance, and possible impact on restart	
	Confirm specific requirements for equipment groups for the restart, to determine minimum time necessary	
	Determine if there is a benefit to running the Linac4 ion source over the shutdown period	
Beam Performance Tracking Status	Investigate possibility of merging injector and LHC performance tracking	
Check List Tool	Investigate the possibility of moving to a commercial product	
	Long term support for other tools to be determined	
15 - November - 2019 https://indico.cern.ch/event/862953/		
Approval of Minutes and Matters Arising	Template on CO requirements to be filled in by commissioning working groups	
SPS Dry Runs	Relocate SPSQC test to avoid clash with BI tests	
	Additional details required for SBDS test	
	CO requests details of Dry Runs to be stored in a central location	
1 - November - 2019 https://indico.cern.ch/event/859585/		
PSB Individual System Tests	Confirm access controls for TE-MS high voltage tests	
	Confirm no activity in PSB surface buildings during TE-EPC tests	
	Check if TE-ABT tests can be included in TE-EPC risk analysis	
	Confirm that POPS-B tests do not require controls	
PS Individual System Tests	Define controls requirements to ensure adequate infrastructure for all tests	
	Finalise BE-RF IST planning	
	Increase margine for F61 tests	
	Clarify BE-OP manpower during test periods	
AOB	Clarify controls requirements for equipments groups for all tests	

18 - October - 2019 https://indico.cern.ch/event/855026/		
Injector Schedule 2020/2021	Determine slip-stacking commissioning period	
	Discuss MD organisation during 2021	
Commissioning organisation during 2020	Consider putting ISTs under mandate of EN-ACE technical coordination meetings	
4 - October - 2019 https://indico.cern.ch/event/851834/		
Approval of Minutes and Matters Arising	Distribute IST procedure template	
HWC Planning - PS	Define OP manpower requirements during the HWC	
HWC Planning - SPS	Finalise details HWC tests that still need additional information	
	Consider possibility of manpower being required during IST period	
HWC Planning - IONS	Organise meetings concerning Linac3 safety aspects	
27 - September - 2019 https://indico.cern.ch/event/845794/		
Approval of Minutes and Matters Arising	Complete IST schedule for all machines	
CO Feedback on Beam Performance Tracking	Discuss how API will handle Beam IDs, Beam Instance IDs, and BCD Stamps to correctly identify cycles	
	Determine if web TIMBER can give suitable performance for displaying beam data	
Linac4 3 MeV Run	Repeat measurements of 2 MHz ripple at higher energy	
20 - September - 2019 https://indico.cern.ch/event/845792/		
Approval of Minutes and Matters Arising	Define a cross-complex system for organisation during the IST period	
FESA Class Readiness - PS	Ensure FESA2 classes are updated to FESA3 and additional classes are completed	
	Consider formalising the monitoring of class developments	
FESA Class Readiness - SPS	Identify method to allow more than 8 injections	
AOB	Consider revisiting FESA classes in the future	
AOB - IST Planning	Finalise how removal of lockouts will be handled	
	Clarify access state during IST period, and decide who should be in the CCC	
6 - September - 2019 https://indico.cern.ch/event/844660/		
Approval of Minutes and Matters Arising	Discuss transition from commissioning coordination meeting to beam performance meeting	
Linac4 IST Report	Define final test procedures for phase 4 of ISTs	
	Consider weekly FOM type meeting for after LS2 to discuss ISTs in all machines, with a daily morning meeting for that days ISTs	
	Review all test procedures in Commissioning Working Groups to identify safety related ISTs, which require more detailed procedures	
	Discuss possibility of requiring OP group in CCC throughout IST period	
FESA Class Readiness - LEIR	Identify necessary software developers	
23 - August - 2019 https://indico.cern.ch/event/841490/		
Approval of Minutes and Matters Arising	Collate IST and HW commissioning schedules in preparation for LS2 day	
	Compile prototype beam availability schedule based on each injector's schedule	
Beam Readiness Dates - SPS	Define when fixed target ion beams will be available	
	Specify ion beam commissioning slots as part of schedule	
	Include expected 12 bunch beam availability in schedule	

	Confirm number of days of beam available for HiRadMat and AWAKE	
Beam Performance Tracking Outcome	Define requirements for CO	
	Discuss how to approach performance tracking for non-operational beams	
	Organise a meeting between the BCWG and CO to discuss requirements	
	Define suitable metrics for each beam	
9 - August - 2019 https://indico.cern.ch/event/839130/		
Beam Readiness Dates - PSB	Cross check with PS schedule	
Beam Readiness Dates - Ions	Determine likely schedule of studies in the SPS	
26 - July - 2019 https://indico.cern.ch/event/836825/		
Status of IST Scheduling	PS and SPS first draft to be completed	
	Include BTP line information in PS schedule	
	Give deadline to experimental areas for IST scheduling	
AOB: Synergies for the Different TFB Systems	Identify software developer to collaborate with machine experts	
	Discuss required FESA and firmware modifications with RF group	
	Confirm responsible person for each TFB with RF	
12 - July - 2019 https://indico.cern.ch/event/830277/		
28 - June - 2019 https://indico.cern.ch/event/833199/		
Beam performance tracking - Ions	Create a document detailing the requirements for performance tracking	
14 - June - 2019 https://indico.cern.ch/event/824431/		
Status of the reference measurement system	Clarify status of application support in the long term	
	Make raw data from JAPC objects recoverable after change of Java libraries	
	Consider interface between NXCALS and reference tool for data storage	
Linac3/LEIR Status of ISTs	Migrate Linac3 schedule from Excel to Microsoft Project	
	Confirm responsible persons for all tests	
	Finish defining test and dates for missing items	
	Investigate possibility of exporting data from Excel to the checklist tool	
	Determine how accesses will be organised during source tests	
	Ensure relevant items from Linac3/LEIR schedule are included in Switchyard schedule	
31 - May - 2019 https://indico.cern.ch/event/823325/		
Status of the IST list for all machines	Discuss schedule of switchyard closure during ISTs	
	Clarify PS ABT equipment ISTs in relation to switchyard closure	
	Define deadlines and developers for software synergies	
	Provide EN-ACE with procedures for ISTs and consider creating EDMS documents	
23 - May - 2019 https://indico.cern.ch/event/821925/		
Equipment Integration PS	Investigate possibility of making BGI applications uniform across injectors	
	Investigate possibility of making WS applications uniform across injectors	
	Investigate better sharing of TT2 steering between PS and SPS	
17 - May - 2019 https://indico.cern.ch/event/819356/		
Approval of Minutes and	Prepare HW commissioning plans for the LBE line run	

Matters Arising		
Equipment integration Linac4	Follow up distribution of "transactional settings" to relevant FESA classes	
Equipment integration PSB	Investigate possibility of including PSB injection mechanism in injection autopilot application	
	Collect FESA readiness dates	
3 - May - 2019 https://indico.cern.ch/event/817498/		
Approval of Minutes and Matters Arising	Review possibilities for planning tool, considering MALT	
	Confirm final details for Linac4 ISTs	
Equipment Integration Linac3/LEIR	Define responsible person for new software tools	
	Prioritise list of desired software tools in case of insufficient manpower	
Equipment integration SPS	Define details of RF dry runs	
	Define details of software development and equipment testing, target end of August	
	Investigate overlaps between SPS and PS BGI applications	
11 - April - 2019 https://indico.cern.ch/event/810607/		
Approval of Minutes and Matters Arising	Confirm impact of IST period on LBE line run	
Introduction to EN-ACE Planning Tool	Continue discussions of suitable planning tool for HW and beam commissioning scheduling	
	Investigate possibility of providing post-LS2 schedule information to EN-ACE for resource checking and final schedule construction	
	Consider including LHC commissioning with injectors due to overlap of experts	
29 - March - 2019 https://indico.cern.ch/event/803331/		
Switchyard and POPS(B) tests	Confirm schedule and safety of ISTs with EPC	
	Organise ventilation of Linac3 during testing	
	Confirm extent of powering and possible safety needs with work proximate to power cables	
	Ion transfer line tests need to include testing of BI equipment	
	Confirm availability of services during early SWY closure	
	Finalise list of CO requirements for ISTs	
ISTs	Update IST table to include LEIR and Linac3	
	Establish a safety protocol for access during IST period	
	Confirm with DSOs what (if any) tests are required for each machine at the start of IST period	
15 - March - 2019 https://indico.cern.ch/event/803083/		
Outcome of the LIU Workshop	Treat resource loaded and co-activity planning	
	Decide on a HWC planning tool	
	Discuss commissioning requirements of experiments	
25 - February - 2019 https://indico.cern.ch/event/798112/		
Switchyard Access	Confirm with EPC if POPS or POPSB commissioning will come first	
	Confirm current master schedule is suitable for EPC	
	Include ION SWY polarity tests master schedule and approve with LS2 committee	
	Establish a schedule in case the POPS containers do not arrive on time	
18 - January - 2019 https://indico.cern.ch/event/785476/		
PSB Beam Commissioning	Review HW and beam commissioning schedules in context of equipment experts availability	

	Consider making commissioning EDMS documents in all injectors as in the PSB	
	Prepare beam availability schedule for each experimental facility	

2018:

Mandate (2018): Link to indico page [↗](#)

- Ensure readiness of plans/procedures/tools and establish teams for commissioning of the injectors after LS2
- Organise, execute, analyse beam commissioning from post-LS2 to LS3 (i.e. during Run3), which implies
 - ◆ Recover pre-LS2 performance
 - ◆ Commission LIU beams to full performance by end of Run3
 - ◆ Establish beam milestones roadmap to meet the above two targets

2018 Goals See following link (2018-BCWG.pptx: 2018-BCWG.pptx)

Follow Up From Previous Meetings (2018)

Origin	Follow-up	Status
23 -November - 2018 https://indico.cern.ch/event/775497/ ↗		
Linac4 LBE Line Run	Finalise scheduling plans for out-of-hours work	
	Schedule presentation from Linac 4 RF expert	
16 -November - 2018 https://indico.cern.ch/event/774197/ ↗		
SPS Beam Commissioning	Ensure schedule accommodates needs of BI (and possibly other systems) for 25ns trains	
	Determine prioritisation of items	
	Modify schedule to ensure adequate scrubbing time	
	Rename "scrubbing" as "conditioning"	
	Consider adding specified 24-hour access period for planning access	
	Include relevant equipment tests with beam (e.g. BLMs)	
	Integrate BI testing and commissioning schedule with beam schedule	
9 -November - 2018 https://indico.cern.ch/event/771454/ ↗		
LEIR Reference Measurements	Modify reference measurements tool to allow a checklist of measurements to be taken	
	Include long term variations in performance in reference measurements	
AOB	Investigate potential benefits of "super-settings" and amount of work required to implement them	
	Investigate possible complex wide improvements to operation (e.g. cycle definition approach)	
2 -November - 2018 https://indico.cern.ch/event/764260/ ↗		
LIU-PSB Integration Plans	Provide a specification for beam quality tracking functionality in new WS application	
	Investigate copying the functionality of the PS MPS editor application for use in the PSB, including discussions with Settings Management WG	
12 - October - 2018 https://indico.cern.ch/event/760162/ ↗		
General discussion		

	Discuss general approach to reference measurements reducing dependence on key individuals	
	Discussion over best practice for acquiring and storing references based on experience in each machine	
	Bring operators (or a subset) into meetings where practical	
	Ion reference measurements in PS and SPS	
5 - October - 2018 https://indico.cern.ch/event/757692/		
LIU SPS RF	Determine required real-time information and coordinate with CO	
	Investigate amount of required information from PS for Phase Loop mask and overlap with BQM	
	Produce detailed list of cycles required for commissioning in order	
	Discussions between OP and RF of what diagnostics and controls to make available in the CCC	
LIU PS Injection Region	Determine suitable (operational) injection matching procedure	
General Discussion	Meeting between machine coordinators to discuss new controls requirements	
	Detail requirements of operators during shutdown	
21 - September - 2018 https://indico.cern.ch/event/757690/		
LIU SPS Beam Dump	Discuss requirements for real time data distribution	
	Consider possibility of planning contingency time in schedule	
General Discussion	Discuss a schedule for required services	
	Consider coordinating hardware commissioning schedule with availability of equipment experts	
31 - August - 2018 https://indico.cern.ch/event/743773/		
LINAC4 Beam Commissioning	Beam expected to be optimised by 28 - September	
	Add daily debriefing to the eLogbook	
Reference Measurement Tool	Test of API in other machines and applications	Reported to be non-trivial by PSB
	Investigate possibility of storing ACQ data along with CCV	
	Investigate data links for large files	
	To be tested by as many users as possible	
24 - August - 2018 https://indico.cern.ch/event/743773/		
Matters Arising	Test possibility of using PSB h=1 to make an MTE-like at the start of commissioning for the SPS	
Linac4 Hardware Commissioning	Try to enable checklist tracking of commissioning progress of RF and ion source	
SPS Reference Measurements	Include ion beams in reference planning	
3 - August - 2018 https://indico.cern.ch/event/743761/		
PS Reference Measurements	Saving AQN and CCV together	
	Tomoscope reference and live measurement in parallel	Under discussion with Tomoscope application developer
	Automated connection of OASIS signals	Being investigated with current OASIS API
Discussion	Discussion of additional requirements for each machine - e.g. OASIS modifications	

	EPC measurements of current in power converters to compare with AQN and CCV	
27 - July - 2018 https://indico.cern.ch/event/742681/		
LINAC3 Reference Measurements	Diagnostics for LINAC3 using LEIR tools - e.g. Schottky	
	Absolute beam energy measurement in spectrometer line	
	Effect of steering on transmission into LEIR and possibility of correction	
PSB Reference Measurements	Investigate the possibility of checking aperture restriction in Ring 2 with beam	
15 - June - 2018 https://indico.cern.ch/event/733190/		
Discussion	Physics planning post-LS2 and impact on beam commissioning priorities	
Previous meetings https://indico.cern.ch/category/9633/		
	Super settings for generation and trim (Delphine)	
	LINAC4 responsibilities: what is happening during LS2?	
	New timing system approach: where shall/should we go	
	Reference measurements end of 2018 for after LS2. How to store reference measurements? New framework?	
	Super table and beam parameter statistics	
	Check list tool: add additional requirements for post LS2. Prepare func spec	
	Software synergies between machines	
	Manpower requirements for injector settings management implementation (Delphine)	
	Expert shifts during start-up?	
	Ideal length of beam commissioning for all beam types up to high intensity per machine	
	How to add testing of signal exchange between machines in planning tool? (Readiness of beam type?)	
	PSB and LINAC4? Commissioning with/of LINAC(2)4. Who is responsible for what? What about check lists and planning?	
	Organisation of individual system tests: if some should be carried out during hardware commissioning, how much extra time is required for check out?	
	Which of the individual system tests should be done during hardware commissioning?	
	Add required state/settings of equipment to test procedure	
	Organise full de-consignation at end of shutdown	
	Better cross-coordination, also including LHC for planning and required testing of LINACs (switch yard)	
	Need hard end of shutdown. No more carry over shutdown work	
	Define better interface between check lists and ASM	

This topic: [Sandbox > LIUBeamCommissioningWG](#)

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