12 June 2023

ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

SUMMARY OF WEEK 23 - 2023

Technical infrastructure – *C. Pruneaux*

Linac 4 – *J.B. Lallement*

PS Booster – *G.P. Di Giovanni*

ISOLDE – *E. Siesling*

PS – *A. Lasheen*

PS – East Area – *J. Bernhard*

PS – nTOF – *N. Patronis*

AD – ELENA – *L. Ponce*

SPS – *M. Schenk*

SPS – North Area – *J. Bernhard*

SPS – AWAKE – *G. Zevi Della Porta*

SPS – HiRadMat – *Not running, no report*

Linac 3 – *Not running, no report*

LEIR – *Not running, no report*

LHC – E. Bravin

CLEAR – *P. Korysko*

Technical Infrastructure (TI)

Facility Coordinator last week	Clement Pruneaux
Facility Coordinator this week	Ronan Ledru

Statistics

Alarms	13 074				
Phone calls	785	***Incoming***	477	***Outgoing***	308
ODMs	116				

Facility Status

Summary	Tue 06/06/23 - 01:57 A gas leak (R449A) on the common Chiller in LHCb has created some smoke which has triggered the fire detection. The Detector safety system has stopped all the cooling plant for LHCb. The pipe has been repaired and all the systems back in operation. Thu 08/06/23 - 23:30 Wrong position of the SDI2 and SMI2 doors which prevent injection in the LHC During works on the APIMMD system, the tags of the doors became invalid but nobody see it. The access piquet has been called during the night to retrieve the data Sun 11/06/23 - 20:45 Trip of LHC4 (SEQ4) harmonic filter EPC piquet on site to measure capacitor banks balancing. Decision taken to restart the SVC during day time.
Issues	
Plans	

Intervention Request

Yes / No	**Duration**	15 minutes	**Preferred date/time**	
Reason	SEQ4 SVC to restart			
Impact	Stop of the LHC			

Linac 4				
Machine Coordinator last week	JB Lallement			
Machine Coordinator this week	G. Bellodi			
Statistics				
Availability	98.2%			
Facility Status				
Summary	Not a bad week.			
Issues	**Wednesday** CCDTL3-4 modulator trip [10 min]. **Thursday** during PSB access. CCDTL1 attenuator of IcFwd1 exchanged and LLRF setup (was inducing beam energy/position oscillations). DTL3 LLRF crate rebooted [45 min]. Lift preparatory work / checks in view of TS intervention [15 min]. Afternoon Setting issue: clone with 2022 settings [15 min]. **Friday** Pre-chopper trip [2 min]. Vacuum BIS interlock valve in L4Z [7 min]. **Saturday** Source HV supply could not be reset (autopilot and manual reset). Issue with the bias supply. PIPO intervention requested [1 hour].			
Plans	Regular operation			
Intervention Request				
Yes / No	***Duration***	3.5 hours	***Preferred date/time***	24 h warning / TS
Reason	• Elevator repair.			
Impact	No beam			

PS Booster

Machine Coordinator last week	G.P. Di Giovanni
Machine Coordinator this week	F. Asvesta

Beam Scheduled			
ISOLDE	Yes	***PS***	Yes

Beam Availability by Destination (AFT)			
ISOLDE	97.6%	***PS***	97.6%

Facility Status

Summary

A **good week** for the PSB with a few activities in parallel:

- Delivered STAGISO beam for GPS and nominal HRS beam for ISOLDE.
- Preparation of the beams for the LHC MD1 block completed.
- Preparation of a high intensity MTE version, up to 800e10 ppr, for tests in the PS.
- The changes of the B-Train FESA class have been integrated in LSA.
- MDs on longitudinal painting control:
  - Intensity > 1e13 ppr possible in all rings.
  - Optimization still needed to inject the maximum number of turns in all rings at the same time. On R2 and the intensity reached ~1250 ppr with 150 turns.
  - Good news which validates the work done during the YETS on the PSB RF bypasses. Last year with this intensity an arc on the RF bypasses in 16L2 in R2 damaged the seal and created a vacuum leak causing a beam stop of ~1 day.
  - A version of the HRS beam with longitudinal painting was prepared and steered to ISOHRS matching the operational trajectory. Before testing this beam in operation, some more work is needed on the parameter's definition for the various intensity ranges.
- Work on the timing system to be able to pulse the shavers twice in the cycle for a special MD.
- The emittance of the R1H of LHC 8b4e beam was blown-up to match the performance of the other rings (R1 is the best performing ring in the PSB).

On Thursday, routine access for the water leak inspection of **BR.QFO11**:

- The **leak deteriorated a bit further**, and now we measure a leak rate of 60 ml/min. Current water refill rate is somewhere between once every 40-50 hours.
- The IEFC endorsed the strategy to continue monitoring the leak and perform regular access (**schedule to be agreed between OP, MD and Physics coordination)**. **No preventive replacement of the magnet will be done during the TS.**

Issues

The longest stop from the PSB was due to the QFO11 inspection.
Otherwise, most of the downtime due to Linac4.
Most notably in the PSB:

- A few trips of different modules of the BI.BSW at the beginning of the week. EPC experts reworked and improved the regulation where possible. The issue is still not fully solved and will be investigated during the TS1. EPC suspects some failing component.
  - During the first recurrent trips, as the investigation needed some more time, we applied the procedure with rMPP to deliver beam with <4 rings.
- Short trips of a couple of KFA14L1 modules and once of the SMH15L1 and Distributor.
- A short trip of multiple cavities in R2 when testing the Longitudinal painting. Probably due to beam loading.

Plans

- Deliver beam to downstream machines/facilities.
- Continue the testing of the longitudinal painting control.

Intervention Request				
Yes/No	***Duration***		***Preferred date/time***	
Reason	Next BR.QFO11 inspection during the injector TS1			
Impact				

ISOLDE

Machine Supervisor last week	E. Siesling
Machine Supervisor this week	E. Fadakis

Beam Scheduled

GPS	Yes	***HRS***	Yes	***HIE-ISO***	No

Beam Availability by Destination (AFT)

GPS	99.2%	***HRS***	99%	***HIE-ISO***	%

Facility Status

Summary

GPS:

- GPS Target #534Sn installed last Monday
- 111 Cadmium (Cd) collections at GLM for various experiments (IS679, IS713, IS732, LOI248, LOI249, LOI250)
- Taking STAGISO proton beam from PSB up to max 0.2uA
- Successful and smooth run no issues to report

HRS:

- MEDICIS target irradiation on target #769M from Monday to Tuesday morning 05/06.05
- HRS Target #819LaC installed last Wednesday
- Various Cadmium (Cd) beams for Target & Ion Source Development (TISD) with/at ISOLTRAP
- Taking all remaining ISO cycles from PSB in the SC, NORMHRS
- Successful and smooth run with minor issues

REX/HIE ISOLDE:

- Worrying problem with sparks inside the REX TRAP remains unclear. F. Wenander is on the issue. Should be operational from the 3th July.
- REX RF:
  7Gap1 instabilities: Mobile seismic system has been installed until new equipment arrives and permanent installation is done. Many thanks to M. Guinchard for the fast action in installing the mobile system.
  7Gap1 amplifier issues being addressed. 7Gap3 amplifier issues being addressed. Buncher tuner issues being addressed.
  G. Piccinini gives as much support as his other priorities allow him. Critical situation well understood by the RF team (S. Ramberger, D. Valuch et all.)
  9Gap vacuum ok and RF running after tightening of the bolts last week.
  RFQ and IHS ok. HIE ISOLDE SRF ok with a few instabilities.
- With first available stable beam from HIE on the 6th July and physics as of the 19th July the Beam Commissioning of REX/HIE ISOLDE is on the critical path.

Issues

HRS:

- Target coupling issues on Wednesday-morning. (Un)clamping had to be done manipulating manually compressed air valves and calibration of the clamps was needed (C. Mitifiot)
- Sunday-afternoon: Due to an abrupt gas-flow in the ISCOOL the users lost the 97Cd beam. Probably caused by mechanical play in the needle valve. Re-adjusted and physics could continue

Others:

- Significant rise of temperature in the 170 ISOLDE hall. CV re-adjusted the set points to compensate

Plans

- GPS run finishing and Target change foreseen this Monday
- MEDICIS irradiations foreseen this Monday-night. TBC.
- HRS run finishing and Target change foreseen Tuesday-morning

Intervention Request

Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

<table>
<tr><th colspan="8">PS</th></tr>
<tr><td colspan="2">Machine Coordinator last week</td><td colspan="6">Alexandre Lasheen</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="6">Benoit Salvant</td></tr>
<tr><th colspan="8">Beam Scheduled</th></tr>
<tr><td>East Area</td><td>Yes</td><td>nTOF</td><td>Yes</td><td>AD</td><td>Yes</td><td>SPS</td><td>Yes</td></tr>
<tr><th colspan="8">Beam Availability by Destination (AFT)</th></tr>
<tr><td>AD</td><td>94.5 %</td><td>EA N</td><td>96.1 %</td><td>EA T8</td><td>96.1 %</td><td>EA T9</td><td>96.1 %</td></tr>
<tr><td>nTOF</td><td>94.3 %</td><td>SPS</td><td colspan="5">94.3 %</td></tr>
<tr><th colspan="8">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="7">

Good availability for the PS with main downtime due to RF cavity issues towards the end of the week (see issues below).
Important effort invested towards EAST/TOF cycle adjustments and tests.

The parasitic TOF bunch was adjusted and optimized for ejection with a bunch length of 28ns, matching the dedicated cycle.
These adjustments led to degradation of the EAST bunch. Optimization of longitudinal emittance along the cycle to keep satisfactory distribution for EAST and reduce losses in the PS ring.
Tests performed to double the parasitic TOF bunch intensity (570e10 p+). Test successful with good beam quality for 40ns bunch length at extraction.
MD done to assess feasibility of increasing proton flux on the nTOF target to 2.2e12 p/s. Test successful, leading to increase of the flux limit to 2.2e12 p/s in operation.

Beam delivered to AD for beam commissioning.
Correlation observed between dedicated LHC filling supercycle, PS magnet temperature, and subsequent degradation of the SFTPRO cycle (MTE efficiency). Investigations ongoing.
Fix applied for jitter at PS extraction for operational LHC 36b beam (reduced jitter by factor 2.5)

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<tr><td>Issues</td><td colspan="7">

Access done on Friday 12:00 to replace broken amplifier of cavity C10-91.
An HL-RF piquet intervention was needed Sunday morning for cavities C10-91, C10-11, C20-92.

C10-91: requires a new access for investigation of the amplifier installed as replacement
C10-11: 1 (out of 2) gap relay broken, 1 gap left open (higher impedance) until next intervention
C20-92: issue with PLC preventing cavity to pulse, requiring on site restart by piquet

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Plans	- LHC MD preparation and delivery			
Intervention Request				
Yes	***Duration***	2h	***Preferred date/time***	Monday 13:00
Reason	Repair C10-91 (investigations on amplifier) and C10-11 (gap relay)			
Impact				

PS East Area							
Facility Coordinator last week	**J. Bernhard**						
Facility Coordinator this week	**B. Rae**						
Beam Scheduled							
T8	Yes	***T9***	Yes	***T10***	Yes	***T11***	No
Beam Availability by Destination (AFT)							
Running T8	95.9%	***T9***	95.9%	***T10***	95.9%	***T11***	N/A
Facility Status							
Summary	T09: Smooth Operation. T10: Smooth Operation.						
Issues	T09: The vertical plane of T09.XBPF042 was not working after the switch back to the normal configuration due to some connection problem. Fixed on Thursday (no downtime for the user).						
Plans	• T09: ALICE FOCAL → NANOCAL • T10: ALICE MUON ID → ALICE MUON ID • T11: No user.						
Intervention Request							
Yes / No	***Duration***		***Preferred date/time***				
Reason							
Impact							

PS n_TOF				
Facility Coordinator last week	N. Patronis			
Facility Coordinator this week	N. Patronis			
Beam Requested				
Yes				
Facility Status				
Summary	Progressing with physics programme according to planning			
Issues	No issues			

Plans	• General comments:
	  ○ Since Friday 09.06.2023 n_TOF proton average intensity interlock was increased from 167E10 pps to 220E10 pps. More flexibility on accepting sequential PS pulses. Many thanks to SY-STI, PS-teams, RP!
	  ○ 28 ns pulse is available for dedicated as well as for the parasitic pulses. Again, many thanks to PS-teams!
	• EAR1: ^{181}Er(n,g) measurement (C6D6, sTED) till Tuesday 13.06.2023. Setup modifications for the next measurement mostly on Wednesday 14.06.2023. Next measurement is ^{30}Si(n,g) using C6D6 detectors.
	• EAR2: ^{243}Am(n,f) reaction study using uMegas detectors is running nicely. Already in data taking mode. Small issues encountered in the gas regulation system.
	• NEAR: no irradiation in the activation area (a-NEAR). In the irradiation area (i-NEAR) different material irradiation hardness studies are on-going.			

Foreseen Beam Stop				
Yes	***Duration***	6 h	***Date/Time***	Wed 14.06.23 10h-16h

AD - ELENA

Machine Supervisor last week	
Machine Supervisor this week	

Beam Scheduled			
AD	Yes/No	***ELENA***	Yes/No

Availability (AFT)			
AD	%	***ELENA***	%

Facility Status	
Summary	* All systems checked for pbars operation in AD, ELENA and transfer lines: - stochastic cooling and e-cooling - Bunch rotation, capture and deceleration * ELENA injection kicker conditionned for pbars operation (2 days) * deployment in ELENA of new LLRF DSP deploy on Monday and tested along the week * study of e-cooling with lower e- current in ELENA
Issues	* Issues preventing deceleration: - wrong wiring on 2nd driver amplifier of stochastic cooling fixed on Wed. - wrong polarity on 2 orbit correctors around e-cooler region corrected on Friday * Issues affecting monitoring: - noisy amplifier on RF LPU under repair - jitter on DI BTV trigger corrected - acquisition problem on AD scraper measurement - Regulation of MAINS power supplies to be checked when expert back from holidays
Plans	* repair of the RF PU amplifier to restaure good tomoscope/Schottky measurement * setting-up of stochastic cooling on both plateau * optimization of DI lines over nights

Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS

Machine Coordinator last week	Michael Schenk
Machine Coordinator this week	Verena Kain

Beam Scheduled

LHC	Yes	***NA***	Yes	***AWAKE***	No	***HiRadMat***	No

Beam Availability by Destination (AFT)

LHC	98.4 %	***NA***	80.9 %	***AWAKE***	- %	***HiRadMat***	- %

Facility Status

Summary

Week of LHC fills, NA physics, short-parallel MDs and a dedicated crab cavity MD at the SPS. Reasonably good beam availability overall with, however, one major issue on a NA quadrupole magnet in the TDC2 area leading to significant NA downtime and requiring a 4 h intervention followed by a difficult recovery of T2 target steering.

LHC:
Various tests were made to verify if injection losses and scraping can be reduced. This showed that for Beam 2, scraping could be reduced down to about 3 - 4 % (H), i.e. about half of what is needed for Beam 1. A test of energy matching for the transfer line demonstrated significant improvements to the trajectory for a pilot bunch (settings reverted as approval needed for bunch trains). Scraping at top energy was attempted, too, but is not currently an option since beam losses are too high at BPM 118 (hardware saturation). Besides, the ALPS team successfully set up trajectory acquisition on all injections. The procedure is now to be implemented to automatically follow the different bunch patterns.

SFTPRO:
During the dedicated crab cavity MD on Wednesday, a significant water leak was discovered on the QTAD.230.200 in a fairly radioactive area (TDC2). Attempts were made by expert to run the magnet without water cooling until iTS1. Originally this looked promising, but when pulsing the magnet, it kept dropping out with “Fault OFF”. Several hours of checks and attempts to get the magnet running were without success. Eventually we decided to go for access Thursday morning after a 24 h NA cool-down.

While the intervention on the QTAD was successful, the recovery of the NA beam after the repair was very challenging. The steering to T2 seemed completely off (low multiplicity, symmetry, inconsistent intensity readings) and line did not behave as expected, while T4 and T6 were fine. On the 230.925 BTV where the beam should be point like, it had a large vertical size. This even after reloading settings from before the intervention. Overall, it took about 5 h of debugging a.o. with additional settings reloads. Eventually, third attempt reloading corrector settings from before start of dedicated MD brought everything back to normal. The reason why it suddenly worked could not be understood yet.

Upon user request, the sharing was adjusted to 100 / 52 / 30 on T2 / T4 / T6 on Thursday.

The reason for the lower spill duty factor observed last weekend after the empty bucket channelling (EBC) tests was found to be due to a dp/p offset setting that had not been properly reverted.

MDs:
Short-parallel MDs took place: 1) ALPS interlocks commissioning; 2) bunch-by-bunch tune-shift studies with intensities reaching from 0.8×10^{11} ppb to 2.3×10^{11} ppb with 1x72b; and 3) PS-SPS transfer studies. While the first two MDs had good beam availability, the third was, among others, impacted by the challenging recovery of the NA beam. The dedicated crab cavity MD took place on Wednesday and had overall a good availability as LHC was in quench recovery.

	Other: To fill in the night from Wednesday to Thursday where no NA beam could be delivered, tests were made in preparation of the LHC MD block with a first iteration on tuning the high-intensity 1x72b standard beam and the 1x56b 8b4e beam, both at $2x10^{11}$ ppb. In addition, a study was carried out on the impact of hysteresis on the machine tunes, playing cycles with different top energies in front of the actual measurement cycle. A test was started on Friday to verify if the spark rate on the ZS tank 1 can be reduced. The gap was opened while proportionally increasing the voltage to keep the same electric field. Various interventions took place in the shadow of the PSB stop on Thursday, 07:30 – 08:30: change of modules on Thales cavities; access for MSE6; ZS ion trap. Work was done on the 200 MHz cavities in the shadow of the PS stop on Friday.
Issues	- Significant water leak on QTAD.230.200 (TDC2) required 4 h intervention on Thursday morning followed by difficult beam recovery. - 200 MHz C1 has still been tripping several times throughout the week. Various interventions took place. Situation better during the weekend. - No signal on BA1 ALPS BPMs for LHC-type beams. To be investigated further when responsible back from vacation. - Spill noise correction stopped on Sunday morning. Relatively strong 100 Hz which took a while to recover. - QUAD 061.710 (NA) not following reference from Sunday on (to be resolved).
Plans	The focus next week will be on NA physics and the LHC MD block 1. Beam preparations for LHC MDs will take place on Monday. The short parallel MD slots foreseen for Monday got cancelled after advancing the LHC MD block by 1 day. Try to find a slot for EBC tests on a non-physics cycle and address open issues listed above.

Intervention Request				
No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS North Area

Facility Coordinator last week	**J. Bernhard**
Facility Coordinator this week	**B. Rae**

Beam Scheduled							
H2	Yes	***H6***	Yes	***K12***	Yes	***P42***	Yes
H4	Yes	***H8***	Yes	***M2***	Yes	***TT20***	Yes
Beam Availability by Destination (AFT)							
H2	91.1%	***H6***	91.1%	***K12***	91.1%	***P42***	91.1%
H4	91.1%	***H8***	91.1%	***M2***	91.1%	***TT20***	91.1%

Facility Status	
Summary	General: Wobbling change on Monday to 300 GeV/c for H8, tuning all the lines accordingly, then went back on Wednesday. H2/4: Smooth running. H6: Smooth running with high intensity and minimum beam size. H8: Smooth running. PROTOV (main) installation delayed a couple of days, GALORE (parasitic) took data in the meantime. M2: Fine tuning done for 100 GeV/c hadron beam. P42/K12: Now running nominal intensity for NA62. No issues running the lines. Sharing: 100-105 (T2) - 52 (T4) - 30 (T6)
Issues	• User changes on the weekend must be avoided. • Several users complain about sudden change of 50 Hz component for which CCC cannot do anything on the weekend as experts are not available. • Otherwise no blocking faults / downtimes in the North Area. • M2: CEDAR PMT readout in CESAR was not working after the crate restart which has been fixed on Wednesday. SCRAPER.065070 readout needs to be checked as the reference is off. Investigation is ongoing by BE-CEM. Ok for operation.
Plans	Continue physics in EHN1, EHN2 and ECN3. • H2: MUonE → EP-FTS planned on Saturday 10.06., effectively done on Sunday. EP-FTS → ATLAS ZDC on Wednesday. • H4: Continue NA64e. • H6: EP Pixel, ALICE ITS3 → ATLAS ITK PIXEL (main), AIDAINNOVA (parallel) • H8: PROTOV (main), GALORE (parasitic) → TOTEM (main), LHCB x2 (parallel), STI (parallel).

Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	

SPS AWAKE				
Facility Coordinator last week	Giovanni Zevi Della Porta			
Facility Coordinator this week	-			
Facility Status				
Summary	Main focus: installation of Density Step Plasma Source Whenever possible: laser and electron beam commissioning Laser commissioning (Monday, Wednesday, Friday): - Moved translator on UV line to increase electron-laser delay - Realigned UV line - Realigned IR line Electron beam commissioning (Tuesday, Friday): - Calibrated and tested orthogonal steering with new corrector. Reproducibility better than 20 μm, as long as momentum shifts during the day are accounted - Position scans for Cherenkov Diffraction Radiation BPMs at 50-75 GHz and 75-110 GHz broadband			
Issues	Patrol lost twice (emergency handle very sensitive)			
Plans	Installation and pulling optical fibers for Density Step Plasma Source. Continue commissioning the electron and laser beams whenever time allows.			
Foreseen beam stop				
Yes / No	***Duration***		***date/time***	

LHC				
Machine Coordinator last week	E. Bravin			
Machine Coordinator this week	J. Wenninger			
Statistics				
Availability	81.4%		***Stable Beam Ratio***	61.9%
Facility Status				
Summary	Week dedicated to luminosity production, around 6 fb-1 delivered in the last seven days, total production so far around 21 fb-1. One shift dedicated to the commissioning of the high beta* cycle (to 120m) on Thursday afternoon. There was also a long stop (~12h) on Wednesday due to a training quench in S81. Operation is now quite smooth. Still some problems with the injection of B1 that requires substantial scraping in the SPS (around 10%). A HW problem in the SPS scraper renders the cycle non reproducible with bad batches that cause losses in LHC and trigger beam dumps. A software interlock has been created to inhibit the injection in the LHC if the scraping in the SPS is outside tolerance. Losses at the end of the ramp from 4L1 and other losses (start of ramp, start of collisions) that were critical earlier in the run are now well below the dump thresholds. Recovery of problem in 4L1 is completed. Operating regularly with I_bunch between 1.55 and 1.6 E11. The background in ATLAS caused by the degraded vacuum in 4L1 has also recovered and is now back to the levels before the venting.			
Issues	Losses at injection of B1 requiring large scraping in the SPS. Unreliable movement of the SPS scrapers leads to badly scraped batches being injected in the LHC that trigger a dump due to losses in IR7. Intensity of 8b4e and 36b batches in an SPS train is often uneven leading to a large spread of the bunch by bunch luminosity, better checking/tuning in the injectors is needed. 12h stop due to training quench in S81. Few issues with QPS elements (crates, heaters etc.) requiring access. Two fills dumped by RF interlock of line 6.B2.			
Plans	Luminosity production until Tuesday afternoon, then MD1 block until TS1.			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	

CLEAR	
Facility Coordinator last week	P. Korysko
Facility Coordinator this week	P. Korysko
Facility Status	
Summary	Last week was be dedicated to two experiments: - Electro-Optical Spectral Decomposition (EOSD) studies for Bunch Length Measurement with CERN BI. - Beam Profiler Detector tests for the Laser Und XFEL Experiment (LUXE) with INFN Padova.
Issues	No major issue.
Plans	This week is dedicated to CLEAR Machine Development.