24 July 2023

ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

SUMMARY OF WEEK 29 - 2023

Technical infrastructure – *R. Ledru*

Linac 4 - *A. Topaloudis*

PS Booster – *R. Murillo Garcia*

ISOLDE – *A. Rodriguez*

PS – *A. Huschauer*

PS – East Area - *J. Bernhard*

PS – nTOF – *N. Patronis*

AD – ELENA – *B. Dupuy*

SPS – *A. Spierer*

SPS – North Area - *J. Bernhard*

SPS – AWAKE – *G. Zevi Della Porta*

SPS – HiRadMat - *P. Simon & A. Goillot*

Linac 3 – *G. Bellodi*

LEIR – *Not running, no report*

LHC - *J. Wenninger*

CLEAR – *P. Korysko*

Technical Infrastructure (TI)

Facility Coordinator last week	Ronan Ledru
Facility Coordinator this week	Ronan Ledru

Statistics

Alarms	24 788				
Phone calls	848	***Incoming***	384	***Outgoing***	464
ODMs	117				

Facility Status

Summary	Mon 17/07/23 - 01:00 Electrical glitch on the 220kV swiss network (Foretaille) felt at CERN Cryo lost and Quench in the LHC Fri 21/07/23 - 15:14 Stop of the BA81 fine water cooling circuit. The circuit has stop after a too long time of opening of the filling valve This was due to a stop of the filling circuit coming from the b.378
Issues	
Plans	

Intervention Request

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

Linac 4				
Machine Coordinator last week	A. Topaloudis			
Machine Coordinator this week	JB. Lallement			
Statistics				
Availability	99.7%			
Facility Status				
Summary	Excellent week			
Issues	Few trips of L4L.RCH.111 power converter despite the change of HW last week: • Wednesday 19/07 morning (3m) • Friday 21/07 night (12m) L4L.RCV.371 power converter trip on Friday afternoon (6m)			
Plans	Regular operation			
Intervention Request				
Yes / No	***Duration***	4h	***Preferred date/time***	Not urgent; to be done in the shadow of another stop
Reason	Finalise elevator repair			
Impact	No beam			

PS Booster				
Machine Coordinator last week	Raul Murillo Garcia			
Machine Coordinator this week	Simon Albright			
Beam Scheduled				
ISOLDE	Yes		***PS***	Yes
Beam Availability by Destination (AFT)				
ISOLDE	99.7%		***PS***	99.9%
Facility Status				
Summary	• Excellent week with very high availability of the machine. • All operational and MD beams were delivered as requested. • Online Check: start resolving LSA – equipment device inconsistencies. • The cause of the noise in the lossEvolution signal of the BR.BLM.B, reported last Sunday, has been understood. https://issues.cern.ch/browse/BIOP-1049 • During the scraping studies MD it was realised that the correctors for the bumps are connected with the wrong polarity. EPC expert contacted to switch the polarity from the surface.			
Issues	• Tuesday: the R3 extraction kicker BE3.KFA14L1 tripped several. Piquet confirms that the kicker can be reset. • L4L.RCH.111 tripped on Wednesday and Friday. A reset fixed the problem. • Thursday: BR.QCD.1 tripped. Could not be reset by OP so PiPo was called. • Friday: trip of PSBTK.361.TK.SC.MODULE.1. Fixed after a reset. • Sunday: trip of PSBEH.361_EK_SC_MODULE_1.			
Plans				
Intervention Request				
Maybe	***Duration***	1 hour	***Preferred date/time***	July 27th 07:30-8:30
Reason	Visually monitor the evolution of the water leak in QFO11			
Impact				

ISOLDE

Machine Supervisor last week	Alberto Rodriguez
Machine Supervisor this week	Simon Mataguez

Beam Scheduled

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

Beam Availability by Destination (AFT)

GPS	n.a.	***HRS***	n.a.	***GPS + HIE-ISO***	91.7 %

Facility Status

Summary	Important week at ISOLDE with first two HIE-ISOLDE experiments of the year. Radioactive beams ($^{184,185}Hg^{45+}$ at 4.0 MeV/u) from GPS front-end to the Miniball experimental station since 19.07 and until 24.07. Details: - 22Ne6+ to Miniball for commissioning and calibration of experimental station (17-18.07). - Target installation (#727M), heating and RILIS setup (17.07). - Set-up of the GPS separator, transfer line to post-accelerator, REX-TRAP and REX-EBIS (18.07). - Rephasing and set-up of the linac (19.07). - First radioactive beam of the year to Miniball ($^{184}Hg^{45+}$ at 4.0 MeV/u for experiment IS563) on 19.07. - Preparation and delivery of second radioactive beam of the year to Miniball ($^{185}Hg^{45+}$ at 4.0 MeV/u for experiments IS699) on 19.07. - End of experiments 24.07 at ~ 08:45
Issues	- Trips, drifts and instabilities of the IH structure (~13 h). Difficult week mostly due to the instabilities and drifts in power of the IH structure causing the loss of the beam. The cavity had to be readjusted often and the quality of the beam. The longitudinal beam emittance too large and it translate to a larger than expected beam after the going through the XT01 dipoles. The beam had to be collimated in the HEBT losing a significant fraction of it (~25-40%) during the experiment. - Trips and rephasing of the superconducting cavities (~3 h). The quality factor Q of SRF06 degraded on 21.07 which forced the rephrasing of the linac. Fortunately, only one extra cavity was being used at that time since the energy requested by the users was only 4.0 MeV/u. Beam back to the users in a couple of hours.
Plans	HRS: - MEDICIS target irradiation (24-25.07). - Setup of separator and LEBT line to VITO. - Physics at VITO (IS733) scheduled for 26.07. GPS: - Target installation (#812), separator setup and physics (IS688) at GLM scheduled for 24.07. - Target installation (#824) on 28.07. REX/HIE-ISOLDE: - Stable $^{22}Ne^{6+}$ at 3.5 MeV/u to Miniball for calibration (24-25.07) - Investigation of IH amplifier instabilities by RF expert (25.07) - Preparation of reference set-up for physics with $^{49,50}Ca$ beams at ISS.

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">Alex Huschauer</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="6">Bettina Mikulec</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>97.5%</td><td>EA N</td><td>98.3%</td><td>EA T8</td><td>98.3%</td><td>EA T9</td><td>98.3%</td></tr>
<tr><td>nTOF</td><td>97.5%</td><td>SPS</td><td colspan="5">95.7%</td></tr>
<tr><th colspan="8">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="7">
Very good availability with few issues during the week
Improved monitoring put in place throughout the week:

Additional samplers of LLRF signals put into operation to monitor synchronisation and reproducibility
Monitoring of T9 and TN target steering based on asymmetry measurement from BLMs around the targets
Keeping a closer look on IRRAD steering based on intensity measurement on the first BPM

HRMT beams delivered with plenty of super cycle changes and splitting adjustments
TOF beam provided at 100E10 p on Wednesday evening, additional variants prepared at 50E10 p and 200E10p to be used in 1-2 week’s time (all variants including operational dedicated and parasitic in the same super cycle)
Proton sharing in the EAST area adjusted after request from physics coordinator on Tuesday night to send more beam to TN and let them successfully finish their programme
BGI-WS benchmarking continued, gas injection valve for BGIH82 apparently again broken (radiation damage)
Automatic online check put in place by BE-CSS; Allowed already to spot several inconsistencies (rounding errors are very often problematic)
SFTPRO high-intensity tests up to 3.5E13 p with only 98% cycle and extraction transmission. Longitudinal spill structure requires further studies and improvements.
</td></tr>
<tr><td>Issues</td><td colspan="7">
Very frequent parameter drifts on all kind of beams, especially EAST target steering and MTE efficiency. Root cause not clear, might be linked to high temperatures, but certainly also to super cycle composition.
AD reported issues with uncaptured beam during the stochastic cooling which suddenly appeared. PS extraction synchronisation improved by adjusting radial position and bunch rotation and batch compression verified, but no clear reason found. AD performance suddenly back to nominal without clear explanation on the PS side.
Very frequent jitter of the barrier bucket (BB) observed on the SFTPRO beams (~1 out of two cycles). Caused by BB created at the edge of two H16 buckets, adjusted by the RF experts. Additionally, the extraction was observed to take place too early → delayed by ~50 SPS buckets
2h without SFTPRO beams on Wednesday evening due to issues with KFA13 (fixed by piquet)
Missing TT2 BPM acquisitions fixed by power cycle of the frontend
Increasing number of bad pulses observed on KFA45 throughout the week (SY-ABT informed and investigating)
Two piquet interventions required Sunday night:

F16.QDN180 down, restart of the converter sufficient, 1.5h without beam for nTOF, AD and SPS.

</td></tr>
</table>

<table>
<tr><td></td><td colspan="4">F16.BHZ167 down, piquet increased waterflow, 45 mins without beam for nTOF, AD and SPS.
Data extraction from NXCALS sometimes very tedious and long for many acquisitions within a cycle (e.g. orbit data, logged in matrix format). Discussing different ways of logging the data to ease data extraction.</td></tr>
<tr><td>Plans</td><td colspan="4"></td></tr>
<tr><td colspan="5">Intervention Request</td></tr>
<tr><td>Yes</td><td>Duration</td><td>30 mins</td><td>Preferred date/time</td><td>Thursday 27.07.2023</td></tr>
<tr><td>Reason</td><td colspan="4">Audio-visual inspection of the PS main units</td></tr>
<tr><td>Impact</td><td colspan="4">To be organised in parallel with the regular PSB magnet inspection</td></tr>
</table>

PS East Area							
Facility Coordinator last week	J. Bernhard						
Facility Coordinator this week	N. Charitonidis						
Beam Scheduled							
T8	Yes	***T9***	Yes	***T10***	Yes	***T11***	No
Beam Availability by Destination (AFT) General: 84%							
Running T8	?%	***T9***	?%	***T10***	?%	***T11***	N/A
Facility Status							
Summary	T09: Low momentum configuration continues for WCTE. No issues. T10: Standard operation. T11: No user.						
Issues	AFT: Fault kept open in PS results in 0% East Area availability.						
Plans	• T09: WCTE continues. • T10: BL4S → RE21 CBM.						
Intervention Request							
Yes / No	***Duration***		***Preferred date/time***				
Reason							
Impact							

PS n_TOF				
Facility Coordinator last week	Nikolas Patronis			
Facility Coordinator this week	Nikolas Patronis			
Beam Requested				
Yes				
Facility Status				
Summary	Progressing with physics programme according to planning			
Issues	No issues			
Plans	• EAR1: 243Am(n,f) In stable data taking mode since Friday. 20 umegas detectors coupled with 243Am and 235U samples (+1 Boron sample). This measurement will stay for about 4 weeks. RP-veto in the area. • EAR2: 64Ni(n,g) also running nicely and smoothly. 8 sTED detectors at 90 deg + 3 C6D6 at 125 deg. This measurement will stay ~2 weeks. • NEAR: Diamond detector test using a few pulses. This test will take place on Wednesday			
Foreseen Beam Stop				
Yes	***Duration***	8h	***Date/Time***	WED, 26.07.2023, 8h00-16h00

AD - ELENA				
Machine Supervisor last week	Bruno Dupuy			
Machine Supervisor this week	Lajos Bojtar			
Beam Scheduled				
AD	Yes		***ELENA***	Yes
Availability (AFT)				
AD	95%		***ELENA***	95%
Facility Status				
Summary	AD nominal beam ~3e7 Pbar per extraction. - Burst of 12 pulses before injection now installed on 2 dipoles and 1 quad in the DI line, for stability study in production. ELENA Nominal beam ~6e6 Pbar per bunch. - Variations of AEGIS current on the main magnet have been compensated by proportional line adjustment on ALPHA and ACACUSA2 lines.			
Issues	Only AD machine: - Again, current variation by factor 2 on QUAD-TRIM3 power supply. Third attempt to fix this issue by first line. - Computer of the optical notch filter at 3.57 GeV was rebooted Sunday to restore nominal stochastic cooling on the first flattop.			
Plans	Physics Pbar production			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS							
Machine Coordinator last week	Arthur Spierer						
Machine Coordinator this week	Michael Schenk						
Beam Scheduled							
LHC	~No	***NA***	Yes	***AWAKE***	No	***HiRadMat***	Yes
Beam Availability by Destination (AFT)							
LHC	-%	***NA***	94.3%	***AWAKE***	%	***HiRadMat***	96.3%
Facility Status							
Summary	A very stable week for the SPS, with a high availability for the HiRadMat run and the North Area. This week was marked by the absence of LHC fills, that allowed us to run the previous week's cancelled MD. MDs: Monday and Tuesday parallel MD went smoothly: -Optimisation of phase jump for fixed target beam extraction -Flat-bottom instability threshold for 12 bunches The long parallel MD on Brightness measurement cancelled on week 28 was inserted on Thursday this week. Profiting from the intensity ramp up, the wirescanners were thoroughly monitored/tested. The intensity reached at flat top with 288 bunches was 2.15e11, 1.8ns bunch length. The vertical wirescanner behaved nicely. Instead, the horizontal wirescanner reached temperatures triggering thermo-ionic emission, but in a much less severe state than before their upgrade. Nevertheless, both wire scanners show no damage. HiRadMat: The main pulse list was completed by Tuesday afternoon and the team profited from the extra time to store reference optics/steering and extend the tests of a window with higher intensities (1.6e11, 288 bunches). North Area: The intensity was increased by 30 units to T4 on Wednesday. Two minor issues in the lines are described below. Some periods with 1 cycle out of 4 lost identified to be Interlock on TT10 BLMs, thresholds still to be discussed. Interventions: Beam stop on Wednesday from 8:00 to 10:00 for CV lift intervention in BA5 and RF Crab Cavities circuit-breaker intervention.						
Issues	- LLRF/CEM intervention Monday 4:00 to 8:00 for white rabbit clock generation failure. - Trouble setting up HiRadMat steering (RBIH tripping at polarity change) Monday night. - Friday 15:30 half of the magnets in the North Area tripped due to an issue with the BA81 cooling water. - NA Power Converters regulation cards changed by piquet on Sunday (NR22_010, NR22_09).						
Plans	MD program: Monday and Tuesday short parallel, Wednesday dedicated with first two hours of Crab cavities Thursday long parallel. Empty bucket channelling setting up should be done when NA62 is able to feedback on data, from 30th of July.						
Intervention Request							
Yes	***Duration***	4h	***Preferred date/time***	n.a.			

Reason	No access needed, but 4 h without beam to replace Philipps amplifier (contact E. Montesinos)			
Impact				
Yes	***Duration***	4h30	***Preferred date/time***	27th of July, in the shadow of PSB inspection
Reason	1. An electrovalve is broken on the pump installed at position 082 in TCC2 (M2 line) 2. Access to TT83 to replace some local electronics of three profile monitors. (1h cooldown, 30 min intervention)			
Impact	No beam to NA, 4h cooldown, 30 min. intervention			

SPS North Area

Facility Coordinator last week	J. Bernhard
Facility Coordinator this week	N. Charitonidis

Beam Scheduled

H2	Yes	***H6***	Yes	***K12***	Yes	***P42***	Yes
H4	Yes	***H8***	Yes	***M2***	Yes	***TT20***	Yes

Beam Availability by Destination (AFT) General: 87.5%

H2	92%	***H6***	92%	***K12***	92%	***P42***	92%
H4	92%	***H8***	92%	***M2***	92%	***TT20***	92%

Facility Status

Summary	H2/H4/T2: Wobbling change, standard operation, instabilities of beam position. H6: Normal operation with no issues. H8: Mostly ok, some issues with stability of beam position. M2: Beam checked with NA64mu. Going smoothly. P42/K12: Switch to beam dump mode for NA62 on Thursday, running at about 57 units on the K12 TAX. About a factor 2 less muon background in the experiment with respect to 2021 running. T2/T4/T6 Sharing: After the discussion during the user meeting, the intensity values on T2 and T6 have been swapped in order to have more rate with the correct beam size for NA61. Now: 50 (T2) - 100 (T4) - 35 (T6) with 40 mm T4 target, ideally until NA62 finishes their beam dump run (probably 31.07.). T4 target head being discussed with H8 users due to low electron yield. Might imply potential request for higher intensity on T4 (120 units?), to be confirmed.
Issues	General: Cooling water issue last Friday in BA81, stop of all NA beams necessary (1h downtime). H2: Fluctuating vertical beam position for NA61 on their target during the weekend. Most probably caused by regulation cards on main bends, all four exchanged one by one until Sunday afternoon. Since then, it is stable. Impact on data being assessed. H8: Fluctuations in vertical beam position, but could be resolved by adapting optics. M2: XWCM.061102/219/543 not working. Local electronics to be replaced. Vacuum in VGGE.061.176 rising. Electrovalve to be replaced. P42: Vacuum electrovalve broken and needs to be replaced.
Plans	• H2: NA61/SHINE continues. • H4: CMS ECAL continues. • H6: ATLAS HGTD → ALICE ITS3, Monolith, EP Pixel. ATLAS MALTA continues. • H8: MPGD TRD, QFIB → POKER. Straw Tracker R&D continues. • M2: NA64mu continues.

Intervention Requests

Yes	***Duration***	1.5 - 2 h	***Preferred date/time***	As soon as possible, e.g. Thursday for PS stop. Access needed in TT83 (1 h cooldown, 0.5 - 1 h intervention) without NA extraction to replace the local electronics for the M2 XWCMs and the vacuum electrovalves in M2 and P42.
Yes	***Duration***	4.5 h	***Preferred date/time***	As soon as possible, e.g. Thursday for PS stop. Access needed in TCC2 (2h cooldown, 2h ventilation, 0.5h intervention) to replace electrovalve for M2 vacuum.

SPS AWAKE				
Facility Coordinator last week	Giovanni Zevi Della Porta			
Facility Coordinator this week	-			
Facility Status				
Summary	Functional tests of new Plasma Source. Laser vacuum pumped down, laser bunch length and intensity commissioned. Installed additional server for digital cameras. Streak Cameras and BTV aligned on nominal proton trajectory.			
Issues	Update on CTU timing issue: new firmware successful, issue solved.			
Plans	Last week before proton run. Complete commissioning of new Plasma Source. Complete installation of rubidium density diagnostics. Complete BTV alignment. Re-install spectrometer cameras array.			
Foreseen beam stop				
Yes / No	***Duration***		***date/time***	

SPS AWAKE				
Facility Coordinator last week	Giovanni Zevi Della Porta			
Facility Coordinator this week	-			
Facility Status				
Summary	Functional tests of new Plasma Source. Laser vacuum pumped down, laser bunch length and intensity commissioned. Installed additional server for digital cameras. Streak Cameras and BTV aligned on nominal proton trajectory.			
Issues	Update on CTU timing issue: new firmware successful, issue solved.			
Plans	Last week before proton run. Complete commissioning of new Plasma Source. Complete installation of rubidium density diagnostics. Complete BTV alignment. Re-install spectrometer cameras array.			
Foreseen beam stop				
Yes / No	***Duration***		***date/time***	

LHC				
Machine Coordinator last week	J. Wenninger			
Machine Coordinator this week	J. Wenninger			
Statistics				
Availability	0%		***Stable Beam Ratio***	0%
Facility Status				
Summary	The week was devoted to investigations of IT.L8 vacuum issue that occur early Monday morning. The leak was confirmed to be between the cold mass and the insulation vacuum. There are no integrity issues on DFBX and other lines are ok (thermal shield, beam screen, heat exchanger). Vibration tests performed on Tuesday by pressurizing the cold mass with Helium indicate as possible position of the leak at the Q1-Q2 interconnect. Wednesday Xrays of all interconnects, some small anomalies were observed on a bellow of the Q1-Q2 interconnect. All S78, LSS8L circuits were locked and grounded, all quench heaters were discharged. ELQA at room temperature on ITL8 did not show any issues, some values are changed by conditions are not nominal in terms of Helium pressure. The magnets are electrically intact. All liquid Helium was removed from S78 and moved to storage already on Friday. On Friday preparation for the opening of the interconnect Q1-Q2: BPM cables disconnected, BLMs and BLM cable trays removal, preparation of the triplet survey system. The RF cavities have been emptied and stabilized at 20K.			
Issues	Insulation vacuum leak in cold mass of inner triplet ITL8			
Plans	Open interconnection(s) and repair leak. No beam for a few weeks to months depending on severity of issue.			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	

Linac 3				
Machine Supervisor last week	G Bellodi			
Machine Supervisor this week	R Scrivens			
Statistics				
Availability	%NA			
Facility Status				
Ion species	Pb			
Summary	DSO test carried out on July 18th and beam permit obtained in the afternoon. RF timing issue solved. Started RF beam commissioning setup to find phase/amplitude setpoints for each individual cavity: scans of RFQ, ITM buncher and IH tank1 already taken. Source running stably throughout the week.			
Issues				
Plans	Sairem1 microwave generator tests and BCT calibration measurements planned for Monday 24th. Continue RF setup to find operational settings for Tank2, Tank3, ramping and debuncher cavities. Send beam to ITH line, setting up of stripping foils.			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

CLEAR	
Facility Coordinator last week	Pierre Korysko
Facility Coordinator this week	Pierre Korysko
Facility Status	
Summary	Last week was dedicated to <u>two experiments</u>: - Testing a new prototype for an Electro-Optical near-field monitor to measure the l**ongitudinal bunch profile** using **Electro-Optical Spectral Decoding (EOSD)** for **FCC-ee** (with **Karlsruhe Institute of Technology**). - **Beam Profiler Detector** measurements for the **Laser Und XFEL Experiment (LUXE)** (with **INFN Padova**).
Issues	No major issue.
Plans	This week is dedicated to <u>two experiments</u>: - **Irradiation of ZFE** with Very High Energy Electrons (**VHEE**) at Ultra High Dose Rate (**UHDR**) to observe the **FLASH** Biological Effect (with **CHUV**). - **Real-Time Dosimetry** studies for Medical Application using an array of **optical fibers** and a digital camera (with the **University of Oxford**).