17 July 2023

ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

SUMMARY OF WEEK 28 - 2023

Technical infrastructure – *R. Ledru*

Linac 4 – *E. Gousiou*

PS Booster – *G. P. Di Giovanni*

ISOLDE – *M. Lozano*

PS – *M. Fraser*

PS – East Area – *D. Banerjee*

PS – nTOF – *N. Patronis*

AD – ELENA – *L. Ponce*

SPS – *V. Kain*

SPS – North Area – *D. Banerjee*

SPS – AWAKE – *G. Zevi Della Porta*

SPS – HiRadMat – *Not running – No report*

Linac 3 – *D. Kuechler*

LEIR – *Not running – No report*

LHC – *S. Redaelli & M. Solfaroli*

CLEAR – *W. Farabolini*

Technical Infrastructure (TI)

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

Statistics

Alarms	25482				
Phone calls	962	***Incoming***	543	***Outgoing***	419
ODMs	191				

Facility Status

Summary	**Mon 10/07/23 - 20:04** Evacuation of LHC half-octant 8-1 due to break glass alarm LHC in stable beam, so nobody in the tunnel. Fire brigade acknowledged the alarm **Thu 13/07/23 - 13:22** Loss of 400V network EBD1/2U due to a 48V fault Fuse of the 48V system has replaced. CV equipments were affected but this has been transparent for the LHC **Thu 13/07/23 - 15:51** LICE TRD cooling circuit trip due to a leak on a water tank. This tank has a negative pressure, so the vaccum piquet has been contacted to help for a solution. The final fix will need 2 days of stop (next TS) **Fri 14/07/23 - 10:50** 66kV trip at LHC2 during works on the spare transformer (EHT103/2E) During the injection test on EHT103, the upper breaker has opened on differential fault. 35 minutes to restore the power **Sat 15/07/23 - 00:28** Fire alarm in CLEX Fire Brigade on site, nothing found Intervention finished at 00:54 **Sat 15/07/23 - 08:28** DSS inundation alarm in UX15, beam dump to check the alarm Some water found in the "Fosse Argon" of UX15. Neither CV operation or CV detector cooling has found a leak on their system **Mon 17/07/23 - 01:00** Electrical glitch on the 220kV swiss network (Foretaille) felt at CERN Cryo lost and Quench in the LHC
Issues	
Plans	

Intervention Request

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

Linac 4

Machine Coordinator last week	E. Gousiou
Machine Coordinator this week	JB. Lallement

Statistics

Availability	91.7%

Facility Status

Summary	- This week has been the first time Linac4 had issues with a cavity water pressure sensor. The issue occurred during the night and required HL-RF klystron and controls experts and access to the machine. The issue was resolved after 13h30; the main signature of the fault is understood and now the HL-RF teams are following up on ways to prevent, better diagnose and repair such faults. - In the shadow of the issue above two pending interventions took place: o BSM1: motor/clutch successfully repaired o L4L.RCH.111: FGC replaced – this was part of the investigation of the recurring trips of this corrector; there has been no trip since the FGC replacement.
Issues	- **[CCDTL1, 13h30]** o After four consecutive trips on the CCDTL1 cavity, each causing ~30min downtime (due to klystron filament heating time), the beam was stopped for investigation by the HL-RF experts. o The investigation showed that a faulty water pressure sensor of the CCDTL1 cavity (used for diagnostics) disturbed electrically the reading of the klystron filament current (used as an interlock). There was no issue with the klystron itself, there was just a perturbation on the reading caused by the sensor that is connected to the same PLC IO. o The event occurred during the night and required the intervention from HL-RF klystron experts and controls experts; access in the machine was needed for the visual inspection of the hoses, of the needle manometer and for the eventual replacement of the faulty sensor. o Actions for prevention, better diagnosis and faster repair are being followed up by the HL-RF team. - **[L4L.RCH.111, 17min]** o Two trips of the power converter of this corrector. o During the CCDTL1 intervention, the FGC was replaced and there has been no trip since.
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	G.P. Di Giovanni
Machine Coordinator this week	R. Murillo Garcia

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

Beam Availability by Destination (AFT)			
ISOLDE	90.6%	***PS***	90.6%

Facility Status

Summary

- Not an easy week for the PSB with most of the downtime caused by the Linac4, and a few issues with the PSB itself, see below.
- During most of the week, GPS took beam steadily at high current (up to 2 uA).
- Other than that, the preparation of the HiRadMat run was completed, and the STAGISOGPS beam checked to be ready for the upcoming week.

Issues

- On Monday late afternoon we experienced a few consecutive trips of the BI2.BSW1L1.1 interlocking all beams via the BIS:
  - The procedure 'PSB injection into less than four rings' (EDMS 2390281) was rigorously followed.
  - BI2.BSW1L1.1 interlock masked and injection in R2 inhibited. During this time, the PSB provided beam to TOF with R3, although at 15% lower intensity than the nominal beam.
  - Initially PiPO changed an electronic card, but it did not solve the issue although this managed to recover ring 2 overnight. When the morning after the converter tripped again, the issue was finally tracked down to a loose screw on the temperature sensor which resulted in wrong temperature measurements which were causing the equipment to trip. Fixed.
- On Tuesday, the ABT piquet was called to check on a few consecutive trips of the BE2.KFA14L1:
  - When the expert and the piquet went on site to check the equipment, they did not observe any anomaly. We will keep monitoring the situation.
- On Thursday we performed the routine access in the PSB to inspect the existing water leak on the QFO11 magnet:
  - The leak rate remains constant wrt previous weeks (60 ml/min).
  - In the shadow, a few more interventions were carried out:
    - BI2.KSW16L4 generator was replaced, as the current was out of specs.
    - The B-Train team installed additional diagnostic on the spare chains to continue the debugging, following last week's issues.
    - The EN-CV team required an intervention on the chilled water towers. This followed a short stop in the night between Tuesday and Wednesday which caused the trip of the PSB cavities in sector 5 & 7. EN-CV team cleaned the filters and managed to rebalance the system. The latter was not possible remotely before and it was the main reason to call for an intervention.
- At the time of the restart with beam, and following the long stop due to the issues with the CCDTL01 in Linac4, we had unusual high losses in the extraction TL resulting in beam being cut by the BLMs for GPS only.
  - The issue was tracked down to an unexpected charging effect on the recombination kicker BT2.KFA20 which was pulsing ~2 kV above the setpoint. The fork between the setpoint and the acquired voltage reduced over time and in ~2 hours it was back to nominal. ABT experts have been notified to follow this up. To recover the situation during this period, we adjusted the setpoint to match the expected voltage.

Plans

- Deliver beam to downstream machines/facilities for physics and MDs.
- Next routine access for the QFO11 visual check on 27th July 2023.

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

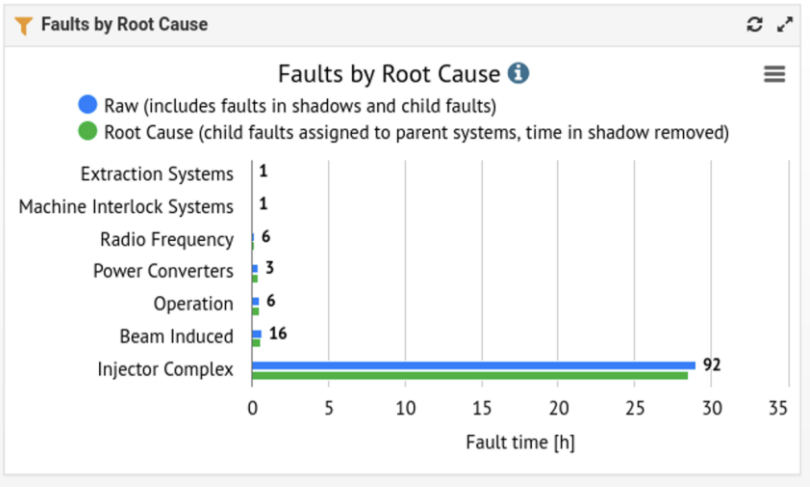
ISOLDE					
Machine Supervisor last week	Miguel Lozano				
Machine Supervisor this week	Alberto Rodriguez				
Beam Scheduled					
GPS	Yes	***HRS***	No	***HIE-ISO***	Yes/
Beam Availability by Destination (AFT)					
GPS	91%	***HRS***	N/A	***HIE-ISO***	95.8%
Facility Status					
Summary	GPS : Ac beams to GHM and LA1 Laser Ionized from Monday to Sunday night. Smooth run. HRS: On stand by. Some investigations about the possibility of running the RFQ with a lower gas flow were done. HIE-ISOLDE : Stable beam to ISS (22Ne6+ and 40Ar11+ at 7.58 MeV/u) during the week and stable beam to Miniball (22Ne6+ at 3.57 MeV/u) from Friday afternoon in preparation for the radioactive run this week.				
Issues	REX 7GAP3 rf amplifier tube replaced.				
Plans	Target change on Monday morning to be used in the Miniball Hg run this week. First radioactive beam of the 2023 campaign.				
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">Matthew Fraser</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="6">Alexander Huschauer</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>83 %</td><td>EA N</td><td>83%</td><td>EA T8</td><td>83%</td><td>EA T9</td><td>83%</td></tr>
<tr><td>nTOF</td><td>83%</td><td>SPS</td><td colspan="5">81%</td></tr>
<tr><th colspan="8">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="7">• PS-OP team forced to re-steer all beams at injection and extraction due to the drifting closed-orbit of the PS:
○ Drifting since 7th July the an unknown reason
○ Only alerted by radiation alarms (PAX304) on Wednesday 12th July
○ Transmission and beam loss affected on most cycles: n_TOF flux limited to 85e10 p/s until extraction could be re-steered over night
○ CO perturbation similar throughout the cycle: at injection and extraction
○ Comparison of CO taken on 14 GeV bare cycle in June indicates an error source in the region of the PS from 85 – 95 (not conclusive)
○ No obvious issues during visual inspection during Thursday’s access (last minute request, thanks Alexandre Cretin)
○ After discussion with EPC/MSC experts on Friday evening, agreed to wait and see how the situation evolves before investigating further: no obvious symptoms of an electrical issue.
• Calibration of the position of the SEH23’s actuation system was carried out during Thursday’s access and beam loss returned to normal on EAST cycles</td></tr>
<tr><td>Issues</td><td colspan="7">• Water leak at 2 cubic metres per day on PSR-TT2 circuit attributed to internal dump TDI48, discovered during Thursday’s access and isolated.
• Operation of TDI47 continued as instructed by SY-STI despite continued water-flow warnings on TDI47.
• Larger bunch lengths observed on 8b4e and fixed: likely due to bad contact in RF loops</td></tr>
<tr><td>Plans</td><td colspan="7">• Understand and stabilise source of PS closed-orbit drift</td></tr>
<tr><th colspan="8">Intervention Request</th></tr>
<tr><td>Yes</td><td>Duration</td><td colspan="2">1h</td><td>Preferred date/time</td><td colspan="2">TBC: depending on evolution of the CO drift</td></tr>
<tr><td>Reason</td><td colspan="7">Audio / visual inspection of PS to check for issue with MUs</td></tr>
<tr><td>Impact</td><td colspan="7">Access in PSR (potentially SY) whilst PS main units are pulsing</td></tr>
</table>

PS East Area							
Facility Coordinator last week	D. Banerjee						
Facility Coordinator this week	J. Bernhard						
Beam Scheduled							
T8	Yes	***T9***	Yes	***T10***	Yes	***T11***	No
Beam Availability by Destination (AFT) General: 90.6%							
Running T8	28.6%	***T9***	28.6%	***T10***	28.6%	***T11***	N/A
Facility Status							
Summary	T09: WCTE operation ongoing in low momentum configuration. Beam on target was checked and re-steered on Thursday. T10: Good operation. T11: No user.						
Issues							
Plans	• T09: WCTE continues • T10: ALICE ITS3 → BL4S						
Intervention Request							
Yes / No	***Duration***		***Preferred date/time***				
Reason							
Impact							

PS nTOF				
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: ^{30}Si(n,g) measurement successfully completed. Auxiliary measurements up to Tuesday18.07.2023. Collimator change (capture to fission: 1.8 cm→ 8.0 cm). ^{243}Am(n,f) setup on Wednesday to stay for ~30 days. • EAR2:^{30}Si(n,g) measurement up to Wednesday morning. 64Ni(n,g) measurement is starting. This is 3 weeks measurement. • NEAR: Intervention on Wednesday 19.07.2023 to install diamond detector. For only a few pulses to check electronics modifications.			
Foreseen Beam Stop				
Yes	***Duration***	5 h	***Date/Time***	WED 19.07.2023; 09:00-14:00

AD - ELENA				
Machine Supervisor last week	Laurette Ponce			
Machine Supervisor this week	Pierre Freyermuth			
Beam Scheduled				
AD	Yes		***ELENA***	Yes
Availability (AFT)				
AD	97.4%		***ELENA***	97.4%
Facility Status				
Summary	- Now two dipoles in the DI line run with forewarning 12 pusles instead of continuous pulsing. - Elena H- source filament broke. It was replaced thanks to ABP team. - Still looking for the causes of AD injected intensity fluctuations.			
Issues	One trip of the Quads, it takes ~30min to restart.			
Plans	Physics Pbar production			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS							
Machine Coordinator last week	Verena Kain						
Machine Coordinator this week	Arthur Spierer						
Beam Scheduled							
LHC	Yes	***NA***	Yes	***AWAKE***	No	***HiRadMat***	No
Beam Availability by Destination (AFT)							
LHC	~95 %	***NA***	~83 %	***AWAKE***	n.a.	***HiRadMat***	n.a.
Facility Status							
Summary	Relatively good week for the SPS. The majority of faults were faults of the SPS injector complex with a total availability of about 83 % (Sunday evening).  The main program was delivery of physics to NA and physics beam to the LHC. LHC filling was smooth this week without any issues with losses at injection. The scraping was typically 7 %. Also, FT physics was smooth no major issues to report. Attempt to put EBC into operation to be scheduled with NA62 in week 30. The TT10 BLM thresholds for all beams are set to very low values to act as beam quality monitor. Any changes from the PS lead to significant reduction of availability to running into interlock limits. The 2h of degraded beam (single injection for FT only) coming back after the dedicated MD on Wednesday were due to non-understood losses in TT10. During this week we therefore adopted the strategy to increase the thresholds along the entire line to at least 5 mGy in case of issues. The TT10 BLM threshold strategy will be further discussed in the SPS coordination meeting on Monday. Several MDs took place: Longitudinal single bunch instability studies, optimisation of phase jump for fixed target beam, test new method for tune and chromaticity analysis/control, measure transmission dependency on vertical emittance, hysteresis compensation tests and effect of increased intensity on T4 for beam dump mode. Unfortunately the dedicated MD with the collimation team to understand LHC beam flat bottom losses was almost entirely lost due to repeated LHC filling, issues with collimator getting stuck and slow progress during the little remaining beam time with the relatively complex set up required for that MD. The long parallel MD on Thursday was postponed due the LINAC4 long downtime. In preparation for this MD however the strategy for the wirescanners and LHC high intensity was discussed with the BI team. The main conclusion is that the wirescanners need to be tested with the highest intensities asap to define or confirm the YETS strategy for the remaining scanners. The potential consequences for the ion run are a separate consideration. The IEFC will come up with an approved						

	strategy for wirescanners and ion run in the near future in the unlikely scenario of them breaking with high intensity. Other preparations took also place: installation of HiRadMat experiment for next week and preparation for oxygen run with 13 GeV injection. The 13 GeV injection plateau requires new regulation for the main dipoles and also lower standby current (145 A). This was successfully tested. The beam dump system SBDS was initially thought to be a limitation for the set up with 13 GeV, as it was supposed to only arm from 14 GeV. It turned out however that it also arms in time for 13 GeV, but assuming 14 GeV dump kicker voltages (which should be fine, experts are checking). Sunday afternoon the indiv cycle with Q26 in preparation for the ion run was set up.
Issues	• Frequently LHC beam splitting from PS not reproducible within one filling • The eddy current compensation is not set up for the LHC operational cycle and the H mean drifts significantly at flat bottom. To be discussed during the SPS coordination meeting whether and when to compensate it. • The SPS sequence for giving access in point 8 needs to be reviewed. • SFTPRO injected 50 buckets off. Ball with the PS – they need to check several other aspects before being able to correct for that. • Not understood: RQIF.80400 trips. EPC working on it (suspecting issue with MCB) • TT10 loss thresholds to be set to reasonable values
Plans	

Intervention Request				
YES	***Duration***	4 h	***Preferred date/time***	n.a.
Reason	No access needed, but 4 h without beam to replace Philipps amplifier (contact E. Montesinos)			
Impact				

Intervention Request				
YES	***Duration***	***0.5 – 2h***	***Preferred date/time***	n.a.
Reason	CV alarm BA5, access in the tunnel required asap.			
Impact				

SPS North Area

Facility Coordinator last week	D. Banerjee
Facility Coordinator this week	J. Bernhard

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	84.8%	***H6***	84.8%	***K12***	84.8%	***P42***	84.8%
H4	84.8%	***H8***	84.8%	***M2***	84.8%	***TT20***	84.8%

Facility Status	
Summary	H2/H4/H6/H8: No issues, good operation week. M2: Muon beam checked for NA64mu. Finer tuning to be done next week with the user. P42/K12: Good operation. Checked high intensity for NA62 beam dump run during the last MD together with HSE-RP, no issues up to about 72 units on T10. Exact request for T4 intensity from July19th on needs to be still evaluated, probably between 100 and 120 units. T2/T4/T6 Sharing: 30 (T2) - 72 (T4) - 45 (T6) with 180 mm T4 target. T4 to be changed to 40 mm on 19.07. for NA62 BD run.
Issues	M2: XWCM.061.102/219/543 not working. Being followed up with BI. Local electronics to be replaced for which access will be needed with no extraction to North Area. To be planned. P42/K12: A set of trips of P0survey with negligible downtime, reason unknown. Might be an unstable regulation card that gives a wrong readout from time to time, being investigated. Some magnet resets.
Plans	• H2: NA61/SHINE continues. • H4: GIF++ → CMS ECAL. • H6: ATLAS HGTD, ATLAS MALTA continues. • H8: ATLAS TileCal → MPGD TRD, QFIB, Straw Tracker RD. • M2: NA64mu continues.

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

SPS AWAKE				
Facility Coordinator last week	Giovanni Zevi Della Porta			
Facility Coordinator this week	-			
Facility Status				
Summary	Bakeout of new Plasma Source. Continue GSM cabling. Laser compressor optics upgrade. Rubidium diagnostics installation			
Issues	Update on CTU timing issue: new firmware installed. Testing in progress.			
Plans	Functional tests to commission new Plasma Source. Pump down laser system and commissioning after optics upgrade.			
Foreseen beam stop				
Yes / No	***Duration***		***date/time***	

<table>
<tr><th colspan="5">LHC</th></tr>
<tr><td colspan="2">Machine Coordinator last week</td><td colspan="3">S. Redaelli (Mon/Tue/Wed), M. Solfaroli</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="3">M. Solfaroli (Mon/Tue), J. Wenninger</td></tr>
<tr><th colspan="5">Statistics</th></tr>
<tr><td>Availability</td><td colspan="2">73.2%</td><td>Stable Beam Ratio</td><td>42.5%</td></tr>
<tr><th colspan="5">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="4">Operation for physics with 2464 bunches, intensity ~1.6e11 p/b.
Large impact from thunderstorm on Tuesday night, with 2 fills dumped and few heaters fired.
Very long fill on Wednesday night/Thursday morning due to unavailability of LINAC4 (RF issue).
CMS magnet cooling sensor replaced on thursday afternoon. Magnet re-filling and ramp up took several hours. Several activities during the afternoon and night, waiting for CMS to be back:

• ALICE cooling issue fix
• Dry run of HB settings
• Optics measurements with Xing bumps on IONS cycle
• Faster beta* levelling test

Trip of 66kV on Friday morning (loss S12, S23, ALICE magnet, IP2 cryo compressor). Once physics restored, on Saturday morning, water leak in ATLAS (access needed) forced to dump prematurely. The investigation took a good part of the day. Stable beams until Sunday 1am when RF trip and quench of few magnets occurred (RQ7/9/10.R4, RQ10.R8, RQX.L8). Following the quench in RQX.L8 the cold compressor was lost and the insulation vacuum pression increased consistently.
TDIS temperature always very close to dump threshold during injections, leading to dump if not extracted immediately after injection is completed.</td></tr>
<tr><td>Issues</td><td colspan="4">RQX.L8 insulation vacuum degradation (to be assessed)
TDIS temperature interlock
66 kV trip -> loss of ALICE, PCs, cryo compressor (solved)
ATLAS water leak (to be followed up)
BSRT-B2 sometimes getting blocked
BSRA calibration to be adjusted</td></tr>
<tr><td>Plans</td><td colspan="4">High beta (3/6 km) optics commissioning (Mon)
HB background test (Tue)
Physics production</td></tr>
<tr><th colspan="5">Intervention Request</th></tr>
<tr><td>Yes / No</td><td>Duration</td><td></td><td>Preferred date/time</td><td></td></tr>
</table>

Linac 3				
Machine Supervisor last week	D. Küchler			
Machine Supervisor this week	G. Bellodi			
Statistics				
Availability	%			
Facility Status				
Ion species	Pb			
Summary	- Most of the time good, stable beam from the source (more than 100 eμA out of the RFQ). Some trips of the microwave which have to be followed up for further understanding. - Controls for RFQ and tank1 delivered. - Successful test of the oxygen inhibit system in the ITL line.			
Issues				
Plans	Continue to condition the source, after the DSO test (18 July) start to send beam through the linac. Continue the RF setup.			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

CLEAR	
Facility Coordinator last week	Wilfrid Farabolini
Facility Coordinator this week	Pierre Korysko
Facility Status	
Summary	Last week was dedicated to Machine Development including: - One-to-One and Dispersion Free Steering Corrections. - Dosimetry studies for Cancer Therapy with VHEE at UHDR. - New beam line preparation work. - Installation of this week experiment.
Issues	No major issue.
Plans	This week is dedicated to the following experiment: - Testing a new prototype for an electro-optical near-field monitor to measure the longitudinal bunch profile using electro-optical spectral decoding (EOSD) for FCC-ee (with Karlsruhe Institute of Technology).