3 July 2023

ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

SUMMARY OF WEEK 26 - 2023

Technical infrastructure – *J. Nielsen*

Linac 4 – *L. Timeo*

PS Booster – *R. Murillo Garcia*

ISOLDE – *M. Lozano*

PS – *B. Mikulec*

PS – East Area – *N. Charitonidis*

PS – nTOF – *N. Patronis*

AD – ELENA – *L. Ponce*

SPS – *K. Li*

SPS – North Area – *N. Charitonidis*

SPS – AWAKE – *G. Zevi Della Porta*

SPS – HiRadMat – *Not running, no report*

Linac 3 – *R. Scrivens*

LEIR – *Not running, no report*

LHC – E. Metral

CLEAR – *Avni Aksoy, P. Korysko*

Technical Infrastructure (TI)					
Facility Coordinator last week	Jesper Nielsen				
Facility Coordinator this week	Jesper Nielsen				
Facility Status					
Summary	Another quite busy week in TI with many interventions and both minor and major events. See more details in blog entry: https://wikis.cern.ch/display/TIOP/2023/07/03/TI+Week+summary%2C+Week+26				
Issues	**Tue 27/06/23 08:04**: A short circuit in the electrical cabinet EMD105*26 was detected by the fire brigade (fire alarm) and caused the breaker upstream (EMD201*59) to open on fault. This event cut all power to Meyrin and when the auto transfer system transferred the load and repowered the Meryrin site after 5 seconds, an internal electrical perturbation of -18% was seen for 180ms. This perturbation was enough to cut several installations CERN wide, like the CRYO in Meyrin and ATLAS. See TIOC event for more information **Thu 29/06/23 02:43:** TIM system had multiple processes in fault, still not understood what exactly caused the problem. The problem was fixed by the best effort expert. **Thu 29/06/23 12:55:** TCR in MEQ59 tripped due to a high conductivity alarm on the cooling system. Indeed the pumps had just been swapped and when the secondary pump started the conductivity was too high. Procedure for swapping pumps is being worked on and followed up in TIOC event. **Fri 30/06/23 02:17:** Electrical perturbation. Lot of thunderstorms in the same time. LHC saw trip of several Quadrupoles. Perturbation recorded as -15.68% for 80ms at CERN.				
Plans					
Intervention Request					
Yes / No	**Duration**		**Preferred date/time**		
Reason					
Impact					

Linac 4

Machine Coordinator last week	L. TIMEO
Machine Coordinator this week	G. BELLODI

Statistics

Availability	89.9%

Facility Status

Summary	A power outage disrupted operation for several hours. The source required reconditioning and reached the nominal current (35mA) the following morning. After the restart, the CCDTL0304 modulator has been operating with reduced cathode voltage (in terms of absolute value). During the weekend, CCDTL1 tripped several times, and the EPC + RF piquet jointly intervened.
Issues	Events which prevented operation: 1. On Monday, a discharge in the CCDTL3 klystron's HV tank tripped the modulator [downtime: 6min]. 2. On Tuesday morning, a power outage occurred. After the green light from TI, the OP team restarted all equipment [downtime: 6h 48min]. 3. On Tuesday afternoon, joint EPC + RF intervention on CCDTL4 to replace the voltage anode divider. Its failure depends on the discharges in the CCDTL3 klystron's HV tank. To avoid sparks, SY-RF reduced the cathode voltage setting [downtime: 2h 5min]. 4. After the restart, a vacuum interlock in the MEBT closed the valves. Likely, the chopper dump was degassing [downtime: 17min]. 5. Also, RPADG.363.LT.RBHZ30 and RPADF.363.LTB.BHZ40 did not pulse correctly. The piquet intervened [downtime: 23min]. 6. Furthermore, wrong settings left from the power failure resulted in several short periods where the watchdog cut the beam [downtime: 3min]. 7. On Wednesday, breakdowns in the RFQ cavity carried to level-1 recovery mode [downtime: 3min]. 8. On Thursday, the operation stopped to allow the compensator MEQ59 to restart [downtime:48min]. 9. On Friday, the pre-chopper tripped, but a reset sufficed [downtime: 5min]. 10. Between Friday evening and Saturday morning, CCDTL1 klystron tripped its modulator six times. EPC + RF piquet jointly intervened and focussed on the filament power supply first. Then, the RF piquet identified a faulty measurement card as the root cause [6h 2min]. 11. On Sunday, breakdowns in the CCDTL2 cavity carried to level-1 recovery mode [downtime: 4min]. 12. Also, RPZEO.400.L4L.RCH.111 tripped, but a reset sufficed [downtime: 10min].
Plans	Regular operation.

Intervention Request

Yes	***Duration***	1h	***Preferred date/time***	
Reason	Repair BSM1's motor/clutch.			
Impact	All proton beams stopped.			

PS Booster

Machine Coordinator last week	Raul Murillo Garcia
Machine Coordinator this week	Chiara Bracco

Beam Scheduled			
ISOLDE	Yes	***PS***	Yes
Beam Availability by Destination (AFT)			
ISOLDE	88.5 %	***PS***	89.0%

Facility Status

Summary	• All operational and MD beams were delivered as requested. • Rework 8b4e transverse emittances after the technical stop due to some variation. • Prepare multibunch HiRadMat beam for LHC. • A first version of the EAST beam from R4 prepared to mitigate for future issues with extraction kickers in R3. • Tuesday morning power cut resulted in 10-hour downtime. See issues below.

Issues	• Tuesday 7:35: power cut.
	  ○ 9:45: TI reports services are ok. Green light for PSB.
	  ○ Issues with FECs and equipment devices that remain offline.
	  ○ 14:00: we decide that EPC and RF replace the CCDTL4 klystron anode measurement element to mitigate potential damages. 2h intervention.
	  ○ Decide to advance the inspection of the water leak in QFO11. No degradation.
	  ○ BE3.DVT11L1, L4T.BHZ40, L4T.BHZ30 not pulsing need intervention from PIPO.
	  ○ 17:00: beam back.
	• Thursday: BE3.KFA14L1 kicker repeatedly trips. Experts work through the day. In the late afternoon decided to only reset 4-5 times. Otherwise work in degraded mode without R3 unless LHC fill is requested. Kicker stable during the night. To be discussed if thyratron is to be replaced: 4h for the intervention + ~1 day to recondition. Experts also checking if the other 3 rings could continue to pulse during the intervention.
	• After the thunderstorm in Thursday night water infiltrations were observed in B361: 1 leak in BHP and 2 in BCER. Water drops do not affect the racks. EN-ACE informed and following this up.
	• Friday and Saturday: CCDTL1 down repeatedly during the night. In the morning experts are called in. Filament current noise has been building up since 28.06. EPC PIPO replaces FUG converter in the Modulator. Doesn't help. Issue fixed however when RF expert replaces an RF acquisition card. CCDTL1 stable.

Plans	• Verify LHC HiRadMat multibunch beam with downstream machines.

Intervention Request

Maybe	***Duration***		***Preferred date/time***	
Reason	Possible intervention needed on the BE3.KFA14L1. Not yet clear. To be decided with ABT experts.			
Impact	4h for the replacement of the Thyratron and time for reconditioning the kicker (~1 day). Experts investigating if the other 3 rings could be pulsed during the intervention. In that case, degraded mode operation.			

ISOLDE

Machine Supervisor last week	Miguel Lozano
Machine Supervisor this week	Erwin Siesling

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

Beam Availability by Destination (AFT)					
GPS	40%	***HRS***	39%	***HIE-ISO***	%

Facility Status	
Summary	-GPS: Beam to GLM at 50 kV .119In , 124In.Laser ionized. -HRS: Molecular beam (RaF) to LA1. -REX/HIE-ISOLDE: Continuation of the cavities phasing process.
Issues	-Power cut on Tuesday. -Intervention at the HRS frontend to replace a leaking pneumatic actuator. -Instabilities of the normal conducting cavities and trips of the SRFs.
Plans	-HRS: Cr beams to Cris at 30 kV. -GPS:

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">B. Mikulec</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="6">R. Garcia Alia</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>86.7%</td><td>EA N</td><td>86.7%</td><td>EA T8</td><td>86.7%</td><td>EA T9</td><td>86.7%</td></tr>
<tr><td>nTOF</td><td>79.8%</td><td>SPS</td><td colspan="5">78.2%</td></tr>
<tr><th colspan="8">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="7">Week characterised by Power Cut in Meyrin on Tuesday – it took the whole day for the PS to recover, in particular because the 10 MHz cavities could only be restarted after the spare cubicle for EMD201*59 had been put in place by EN-EL. Had to call in practically all piquets and many specialists.</td></tr>
<tr><td>Issues</td><td colspan="7">Main issues were:
- H1 synchronisation with SPS not working Monday night, Tuesday night and shortly on Wednesday; affected LHC single-bunch beams and MTE barrier bucket cycle; a faulty cable and an ageing amplifier have been exchanged for the H16LI beam control (Tuesday night the MTE cycle was delivered to the SPS without barrier bucket)
- Broken power supply of the nTOF target Semgrid stopped beam operation to nTOF Tuesday night after the power cut
Since Friday delivering beam to AD for physics
- Put in place BLM thresholds for the TT2/F16 transfer line for all operational cycles, following the addition of filters for noise-suppression
- Realised a very high value for the BLM at the splitting to the TL to AD → resteering back to the ‘golden’ with the help of Y. Dutheil yesterday</td></tr>
<tr><td>Plans</td><td colspan="7">Make as soon as possible cavity monitoring for LHC multi-bunch beams operational; UCAP existing</td></tr>
<tr><th colspan="8">Intervention Request</th></tr>
<tr><td>Yes</td><td>Duration</td><td colspan="2">2h (0.5h access + calibration 1h)</td><td>Preferred date/time</td><td colspan="3">Not very urgent</td></tr>
<tr><td>Reason</td><td colspan="7">SEH23 cannot be moved (in local)</td></tr>
<tr><td>Impact</td><td colspan="7">currently blocked position; movement only in local with specialist if needed</td></tr>
</table>

PS East Area							
Facility Coordinator last week	**N. Charitonidis**						
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	90.6%	***T9***	90.6%	***T10***	88.3%	***T11***	N/A
Facility Status							
Summary	T09: No issues. Operation ongoing. T10: Smooth operation. T11: No user.						
Issues							
Plans	• T09: IDEA DRC continues • T10: IDEA CC → ALICE ITS3, ALICE Timing						
Intervention Request							
Yes / No	***Duration***		***Preferred date/time***				
Reason							
Impact							

PS nTOF				
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	Missing target Semgrid acquisition for several hours. No beam from Tuesday night up to Wednesday morning. The problem solved after changing a power supply module.			
Plans	• EAR1: The ^{30}Si(n,g) measurement is in data taking mode. • EAR2: ^{243}Am(n,f) measurement is also running nicely and smoothly. • 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***	5h	***Date/Time***	05.07.2023; 09h00-14h00

AD - ELENA				
Machine Supervisor last week	N/A (First Shift of 2023)			
Machine Supervisor this week	Bertrand Lefort			
Beam Scheduled				
AD	YES		***ELENA***	YES
Availability (AFT)				
AD	89 %		***ELENA***	100%
Facility Status				
Summary	Physics only starts on Friday at midday. The days of the week before that were dedicated understanding the recurrent issues we are experiencing with the main quads and fixing a failing amplifier in the Stochastic cooler. We also dedicate a fair amount of time optimizing the E-cooler (energy and electron trajectory) and optimizing the magnetic horn current VS Target longitudinal position.			
Issues	Quads Mains tripping BTV 5303 large variations shot-to-shot BVT 6068 large variations shot-to-shot			
Plans	We have noticed that, on the QUAD-TRIM3, between the current shown on the power supply display and the galvanometer reading there is a factor 2 error. We had to compensate the GFA accordingly. Must be investigated & fixed by the specialists on Monday!			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS							
Machine Coordinator last week	Kevin Li						
Machine Coordinator this week	Arthur Spierer						
Beam Scheduled							
LHC	Yes/No	***NA***	Yes/No	***AWAKE***	Yes/No	***HiRadMat***	Yes/No
Beam Availability by Destination (AFT)							
LHC	82.9%	***NA***	75.5%	***AWAKE***	-	***HiRadMat***	-
Facility Status							
Summary	A difficult week for the SPS with issues coming mostly from the injectors during the first half of the week followed by problems on the SPS side with the LHC beams which have not been operationally used since before the TS. The week started quietly in FT production mode with scrubbing for LHC beams completed (and wirescanners remaining fully functional). LHC multi-bunch beam setting up was planned for Monday but was put on hold due to persisting issues and seemingly unstable beam coming from the PS. Instead, VdM beams were prepared and characterized in the SPS with wirescanners(!). On Monday evening around 23:00 the PS suffered an outage of an RF component which is crucial for barrier buckets on the MTE beams. Beam delivery to NA had to be interrupted. While trying to fix the issue on Tuesday, a power glitch on the Meryin site took the entire complex down. Whereas the SPS recovered fairly quickly, collateral damage in the upstream machines prevented beam delivery until around 23:00. By this time, FT beams could be delivered again, but still without barrier buckets. Interrupted by the dedicated MDs on Wednesday, the FT beams were taken back in the evening with some delay due to a fault on the TT20 TECS control. The FT beams were further penalized during a large part of Thursday daytime due to problems with the extraction kicker on ring 3 in the PSB. It was only by Thursday evening, that FT beams could be delivered to the NA more stably and routinely for the remainder of the week. LHC had been taking beam all week with single bunches a first, VdM beams later and then moving towards multi-bunch beams towards the end of the week. The move to multi-bunch beams had been bumpy. Having stable multi-bunch beams back only by Friday, the setting up could be done only late and certain trims done to correct the unstable beams on Monday ended up deteriorating the operational beams sent to the LHC; this all took some time to diagnose, additionally perturbed by discontinuous beam delivery from LINAC4. By Saturday morning, however, beams from the SPS were ready and up to specs for the LHC. On the positive side, the newly installed wirescanners have been keeping up so far and were extensively used for LHC beam characterization. Moreover, the BSRT has been calibrated at 450 GeV during a calibration campaign on Thursday. The instrument can now serve as backup for emittance measurements at flat-top. The instrument has also proved to be extremely useful during crab cavity MDs. It was not used during this week's crab cavity MD, however, which has not been very successful due to several interruptions and different problems on various sides. The second part of the MD has been successful. Moreover, first tests of the technicalities for dynamic hysteresis correction could be tested parasitically during the Wednesday MDs.						
Issues	• Power glitch taking beams out essentially all Tuesday • Problems with PS RF for MTE and single bunch beams until Wednesday • Booster ring 3 leading to unstable beams for a large part of Thursday • Several issues for LHC beams – re-phasing missing and badly diagnosed, FGC RDH11607 REF.FUNC.PLAY disabled and bad Laslett tune corrections						

Plans	• Ion commissioning: test of dynamic filling patterns selection with LHCINDIV (4 injections) • Ion commissioning: test of 13 GeV injection energy cycle			
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

SPS North Area

Facility Coordinator last week	**N. Charitonidis**
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: 75.9%

H2	72.9%	***H6***	75.9%	***K12***	75.9%	***P42***	75.9%
H4	75.9%	***H8***	75.9%	***M2***	75.4%	***TT20***	75.9%

Facility Status

Summary	H2/H4/H6/H8: No issues. H8: First electron beams this year, users satisfied. K12: SHADOWS / NA62 muon test completed successfully on Monday. M2: AMBER DY high intensity test started 30.06 until 04.07. Test with RP done on 30th June to determine the exclusion zone during the test as well as max allowed intensity during day and night. T2/T4/T6 Sharing: 30 (T2) - 57 (T4) - 100 (T6) adjusted on 30.06. NA62 has requested 28-29 units on T10 for now, intensity of T4 to be adjusted accordingly if the target length changes.
Issues	H2: NR22_010 supply failure caused 4h downtime on Friday. First line intervened and fixed it. M2: Negative current could not be set on Quad 23. First Line was called – 1 hr downtime.
Plans	• H2: LHCb ECAL → NA61/SHINE • H4: NA64e → RD51 • H6: CMS MTD, EXFLU, ATLAS ITK PIXEL → EXFLU, MONOLITH, EP PIXEL • H8: IDEA DRC → ATLAS TileCal

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	Alignment of new Plasma Source. GSM cabling in TT41. Rotated BTV 412354 screen (open vacuum) to center proton beam on screen. Adapted CTU/VTU for new Streak Camera.			
Issues	CTU is not discarding Synch pulses after first one. Investigating with RF/timing.			
Plans	Hook up services to new Plasma Source. Continue GSM cabling. Re-install electron spectrometer			
Foreseen beam stop				
Yes / No	***Duration***		***date/time***	

LHC				
Machine Coordinator last week	E. Metral			
Machine Coordinator this week	D. Nisbet			
Statistics				
Availability	~ 69% (for the week, on MO 03/07/23 at ~ 07:00)		***Stable Beam Ratio***	38% (for the week, on MO 03/07/23 at ~ 07:00)
Facility Status				
Summary	- T2 CMS detector removed on Monday for VdM scans; restart of the CMS solenoid in ~ 4h => The VdM programme was done with 2 fills (#8997 and #8999) - Successful B1H crystal collimator check - Settings of TOTEM pot (XRPH.A6R5.B1) updated - Successful aperture check (except B2V due to issue with ADT, solved after) - Remaining Loss Maps (collision, flat-top, injection) done + Nominal cycle validation with bump for B2 - Checked the beneficial effect of the BPM correction on beam lifetime - E-cloud effect checked with ALICE solenoid down to 12kA (instead of 30kA) - Intensity ramp-up ongoing: last fill with 1800b (few hours in SB but dumped by quench of RQ7.L1) - Note: the 1st fill of the week was #8989 and the last one (on MO 03/07/23 at ~ 07:00) was #9023.			
Issues	- Fill dumped by unmaskable BLMs when moving the collimators - Issue with RB.A81 => Access needed to reset the circuit breaker - Electrical power cut in Meyrin tripped several circuits. All injectors were down and several accesses were needed - BSRT B1: motion of the lens is not fluid => Decided to freeze the BSRT in the FT configuration temporarily - ATLAS toroid OFF for several days - No beam from injectors due to PS RF beam control problem (loose cable and a broken amplifier) - Beam dumped due to RF trip (RF piquet saw that the trip was due to a crowbar of the line 4B1 => He gave his green light to restart) - Electrical glitch in P4 - Dumps at injection due to issue with Laslett tune shifts correction in the SPS (on 26/06/23 a large correction was applied on the 3rd injection for the QF) - 4 ATLAS detector dumps (BCM): at ~ 5.2 TeV (#1); ~ 5.6 TeV (#2); 6.8 TeV (#3 and 4) - Dump at ~ 5.5 TeV due to RF trip (RF trip of line 4B2: no alarm, no error, RF just went OFF) - Beam dump (RB.A78 trip: earth fault from external box) => Could be reset - B1 losses during 236b injection, beam quality issues in PS - RQ7.L1 quench => Still investigating			
Plans	Physics, back to pre-TS1 performance (planning to be back to 2400b physics fill this morning)			
Intervention Request				
Yes	***Duration***	> 2h	***Preferred date/time***	Not urgent => BSRT B1 + Some CV investigations

CLEAR	
Facility Coordinator last week	Avni Aksoy & Pierre Korysko
Facility Coordinator this week	Pierre Korysko
Facility Status	
Summary	Last week was dedicated to CLEAR Machine Development including: - Dosimetry studies for Cancer Therapy with VHEE at UHDR. - One-to-One and Dispersion Free Steering Corrections. - Uniform beam irradiations using a double-scattering foil system. - Beam stability studies.
Issues	No major issue.
Plans	This week is dedicated to two experiments: - Bunch Length Monitor for FCC using the Coherent Cherenkov Diffraction Radiation. - Generating a Transversely Uniform electron bunches by tailoring the space charge forces and the magnetic field of the solenoid.