

30 May 2023

# ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

## SUMMARY OF WEEK 21 - 2023

Technical infrastructure – *R. Ledru*

Linac 4 – *A. Topaloudis*

PS Booster – *R. Murillo Garcia*

ISOLDE – *E. Piselli*

PS – *M. Fraser*

PS – East Area – *J. Bernhard*

PS – nTOF – *N. Patronis*

AD – ELENA – *L. Ponce*

SPS – *F. Velotti*

SPS – North Area – *J. Bernhard*

SPS – AWAKE – *G. Zevi Della Porta*

SPS – HiRadMat – *A. Goillot*

Linac 3 – *No report, not running*

LEIR – *No report, not running*

LHC – *S. Redaelli*

CLEAR – *P. Korysko*

Technical Infrastructure (TI)			
<b>Facility Coordinator last week</b>		Ronan Ledru	
<b>Facility Coordinator this week</b>		Jesper Nielsen	
Facility Status			
<b>Summary</b>			
<b>Issues</b>		<p>Thu 25/05/23 07:45: Electrical perturbation, caused by a fault on the 400kV line Albertville / Montagny les Lanches. EN-EL measured a dip of -7.71% for 80ms on the CERN electrical network.</p> <p>Fri 26/05/23 08:44: Trip of BEQ1 compensator due to a low flow of the cooling. TI checked with SIG who confirmed that an intervention was ongoing on their side. Coordinated with CV and EPC to bring the SIG cooling station back to nominal before restarting the compensator.</p> <p>Tue 30/05/23 05:29: In LHC8, the compressed air used for CRYO installations had one compressor that stopped on fault. The pressure went down to 5.9 bars and almost tripped the CRYO installations. TI went on-site and restarted in manual one of the compressors, which was sufficient to get the pressure up again until the piquet could come on-site.</p>	
<b>Plans</b>			
Intervention Request			
<b>Yes / No</b>	<b>Duration</b>		<b>Preferred date/time</b>
<b>Reason</b>			
<b>Impact</b>			

<b>Linac 4</b>			
<b>Machine Coordinator last week</b>		Topaloudis Athanasios	
<b>Machine Coordinator this week</b>		Gousiou Evangelia	
<b>Statistics</b>			
<b>Availability</b>	99.9%		
<b>Facility Status</b>			
<b>Summary</b>	Excellent week		
<b>Issues</b>	Power converter (L4C.RQD.061) tripped (downtime: 10')		
<b>Plans</b>	Regular operation		
<b>Intervention Request</b>			
No	<b>Duration</b>		<b>Preferred date/time</b>
<b>Reason</b>			
<b>Impact</b>			

<b>PS Booster</b>			
<b>Machine Coordinator last week</b>		Raul Murillo Garcia	
<b>Machine Coordinator this week</b>		Federico Roncarolo	
<b>Beam Scheduled</b>			
<b>ISOLDE</b>	Yes	<b>PS</b>	Yes
<b>Beam Availability by Destination (AFT)</b>			
<b>ISOLDE</b>	96.4%	<b>PS</b>	96.4%
<b>Facility Status</b>			
<b>Summary</b>	<ul style="list-style-type: none"> <li>All operational and MD beams were delivered as requested: <ul style="list-style-type: none"> <li>STAGISO_GPS run since Friday.</li> </ul> </li> <li>Wednesday: deploy FESA class ABT_BIKSW_Ring and INCA server to fix the issue when loading tags for the user MD_LHCINDIV_BSRT_2023.</li> <li>Thursday: urgent access to inspect BR.QFO11 since CV refilling time had shortened. Anthony found a new water leak near BHZ21 on the hose connection. He fixed the leak by tightening the connection. Leak in QFO11 is stable.</li> <li>Thursday: preliminary successful operational tests with longitudinal painting for ISOLDE beam</li> </ul>		
<b>Issues</b>	<ul style="list-style-type: none"> <li>Wednesday: HRS beam cut due to losses detected in BT34.BLMIB.20.R in the recombination line (rings 3 and 4). <ul style="list-style-type: none"> <li>Vertical emittance higher than expected in R3.</li> <li>Emittance and losses reduced by adjusting the beam position at injection.</li> <li>BLM experts confirm the losses are real.</li> <li>A new extraction setting significantly reduces the losses for both ISOGPS and ISOHRS. It needs to be propagated to the operational users. To be discussed with the ISOLDE team.</li> </ul> </li> <li>Friday: injection issues due to the BCT FECs cfv-361-bctfi1 and cfv-361-bctfi2 not responding. Problem with the power supply of the crate. Downtime of ~2 hours</li> </ul>		
<b>Plans</b>	<ul style="list-style-type: none"> <li>Deliver beams to downstream machines and for MDs.</li> </ul>		
<b>Intervention Request</b>			
Yes/No	<b>Duration</b>	1 hour	<b>Preferred date/time</b> May 31 <sup>st</sup> 10:00 AM May 31 <sup>st</sup> 11:00 AM
<b>Reason</b>	IT requesting to stop GSM and Tetra network		
<b>Impact</b>	No beam stop necessary. Only if urgent access is requested, the intervention must be postponed.		

PS							
<b>Machine Coordinator last week</b>		Matthew Fraser					
<b>Machine Coordinator this week</b>		Denis Cotte					
Beam Scheduled							
<b>East Area</b>	Yes	<b>nTOF</b>	Yes	<b>AD</b>	Yes	<b>SPS</b>	Yes
Beam Availability by Destination (AFT)							
<b>AD</b>	94.5%	<b>EA N</b>	93.9%	<b>EA T8</b>	93.9%	<b>EA T9</b>	93.9%
<b>nTOF</b>	93.9%	<b>SPS</b>	93.9%				
Facility Status							
<b>Summary</b>	<p>A reasonable week for the PS with a few minor faults.</p> <p>LHC reports of intensity variations across the 36b batch investigated:</p> <ul style="list-style-type: none"> <li>- First ~4 bunches impacted by transient beam loading due to the largely empty machine with only 36b.</li> <li>- RF team disabled FInemet cavity to improve situation</li> <li>- First and last bunch intensity variations likely caused by SPS MKP (injection)</li> </ul> <p>EAST (injection at 1.4 GeV) cycle progressing well with many studies ongoing</p> <p>nTOF bunch with 28 ns bunch length (4sigma) ready in PS</p> <p>First version of VDM beam prepared at ~ 2.7 mm mrad</p> <p>KFA71 waveform cycle tested and ready for module-by-module beam-based synchronisation measurements</p> <p>FTA line optimisation and setup studies completed.</p>						
	<b>Issues</b>	<p>Beam stop and access Monday 22/5 afternoon to fix amplifier on C10-81 ~ 2 h downtime:</p> <ul style="list-style-type: none"> <li>- Restart complicated by KFA71 modules 2&amp;12 pulsing on all users just after injection: bug in local pulse unit, understood by ABT-EC and fixed.</li> </ul> <p>Beam stop Wednesday morning remove 25 ns jitter lasted ~ 3h (30 mins expected):</p> <ul style="list-style-type: none"> <li>- Old timing gateway module unexpectedly calibrated to falling edge of trigger pulse (long pulse of 10 us), new module with respect to rising-edge</li> <li>- Confusion with timing fault thought to come from front-end reboot for new TOF timings.</li> <li>- Rolled back KFA71 HW. New TG module will be reprogrammed, intervention needs planning.</li> </ul> <p>East extraction septum PE.SMH57 tripped with a FAST_ABORT (WIC temperature) needing expert intervention Thursday and Sunday morning</p> <p>NA users report too large emittance in MTE core: wire-scanners show clear correlation with TFB gain, to be checked every shift in PS.</p>					
<b>Plans</b>		<p>Investigations of PS extraction jitter proposed for Wednesday afternoon:</p> <ul style="list-style-type: none"> <li>- Plan 3 -5 consecutive LHC type cycles in a row in the PS to reproduce jitter issue (long parallel MD style) (systematic jitter behaviour)</li> <li>- No coupling to the SPS</li> <li>- Impact on the PS physics limited: same as the /LHC filling.</li> </ul>					
Intervention Request							
Yes	<b>Duration</b>	~ 2 hours		<b>Preferred date/time</b>	Wed 31 May 08:00		

<b><i>Reason</i></b>	T9 user vacuum modification needed with access in mixed zone.
<b><i>Impact</i></b>	Only East Area users (BE-EA coordinating) and IRRAD/CHARM OK

PS East Area							
<i>Facility Coordinator last week</i>		J. Bernhard					
<i>Facility Coordinator this week</i>		N. Charitonidis					
Beam Scheduled							
<i>T8</i>	Yes	<i>T9</i>	Yes	<i>T10</i>	No	<i>T11</i>	No
Beam Availability by Destination (AFT)							
<i>Running T8</i>	95.8%	<i>T9</i>	93.5%	<i>T10</i>	N/A	<i>T11</i>	N/A
Facility Status							
<i>Summary</i>	T09: CALICE data taking continuing.						
<i>Issues</i>	T09: XCET044 local electronics fault on 24.05. with 3 h downtime.						
<i>Plans</i>	<ul style="list-style-type: none"> <li>• T09: CALICE → Atlas Malta in low-momentum beamline configuration.</li> <li>• T10: No user.</li> <li>• T11: No user.</li> </ul>						
Intervention Request							
Yes / No	<i>Duration</i>	2h		<i>Preferred date/time</i>	Wednesday 09:00		
<i>Reason</i>	Access in mixed area (stop of East extraction) to change over to low-momentum configuration in T09 (complete vacuum). Already coordinated with T08 users and PS.						
<i>Impact</i>	Standard user change. If not done, user cannot take data.						

PS n_TOF				
<i>Facility Coordinator last week</i>	N. Patronis			
<i>Facility Coordinator this week</i>	N. Patronis			
Beam Requested				
Yes				
Facility Status				
<i>Summary</i>	Progressing with physics programme according to planning			
<i>Issues</i>	No issues			
<i>Plans</i>	<ul style="list-style-type: none"> <li>• EAR1: <math>^{181}\text{Er}(n,g)</math> measurement (C6D6, sTED)</li> <li>• EAR2: Capture setup auxiliary measurements</li> <li>• NEAR: <math>^{89}\text{Y}(n,g)</math> using 20mm B4C filters till Wednesday</li> </ul>			
Foreseen Beam Stop				
Yes	<i>Duration</i>	5h	<i>Date/Time</i>	We 31/05/23 9h-14h



<b>AD - ELENA</b>			
<b>Machine Supervisor last week</b>			
<b>Machine Supervisor this week</b>			
<b>Beam Scheduled</b>			
<b>AD</b>	Yes/No	<b>ELENA</b>	Yes/No
<b>Availability (AFT)</b>			
<b>AD</b>	%	<b>ELENA</b>	%
<b>Facility Status</b>			
<b>Summary</b>	<ul style="list-style-type: none"> <li>* QFC54 repair:               <ul style="list-style-type: none"> <li>- leak test completed after nbake-out on the injection kicker and extraction spetum</li> <li>- 5 leaks developed on the module 56 of the injection kicker during reconnection of the powering box, fixed by VSC.</li> <li>- conditioning of the kickers started on Friday</li> </ul> </li> <li>* AD ring in beam ON mode so complete HW tests:               <ul style="list-style-type: none"> <li>- all power supplies circuits tested, e-cooler ON, final test of the C10 cavity</li> </ul> </li> <li>* Beam back to target area on Thursday evening, beam in DI to check synchronization of the power converters after roll back of the timings</li> <li>* ELENA Hminus operation:               <ul style="list-style-type: none"> <li>- GBAR usin Hminus for calibration</li> <li>- final deployment of new TRIC card for intensity monitors in ring and transfer lines for coherent intensity measurement along the chain</li> <li>- work on orbit to align e- and ions.</li> </ul> </li> </ul>		
<b>Issues</b>	<ul style="list-style-type: none"> <li>- synchronisation of old Pow1553 power supply in DI line with new timing to reduce number of pulses before injection. Need extra timings to start the power converters, discussion postpone to next week and roll back for the first week of beam in DI</li> </ul>		
<b>Plans</b>	<ul style="list-style-type: none"> <li>* start beam commissioning of DI line with nominal intensity</li> <li>* study emittance at extraction in ELENA with reduce cooling time on last plateau.</li> </ul>		
<b>Intervention Request</b>			
Yes / No	<b>Duration</b>		<b>Preferred date/time</b>
<b>Reason</b>			
<b>Impact</b>			

SPS							
<b>Machine Coordinator last week</b>		F.M. Velotti					
<b>Machine Coordinator this week</b>		K. Li					
Beam Scheduled							
<b>LHC</b>	Yes	<b>NA</b>	Yes	<b>AWAKE</b>	No	<b>HiRadMat</b>	Yes
Beam Availability by Destination (AFT)							
<b>LHC</b>	92%	<b>NA</b>	84%	<b>AWAKE</b>	-	<b>HiRadMat</b>	99%
Facility Status							
<b>Summary</b>	<p>Good availability for the SPS, in line with usual average. The week was characterised by the start of HiRadMat experiments in 2023 and the optimisation of the beam for the LHC.</p> <p>After a rocky week, the LHC cycle was re-optimised and many experts worked on it (including PS RF experts) to try to improve the beam quality and improve the filling time. This comprised an upgrade on the RF for the re-phasing to LHC (now much more resilient to bad cycles), variation of pickup gains to account for the injected intensity, tune compensation for intensity, damper, chromaticity and MKP rise time. Finally, a change in speed on the slow motion of the scraper was also done reducing a bit its recurrent lost of steps (still there but less severe). All these changes resulted in very smooth LHC fills, but still with about 9% scraping. Several attempts were done to try to reduce it and inject with low losses – only achieved when the LHC requested higher intensity per bunch. The LHC was filled with up to 60% losses during the injection process with 6% scraping (TCP monitor factors were also changed).</p> <p>The main source of problems for the LHC fills now are the scraping losing steps (had a couple of events of dumps due to this), intermittently transfer from PS larger bunches on 36 bunch trains and injection phase jitter. Investigation still ongoing to understand the high losses in the injection process in the LHC.</p> <p>NA physics continued during this week with solely 2 long stops: a forced door and MBE intervention still coming from the problem of the previous week. Intensity slightly increased, as requested, and improvement on the horizontal emittance in the PS following low spill quality observations from NA62. EBC test postponed due to machine availability on the scheduled test.</p> <p>HiRadMat first experiment of 2023 completed. Only single bunches (up to <math>3e11</math> p) extracted. Thanks to the good progress over the week, there was also time to take high intensity LHC beams: accelerated to flat top <math>2.1e11</math> p/b in 288 bunches with 200 ns spacing this time.</p>						
<b>Issues</b>	<ul style="list-style-type: none"> <li>- Injection phase jitter</li> <li>- Longer bunches at injection (not clear if already from PS) from time to time on 36 bunches batches</li> <li>- Scraper still losing steps during operation</li> <li>- Bend H4 R22-11 and R22-12 showing intermittently that the current limitation for 400 GeV is not there (it does not seem to be true) – solved</li> <li>- MBE problem in TT20 from last week – investigation carried out due to a suspect of an arc. Finally found it in the transformer of the MBE: copper bar isolated and problem solved.</li> </ul>						
<b>Plans</b>	<p>Next week parallel MDs, crab cavity MD and long parallel MD.</p> <p>Long term actions:</p> <ul style="list-style-type: none"> <li>- Hysteresis problem on bumpers – cycles with different setting cause sever change in orbit in the following ones.</li> <li>- Request to inspect tunnel cracks once per month to measure movements (call P. Bestmann).</li> </ul>						
Intervention Request							
No	<b>Duration</b>	-	<b>Preferred date/time</b>				
<b>Reason</b>							
<b>Impact</b>							

SPS North Area							
<i>Facility Coordinator last week</i>		J. Bernhard					
<i>Facility Coordinator this week</i>		N. Charitonidis					
Beam Scheduled							
<i>H2</i>	Yes	<i>H6</i>	Yes	<i>K12</i>	Yes	<i>P42</i>	Yes
<i>H4</i>	Yes	<i>H8</i>	Yes	<i>M2</i>	Yes	<i>TT20</i>	Yes
Beam Availability by Destination (AFT)							
<i>H2</i>	87.8%	<i>H6</i>	87.8%	<i>K12</i>	87.8%	<i>P42</i>	87.8%
<i>H4</i>	87.0%	<i>H8</i>	81.2%	<i>M2</i>	87.8%	<i>TT20</i>	87.8%
Facility Status							
<i>Summary</i>	<p>H2/4/6: Smooth Operation.  M2: 60 GeV/c beam tuned for AMBER. Instabilities in the number of units on target from time to time.  P42/K12: NA62 has not resolved TDAQ issues, continuing with lower intensity.  Sharing: <b>100-105 (T2) - 50 (T4) - 60 (T6)</b>  <b>Note: T6 can be operated at lower intensity if this stabilizes the splitting (OK for AMBER). Preference for stability over total intensity.</b></p>						
<i>Issues</i>	<p>General: T2 wobbling magnet power supply issue (2h downtime for whole NA).  H8: Several quadrupole power supply issues (total 13h downtime).  H4: Quadrupole power supply issue (1h20min downtime).  H6: One XWCA wire chamber broken and to be replaced.</p>						
<i>Plans</i>	<p>Continue physics in EHN1, EHN2 and ECN3.</p> <ul style="list-style-type: none"> <li>• H2: RADICAL → MUonE ECAL.</li> <li>• H4: Continue NA64.</li> <li>• H6: ATLAS HGTD, ATLAS TOF continue parasitically, add ATLAS BCM Prime.</li> <li>• H8: SND and CMS MTD (in parallel), STRAW TRACKER (parasitic) → SND (main) and STRAW TRACKER (parasitic) only.</li> <li>• M2: Continue AMBER antiproton run.</li> <li>• P42/K12: Continue NA62. Might ask from time to time to change sharing slightly between T2/T4 due to TDAQ tests for NA62 (already checked with everybody).</li> </ul>						
Intervention Request							
Yes / No	<i>Duration</i>			<i>Preferred date/time</i>			

## SPS AWAKE

<b>Facility Coordinator last week</b>	Giovanni Zevi Della Porta		
<b>Facility Coordinator this week</b>	-		
<b>Facility Status</b>			
<b>Summary</b>	Dismantling and transport of Discharge Plasma Source after May proton run. Access System maintenance of TAG42 and TAG41.		
<b>Issues</b>	Patrol lost in TAG41 due to TAG42 Access System maintenance. Re-established.		
<b>Plans</b>	Begin installation of Density Step Plasma Source: TCC4 overhead cable tray and dedicated racks. Electron beam commissioning, if time allows. Contractor visit to CNGS area of TCC4.		
<b>Foreseen beam stop</b>			
Yes / No	<b>Duration</b>		<b>date/time</b>

<b>SPS HiRadMat</b>				
<b>Facility Coordinator last week</b>		A. Goillot		
<b>Facility Coordinator this week</b>		A. Goillot		
<b>Facility Status</b>				
<b>Summary</b>	HRMT-62 'Fireball' experiment successfully completed			
<b>Issues</b>	No issues particular to the TT60-TT66 line			
<b>Plans</b>	Next beam time: Week 26			
<b>Foreseen beam stop</b>				
No	<b>Duration</b>	-/-	<b>date/time</b>	-/-

## CLEAR

**Facility Coordinator last week** Pierre Korysko

**Facility Coordinator this week** Pierre Korysko

### Facility Status

<b>Summary</b>	<p>Last week was dedicated to 4 experiments:</p> <ul style="list-style-type: none"><li>- Medical research with the University of Victoria collaborators on VHEE at UHDR Real-Time Dosimetry using scintillators and optical fibres.</li><li>- Medical research with EPFL and the University of Victoria collaborators for biological sample irradiations.</li><li>- Spatially Fractionated Radio Therapy studies (to increase even more the healthy tissue sparing effect around cancerous cells).</li><li>- Medical research using scatterers for VHEE at UHDR to obtain a flat profile beam for Radio Therapy.</li></ul>
<b>Issues</b>	<p>Power supply of one focal of Klystron MKS15 had to be changed.</p>
<b>Plans</b>	<p>This week will be dedicated to two experiments:</p> <ul style="list-style-type: none"><li>- Beam for CERN Beam Instrumentation: AWAKE ChDR BPM studies.</li><li>- Medical research: irradiation of ZFE with VHEE at UHDR for RT studies.</li></ul>