27 March 2023

ACCELERATORS & EXPERIMENTAL FACILITIES STATUS

SUMMARY OF WEEK 12- 2023

Technical infrastructure – report received

Linac 4 – report received

PS Booster – report received

ISOLDE – report recevied

PS – report received

PS – East Area

PS – nTOF – report received

AD – ELENA – report received

SPS – report received

SPS – North Area

SPS – AWAKE – report received

SPS – HiRadMat

Linac 3

LEIR

LHC – report received

CLEAR

Linac 4				
Machine Coordinator last week	Jean-Baptiste Lallement			
Machine Coordinator this week	Piotr Skowrionski			
Statistics				
Availability	99.9%			
Facility Status				
Summary	Pretty good. Source fine tuning and RF tests took place during the scheduled stop on Tuesday morning. **Issues last week**: Just a LEBT corrector magnet converter trip on Friday (5 min, just to write something).			
Issues				
Plans	Produce H^- at 160 MeV for the PSB.			
Intervention Request				
No	***Duration***	1 hour	***Preferred date/time***	-
Reason	1 hour request for SY-RF tests. No access needed. (R. Wegner).			
Impact	No beam			

<table>
<tr><th colspan="5">PS Booster</th></tr>
<tr><td colspan="2">Machine Coordinator last week</td><td colspan="3">Federico Roncarolo</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="3">Jean-Francois Comblin</td></tr>
<tr><th colspan="5">Beam Scheduled</th></tr>
<tr><td>ISOLDE</td><td colspan="2">Yes</td><td>PS</td><td>Yes</td></tr>
<tr><th colspan="5">Beam Availability by Destination (AFT)</th></tr>
<tr><td>ISOLDE</td><td colspan="2">-%</td><td>PS</td><td>-%</td></tr>
<tr><th colspan="5">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="4">○ Operational as per schedule. All necessary beams have been prepared and are ready/given to users.
○ Last week was dedicated to:
▪ finishing HRS preparation and taking reference measurements
▪ preparing ToF 4 rings user:for extraction optimization at high intensity and ensuring redundancy in case of single ring(s) failure/unavailability)
▪ preparing all users for the EAST area
▪ conducting special irradiation tests (overnight) of ISOLDE dumps
▪ GPS: 8 hours from Monday to Tuesday
▪ HRS: 8 hours from Thursday to Friday</td></tr>
<tr><td>Issues</td><td colspan="4">○ BCT WDs (BTY à Ring and Ring à BI line) sporadic interlocks: mitigated, root cause being investigated (2 events, ~40 minutes in total).
○ Electrical glitch on Sunday afternoon (1 hour and 7 minutes to recover - Quads, RF).
○ Pending, non-blocking from previous weeks:
▪ KSW transactional errors causing WD interlocks (<10 minutes downtime this week) → An update of the timing is expected for next week to address this issue.
▪ MRP and BTM Pick-ups: noise and calibration.</td></tr>
<tr><td>Plans</td><td colspan="4">○ Deliver beams to downstream facilities as needed, with emphasis on those that impact physics.</td></tr>
<tr><th colspan="5">Intervention Request</th></tr>
<tr><td>No</td><td>Duration</td><td>-</td><td>Preferred date/time</td><td>-</td></tr>
<tr><td>Reason</td><td colspan="4">-</td></tr>
<tr><td>Impact</td><td colspan="4">-</td></tr>
</table>

ISOLDE

Machine Supervisor last week	Erwin Sielsing
Machine Supervisor this week	

Beam Scheduled					
GPS	**Yes**	***HRS***	**Yes**	***HIE-ISO***	**No**
Beam Availability by Destination (AFT)					
GPS	**-%**	***HRS***	**-%**	***HIE-ISO***	**-%**

Facility Status

Summary

Advancing well towards physics.
Again a very busy and good week for ISOLDE. Many tasks accomplished also due to the work at PSB. Special thanks again to Gian Piero, Simon, Federico and the PSB team!

GPS:
On Monday night, due to the SEMGRIDS test finishing ahead of schedule, we were able tests in the frame of the Beam Dump Replacement Study (Ana-Paula Bernardes et all.) a continuous 1.4GeV, 2uA proton beam onto the GPS dump (without target on the GPS Front End). Thermocouples were registering the temperature increase of the dumps providing very useful information for the requirements of the new dumps. Despite some start issues (Watchdog playing up at PSB) the run was very successful and useful data recorded.
Also coupling tests with the LIST targets were carried out to confirm correct coupling of their RF connectors. All with positive result.
GPS has been running with a LIST target in place during the rest of the week and the weekend.
Fortunately the effect of the power glitch yesterday afternoon was minimal at ISOLDE. Only the HT and separator magnet tripped.
(We now have some issues with the HT tripping, not related to the glitch. We're on it.)

HRS:
PSB carried out all HRS SEMGRID tests again ahead of schedule and we used the Wednesday-afternoon to verify with our colleagues from PSB and BI the correct functioning of the second, spare, SEMGRID target #2 which had reported issues with the signals (rising from pulse to pulse) reported. The tests were successful and no abnormalities were observed (the issue last year was probably due to a badly connected Burndy plug at the target side (manually done by us)).
Thursday was used to continue with a normal target to verify the correct functioning of the HRS Front End. Once this was confirmed the target was removed and a similar to GPS protons-on-dump test was carried out on Thursday night:
In the frame of the Beam Dump Replacement Study (Ana-Paula Bernardes et all.) a continuous 1.4GeV, 2uA proton beam onto the HRS dump (without target on the HRS Front End).
A bit of a bumpy start due to some issues at PSB injection but once the 2uA current was stable again very useful date was recorded by our colleagues from STI.
Friday the target was recoupled on the HRS FE and setting up for reference files from HRS has continued and will continue this week.

REX/HIE ISOLDE:
At the REX side the recommissioning of the REX RF amplifiers is ongoing. Some tripped during the weekend probably due to the power glitch. Setting up will continue during the week.

	At HIE ISOLDE the cooldown of the Cryo Modules has started. D. Valuch has started SRF reconditioning tests at warm. The cryo team (T. Dupont) has verified the compressor station gear box shaft seal last Tuesday: All good. (Last year there was a serious failure of the gear box bringing the plant down). All this advancement would not have been possible without the flexibility and hard work by our colleagues at PSB, from the Robot team, in STI and RP as well as the Cryo and RF colleagues on the REX and HIE side. Many thanks!				
Issues					
Plans					
Intervention Request					
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">Alexander Lasheen</td></tr>
<tr><td colspan="2">Machine Coordinator this week</td><td colspan="6"></td></tr>
<tr><td colspan="8">Beam Scheduled</td></tr>
<tr><td>East Area</td><td>No</td><td>nTOF</td><td>No</td><td>AD</td><td>No</td><td>SPS</td><td>Yes</td></tr>
<tr><td colspan="8">Beam Availability by Destination (AFT)</td></tr>
<tr><td>EA T8</td><td>%</td><td>EA T9</td><td>%</td><td>EA T10</td><td>%</td><td>EA T11</td><td>%</td></tr>
<tr><td>nTOF</td><td>%</td><td>AD</td><td>%</td><td>SPS</td><td colspan="3">%</td></tr>
<tr><td colspan="8">Facility Status</td></tr>
<tr><td>Summary</td><td colspan="7">Good continuation of the beam commissioning in the PS, despite two half days of beam stop for accesses and TOF/AD DSO tests. The beam was prepared and delivered to the SPS in view of the scrubbing run next week. AFT is 96.8% as it stands.
The KFA71-79 modules were synchronized, module 10 seems still delayed by 500ns and will be checked and is taken out of operational beam meanwhile.
Turn by turn measurements with SEM grids performed on Thursday morning in shadow of the TOF/AD DSO tests. Impact of improved matching on emittance is being checked.
Setting up of RF hardware required for high intensity LHC beams ongoing (coupled bunch feedback, multi harmonic feedback).
Work ongoing on the PS BGI.
LHC type beams:
Delivered up to 4x72b to the SPS (1.4e11 ppb).
The 8b4e beam was prepared (56b) and will require further polishing.
The beam intensity on the LHC nominal cycle was pushed to 2.3e11 ppb (72b) and to 2.5e11 on BCMS (48b).
The 2 basic period cycle (12b-48b) is being prepared (beam presently extracted on spec, further checks needed)
The LHCPROBE was set up.
SFTPRO
MTE beam delivered to the SPS to 1500e10 ppb and barrier bucket, fine tuning ongoing both in transverse and longitudinal planes.
EAST
Beam delivered in acceptable condition to the T9 and N targets. Fine adjustments will be continued.
AD and TOF to be continued in the next weeks (TOF already close to spec, fine tuning required).</td></tr>
<tr><td>Issues</td><td colspan="7">200MHz cavities not working on Monday afternoon, traced down to a broken NIM power supply blocking the distribution of the 10MHz clock (exchanged)
High frequency cavities C80-89 and C40-77 power amplifier repair and thourough investigations (beam still delivered to the SPS in old nominal bunch rotation scheme).
Detailed outline: The C80-89 cavity amplifier was repaired during the beam stop on Tuesday morning in shadow of the SPS. The C40-77 also required an exchange of the amplifier following the issues from W11 (burnt power converter and amplifier issue). After replacement of the C40-77 amplifier, signal returns from the power converter to the PLC were still found unsatisfactory (risk of interlock not triggering). Thorough investigations on the power converter and PLC were conducted from Tuesday to Thursday afternoon as it was suspected to be the cause of the issues from W11. Another intervention in the ring on Thursday afternoon was needed where a broken HV cable was identified. The HV cable was repaired by the</td></tr>
</table>

	RF expert fixing all the issues. The beam could be delivered to the SPS meanwhile with 1x40 MHz cavity. No further issue is expected. • BHZ377-378 had several trips on Friday and was fixed by the expert.				
Plans	-				
Intervention Request					
No	***Duration***	-	***Preferred date/time***	-	
Reason	-				
Impact	-				

AD - ELENA				
Machine Supervisor last week	Laurette Ponce			
Machine Supervisor this week				
Beam Scheduled				
AD	No		***ELENA***	No
Availability (AFT)				
AD	-%		***ELENA***	-%
Facility Status				
Summary	AD: ▪ The week was dedicated to the preparation of the QFC54 quadrupole disconnection and extraction ▪ DSO tests of AD target and AD ring performed and validated. ELENA: ▪ Refill of the gaz carthridge thanks to ABP-HSL material.			
Issues	QFC54 water leak – magnet being taken out, repaired and to be reinstalled.			
Plans	▪ Extraction of the magnet and re-closure of the ring ▪ Start of HW commissioning tests in AD target			
Intervention Request				
Yes	***Duration***	-	***Preferred date/time***	-
Reason	Extraction of QFC54			
Impact	Delay of restart			

PS nTOF				
Facility Coordinator last week	Michael Bacak			
Facility Coordinator this week				
Beam Requested				
EAR 1	No		***EAR 2***	No
Facility Status				
Summary	• DSO tests in n_TOF (including TT2A) are completed (23/3/2023). • Cable re-arrangement in EAR1 and EAR2 towards improved EM compatibility finalized.			
Issues	-			
Plans	• Ramp up of n_TOF target cooling/moderation circuits (STI) • EAR1: det./antennas - investigation of “ringing” problem (=5/2.5 MHz signal oscillation just after the gamma flash) • EAR1 neutron escape line: finalize modifications and vacuum tests • NEAR: setup of infrastructure for diamond detector flux measurement (xy-table, additional shielding) • Finalize fine tuning of FEC + new DAQ for NEAR (EAR3)			
Foreseen Beam Stop				
Yes	***Duration***	-	***Date/Time***	-

SPS

Machine Coordinator last week	Verena Kain
Machine Coordinator this week	

Beam Scheduled

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

Beam Availability by Destination (AFT)

LHC	%	***NA***	%	***AWAKE***	%	***HiRadMat***	%

Facility Status

Summary	• successful beam based alignment: 4 quads in H and 5 quads in V. RMS measured afterwards for LHC and SFTPRO as predicted. Excellent tools and ALPS system. • aperture scan: vertical and horizontal. All similar to end of 2022. • fast extractions: set up LHC, AWAKE, HiRadMat with single bunch extracted to TEDs. LHCPILOT to TI 2 and TI 8 TEDs with LHC mastership, LHC frequency for re-phasing, BQM and extraction bump interlocking enabled. Extraction setting-up info: LSS4 bump had to be slightly reduced to maximise aperture (not understood). • LHC cycles prepared in terms of tunes and chroma for single bunch and orbit through cycle: LHCPILOT, LHCINDIV cycle with single injection and MD5 for multi-bunch (Laslett tune changes working). • beam instrumentation checked: TT10 ALPS electronics qualified (several issues encountered and patched: e.g. with intensity spikes of MTE BB beam; one dead horizontal BPM in TT10 fixed, polarity inversion of last vertical BPM fixed), wire scanners set up (synchronised for slot 1 corresponding to bucket 1), several ring BPMs fixed as well after kick response measurements from last weekend. • damper set up for SFTPRO and LHC cycles. • 800 MHz commissioned on Thursday to be ready for scrubbing. • scrubbing: started to take 12 bunches on Wednesday. Scrubbing for real commenced Friday evening. MKP4 outgassing is driving progress. Temperatures on MKP4 are stable! 4x72 bunches Sunday evening (250 ns batch spacing, 1.4e+11 ppb, emittances 1.6 um at injection - 1.9 um at end of FB) • other studies: successful ML algorithm test for tune denoising through cycle (1-2 measurements/clicks to correct entire cycle), successful test of Laslett-like incorporation of tune changes with intensity on fixed target (1 measurement/click to follow intensity change through entire cycle); preparation of accurate chromaticity measurement on MD cycle for power clamping EPC test next week; cavity voltage calibration and phasing check - analysis ongoing
Issues	
Plans	• LHC injection: no beam before Wednesday • find slot for pLHC module on SFT test for dampers (Gerd) • test trajectory interlock (could not be done this week due to many issues with TT10 BPMs) • set up slow extraction to TED • scrubbing towards LIU intensities • MKE6 waveform scan • Slot for 800 C2 measurement after update of amplitude and phase (C1 done)

Intervention Request

Yes	***Duration***	½ day	***Preferred date/time***	Before mid-May
Reason	Inform survey team for BA1 tunnel access if opportunity			
Impact	No beam			

<table>
<tr><th colspan="5">SPS AWAKE</th></tr>
<tr><td colspan="2">Facility Coordinator last week</td><td colspan="3">Giovanni Zevi Della Porta</td></tr>
<tr><td colspan="2">Facility Coordinator this week</td><td colspan="3"></td></tr>
<tr><th colspan="5">Facility Status</th></tr>
<tr><td>Summary</td><td colspan="4">Electron beam commissioning and installation of new BTV
▪ Electron beam commissioning:
○ Measured response curve and hysteresis of new corrector at the end of the beamline (using current instead of K, since logical.K is not yet available)
○ Tested orthogonal steering with new corrector. Also tested effect of cycling magnets before every correction to improve reproducibility. Promising, but we will need more statistics to estimate residual steering error
▪ BTV screens
○ Installed new BTV screen close to plasma exit, aligned digital camera using He:Ne laser on proton trajectory
○ Replaced 2nd YAG screen on BTV.412354 with an OTR so that this BTV can be used for proton trajectory alignment.
▪ Laser interlock:
○ Upgraded PLC logic for machine-protection interlock to protect</td></tr>
<tr><td>Issues</td><td colspan="4">▪ BTV.412442
○ Unexplained interlock for ~30 minutes on Thursday. Added all relevant signal to Timber in order to monitor this in the future
▪ Patrol lost (Tuesday): emergency handle was moved by mistake while transporting material. While re-patrolling, operators installed red seals on all emergency handles to reduce the chances of this happening again.</td></tr>
<tr><td>Plans</td><td colspan="4">Transport Discharge Plasma Source to TAG41 and beginning installation and alignment</td></tr>
<tr><th colspan="5">Foreseen beam stop</th></tr>
<tr><td>Yes</td><td>Duration</td><td>-</td><td>date/time</td><td>-</td></tr>
</table>

LHC				
Machine Coordinator last week	Jorg Wennninger			
Machine Coordinator this week				
Statistics				
Availability	-%		***Stable Beam Ratio***	-%
Facility Status				
Summary	During standard checkout tests a hardware problem appeared on the new B1H crystal collimator TCPCH.A4L7.B1: connection lost between crystal and mechanical stage. The tank was vented and removed from the tunnel on Wednesday, replacement chambers were put in place. Inspection in the laboratory revealed a problem with the linear motion stage. Friday morning it was decided not to re-install the tank immediately but to wait for TS1 despite the higher radiation levels in LSS7. Vacuum bake-out and pump down started on Friday. The powering tests - close to 11'000 - were completed on Thursday. Only one dipole training quench was recorded on RB.23 which quenched 13A below the target. On Friday afternoon, pilot bunches were sent to the TI2 and TI8 downstream TEDs. The lines were steered and the synchronization between the beam and the injection kicker pulses was checked to be correct. Over the weekend the nominal 2023 and the vdm cycle were played with most HW systems (PCs, RF, ADT, BIS, LBDS). The LBDS, injection and FMCM MP tests were completed. Outstading issue for beam operation: the orbit and tune feedback crashes frequently, BI expert trying to address the issue.			
Issues	B1H crystal collimator TCPCH.A4L7.B1 removed and replacement chambers put in place – Reinstallation of crystal collimator during TS1.			
Plans	• Completion of vacuum pump down Monday/Tuesday. • Last checkout tests on Tuesday (if required). • First beam in the LHC on Tuesday or Wednesday morning.			
Intervention Request				
Yes	***Duration***	-	***Preferred date/time***	various

Linac 3				
Machine Supervisor last week				
Machine Supervisor this week				
Statistics				
Availability				
Facility Status				
Ion species				
Summary				
Issues				
Plans				
Intervention Request				
Yes / No	***Duration***		***Preferred date/time***	
Reason				
Impact				

Technical Infrastructure (TI)

Facility Coordinator last week	Jesper Nielsen
Facility Coordinator this week	

Statistics

Alarms	~ 14'000				
Phone calls	707	***Incoming***	432	***Outgoing***	275
ODMs	93				

Facility Status

Summary	Busy week.
Issues	Mon. 20.03: Local powercut of buildings EHN1, BG810, BG83 during a maintenance of the electrical switchboard EAD6/B81. The breaker did not work properly when operated after the intervention, which caused the power cut. This breaker is part of the NACONS project, and was operated several times successfully after the cut. Wed. 22.03: ▪ Electrical breaker EZD101*85 had a fuse fault, TI informed the PS operator who was already in contact with RF piquet who went on site to change the fuse. ▪ CRYO trip in CMS caused a "gas" alarm in CMS DSS system, that interlocked the ventilation systems via the gas detection and tripped the magnet of CMS. A relatively complicated event to follow due to the complexity of the interlocks between the systems. Thu. 23.03: Fire alarm in TCC2, Fire Brigade asks TI to stop the ventilations of TCC2 during the intervention. Fri. 24.03: A 18kV breaker in BE91 has a technical problem that would block it from opening when powered. An intervention is required rapidly to repair it. Normally it should be possible to do the intervention in less than 40 minutes, which should be sufficient for maintaining a reasonable pressure of the compressed air. Building 774 and the heating plant will be cut during the intervention. Intervention is planned for Tuesday 28 March at 7h20 - 8h00. The intervention is agreed with OP-TI, EN-CV, SMB, SPS, TE-CRG, le TSO du 774 Sun. 26.03: 14.23 power glitch due a thunderstorm nearby. Loss of QPS LHC, cavity loss SPS,PS,POPSB. Some electrical heatings on ventilations down RTE confirm a glitch on 400kV line GENISSIAT-VOUGLANS.
Plans	-

Intervention Request

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