

Accelerator Complex Status

End week 11 (Monday 22 March 2021)

Technical Infrastructure (Ronan Ledru):

A reasonable week.

Statistics:

- Close 4500 alarms.
- 934 phone calls (602 incoming, 332 outgoing).
- 97 ODM created.

Events worth mentioning:

- Tue. 16.03: Trip of EMD403/8E (18kV at SE8). This was due to over-current from EPC power converter. Those power converters were in test mode and the load was 3 times higher than normal. A heat run was being performed in the T18 line.
- Thu. 18.03: Switch ON of MEQ59 SVC. Smooth intervention, no impact on the electrical network
- Fri. 19.03: Two evacuation Alarm in BA5. The BA5 was in closed mode and nobody inside. This recurrent problem of spurious alarm is followed up since several month through the TIOC meeting. The cable between the access control and the evacuation system has been disconnected on the access control side.
- Fri. 19.03: Trip of EMD603/B3 (18kv in BB3) - no power for the BAF3 Hall. This was a human error from SY-EPC by opening EMD410/B3 by mistake.
- Fri. 19.03: All Ventilation of SU2 stopped due to the trip of the EMD404/2E (18kV in SE2). The breaker tripped because of the failure of the UAPT-00204 motor. Everything has been restarted quickly.
- Fri 19.03: Evacuation alarm in UX15 during the maintenance. The logic was not inhibited by the technician.
- Sat. 20.03: Again, evacuation alarm in BA5. The cable between the access control and the evacuation system has been disconnected on the evacuation system side. From Saturday, no new evacuation alarm at BA5.
- Sun. 21.03: Trip EBD139/65 (earth fault). Electrical cubicle checked, but nothing found. Power was restored at 00:44.

Electrical intervention for this week :

- Today : UPS network of BA81 and BAA85, 2 powercuts : 9h and 13h.

Details: <https://wikis.cern.ch/display/TIOP/2021/03/22/TI+Week+Summary,+Week+11>

LINAC 4 (Alessandra Lombardi):

Monday : day long stop for several interventions. Linac4 tunnel stayed close, this allowed RF interventions. In particular LLRF control regulation gave excellent result in terms of energy stability along the pulse. No need for compensation of energy along the pulse with PIMS anymore.

Tuesday and Wednesday: regular operation with problems of oscillation in DTL1 taken care by the RF team.

Thursday :interventions planned by EN-EL and SY-EPC: source and RF switched off for about 2 hours. During Thursday also BLM system update

Friday-Sunday : generally uneventful, on Saturday the autopilot HV reset actor was turned back on (it was found switched off).

It was a good week for the source.

PS Booster (Simon Albright):

Monday was given over to Linac4 for important interventions and studies, in the shadow of these we had several accesses in the PSB and a study on the regulation of POPS-B. On Tuesday the POPS-B regulation studies continued, and whilst the required level of control has not yet been achieved there is progress and a plan for how to proceed. During the rest of the week, we have made a lot of progress with studies and beam commissioning.

The problem on MTE Ring 2 is still not fully understood, but a workaround is in place that allows it to be produced with good distribution. This beam has also been used for many studies of transverse painting, which has resulted in suitable functions being defined to produce the required transverse distribution.

There have been many studies on the LHC25 cycle, which has benefited from the re-cabling of XNO311L1 and XNO816L1 allowing improved resonance compensation. A high frequency ripple has also been identified on the field of the main bends, which appears to be impacting the longitudinal plane. The effect can be reduced by using the simulated B train, investigations of the effect and possible mitigations are ongoing.

The LIU Wirescanners have been tested extensively this week, and they are progressing well. The wiresscanner team have been very supportive and there are good measurements being made.

Beams now available for commissioning the PS and transfer line are:

- MTE all rings up to (and in some cases above) 250E10 ppr
- LHCINDIV with nominal specifications
- LHC25 Ring 3, other rings are progressing and there has been improvements to the longitudinal distribution
- Rotated LHCINDIV with 30ns bunch length

Points to follow up during the coming week are:

- Bringing LHC25 Rings 1, 2 and 4 up to the same standard as Ring 2
- Pushing the intensity limit on MTE
- Starting the commissioning of ISOLDE beams

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ISOLDE (Alberto Rodriguez & Frederik Wenander):

It has been a very busy and productive week at ISOLDE. Quite a bit of progress on several areas.

- First beam from the new HRS front-end (FE11) was extracted on Friday following multiple tests and debugging of a few problems with the cooling water, high tension and other power supplies earlier in the week. Even though, there are still a few things that need to be done this coming week before we formally start the beam commissioning, this was a major milestone for the SY/STI group and for us in operations.
- On GPS side, the RILIS team continued with the commissioning of their laser system. In addition, most of the hardware for the new gas supply system to produce plasma ionized beams was installed. It is not yet operational, but it is on track to ready on time for the physics campaign.
- On the REX/HIE-ISOLDE side, the maintenance period for the post-accelerator finished last week
- First beam (20Ne7+) from the REX-EBIS charge breeder was extracted on Tuesday, accelerated through the RFQ to 0.3 MeV/u and drifted through the rest of the REX linac up to the diagnostic box before the first cryomodule
- The beam instrumentation in the first four diagnostic boxes of the linac were recommissioned. One of the silicon detectors had to be replaced on Wednesday morning. But, everything else worked very well.

- Smoothing of some of the devices (a few quads, dipoles and diagnostic boxes) in the HEBT lines was completed by the alignment team last Monday and Tuesday.

The cooldown of the cryomodules started last Thursday. SRF cavities are now at ~ 250 K.

At REX

- REXEBIS has been delivering stable beams for REX/HIE-linac setup during the past week.
- The correct functionality of the refurbished local ion source has been confirmed. However, tests with the spare unit have shown that that excessive heating power to required deliver the nominal 1+ beam, so it will be disassembled and further inspected.
- Test of the full chain (local ion source, trap and EBIS are foreseen for the upcoming week).

At TwinEBIS

- Finally, the assembly of the mechanical parts of the TwinEBIS ion extraction was finished and the standalone unit is now pump and under vacuum.
- In spite of intensive tests, we have not managed to launch the full electron beam from MEDeGUN but are limited at 300 mA, with significant losses. The investigation will continue during part of the upcoming week.
- The LHe level sensor for the SC solenoid has stopped working. The investigations indicate that the fault is inside the vessel, which means we can most likely not repair the level meter. This is a very unfortunate fault and we're discussing different approaches (within the EBIS team and with SC magnet specialist at CERN).

PS (Denis Cotte):

Lundi / Mardi :

Le PS étant sans faisceau, la première partie de la semaine était dédié à différentes interventions et accès au PS Ring, PS-SWY et TT2.

Quelques interventions importantes :

_arrêt de l'étuvage SMH42/BSW42.

_modification du refroidissement des transformateurs de POPS (Lundi à Mercredi)

_réparation de l'écran F16.BTV201

_accès des géomètres dans la zone nTOF Primaire.

Coté opération, on profitait aussi de l'arrêt pour effectuer le calcul du réalignement des « MU magnet » avec la mise à jour des offsets des PickUPs et la mise en place d'un système de surveillance du pulse du SMH42.

Découverte d'un problème sur PE.BTV16 ou le bras qui déplace l'écran s'est désolidarisé du mécanisme de déplacement.

Mercredi/Jeudi :

Mercredi eu lieu le réalignement de 5 Main Unit Magnet (3H et 2V) dans la journée par le transport et les géomètres et des tests de polarité dans TT2 pour les BHZ377/378 par D.Bodart.

En fin de journée, **le SMH42 pulsait à nouveau** à sa valeur nominale.

Jeudi matin eu lieu l'intervention EN/EL et en parallèle le démontage de la BTV16 par l'équipe BI/ML dans le PS-SWY.

Le retour des conditions de vide dans cette partie de la machine devait duré jusqu'au Vendredi matin.

Entre temps, quelques optimisations sur le cycle magnétique de MTE permettait de réduire l'overshoot sur l'arrivé du palier intermédiaire.

Début du conditionnement du KFA45 suite à la longue période sans faisceau.

Vendredi / Week-end :

Vendredi à 11h, **le SMH16 pulsait à nouveau** à sa valeur nominale.

Vers midi le faisceau était de nouveau **injecté et accéléré** au PS.

Après quelques problèmes avec un stopper de TT2 et une PFW qui tombait, le faisceau était de nouveau extrait et envoyé sur D3 dans la soirée.

AD (Laurette Ponce):

For AD, the EPC HW tests are postponed due to a damaged access system cable that, which does not allow lifting the access veto on the MAINS. The repair of the cable is a heavy task and will not be performed by EN/EL before 31 March.

ELENA (Laurette Ponce):

Main activities in the ring:

- Continue measurement/corrections of working point settings on the acceleration/deceleration cycle, measurement on the last 100 keV plateau with beam injected directly on the plateau for better intensity
- continue measurement of main bend hysteresis effect
- continue e-cooling studies with Hminus beam Installation of the screen with a hole in the source for better diagnostics/adjustement of the produced beam

Several issues:

- several trips of HV of the source
- problem of frequency transmission from Btrain to LLRF after installation of a new FEC for switching between operational and spare system
- bugs/problems when re-deploying the multi RF segment functionality, work on-going.

SPS (Stephane Cettour Cave):

Summary last week:

- TI8 tunnel and TI8 LHC TE-MSC thermal camera checks -> done
- MPS dipole and quad
 - Update ramp for dynamic eco -> done
 - Solved the oscillation problem when slow abort was requested by FGC -> done
 - noise reduction on QF and QD
 - On QF the noise on the voltage transmission between mugef and FGC reduce by a factor 20 with the new cable
 - On QD we need to do a measurement to see the difference
- SBDS remote test control - BETS tracking
- TMR MKP has been changed
- Replacement MKQH switch -> in conditioning during the week end
- Still problem on girder (MSE6, MST6 and TPSC4) in progress
- All the ZS motors work as expected anode and cathode.
- WIC main power supply spare interlock correction implementation -> done
- BEQ1 dynamic tests with EPC and ABB -> done
- Gradual removal of BIC jumpers -> done on BIS RING: only 3 Inputs remain jumpered (chain 1, vacuum LSS3, WIC MPS)
- AUX PS tests continue at BA80
- Modification of cards on Sextupole and Octupole -> done
- Radiation monitor BIC tests -> done
- Access system DSO tests for EAST, WEST, TI2, TI8 and AWAKE Friday 19th -> Successfully completed

Plans for this week:

- MPS dipole and quad noise reduction measures
 - QS still to be repaired and commissioned
 - Qualification of MBI, QF, QD (noise, following function and repeatability)
- Following TE-MSC thermal checks

- One enlarged quadrupole showing signs of excess heat on inner coil - suspected blocked filter
- weekend intervention foreseen 27th March - drain of main magnet circuit required
- SBDS remote test control - MBI pulse required
- BEQ1 dynamic tests with EPC and ABB, maybe a second measurement no impact on other tests
- Gradual removal of BIC jumpers on Injection BIS
- AUX PS tests continue at BA80
- Test Sextupoles and Octupole after the upgrade
- Final check on FEI and FII
- Check FMCMs
- Polarity and current check on TI2 and TI8

AWAKE (Edda Gschwendtner):

WEEK SUMMARY: 3rd week (out of 3) dedicated to improving the laser focusing system with off-axis parabolic (OAP) mirrors, to allow higher laser energy without damaging optical elements. Unfortunately, the second OAP mirror was damaged by high-power laser, so we had to fall back on pre-OAP setup until the next attempt. Access System DSO tests.

- **TAG41 accesses:** RP changed panels everywhere in TAG41, Electron Gun changed water flow monitors TCV4, Proton BPM troubleshooting in TT41.
- **Access System:** [1 full days of exclusive work] DSO tests in TAG41 successful.
- **Upstream and downstream streak cameras:** continued alignment work during laser-off periods
- **Vacuum:** vented laser/proton beamline to allow inspection of laser elements, followed by pump-down the following day
- **Laser:** OAP telescope failed laser induced damage threshold (LIDT) testing.
- Damage to second OAP in telescope (OAP2) and to mirror MP5 before vapor source.
- MP5 replaced with a dielectric mirror that has a higher LIDT (at least a factor of 2 higher)
- OAP Telescope removed and focusing scheme reverted to AWAKE Run 1 configuration
- Redesigned OAP Telescope line with a ~50% reduction in fluence to reduce damage, aiming for a second attempt in late April.
- Minor improvements made to diagnostics and controls (external triggering of spectrometer, delay stage under the first telescope lens, Schlieren diagnostic mask optomechanics)

Next week: Electron Beam for 2 weeks. Primary goal is commissioning the new optics. In addition: QE measurements, and a first comparison of electron propagation in vacuum and plasma (this will be the main goal for future electron beam weeks).

LINAC 3 (Richard Scrivens):

Tests were made on the source with higher microwave powers. Higher power did not lead to higher intensity.

The energy ramping cavity was commissioned in ramping mode.

The GHOST automated tuning was left running for more testing.

Weekly stripper foil measurements were made.

There was a half day stop due to the risk of an electrical cut during the MEQ59 SVC switch on.

Significant perturbations on the timing system of Linac3 looked to be due to the fibre distribution to building 351 – swapping to a spare fibre seemed to resolve the situation.

The beam was supplied for beam commissioning of the BPMs in the transfer line.

LHC (Jörg Wenninger):

S12	S23	S34	S45	S56	S67	S78	S81
Phase 1	Cold	Phase 2	Phase 1 (paused)	Cold	Repair	Training (paused)	Cold

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Monday 15th coordination of LHC was handed over to BE-OP-LHC.

Little progress on powering due to S67 repair (some progress on Phase 2 in S34), preparation for powering in the other sectors (ELQA, QPS boards).

Friday 19th DSO tests for LHC injection (chains 2 & 3) and SPS extractions EAST and WEST passed successfully.

A non-conformity on EIS-b (TI2 and TI8 bends) in LHC chains 2 and 3 must be repaired (temporary solution for the DSO test).