

## Accelerator Complex Status

### End week 48 (Monday 30 November 2020)

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#### Technical Infrastructure (J. Nielsen):

- A reasonable week for TI.
- Statistics:
  - About 8000 alarms
  - 1076 phone calls (680 incoming, 396 outgoing)
  - 153 ODM created
- Events worth mentioning:
  - Thursday 26.11 at 14:35, SPS BA1 Main magnet cooling leak. Circuit stopped by TI on request of EN-CV. Tests by TE-ABT-EC stopped.
  - Thursday 26.11 at 14:42, 1,8K cryogenic pumping unit (QURCB) at P4 tripped when turning on the electrical compensator (SVC).
  - Friday 27.11: Fire departments computers froze Friday night 27/11 - CSAM fixed during Saturday.
  - From TIOC: Leakage of heating water in SE1 electrical substation. Heating has been turned off for the moment.
  - One of the 400 kV circuit breakers (EHT50/BE) suffers from a compressed air leak. EN-EL decided to temporarily install an additional compressor (external) to not overload the internal compressor. This will allow to maintain its functioning until at least next week, when EN-EL would like to do an inspection. To be followed-up by the TIOC.
- Details: <https://wikis.cern.ch/display/TIOP/2020/11/30/TI+week+summary%2C+Week+48>

#### LINAC 4 (B. Mikulec):

During last week, beam could still only be sent to the Linac4 dump due to the PSB access for magnet cover installation.

- Throughout the week several periods of **foil tests** (dedicated operation); the only foil from a European supplier (graphene foil) was successfully re-tested (**~99.6% transmission**).
- Investigations of strange wire scanner profiles point towards a heating issue; the problem disappears when a few ZERO cycles are inserted in-between the measurement cycle (to be further studied)
- Data for offline emittance calculation taken after rephasing
- Thursday machine access, mainly for the exchange of a wire scanner and 3 SEM grids; unfortunately the exchanged wire scanner is not working → another short access on Monday morning (during PSB access)
- In parallel to the access, modifications on the RF rack (EISm), which required a DSO test Friday morning
- Central timing and FGC interventions

Next week is the last week before sending beam to the PSB - we will put the focus on reference measurements.

#### PS Booster (F. Chapuis) :

##### **Intervention in the W47/W48:**

- The Magnets Covers Consolidation has been finished on Friday.
  - All covers are in place except for the external part of the “triangle”. It is foreseen install them in week 1 and 2/2021. To compensate this lack of safety in the Triangle, the

compensatory measure has been applied according to BE-ASR recommendation; mainly: adding signs informing about the electrical hazard.

- Remaining issue to be fix in week 49:
  - The cleanliness of the Booster → the Booster Auxiliary circuits will be unlockout as from Tuesday 01/02;
  - POPSb Main Transformer plate forgotten → will be reassembled on Monday and Tuesday, the POPSb unlockout will follow-up on Tuesday afternoon at the earliest.
- Issue raised in the W48:
  - The BR2.BSW4L1 have been change within this period. The performances during the tests did not matching with the expectations. New tests have been done with the newly installed. After testing, it appears that the performance is again not matching the expectations.
  - After investigation BE-BI suspect a problem with the tank housing the BWS, the mechanical structure is not enough rigid to compensate the vacuum strength. BE-BI is studying a solution, Some feedback is expected for the next FOM meeting.

#### **Hardware-Test and Cold-Checkout during Week 48:**

- Monday 23/11:
  - Wide-Band Puck-up test: Tomoscope, BSM and OASIS ready (A. Findlay);
  - Change of the BR2.BSW4L1 (as describe above)
- Tuesday 24/11:
  - BT.BHZ10 reliability run to check it in full PPM-Mode (several beams programmed in the SuperCycle with different destinations: ISOLDE, BDump and PS) to prepare the test with the PSB Fast Interlock Application. An Issue has been produced to request to set-up a pre-pulse (Hysteresis compensation: 1.4Gev ↔ 2GeV beams) when the power-converters pulses with a negative current.
  - Issue with BTY.BVT101 External Condition → solved;
  - Investigations in collaboration with BE-BI about the EMC produced by BI.DIS10 and acquired by the BCTs located in BI Line (but also in BT line) à test: adding “ferrites” around acquisition cables;
- Wednesday 25/11:
  - Recombination Kickers External Condition behaviour issue → solved;
  - FGC\_62 firmware has been updated by TE-EPC-CO;
  - Fast Interlock Dry-Runs (L. Kolbeck, B. Mikulec and G.P. Di Giovanni involved for the Op side). All power-converters monitored are tested and validated except BT.BHZ10.BTM;
- Thursday 26/11:
  - Reliability Run to check the systems involved in the use of the Matching monitor installed in Ring3 (BI.DIS10, BE3.KFA14L1, L4L.CHOPPER,...) and checking also the forward of the BEX.MC-CTM=275ms à some missing pulse have been monitored, investigation in progress for TE-ABT specialists;
  - Dry-runs with BTTRIC and watchdog → mainly working, minor issue investigation in progress;
- Friday 27/11:
  - Fast Interlock Dry-Runs last test to do with BT.BHZ10.BTM à test aborted due to power-converters “fundamental” issue, investigation in progress for TE-EPC;
  - BR2.BSW4L1 test with vacuum sector BR20 vented to Atmospheric Pressure (as describe above);
  - BIS Dry-run (in collaboration with EN-STI) to test H0-H\_Dump and Head/Tail\_Dump → test validated;
  - BE-BI, BI.DIS10 EMC investigation follow-up (BE-BI) → test: to ground the rack in BOR.

### PS (K. Hanke):

- Audio-visula patrol for POPS+W8L+PFWs. We have found that the FGC63 regulation is too performant and that we have to adjust the W8L function (compared to pre-LS2). Probably change in Working Point.
- Magnet tests in SWY and for common circuit with PSR are completed. SWY has been closed last Friday evening
- Magnet test for F61 and 62 successfully completed.
- Dry Runs for KFA4, 13, and 21. Minor issues, like missing acquisition timing and saturated Oasis signal
- TT2 vacuum repair preparation in good progress. Welding foreseen for week 50, which has an impact for the SPS DSO test. Will be followed up with DSO team, SPS, and PS operation.
- This week: SMH42 tests, PSR magnet tests, Dry run for KFA.

### ISOLDE (A. Rodriguez):

- F. Wenander from ABP continued taking beam from the GPS target and injecting it into the REX-TRAP and REX-EBIS to fully characterize the performance of the new electron gun last Monday and Thursday
- On Friday, we did some scaling tests of the linac to  $A/q$  between 2.0 and 2.5 to check the stability of the REX RF systems at low power levels. The specs are between 2.5 and 4.5. But, there are several experimental proposals for next year that would benefit of a lower  $A/q$  (i.e. higher final energy).
- We also spent some time on Tuesday checking that the synchronization of the different parts of the facility (mostly REX-TRAP, REX-EBIS and the linac) was ok after the intervention in the timing system .
- On the low energy side, we are almost done with the reference set-ups to all experimental stations with the current quad configuration. We will finish them this week.

### ELENA (Laurette Ponce):

As was mentioned at the FOM, there were serious issue with the ion switch power supply at the beginning of the week. A switch to the non-pulsed PC was made for the rest of the week, preventing extraction towards LNE00. The time was therefore used to work on the beam quality in the ring and extracted toward Gbar, comparing different settings, switching to  $h=4$ , etc...

For the ion switch power supply, EPC is following-up a better spark protection with the company. The last spare should be installed this week to restore extraction to LNE00 (ALPHA is ready to take beam). The 3 broken PCs are under repair at the company and should be ready upgraded in 2-3 weeks time, so after Christmas.

### LINAC 3 (Richard Scrivens):

There were further investigations of the effects on the beam of the source moveable puller position, with emittance reconstruction from profile measurements with quadrupole scans, and a CSD (charge state distribution) scan.

CSD scans seemed to show a shift towards higher charge states for shorter gaps (hence a lower Pb29+ current), to be confirmed.

Emittance measurements do not show conclusive trends yet.

A timing protection module was installed on the source Sairem RF amplifier.

On the RF side, Tank1 and Tank2 were commissioned, with confirmation of phase and amplitude setting points.

Cross-talk was observed between different users for RF devices (with acquisition of previous cycle being received).

A new application for LBS measurements was successfully tested without beam.