

Accelerator Complex Status

End week 14 (Tuesday 12 April 2021)

Technical Infrastructure (Jesper Nielsen):

Statistics:

- Close 4500 alarms.
- 647 phone calls (456 incoming, 191 outgoing).
- 90 ODM created.

Events worth mentioning:

- Tue. 06.04: Trip of breaker EBD139/25 that powers the UPS for demineralised water station and CRYO equipment (heaters). Fortunately the UPS was not too loaded by other equipment and EL was very quick to intervene, therefore the breaker was re-armed before the UPS ran out of battery and there was no power cut seen by users.
- Wed. 07.04: Trip of stable filter in LHC4, whilst this is required for the current tests of the CRYO, the SVCs of LH2, 6 and 8 are capable to compensate for the reactive power and it can be switched back on when a time slot is found.
- Mon. 12.04: APIMMD04 PLC down since 11/04 12:24. Piquet unable to repair it. Possibly a faulty network receiver. No alarms from these installations during this time.

Details: <https://wikis.cern.ch/display/TIOP/2021/04/12/TI+Week+summary%2C+Week+14>

LINAC 4 (Piotr Skowronski):

There were 2 issues to report:

- Pre-chopper on Saturday at 01:45, powering cable needed to be replaced (access needed). It took 5h 40 minutes to repair, but 3h 30 minutes is accounted as operational error because we called RF piquets instead of ABT one. The OP dashboards are being cleaned up and updated to have all the piquet information correctly filled in.
- Cooling fan for CCDTL1 klystron on Sunday 2PM. Took 3 hours to fix.

Other item to mention is update of Stray Field Compensation on SIS which sometimes did not update correctly new set-points (from YASP of PPM copy) for the SFC correctors..

PS Booster (Gian Piero Di Giovanni):

it was a calm week for the PSB machine - with no major event to report - which allowed the experts to work without long interruptions (also several experts were on deserved holiday).

Main Achievements:

- **MTE:**
 - Working on a clone, we can reach high intensity (600E10 ppr or 300E10 ppb) with a vertical emittance of around 3.5-3.6 μm (pre-LS2 it was of the order of 5.5-6 μm).
 - The RF team focused the work on cleaning the setting and homogenizing the split bunches for all rings at extraction.
 - The remaining block is to finalize the synchronization at extraction. And the work done this week was a necessary step to be in the position to, hopefully, complete this task this week.
- **BCMS25:**
 - Initial setting-up of the beam done - starting from the excellent work done on LHC25 - per PS RF team's request.
 - Beam sent to the PS for PS RF setup.

- **The trajectory at PSB injection were re-optimized** for all users to follow-up on a few changes done during the last weeks, for instance a modification of the steering in the L4T for the Linac4 emittance laser measurements.
- **Extraction trajectory fluctuation:**
 - On Friday we gained a new insight. The position jitter seen on the ejection trajectory seems linked to an odd signal of the calculated BPM position.
 - This was particularly evident on a special MD beam with bunch rotation and only 40 ns of bunch length.
 - The SY-BI experts have been informed and the debugging is ongoing.
- **Origin for one type of POPS-B trips understood:**
 - The experts understood that the source of the regular POPS-B trips experienced over the long week-end was coming from the B-Train setting in R2.
 - On Wednesday we switched the B-Train chain to the spare one to allow TE-MS-C-MM experts to investigate the problem with the B-Train in R2.
 - No trips linked to the B-Train after that.
- **BTM SEM** grid application configuration fixed and now can be used for all rings:
 - We are experiencing some stability issue with the measurements of low horizontal emittance ($\sim 1 \text{ um}$) because of the dispersive component.
- Several fixes and improvements deployed for the **WS application** (both pre-LS2 and LIU), e.g. now the optics is dynamically fetched from LSA instead of being hardcoded.
- **Measurement campaign on the LHC25 transverse profile:**
 - With the LHC25 setting-up a few problems manifested themselves:
 - Difficulties in controlling the RF capture process and tailor the longitudinal parameters at extraction, because of the large energy spread.
 - Tails in the vertical transverse profile.
 - To gain further understanding, an extensive measurement campaign was launched during the long Easter break thanks to the operation team to study the profile as a function of the debuncher setting (which determines the energy spread).
 - The preliminary analysis seems to indicate that we already have tails at injection which get enhanced at extraction (e.g. from not fully compensated resonances).
 - We could explore reducing L4 energy spread at PSB injection without losing too much in brightness.
 - This should be beneficial for RF setting and needs dedicated MD studies while exploring ways to mitigate any brightness loss (e.g. by injecting with a vertical offset).
 - ABP also continued the intensive program to understand of the resonances and their compensation, and identify the root cause of the tails in the vertical plane.

Main outstanding items:

- Complete the MTE setting-up at high intensity and low vertical emittance and finally send the beam to the PS.
- Set-up the ISOLDE beam:
 - For this we revived the TOF beam with 4 rings to be the baseline to start with (by adapting B-field program). The PS had not taken this beam for a while, so several settings at extraction had to be re-adjusted to follow-up on the changes which came with the PS commissioning.
- POPS-B still needs work to reduce current oscillations in all rings. And iterative studies ongoing together with Bdl fine tuning.
- Continue the debugging of the jitter of the extraction trajectory observed in the last weeks.
- LIU wire scanners are generally working fine. SY-BI needs to define correct settings to systematically get good profiles.

- At times we experience several kickers trips. We will follow-up this with SY-ABT experts.

ISOLDE (Simon Mataguez):

- COLLAPS Beam commissioning started 06/04
- EN-CV started some activities related to the target area ventilation consolidation. The first step has been the relocation of a water reservoir (located in the ventilation platform area) which is part of the targets cooling system. The implication for the commissioning is that there will be not Frontends operation as of the 07/04 until the 09/04 included à GPS and HRS switched off Tuesday evening 06/04
- Done Target change in GPS
- Solved SY-STI Interlock when GPS target in place (until now it was not present)
- Done GPS gas line identification in HT room
- Issue found, the scanners YHRS.BSC4820/30 have been mounted before the sem-grid YHRS.BSG4700 / slits and collimator (these never changed position but the scanners did compared to the old ones and with regard to the BSG4700). This causes difficulties for the calibration of the scanners and the correct functioning of the slits to block off neighboring masses cannot be seen or verified on the scanners anymore. A new flange is needed to put back at the correct position. The beam will be centered with a Farady cup YHRS.BFC.4900.
- Friday 09 April of both front ends and targets restarted successfully, goal for today goal to produce stable beam again to continue beam commissioning and at HRS send beam trough the ISCOOL / RFQ.

PS (Frank Tecker, Denis Cotte):

A large fraction of the time was devoted to the setting up of the LHC nominal beam, that had been started over the Easter weekend.

Initially, losses at injection in section 88 and downstream lead to vacuum increase and trips of C80-88. The losses could be redistributed but not completely cured. It turned out that the losses can be cured by vertical shaving in the PSB.

The beam is triple split, accelerated and the 2x double splittings have been set up.

Another problem with losses appeared at extraction: when the double splittings were switched on, there were randomly losses appearing in section 16 and downstream from about 50 turns before extraction. Adjusting extraction bump amplitude and extraction kicker could significantly reduce them but this still needs follow-up.

Also on the MTE beam, there is significant work still needed on the loss reduction.

Work on the shadowing (TPS15/SMH16) has been done, scans of the septum position were performed. But the septum motor got stuck on Sunday and needed an access to move it locally to the nominal position. This needs follow-up on Monday.

POPS had been running in degraded mode over Easter, was switched to normal on Wednesday morning but is again in degraded mode since Saturday night.

Wire scanner experts are still working on the firmware to fix problems.

AD (Laurette Ponce):

- Leak in the stochastic cooling kicker repaired and leak test performed successfully.
- Interlock cable of access system repaired, validation to be performed.

ELENA (Laurette Ponce):

- Intervention to improve vacuum in LNE02 on Tuesday

- Wrong cabling of electrostatic quadrupole corrected on Tuesday, waiting for green light from vacuum for powering test of the elements.
- Continued testing RF functionalities
- Work on orbit correction along the deceleration cycle, tested knob to correct e-cooler magnetic system effect
- Study of injection efficiency on the different cycles

SPS ():

DOS test done and beam permit approved.
First beam injection plan ned today.

AWAKE ():

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LINAC 3 ():

LHC (Jörg Wenninger & HCC webpage):

S12	S23	S34	S45	S56	S67	S78	S81
Phase 2	Phase 1	Training	Phase 2	Phase 1	Repair	Training	Cold
		27 / 11630 A				45 / 11389 A	

Powering phase 2 well advanced in S12 and almost completed in S45.

Last week the powering permit for S12 was approved.

Magnet training status:

- RB.A34 did 27 quenches, reached 11632A which corresponds to 6.81 TeV.
- RB.A78 did 45 quenches, reached 11389A which corresponds to 6.67 TeV.



