

Accelerator Complex Status

End week 13 (Tuesday 6 April 2021)

Technical Infrastructure (Jesper Nielsen):

Statistics:

- Slightly over 7000 alarms.
- 783 phone calls (541 incoming, 242 outgoing).
- 105 ODM created.

Events worth mentioning:

- Mon 29.03:
 - Trip POPS + 7 cavités 10mhz et 2 de 200Mhz + kickers d'injection (3 modules). Cause is not known for the trip.
 - Trip 18kV pulsed network, EMD205/M2 powering the switchboard ERD3/A2. The trip was caused by some heat tests of the magnets in the SPS. The tests were adapted differently to limit the current in the magnet during the tests.
- Tue. 30.03:
 - Many alarms CV in point 8, RE88, RE82, RE78, RE12, RR13, RR77, UW85, UX85, SF8. Cooling circuits had tripped. CV piquet on-site to restart, took a long time since the PLC had stopped and needed rebooting.
 - Evacuation alarm LHCb, at first nothing was found, but the fire brigade then found a team of workers welding without having deactivated the fire detection.
 - Trip of Linac4, booster, PS, due to a problem with the timing GMT network. After investigations it was clear that a small temperature increase had occurred in the server room, caused by an intervention on the cooling water, which caused an already faulty power supply to fail.
- Wed. 31.03: The LHC operator informs TI of an important water leak in RE42. The piquet EN-CV informs us that a sealing of the pressure vessel eau brute was gone. Valves are shut and a reparation is foreseen the coming days.
- Fri. 02.04: Stop of CRYO sector 5-6, due to a faulty oil pump. CRYO piquet and best efforts on-site to restart.

Details: <https://wikis.cern.ch/display/TIOP/2021/04/06/TI+Week+summary,+Week+13>

LINAC 4 (Jean-Baptiste Lallement):

A pretty good week for Linac4 with 98% availability. On Tuesday afternoon, an issue with machine timing distribution blocked the operation for 1.5 hours (all machines affected, not only Linac4). On Sunday morning, a fault on a transfer-line corrector magnet converter stopped the operation for 2 hours with no real consequence.

New settings for the LEBT magnets, giving a slightly better transmission through the RFQ, were applied on Thursday. In parallel, as mentioned last week, the source cesium oven temperature was increased from 55 to 65 degrees..

PS Booster (Chiara Bracco):

Main achievements:

- Control of position and angle at extraction now available in YASP
- Energy matching per ring (with Bdl) with PS done
- Special bending magnet trims included in YASP as optional ring correctors

- Shielding around LBS.BVT reduced perturbation on BI line by \sim a factor 4, considered acceptable
- Problems with trips of extraction/recombination kickers solved (communication)
- Problems with watchdog understood and solved (value from L4L.BCT.3113 and peak current now used)
- Continued BE4.KFA14 waveform measurement using bunch rotated LHCINDIV
- Optics measurements with tune kicker performed and data being analysed
- MTE beam:
 - RF: Minimised losses in all rings, when injecting up to 60 turns. Bunch splitting optimised only on R3 producing even bunches and an emittance close to 1.5eVs.
 - Optimum transverse painting and vertical offset defined for WP of $Q_x=4.11$ and $Q_y=4.34$
 - Achieved emittance $E_h=12-14\text{ }\mu\text{m}$ and $E_v=3.6\text{ }\mu\text{m}$
- LHC25 ns:
 - Works on resonance and beta-beating correction at different working points and intensities are being continued
 - Studies on possible reduction of momentum spread of injected beam and effect on transverse emittance are being performed.

Access on Tuesday March 30th:

- **No beam between 9:00 and 17:10**
 - Access finished within estimated time and POPS-B unlocked-out at 14:20 (some waiting time between end of access and unlock)
 - All FE down due to MGT fault at \sim 15:00
- **Interventions:**
 - Bdl current controller retuned
 - Exchanged control unit in LIU V wire scanner in Ring 3
 - New release of FGC62 and FGC63
 - MTG update
 - FE replacement for KSW Ring3
 - Correction of voltage drift in Linac4 CCDDL1 antenna
 - BU3 cavity loop updated and tested
 - POPS-B moved to other generators
 - Investigation on BSW faults when in standby (not pulsing for a long time), problem understood and different solutions being investigated
 - Update of Finemet Control and Booster 2 Linac4 RF interlock pannel
 - Replacement of RF amplifiers (5L1 and 13L1)
 - BR2.BHZ162 repaired (small broken cable on the thermal protection). During next TS the remaining switches will be checked on this magnet and the Bhz151.
 - Added 6 dB of attenuation to horizontal TF pickup signals to avoid saturation

Main open issues:

- MTE:
 - No settings found for the synchro loop (shot-to-shot variations) to be rechecked when other experts are back
 - Impossible reducing emittance to less than $3.6\text{ }\mu\text{m}$ (target = $2.5\text{ }\mu\text{m}$)
- LHC25 ns
 - Losses from uncultured beam when injecting more than 30 turns (LIU target 35 turns)
 - Large vertical tails
- POPS-B still needs some work to reduce current oscillations in all rings. Iterative studies ongoing together with Bdl fine tuning. Still several trips.
- LIU wire scanners: still difficult to define correct settings and get systematically good profiles

- Shot-to-shot vertical jitter (~1 mm) in extraction line, it cannot be explained by ripple of relevant devices (0.2-0.3 mm expected).

ISOLDE ():

PS ():

AD ():

ELENA ():

SPS (Stephane Cettour Cave):

- Continued SBDS commissioning with SPS in TEST mode -> normally today the SBDS should be handed to OP
- TPSC4 replacement for vac chamber -> **Done**
- TI2 magnet thermal checks until ~Wednesday -> **Done**
- Preparation for SPS ring phase 2 DSO tests and North area primary chain DSO tests 7th, 8th, 9th April
- Crab cavity interlock pre-tests Monday evening -> **Done**
- Completion of last few outstanding FEI checks -> **Done**
 - 4 remaining FMCs -> **this week**
- Last few remaining polarity checks -> **Done**
- Continued interlock checks
 - test WIC for all transfer lines -> **Done**
 - test all input BIC for UA9 equipment -> **Done**
- Control of spare MKDH cable on Monday -> **Done**
- Continued work on QS -> **Done** now the QS is operational like QF, QD and 14 SMD
- Installation and test of the fast interlock from the WIC to fire beam dump if a main circuit trips -> **this week**
- Heat run sextupoles, octupoles and AUX PS in the Ring -> **Done**
- Test under real conditions
 - SIS permit injection -> **Done**
 - BIS injection plus BIS ring -> **Done**
 - Test the reaction of BHZ377, BHZ378, and MDSH.11971 following different condition and they react as expected -> **Done**

Planning:

- SBDS
 - Start reliability run
 - BT working on an auto soft start if the SBDS doesn't pulse at high energy for a given time to avoid a vacuum spike in the MKDV1
- DSO tests
 - SPS ring phase 2 and Ion interlock on 7 April
 - North area primary chain 8, 9th April
- Remove all jumpers on the BISs
- 4 FMCs need to be checked and two others need to be rechecked because of power convertor instabilities
- Continued interlock checks
- Installation and test of the fast interlock from the WIC to fire beam dump if a main circuit trips
- Thursday and Friday no access we aim to pulse all the SPS from 7h00 to 23h00
- Prepare beam permit to inject the beam on 12 April.

AWAKE (Edda Gschwendtner):

WEEK SUMMARY: Second of 2 weeks of electron beam. Successful propagation of electron bunch in Rb plasma, measured deceleration/acceleration and charge loss.

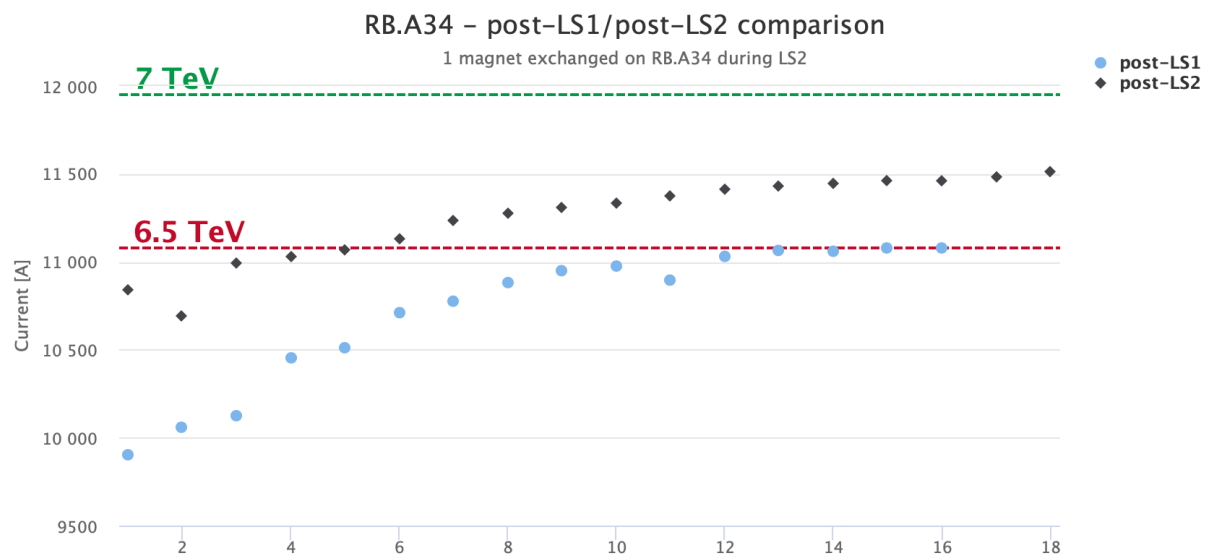
- **New Data Acquisition system:** tested new DAQ system from BI on one digital camera (BTV42).
- **TAG41 Accesses:** RP measurements of x-rays next to active Klystron
- **Vapor source:** warmed up to 200 C, aligned Rb interferometer for Rb density measurement, filled with Rb gas. Cooled down at the end of experiments.
- **Laser:** aligned IR low-power mode to prepare for ionization, re-installed pickoff measurement (camera and energy meter) after the vapor source, to measure ionization of Rb. Test of Rb ionization: plasma confirmed by laser pickoff measurements. Realigned IR each morning before ionization.
- **Electron propagation in plasma, measured on spectrometer:** Test of electron beam through plasma (150 pC), measured on spectrometer. Energy loss/gain observed in transport, as expected. Full set of measurements at 150 and 300 pC electron beam charge.
- **Downstream streak camera:** measured electron bunch length for both charge setups. Now comfortable using this daily.

Next week: Access in preparation of laser ionization measurements.

LINAC 3 ():

LHC (Jörg Wenninger & HCC webpage):

S12	S23	S34	S45	S56	S67	S78	S81
Phase 1	Phase 1	Training	Phase 2	Cold	Repair	Training	Cold
		16 / 11461 A				33 / 11298 A	



RB.A78 – post-LS1/post-LS2 comparison

NO magnet exchanged on RB.A78 during LS2

