

# Accelerator Complex Status

## End week 17 (Monday 30 April 2018)

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### TI (Jesper Nielsen)

Quite a busy week with:

- Wednesday 25.04 at 15:49 SPS beam was lost due to trip of the compensator (BEQ3).
- Thu. 26.04 at 01:23 Low level alarm on FDED-00021 cooling circuit. TI operator on-site managed to fill the circuit manually and restart the pumps. CRYO North Area alarms shortly after. After investigations it was seen that the pressure from the North Area cooling towers was too low, and that it had decreased since several hours. The piquet found a motor on an automatic filter was broken, which had caused the pressure decrease. When bypassed all went back to normal.
- Fri. 27.04 Trip of the cooling towers for the station FDED-00049, which supplies LEIR and LINAC3. The piquet went on-site to find the cooling towers stopped, as well as the distribution pumps. No faults were found on-site, and the station was simply restarted. More investigations will take place.
- Sun. 29.04 at 06:41 Electrical perturbation, tripped the booster and was noted by 513 operators (who saw the lights flicker!). EDF/RTE confirms a mono-phased fault on the 400kV line Chaffard-Grandville.
- Sun. 29.04 at 09:40 Cooling fault in target area TCC8 caused an interlock on the beam in the North Area. TI tried a reset of a pump, but it immediately tripped again. Switch to secondary pump and access planned to investigate further.
- Sun. 29.04 at 22:18 Electrical perturbation tripped all the machines, RTE confirmed a glitch on the 400kV line of Genissiat.

Details: <https://wikis.cern.ch/display/TIOP/2018/04/24/TI+Summary+Week+17>

### LINAC2 (Francesco Di Lorenzo):

Availability of 99.7 %.

- On the Monday a watch dog coming to the zero cycle , solved by the reset.
- On Friday around the 1 o'clock in the night the valve LI.VVS10 has been found closed (probably due to power glitch), the problem has been solved by the vacuum piquet.
- On Sunday the F. James amplifier's in the RFQ (LI.CRFQ) stopped the beam for 5 minutes.

No more than 3 flash over during the week.

### LINAC3 (Francesco Di Lorenzo):

Availability of 98.1 %.

- On Monday hardware problem with the cfv-351-bctft.
- On Thursday Detlef stopped the source to refilling the ovens.
- On Friday the source has been stopped due to high water temperature , caused by water leak close to the distributor, it solved by Sebastian Bertolo. Found the debuncher completely out of tuning, problem solved by RF specialists and all the rest solved by Detlef with some resets.

## LINAC4 ( ):

### PSB (Fanouria Antoniou):

A very good week for the PSB with 99.4% availability. The main downtime of 1h42min came from a PS intervention (access) followed by a MPS down due to a power glitch which lasted 54min23sec.

Main priority of this week was the preparation of the 8b4e\_BCS beam. As priorities from the previous week, power supply ripple checks were performed after the connection to the spare MPS, with no tune ripple issues observed for all 4 rings. The MPS trips of last week were due to a faulty power supply. Finally, the higher intensity MTE\_2018 beam was checked and is ready to be sent to the SPS when is needed.

ISOLDE took beam during the week. The B-train reliability run was paused on Tuesday due to a White Rabbit switch dropping frames unexpectedly. All the ISOLDE beams went back to the operational B train. The B-train reliability run is expected to continue next week.

Finally, several MD studies took place this week focusing on: optics studies setup using the ADT, MTE beam optimization, preparation for brightness studies on the BCMS25 beam, loss maps, optimization of the TOF cycle for the PS MDs.

### ISOLDE (Emanuele Matli):

#### GPS:

Target change on Tuesday morning “perturbed” by activities in Medicis and wrong manipulation of security chain that led to lost of patrol of TT70. Ion source calibration in the afternoon and stable beam to users in the evening. On Wednesday delayed start of STAGISO due to an issue with gating of beam transformer that triggered the watchdog (watchdog not being PPM the interruption affected HRS as well) In the late evening wrong vacuum manipulation vents the whole separator and needed intervention to recover the vacuum and restart the target and line heating. Target checked on Thursday morning and beam back to user but immediately interrupted due to a collision of the faraday cup YGPS.FC4900 with the deflector to GLM. There should be an interlock preventing moving the deflector when the FC is inserted but apparently it didn’t work. The interlock that prevents the insertion of the FC when the deflector is in seems to work correctly. Intervention in the afternoon to manually extract the FC. it’s moving now but the

arm was bent and we are not sure of the position of the FC with respect to the beam. Deflector position was recalibrated.

Implantations started in the evening and continued without issues over the w/e.

#### **HRS:**

Wrong vacuum manipulation during the intervention for the Faraday Cup tripped the HRS line from the front end to HRS40.

We had troubles pumping down HRS40 and needed the help of the vacuum expert who forced on the turbo pumps (He injection OFF).

Once vacuum was recovered set up of HRS to CA0 and stable beam to users in the evening.

On Wednesday proton scan (with automatic scan application), RILIS setup and yield checks.

In the evening HT gives up, after tripping several times during the day.

Thierry informs us that it can't be reset.

Access to HT room the following morning to replace a broken resistor.

YHRS.TCS.675\_RIGHT got stuck and needed piquet intervention for recalibration.

Target change on Friday morning due to a too high level of contamination that made impossible the measurement of neutron-rich Scandium.

Laser optimisation and setting up of separator in the evening.

Running smoothly over the w/e.

Some issues with beam instrumentation:

YHRS.BSC6800 scanner seems not working

Scanner in CB0 seems to have H and V planes inverted

YCD0.BSC0800 scanner doesnt seem to work properly

YHRS.BSC2600 not working

YLA1.BFC0900 AQN always stays to OUT.

BI technicians replaced several supports of the end switches of the Faraday cups. Intervention without impact on beam.

YHRS-QP180 tripped several times, each times it needs a local power cycle and restarts for a while. Same as last year.

The VISTAR reaction time is very slow, moreover when the watchdog interrupts the beam the information disappear and is replaced by the message " NO HRS/GPS in Supercycle", which is misleading.

#### **PS (Klaus Hanke):**

On Tuesday an access was needed to change the final amplifiers of C76 and C81 (13:00 – 15:00); in the shadow of this some other non-blocking issues could be solved (pick-up repaired, intervention on a wire scanner, TT2 stripper). Later the C81 tripped again but then the situation stabilised. Throughout the week however there were multiple resets of the RF.

On Wednesday during the night ZT10.QDE01 went in error; not resettable; the first line was called the next morning (since it was a non-blocking fault). It was an issue with the cooling circuit, they found some metal pieces in the cooling water. Cleaning and purging the circuit cured the problem.

TOF complained about different trajectories for the dedicated and parasitic beam; a steering session was coordinated with them (on Friday) and the trajectories aligned.

On Friday the TFB went down, the piquet had to intervene on it.

Saturday morning F16.QDE120 went down, unresettable. The EPC piquet was called and solved the problem (a card was burnt); about 1 h down time

Sunday morning the situation with C81 degraded, it does not deliver the required power. The piquet intervened on it and decided that an access is needed (will be organised Monday 30<sup>th</sup>). Sunday evening a power glitch took out the RF for about 40 min.

Beams: ions early and nominal have been prepared, as well as the 8b4eBCS (was already taken by the SPS). Intensity on MTE should be progressively ramped up.

## AD & ELENA ():

### SPS (Kevin Li)

Program and beams:

- The SPS had an availability of about 80%. Most of the downtime was caused by the pre-injectors. Major faults in the SPS were the loss of a compensator on Wednesday and a controls problem with an FEC in BA2 on the weekend, which was however blocking only for the fixed target beams. An intervention on a TT40 vacuum pump could be done in the shadow of the compensator fault.
- The week started with scrubbing in the LHC. The standard 25ns beam was in good shape and could immediately be taken for scrubbing. 4x72 bunch injections were injected with intensities around  $1.1e11$  and emittances around 2.5 - 3  $\mu\text{m}$  at injection into the LHC. In parallel, the BCMS was taken for final setup and fine tuning since it should be used for scrubbing overnight. The preparations were perturbed by frequent refills which were required due to the reappearance of the 16L2 phenomenon in the LHC. Nevertheless, the BCMS beam could be finalized and was ready in time for the LHC to be taken for scrubbing around midnight after a short pause due to a vacuum spike on the MKD. BCMS intensities were around  $1.2e11$  and emittances around 1.5 - 2  $\mu\text{m}$  at injection into the LHC. The beam was generally in good shape. In view of a potential re-awakening of the LHC Gruffalo, the injectors started preparing the BCS beam which was taken in the SPS on Friday morning. The beam was set up in the SPS. It is available on LHC4 and is ready to be taken by the LHC, although it currently still suffers from a vertical blow-up during the ramp. This still needs to be

investigated. BCS intensities are around  $1.1 \times 10^{11}$  ppb, emittances around  $1.1 \mu\text{m}$  in H and  $1.4 \mu\text{m}$  in V. All LHC filling schemes are now set with a 200ns batch spacing.

- The fixed target beam was running at  $1.5 \times 10^{13}$  ppb almost all week. Several tests were made. It was found that the radial loop had an intensity dependence (1 vs. 2 injections - beam moves by  $\sim 0.5$  mm) which has an impact on the extraction losses. The Wednesday MD was very successful and slow extraction with constant optics by scaling the momentum was demonstrated in the SPS for the first time. On Thursday night there was a 6 hour ZS realignment campaign. New ZS reference positions were established and the girder was realigned. In addition, a first version of a new automatic optimization was successfully tested during this procedure. To check possible orbit drifts, SFTRPO2 orbit measurements at 4261ms are now being taken once per day. On the weekend, the intensity for COMPASS was lowered to 20 units following their request during the user's meeting. Intensity increase should take place gradually starting from next week.
- The HiRadMat beam was taken on Tuesday - 12 bunches were extracted to TT60 TEDs. Laslett tune correction was done for 4 x 72 batches. The AWAKE beam was finalized including the re-phasing to the AWAKE clock and ready for the AWAKE team to begin their setup on Friday afternoon as scheduled.
- Preparations for several MD cycles were done during the week (crab cavity, high intensity beams). The high intensity MD cycle (LHC50NS) set up was started on Thursday with an INDIV.

Problems:

- Vertical scraper moves in after a while and does no longer fully retract. Needs to be reset every time. Not yet resolved.

### **LHC (Enrico Bravin and Elias Metral):**

The scrubbing run started on Monday and within the morning reached  $\sim$ full machine. Unfortunately the grufalo in 16L2 came back at the same time. A few beams were dumped by 16L2 induced losses and instabilities until it was observed that the solenoid in 16L2 could be used to suppress the loss events.

During the ramp up of the intensity 16L2 loss events were recorded during the cycles, but none of them triggered a beam dump until the 1200b step was reached (dump after a few hours in stable beams). The machine reached 600b on Wednesday and 1200b on Saturday, which also marked the first luminosity above design ! K-modulation in IR4 was performed on Saturday to determine more accurately beta functions at the wire-scanners and BSRT.