

## Accelerator complex status

### End week 16 (Sunday 19<sup>th</sup> April 2015)

#### TI (Jesper Nielsen)

<https://wikis/display/DC/2015/04/15/TI+summary+week+16%2C+2015>

#### Linac2 (Giulia Bellodi)

It had started like a quiet week for Linac2, until the weekend approached.

On Friday evening (around 19h30) the RF began showing signs of problems, with a HV modulator fault.

Called on site by the PSB operator with Vince Cobham, we found that two infrared heaters on the tank3 ignitron were not working correctly, and we replaced them with spares. RF could then be restarted and operation resumed normally for 24 hours (1h30 beam downtime).

RF instabilities restarted again on Saturday evening around 18h30, and around 4am the RF HV modulator went on fault again. The PSB operator called directly the RF specialists (Frank Gerigk and Vince Cobham), who came on site and with the help of the piquet power replaced the control chassis of the Hezemeyer. During the ramp-up however, sparking was observed on the tank3 driver supply already at the level of 18kV (vs 20kV operational value), which was traced to sparking in the area of the connector of the HV cable (connecting modulator and anode) in the modulator cage.

An emergency team was put in place on Sunday morning to investigate further the issue, with the help of Erk Jensen and David Nisbet.

The HV earthing connector (between the current measurement and the transformer) located near the point where sparking was seen was removed, cleaned and replaced further down. Marks and signs of oxidation were observed on the surface. When the RF was restarted however around 1pm, sparks were observed again at the same location when raising the voltage. A very large negative overshoot (60kV) was observed on Tank3, and a similar overshoot was also found on tank2, oscillating at approx 0.75MHz. Also a factor of 2 difference was seen in the voltage read by the RF scopes and the Hezemeyer control chassis.

Current understanding is that the large overshoots and the oscillations might come from the PFN line, but the presence of RF specialists with more experience and better knowledge of the system is needed to confirm the hypothesis and solve the problem.

The team left at around 14h30 and investigations will resume on Monday morning.

#### ISOLDE (Erwin Siesling)

First week of physics at ISOLDE starting with target and ion source development tests (TISD) EN-STI

#### GPS:

Tuesday target #513 VADIS was put onto the Front-End. Experimental target for TISD tests.

Stable beam done on Wednesday.

Proton scan Thursday with NORMGPS cycles but we had problems with the performance of the ion source and the proton scan was delayed till Friday-morning.

Boron 8 isotopes release curves were measured successfully by the target team and beam was sent to ISOLTRAP, all from Friday until Sunday when no more protons were available due to the problem at Linac 2. ISOLTRAP had some difficulties retrieving useful info due to the many different molecules produced by the target together with the 8B and 8BF.

Monday the target change was done for #511 Pb. Now setting-up stable beam. Possibly advancing the proton scan to today. This would then be with STAGISO with max intensity 8E12ppp (to be confirmed).

Issues:

- Vistar application not working and beam parameters for intensity and values for the comparators were set manually from the knobs.
- Few more technical issues – to be mentioned in today's ISOLDE Technical meeting.

**HRS:**

Semgrid target tests finished Tuesday evening.

(Missing Semgrid cable was found back in the target zone)

Target #538 was put back onto the FE on Wednesday to continue RFQ transmission tests and stable beam tuning to COLLAPS.

COLLAPS stable beam tests finished successfully this morning. RFQ transmission tests continue.

Target change for HRS might be postponed till Monday next week to finish the RFQ transmission tests.

Issues:

- Faraday Cup HRS.FC300 piston is broken and was stuck in the beam since last week. Attempts were made to fix it in outer position but were unsuccessful. BI has removed the mechanics from the machine Thursday afternoon. We will work without it until repaired.
- Friday night target heating went down. Took some investigation to find the problem which was solved by a hard cut and start/stop of the POWHRS PLC.
- Saturday night the ISO INCA Server went down. A ticket was opened and Prezemyslaw from the INCA team got things going again. CO is suspecting a problem with the mass scan application we are using that might have caused the problem with the server. Under investigation.
- Few more technical issues – to be mentioned in today's ISOLDE Technical meeting.

## Booster (Bettina Mikulec)

A lot of work was done throughout the week.

- Beam steering and SEM grid measurements were performed to HRS, and beam provided to GPS.
- Setup of the EASTA beam for next week and its parasitic TOF cycle on ring 2.
- Setup of the STAGISO beam for next week's run.
- Finemet MDs.
- Remapping of PSB and PS users due to the ever-growing number of LHC and scrubbing beams. In the PSB currently only 3 MD cycles (1 for PSB and 1/2 cycles for the PS) remain available.

## BLM issue Wednesday:

In the evening, after a few BLMs showed stuck acquisitions, the BLM frontend was rebooted. Following this, the acquisition of all BLMs was lost. DIAMON diagnosed some timing-related faults that were incomprehensible for us, and moreover there were reboot problems of the frontend. Therefore all persons on the call-out list have been contacted (all from BI). E. Effinger came in, checked the hardware (which was working) and rebooted a few more times the frontend. The crate was on and lights flashing on the timing board, but as BI is not responsible neither for the old GM class nor for the timing, he couldn't help further and left at 11 pm. M. Ludwig and B. Dehning were also not able to help (confirmed that they were not responsible and that the wrong persons were on the call-out list), L. Jensen, Jean-Michel Nonglaton and I. Koszar were on vacation. After I consulted with K. Hanke and M. Lamont it was decided to stop all beams for the night except for the LHCPROBE beam for the LHC – the operators were advised to survey the transmission to the PS during LHC filling. Early morning S. Bart Pedersen found that a timing had been disabled, which was not visible in the TRIM history. It seemed that the file carrying persistent data had been corrupted due to an unknown reason (and reloaded during the reboot), which was later confirmed by Nicolas de Metz Noblat and Jean-Michel Nonglaton. Nicolas will follow this up on Monday.

Some downtime on Thursday morning due to the upgrade of the BIS software and a subsequent wrong SIS user permit, which the MPE team had to reset due to insufficient RBAC roles for the PSB operators.

Friday and Saturday evening there were a few Linac2 RF faults that could be reset by the operators, but finally Sunday morning the linac could not be recovered from an HV modulator fault affecting RFQ and all 3 tanks (see Linac2 report). No beam until Monday.

## PS (Guido Sterbini)

It was a difficult and eventful week for the PS perturbed by several issues and downtimes.

The main users for the PS proton beam were LHC (LHCPROBE), the SPS scrubbing beams (the high intensity and the doublet beams) and nTOF. TOF beam is delivering around  $750 \cdot 10^{10}$  ppp with a

total integrated current of  $\sim 4 \times 10^{17}$  p on the target in the last week (quite a good results considering the amount of technical downtime and TOF accesses).

On Monday there was a problem with the 200 MHz cavities (broken LLRF switch, 2 h downtime for TOF). The cavity C10-66 had problem with the gap relay and an access was organized (1h15 downtime for all beams). In the afternoon a problem with the C10-86 perturbed the operation (temporally replaced with C10-11, and fixed on Tuesday by replacing the AVC board). Continuous adjustments on the bumper 43 (BSW43) were needed to compensate its drift of 0.1 kA over 3 kA.

During the night the 200 MHz cavities tripped several times.

On Tuesday there was a major problem of the BSW43 (jitter of 0.5 kA over 3 kA). It was no possible to inject any more. The piquet solved the problem by replacing a control card (1h 45 min downtime). The afternoon was spent in recovery the injection conditions on the different beams.

On Wednesday an emergency stop inadvertently pushed in B151 burned one control card of the 200 MHz cavities (1h15 downtime). During a scan the WS 54H remain in. E. Piselli put it back in the position. In the afternoon there were 30 min stop for a non-reachable monitor (PAXPT113, disconnected by the RP team). During the night no beam was delivered to PS due to a problem with the PSB BLM system solved around 08h00 of Thursday but the beam was off at 08h30 for the planned stop and access (10h40 downtime).

During the Thursday stop a lot of activities were performed (PFW tests to address the oscillation observed in the power supplies, intervention on the C20-80 and C10-66 amplifiers, installation of the new support of one FMR in the MU101).

In the afternoon s problem on the C202 was solved by LLRF piquet (the impact on the beam production was limited since TOF and SPS were in access mode). One group of 10 MHz cavities was lost (LLRF problem on the coarse tuning, 45 min downtime). The night was quiet and the setup of the EAST beam started (acceleration to the flattop).

On Friday the East zone was patrolled and the beam permit was confirmed by RP (it was not officially suspended by they asked to wait for the beam permit confirmation after some tests on their side). On Friday evening the C10-96 developed a problem similar to the one of the one of C10-66 at the beginning of the week (C10-11 cavity is now replacing it).

On Saturday the Piquet Access was called to put the EAST area in beam mode (a concentrator was off) but finally the setting up of the slow extraction for the EAST beam could not start since there was not power in the building to power the two BHZs of the F61 line (the setting-up will continue on Monday).

Late in the afternoon there were two beam interruptions from Linac2 (15 min downtime in total) but early in the morning the Linac2 stopped to deliver beam for an RF problem.

On Sunday a lot of investigations were done to solve the Linac2 problem but finally it was decided to wait for the specialists on Monday.

## SPS (Hannes Bartosik)

It was an interesting week for the SPS with the scrubbing run for high intensity 25 ns beams and the replacement of the COLDEX bypass by a straight beam pipe being the main highlights.

- The LHC was the only client for the SPS this week. On Tuesday evening we had a problem with the extraction for beam 1 due to a temporary shift of the MKE6 extraction kicker waveform with respect to the pre-pulse. The problem disappeared after about one hour. Since the same problem occurred on Wednesday, 2 timing cards on the MKE6 FEC were changed on Thursday. Since then beam 1 could be extracted without problems. The old timing card is being tested in the lab.
- The bypass of the misaligned COLDEX experiment, which created an aperture restriction for the extraction of the nominal LHC beam in LLS4, was replaced by a standard straight chamber during a 10h intervention on Thursday.
- The main activity this week was the SPS scrubbing run for high intensity 25 ns beams. Standard 25 ns beams with up to  $2 \times 10^{11}$  p/b were injected into the SPS and stored at 26 GeV/c in order to accumulate scrubbing dose. Although coherent horizontal instabilities could be suppressed with octupoles, still significant losses due to electron cloud are observed for the high intensity beams. In order to compensate (at least partially) for the COLDEX intervention and the down-time of the pre-injectors accumulated until Thursday, the scrubbing run was continued until Sunday morning in parallel to LHC commissioning. Like in the scrubbing run in 2014, the main limitation for storing high intensity 25 ns beam in the machine for a long time was coming from the outgassing of the MKP4 injection kicker related to heating, despite the raised interlock threshold values. The high intensity doublet beam was used for scrubbing during periods of MKP4 cool-down.
- On Friday the nominal 25 ns beam was accelerated to 450 GeV/c. The vacuum interlock level of the high energy beam dump TIDVG installed in 2014 was reached after about 12 minutes of continuous beam dumps. In view of LHC filling, further conditioning of the beam dump is still needed.
- The fast slow extraction (resonant extraction within about 1 s) for SHIP, a proposed experiment at the SPS North Area, was successfully tested with a low intensity fixed target proton beam during an MD on Friday.