

Accelerator Complex Status

End week 49 (Monday 10 December 2018)

TI (Clement Pruneaux)

Mon 03/12/18 19:40 Lightning strike very close to the 400/66kV transformer EHT5. Complete power outage for 2 hours and helium loss in the LHC tunnel.

Details: <https://wikis.cern.ch/display/TIOP/2018/12/10/TI+Summary%2C+Week+49>

CLEAR (Wilfrid Farabolini):

Executive Summary:

Week 49 in CLEAR was composed of a patchwork of activities, mainly:

- THz Cherenkov diffraction with various radiators,
- Optical Cherenkov diffraction with long glass radiators,
- Tests of THz BPMs with a pyramidal radiator,
- Kick measurements on the CLIC structure,
- Preparation of VESPER for next week medical flash irradiation
- Unmounting Plasma Lens Marx generator

Many accesses were done for changing set-up thank to the RP availability (about 2 per days)

Main incidents have been:

- General power cut due to a storm (nearly 1 day lost)
- Laser oscillator switched off
- Burnt resistor on modulator 31

Detailed overview :

Monday:

- Morning access
 - Installation of Cherenkov diffraction long glass radiator
 - Cherenkov hollow cylinder for THz shadowing experiment
 - unmounting the Marx bank generator from the Plasma Lens experiment
- Afternoon experiments on THz test stand
 - problem with set-up alignment of long glass radiators (blackening the glass with the beam)
 - test of the Cherenkov BPM with pyramidal radiator THz
 - 19:42 total black-out due to a storm
 - attend to preserve the vacuum level and to put in safe status the laser

Tuesday:

- Morning and afternoon up to 17:34: Recovering all the systems (Vacuum, control, timings, Laser, Water...)
- Late Afternoon: Beam eventually as before.
 - Calibration of the correctors upstream to CLIC structure to perform bumps in it.
 - No kick studies because screen MTV390 was stuck (due to the power cut, access needed)

Wednesday:

- Morning: THz test (0.17 THz actually) with the long hollow Teflon cylinder. Shadowing effects evidence.
Access:
 - cylinder changed for a cone
 - realigning long glass Cherenkov radiators
- Afternoon:
 - THz test with the cone with curved output surface (0.5m focal length, 0.17 THz)
 - successful Cherenkov diffraction radiator, light visible on the 2 cameras.
 - many kick measures from the CLIC structure up to 2:30. But no bunch length measurements due to MKS31 failure

Thursday:

- morning:
 - access:
 - installation optical fibres on the long glass radiators
 - installation of a THz Teflon cone with flat output surface
 - screens alignment on VESPER to prepare CHUV medical irradiation for next week
 - test of the THz cone
- afternoon:
 - no signal visible on optical fibre probably due to misalignment (very tough with fibre)
 - access
 - add diffusers to help light collection on the fibres
 - Removed the cone to check the level of the transition radiation at 0.17 THz on the final mirror only
 - realigned VESPER screens to maximize beam aperture
 - test of the THz generation on mirror
 - still no signal on optical fibre despite diffuser
 - large and high charge beam for medical irradiation being prepared: 3 nC with 100 bunches, high laser energy and large spot size.

Friday:

- Morning:
 - access
 - removed fibre, install polarizer before camera and IR diodes instead
 - installed smaller bore Cherenkov cone
 - Laser problems fixed at 13:00
 - Fix MKS31 (deflector power): a high power resistor was burnt
- Afternoon:
 - test of the Cherenkov small cone
 - scan with the polarizer (OK) and with the IR diode (not OK)
 - access
 - removed polarizer replaced with a red filter replaced cone by a

- diffraction silicon screen
- test with the new set-up

LINAC3 (Richard Scrivens):

Monday: The 400kV power went down in the evening, and the decision was taken later in the evening not to make a restart.

When the OK was given on Tuesday, the beam was back within 4 hours (from a cold start).

Friday: One of the source power converters tripped twice and could not easily be restarted. It required adjustment of the filter parameters. Each trip required an hour long reconditioning of the source.

Saturday: A source performance change started around 12:00, and it took until around 21:00 to get back to a stable situation (with both ovens now being powered, and a change in the source tuning point required).

LINAC4 (Bettina Mikulec):

Last report from Linac4 this year.

We stopped Linac4 operation at 5pm on Friday 7/12.

This autumn run was very successful with advancements both in machine reliability as well as in beam quality. We could finish the planned program and took the required data to prepare for the LBE line run next year.

Concerning the faults last week was marked by the thunderstorm Monday evening, bringing down a lot of equipment.

Beam was only back on Tuesday around 5:30 pm, which is understandable also because there is no piquet coverage during nights and due to the lower priority for the restart compared to the other machines. An access was required in addition due to flowmeter problems with DTL3 and PIMS11/12.

LEIR (Angela Saa Hernandez):

The overall performance of LEIR was quite good. Beam was extracted towards the fixed target experiments quasi-continuously from Tuesday noon on, once recovered from the power glitch suffered on the night before. To that end several servers, with which communication had been lost, had to be rebooted. After the glitch a tune ripple of 50Hz and ~ 1 Gauss peak-to-peak amplitude was measured on the main bends. It affected strongly the beam and a 230Hz peak-to-peak variation could be measured using the Schottky diagnostic. The tune ripple was present independent from the B-train used (WhiteRabbit or the previous system) and the piquet was called to perform further investigations. The tune ripple was still observed for a DC-field on the main bends, and also after a change of the regulator card. It "spontaneously" cured on Tuesday evening and despite the efforts to track down its source we could not find it (?!)

On the MD side, the tests with the turn-by-turn BPM system continued and the tune could be reconstructed during ramping and at flattop, with clean measurements. Additionally an investigation was done to understand if the position of the electron beam in the electron cooler could also be measured with the use of the ion BPMs.

And of course we devoted quite some time to get reference measurements of pretty much everything and on all cycles for a smooth recovery after LS2.

ISOLDE (Alberto Rodriguez):

Physics at ISOLDE stopped on Monday evening when the power cut stroke the facility. It took us a couple of days to recover all the systems. As the different systems recovered, we continued working on the MDs that we had planned for the week. Last Friday, the cryo and RF teams started warming up the cryomodules in preparation for the shutdown.

PS (Denis Cotte):

The PS had a good, last week of operation, delivering the scheduled beams. This last week of physics for 2018, PS beam availability is around 84.4%.

Most of the downtime resulted from the CERN wide blackout following the lightning storm on Monday evening.

Lightning strikes very close to the 400/66kV transformer in Preveessin.

- 13h with power limitation. (no beam)
- +2h to restart PS/LEIR and put back the beam.

The other big part of downtime was due to the absence or unstable beam from Pb injector. (Around 8h over the week)

On the PS side, there were only few beam interruptions because of the PFW trip and RF tests. (~20 minutes without beam)

Today, we stopped physics and all remaining beams in PS at 6am.

We will keep POPS and 10MHz cavities powered to validate the new simulated B train with "WhiteRabbit" until 11h30.

SPS (Francesco Velotti)

Last week of beam for the SPS before LS2. This week we had only NA users taking 36.8 ZGeV/c lead beam. Pretty quite week but lighted up by the thunderstorm of Monday evening. This is when a lightning stroke around the prevessin site causing the 400 kV network to go down. All CERN was left with no power. This caused about 16h of no beam for the SPS. The recovery was slowed down by the power limitation imposed (110 kV for the whole CERN) and we had to wait for the green light to be able to try to re-start all systems. LINAC3 and LEIR restart very actually very fast and in fact we were able to resend beam to the NA at about 13:00 of Tuesday. This issue also caused the need for 2 accesses for the crab cavities, one Tuesday and one Wednesday.

After that, the SPS and its injectors worked pretty stably. Only on Saturday, the source was very unstable and needed expert to work on it for almost the whole day to be able to stabilise it - it seems that there was not enough lead left. Reference measurements were also taken during the whole week also for this energy.

LHC (Mirko Pojer):

The first quench in S12 was launched on Monday morning (quench at 6.61 [TeV](#)) and a second quench had just been performed when a power cut struck CERN during a thunderstorm, cutting the 400 kV line. All cryogenic systems of the LHC were lost. Within a short time the Helium in DFBs and in the RF cavities was released to the tunnel which was fortunately empty due to the powering test campaign.

The dipoles are training slowly and the test campaign was prolonged until Wednesday 12.12 morning.

This morning around 6:30 the dipoles had the 10th quench, reaching 11410 A which corresponding to 6.76 TeV. Focuss will now go to Quadrupole training in S12.