Accelerator Complex Status

End week 21 (Monday 29 May 2017)

TI (Ronan Ledru)
Wednesday 18:05: Due to problem with the card YZRIF52-07 in the access system of the PM85, the beam has been dumped and the patrol has been redone.
Thursday 11:16: Trip of ALICE Dipole. The piquet onsite found a power cable eaten by animals.
Sunday 15:20: Another trip of an electronic card of the LHC access control. Patrol was lost in IP5 and CMS. The card has been replaced and the patrols has been redone.
Details: https://wikis.cern.ch/display/TIOP/2017/05/26/TI+Summary+Week%2C+21

LINAC2 (Detlef Kuchler):
Very good week. Only two resets of CFV-361-BCTFI1 (total downtime 8 minutes).

LINAC3 (Detlef Kuchler):
Regular trips of the source microwave generator (resettable).
Since Wednesday evening the RFQ is down. First a capacitance in the amplifier had to be replaced (work finished Friday afternoon). But there is still a short circuit. Work will continue this morning.

LEIR (Django Manglunki):
A very good short week for LEIR, which delivered the Xe beam to the PS for the first time, with some advance on the schedule.

- Still some problems with ITE.BHN30 which trips several times a day. TE/EPC is monitoring it.
- The longitudinal instabilities have disappeared even at relatively high intensity.
- LEIR was coupled to the complex on Tuesday 23/5 afternoon and the beam was transferred to the PS in the evening.
- On Wednesday 24/5 evening, the machine was decoupled and put in standby as there were no user during the long week-end.
- LEIR will restart with beam on Monday 29/5 morning after the repair of the RF amplifier of the Linac3.

PSB (Alan Findlay):
A good week for the PSB with no significant down time. The high intensity MTE beam was the flavour of the week, so time was spent removing losses during the capture and acceleration, then during the extraction process. Good progress was made, and although the Eh remains ~5-10% higher than desired at 8.4-8.8, the beam is in good shape otherwise.

ISOLDE (Erwin Siesling):

HRS:
STAGISO tests were carried out last Tuesday after which HRS has been in standby. Target change foreseen Monday-afternoon.

GPS:
The originally planned new target was unfortunately not ready and it was decided to use last year's target #513 carbon nanotube for the production of the 8B beams.
Stable beam setting up and proton scan plus yield checks (on Sulfur Fluorides, Tantalum Oxides, Tantalum Fluorides and Boron beams) finished on Tuesday-evening and showed us positive results to decide to continue the run with this used target.
Tuesday night during IDS stable beam tuning the HT gave up after a whole day running perfectly at 60kV. We were not able to ramp it back up.
Wednesday morning an intervention in the HT room had been planned anyway to replace a leaking heat-exchanger gauge and this access was used as well by the specialists Jan Schipper and Thierry Gharsa to investigate the failing GPS (HT2) power supply. The power supply was replaced by the spare which had just come back after a previous failure a few weeks ago. Several checks pointed this time to an issue at the GPS Front-End side and after severe investigations CV found the de-humidifier in the zone malfunctioning and using up (leaking?) chilled water used for condensation of the target zone air. This repair can only be carried out during the technical stop on Wednesday due to radiation in the target zone.
We could still run at 30kV which is sufficient for the IDS users.
Wednesday-morning after the intervention when finally HT was back we suffered another failure. This time a tripping circuit breaker which cut all power in the HT room including HT and target heating. We don't know what caused it and after re-arming the circuit breaker all went rather smooth.
Since Wednesday-evening IDS is taking data on radioactive Boron beams from GPS using full intensity and max p-current from PSB. The run will finish Monday morning when beam will be taken by REX for Trap and EBIS tests.
Few more issues during the run:
Friday after refilling the SF6 gas in the target gas-line the yields did not improve as expected. The beam also needed retuning/calibrating. This will be discussed with the target group to have a better understanding of what is happening inside the target.
Saturday-night a few trips of the vacuum gauges causing some elements to trip and vacuum valves that closed. Sunday-morning the target anode voltage went down.

Despite quite a number of unforeseen circumstances and issues, it has been from the physics point of view a good week with users that are very happy with the obtained data.

PSB (Ilias Efthymiopoulos):

Smooth running for the PS with overall 95% availability (statistics taken Sunday evening).

PS delivered beams to East Area (including IRRAD), nTOF (2.51 E18 pot), AD, SPS and all varieties of LHC beams including 12 and 72 b @ 25ns. Special beams for AWAKE (LHCPROBE and LHCINDIV) were also prepared and delivered, as well as injection studies with Xenon beams from LEIR. The last needs further work to adjust several machine parameters to the new ion parameters. On Tuesday we allowed an 1 hour stop of all beams in the shadow of an LHC refilling to intervene and repair the SMH26 that was blocking ion injection from LEIR. Sunday evening the extraction septum to East Area (SMH57) triggered by external temperature fault that was traced by the expert to increased temperature of the cooling water. During the afternoon we reduced by 20% the cycles to the East Area (1 less out of 5) that seemed to allow operation without alarms. Later the cycle was put back - to be followed with EN/CV. On the smallish issues, we had few occasional trips of cavities and power supplies that corrected by reset or intervention without major beam loss. We also observed that the longitudinal emittance for the LHC 72b beam (LHC1) could be improved with better running of PFW, also comparing the settings of last year; more work on this to follow.

On the MD side we had three MDs scheduled: to check the functionality of the tune and chromaticity knobs from LSA foreseen to replace a dedicated standalone application, the stability study of Btrain at injection of LHC beams, and the study of LHCINDIV beam without gamma jump.

AD (Pierre Freyermuth):

The overall week was good for AD with no major failure this time. However, the average extracted intensity was not at its best during the weekend. A slow fluctuation over the day might be explained by temperature sensitivity of some equipment. Injection bunch rotation might be optimized and some unexplained losses on the 300MeV plateau could be followed up next week.

--- Day by day summary ---

Tuesday 23/05
- No user took the beam the morning, we did some AD access.
- PS stopped 1h.
- Some issue with the pulse length of the extraction kicker.

Wednesday 24/05
- C10 cavity PLC software work ongoing

Friday 26/05
- C10 cavity tripped. Work still ongoing on the PLC side.
- AD Extraction septum power supply was very sensitive to the temperature. Specialist exchange a capacitor which successfully stabilise the length of the pulse.

Saturday 27/05
- On the AEgIS extraction line, the beam is moving shot to shot by 5mm. It is visible only on the last grid, while stable on all the previous grids. To be followed.

- 1 hour stop due to a power supply failure on the AD injection line (DI.BHZ6025, ~3KA pulsed). First Line called and intervention supervised by CPS team.
- Some losses appear from time to time on 300MeV plateau.

Sunday 28/05
- TT2 stopped due to a power supply issue.

SPS (Francesco Velotti):

- Monday:
  - Update of mains (bends and quads) FGC software. It was deployed and all functions of the mains had to be re-driven to the hardware. Tune automatic step operational.
  - Automatic tune changer was setup on the HiRadMat2 cycle
  - HiRadMat new optics (0.25 mm spot size at FP2) deployed and tested
  - Longitudinal and transverse damper setting up for HiRadMat 288 bunches done
  - HiRadMat access given to complete the installation of BTV at the target to measure beam size delivered
- Tuesday:
  - Longitudinal and transverse damper set up on HiRadMat cycle for 4 batches (up to 1.5e11) finished
  - SPS timing tail clipper test done
  - HiRadMat #18 successfully done. Still need to check if the beam parameters have been satisfied at the experiment
  - LHC 25ns 72 bunches taken and optimisation started
- Wednesday:
  - Setting up of 72 bunches for LHC
    - Problem with one of the 800 MHz cavity - beam not ready yet to be delivered to the LHC
    - Finally 72 bunches not delivered to the LHC due to problems with 800 MHz cavities and long damper
    - After few tests, Thomas and Giulia managed to have the 72 bunches stable all along the cycle - ready for Friday
- Thursday:
  - AWAKE asked to be in laser test mode. There was a bit of confusion regarding the possibility or not due to the missing signature on the beam permit. In the end, checking with Spencer this was clarified.
  - Few problems with the access in the AWAKE zone during the night, but the
  - Good day of production for FT
  - Trajectory in TT10 made the same between 12b and 72b
  - LHC25ns optimisation continued:
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    - Chroma in H and V measured and re-tuned
    - tune in H and V corrected as well
    - Emittance now in the range of 2.5 mm.mrad
- Friday:
  - Beam to AWAKE. No major problems. TT40/41 steered and all checked done by BTP.

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        - To be checked the BIC on TT41B. In order to have it extracted, the TT41B has to be re-armed to extract.
    - 72 bunches to LHC. Beam re-steered from in TT2 - TT10 in order to have same trajectory between
- Weekend:
    - Problem on QTLF in TT20 on fast stop caused some down time to the FT. EPC going to check Tuesday
    - Cycle for coast with Q20 deployed and tested (LHCMD3)
    - Problem on RBI seen by the FMCM

LHC (Stefano Redaelli and Jorg Wenninger):

After just under 25 days of commissioning the first stable beams fill with 3b / beam took place on Tuesday. After 2 fills, the number of bunches was increased to 12b and two fills were executed with that bunch count. With 12b some bunches became unstable in the horizontal plane during the squeeze, leading to emittance blowup. The octupoles will be increased for the following fills. Friday the green light was received to move to 75b. The weekend was very efficient and Sunday midday more than 20 hours of stable beams were accumulated with 75b. On Sunday evening the green light to switch to 300b was given by rMPP. A fill with 12b per injection went into stable beams Sunday night with L ~1.5E33 cm-2s-1.
The 2016 VDM cycle recommissioning was started, the injection orbit was established with nominal bunches, and probes were brought to collisions.
The optics was measured at 33 and 30 cm (dump on an AC dipole kick). The beta-beating re-increased to 5-10%.
In preparation for the scrubbing run 72b trains were injected from the SPS Friday afternoon. Following an initial vacuum spike on MKI2D that took an hour to recover, conditioning proceeded smoothly and 400 bunches were accumulated in each beam. S12 showed already electron cloud activity while the other arcs were 'quiet'.
In the weekend, the intensity step of 75b was completed (3 fills, all dumped by OP, for about 21h in stable beams) and validated. A fill with the next intensity step of 336b was prepared and kept in collision for >8h.
Availability issues: problems with access system in P8 and P5, requiring patrols (all together ~10h lost); Cryo problem (turbine in P8) causing ~6h without beam; BLM controls (3h).

Next:
Monday 29.05:

- 24 hours of pre-scrubbing with 72b trains

Tuesday 30.05:

- SB with 300 b

Wednesday 31.05: **Injector TS - beam stop at 05:00.**

- Aim to bridge with SB at low mu

Thursday 01.06:

- Access / injector TS (until evening).