Accelerator Complex Status

End week 12 (Monday 26 March 2018)

The restart of the accelerator complex is well under way and all activities are on or slightly ahead of schedule. Beams are accelerated in the LINAC2, PS Booster, PS and the SPS. The powering tests on the LHC circuits finished also ahead of schedule and the machine cold check out has started. Tuesday the extraction of the SPS beam with beam down TI2 and TI8 is foreseen.

TI (Clement Pruneaux)

The main topics were:
Tue. 20.03 at 06:06: An electrical perturbation caused trips of some equipment in injectors and caused some minor problems in the computer centre. The perturbation was confirmed by EDF/RTE near Génissiat.
Fri. 23.03 at 11:34: The LHC4 Static Var Compensator (SVC) tripped. When switched back on, the CRYO tripped 2 times. The cause of the trips is still being investigated.
Sun. 25.03 at 04:27: All OPC servers went down, due to the change to summertime. Reboot one by one by TI solved the problem.
Details: https://wikis.cern.ch/display/TIOP/2018/03/20/TI+Summary+Week+12.

LINAC2 (Giulia Bellodi):

LINAC2 had a very good week, with 100% beam availability (except for a 5minutes planned stop to update the LT.BHZ20 firmware).

LINAC3 (Giulia Bellodi):

LINAC3 is still in setup mode, and the week was devoted to frequency scans of the Sairem microwave generator and
to 150ms spacing tests with the source.

PSB (Jean-Francois Comblin):

It was another good week for the Booster, with very little downtime: just a few power converter trips and a power glitch, Tuesday, that allowed to spot a problem on the remote reset of the MPS.
The recurring problems with the distributor of ring 1 and the transverse feed-back of ring 4 are now understood, and proper actions will be taken by specialists very soon.
Lots of progress have been made on the MTE beam, with an intensity increased to 2700E10 per cycle.
All the LHC beams have been correctly sent to the PS, as well as TOF, AD and EAST beams.
For Isolde: the BTY line was checked, and all the problems fixed. The HRS beam was correctly aligned on the BTM grids, to prepare the annual steering of the beam in the BTY line to the targets.
The commissioning of YASP for the PSB-PS steering is mainly finished: all the technical issues have been solved and kick response scans performed. We now have to gain experience with actual corrections.

PS (Frank Tecker):

The PS had a good week, delivering the scheduled beams to the SPS and continuing the setup of further beams. LHCProbe, LHCIndiv, LHC 12b, MTE (low intensity, 4 turns, and nominal with ~1.8e13), and AD are available. TOF beam (up to 700e10) to D3 and EAST beam to PS internal dump have been prepared. Both zones had DSO tests on Thursday and are waiting for the completion of the Beam Permit.
LHC 72b beam is in preparation.

The energy matching needed some special attention due to the B-train measurement. The initial low-energy orbit was 11mm to the outside. A first energy matching revealed 4.4G difference and the injection field had to be changed from 1013.6 G to 1018 G. New and old B measurement were consistent but the new had been calibrated to old one.
An eddy current compensation card had been re-connected during the shutdown on the F side of the reference magnet unit 101. This card supposedly lowers the field by 5.5G for a 14G/ms ramp (the present ramp is 21G/ms - factor 1.5 faster). The peaking strip for the start of the old B measurement is only on the D side. So, the reconnection of this card changed the old B-train by 5.5G * 1.5 / 2 = 4.1G. The new measurement is not affected by the card (since 500G marker coils on both sides calibrate the measurement) but it had been calibrated to the old one.
The compensation card was taken out again to reproduce the 2017 situation. The energy matching was redone and is now like in the last year.

SPS (Kevin Li)

Beam commissioning went well overall with several problems detected and solved on the way. Kick response and aperture measurements were carried out. Only one of the remaining three vertical bottlenecks was removed with the YETS interventions. Beam based alignment was successfully completed, shifting four magnets in 3, 4 and 5; remeasuring showed a clear improvement (LHCPILOT: 5.502, 3.13 --> 2.432, 1.744; SFTPRO: 2.564, 2.045 --> 2.286, 1.942). Extraction was set up for the LHCPILOT cycle. 12 bunches were injected and accelerated on the LHC 25 ns cycle and the automatic tune correction was set up. Work was done on the mains power converters to enable economy mode and to improve QD active filters. The intermittent publication issue of BLM data of LSS6 is still under investigation.

- Thursday (wk 11): First beam to TT10.
- Friday: First circulating beam 2018 in the SPS; RF set up, MOPOS alignment, basic checks; 5 cycles commissioned, preparation for kick response measurements.
- Saturday (wk 11): Kick response measurements - mediocre BPM calibration in H; BI checked and corrected; problems with BLM in LSS6 tripping SIS, CO and BI are investigating; aperture measurements launched.
- Sunday (wk 11): First results of aperture measurements processed - one bottleneck in vertical removed.
- Monday (wk 12): Problems with short MD1 cycle - understood (linkrules of sextuples not updated); main frequency response measurements show clear improvement of the 50 Hz line; impact of certain RF loops on

horizontal aperture measurements understood; beam based alignment (on LHCPILOT and SFTPRO) requires shift of 4 quadrupoles.

- Tuesday (wk 12): Access for beam base alignment; re-measure after shows clear improvement on both cycles (up to a factor 2), decided another iteration was not needed; problems after access on QD power converters, switched temporarily to spares; by the evening, a fix was in place; LHCPILOT and SFTPRO need energy re-matching after changes in PS B-train measurement; the LHCPILOT energy re-matching was done.
- Wednesday (wk 12): SFTPRO energy re-matching done; prepared LHC fast extraction; problem with BPM in BA4; BI investigating.
- Thursday (wk 12): Access for fix of damper pickups - in parallel work on mains power converter problems in economy mode; afternoon, fast extraction to TEDs in TT40 and TT60. Friday: Preparation of 12 bunches on LHC and HIRADMAT; chromaticity correction and golden orbit and trajectory measurements for LHCPILOT; over noon access for MKP, in parallel access to investigate faulty BPM in BA4; after recovery, took 12 bunches on LHC cycle, RF setup and put in place and tested autoQ Laslett correction on first injection; BPM MOPOS aperture correction reverted.
- Saturday (wk 12): re-check orbit for horizontal aperture measurements.
- Sunday (wk 12): optimization of SFTPRO cycle.

LHC (Jorg Wenninger):

Powering tests completed middle of the week. Checkout starting, experiment handshakes and signal exchange tested Thursday. Friday UPS tests of LBDS, IT beam screen regeneration in points 1 and 2. Checkout proceeding smoothly over the weekend: the machine was left for 18 hours in physics conditions (2017 settings) without any failure, BETS tests of the LBDS were completed. In general the machine hardware and software are in very good shape, the only system that could not yet be checked being the RF system for which the low level setup will be completed in week 14. In terms of interlocks, the only worry are one faulty BLM (permanent interlocks) and one BLM missing in the DB, those faults would prevent arming the BIS loop. The experiments will open the valves today. Allowing to close the BIS loop and it is foreseen to send the LHCPROBE beam down to the TI2 and TI8 lines on Tuesday.