Summary of the 46th FOM Meeting

Held on Tuesday 1st December 2015

Agenda (https://indico.cern.ch/event/464739/)

1. *Follow-up of the previous FOM*
2. *Status of the Machines*
3. *Schedule Updates*
4. *New procedure for the beam permits (M. Tavlet)*
5. *AOB (Access door maintenance)*

1. Follow-up of the previous FOM

The minutes of the 45th FOM were approved.

There was no open action.

2. Status of the machines

Linac3 (G. Bellodi)

During the first part of the week there were a few problems with the stability of the source. Several remote interventions were needed.

In the second part of the week, using the second oven, a stable intensity of more than 20 μA could be delivered.

An oven refill is taking place today (Tuesday 1st December). **K. Hanke** asked if this is the last scheduled oven refill of 2015. **G. Bellodi** answered positively.

LEIR (D. Manglunki)

It was a very good week for LEIR.

LEIR eventually retrieved the NOMINAL beam performance of 5e10 charges extracted (~5e8 ions/bunch) for the LHC, while the EARLY was used for the North Area fixed target. Also, the MDNOM, MDRF and BIOMD cycles were used for more studies on transverse feedback/blowup, optics, RF, injection efficiency, electron cooling…

At the beginning of the week, TE/EPC confirmed that the 300 mA 50 Hz noise observed on the current of ETL.BHN10 was due to a measurement problem on the samplers and was not impacting the actual field seen by the beam.

On Thursday (26th November) the extraction trajectories were re-optimized, from the machine (bump and kickers) to the transfer lines towards the PS, before asking the PS to retune their injection oscillations.

On Sunday at 13h30 the RF cavity ER.CRF43 tripped on a non-resettable HV fault, unfortunately during a LHC filling attempt. It could eventually be restarted in local, but caused 50 min of down time. It tripped again at 21h09 while the LHC was in stable beams, and the specialist had to call the EPC piquet (3 h beam downtime for the North Area, 1 h of which in parallel with an SPS chain 11 problem). During the night, the situation in LEIR degraded: the EARLY beam was ok, as well as the first NOMINAL cycles, but the injection efficiency of the subsequent NOMINAL cycles became lower and lower. While investigating the reasons, ETL.BHN10 and CRF43 tripped with no possible remote reset; they had to be restarted locally. Eventually the problem was solved by retuning the injection line. The North Area was marginally affected as it was experiencing beam stopper problems tripping chain 11 at the same time, but the LHC filling was delayed.

On Monday the injection optimization eventually drove the intensity beyond the 5e8 ions/bunch design values.

Concerning the CFR43 problems, **A. Findlay** informed that the cavity power supply was replaced yesterday (Monday 30th November).

PS (A. Guerrero)

It was a quiet week for the PS. The machine delivered ions to the SPS and LHC. For the nominal ion beam the normalized emittances measured in TT2 are 0.7 and 0.8 μm rad in the horizontal and vertical plane respectively.

On Wednesday afternoon there was no beam during two hours due to a failure in the access system, which drove the ADT zone to fall-back mode and TT2 to beam-off as protection. On the access console the ADT zone could not be withdrawn from access mode (to be able to switch TT2 again to beam mode) as the EIS-a condition was not fulfilled even if all EIS were notifying OK condition. The access piquet and the specialist were called. It was found that the main 48 V circuit breaker of the AD Target hardware loop switched off either due to a short-circuit or to overload. **D. Chapuis** informed that a temporary fix was put in place to ensure normal operation in the next two weeks before the YETS when a permanent fix will be deployed.

The BHZ377 interlock test continued. The magnet current goes to zero when the interlock coming from the SPS arrives however after the veto condition is removed, the magnet does not cycle correctly when the following destination is SPS (to be followed-up).

D. Manglunki reminded that it is important to have a daily sublimation during the ion run. Even if there is no apparent effect on the vacuum can be seen on the gauges, it preserves the lifetime of the ion beam. **J. A. Ferreira Somoza** confirmed that daily sublimations are done.

SPS (H. Bartosik on behalf of V. Kain)

Since Tuesday (24th November), the LHC is taking nominal ion beam with 12 injections. The re-phasing issue affecting both ion cycles (the EARLY and the NOMINAL) was found to have a two-fold source: (1) the dynamic economy and the consequent different magnetic history in the SC and (2) to the RF re-phasing procedure not properly configured for ions.

More studies were carried out during the week to further decrease the batch spacing between two injections into the SPS. The damper was successfully commissioned for ions Tuesday night. With the damper operational, 150 ns batch spacing could be achieved in the SPS. On Sunday a filling scheme with 150 ns batch spacing was tried in the LHC. Unfortunately it had to be abandoned again due to high losses on the transfer line collimators and hence in the injection region. They are probably caused by horizontal tails due to the large oscillations of some bunches at SPS injection with 150 ns spacing. Scraping could not be deployed, as it would significantly decrease the intensity of a few bunches. Eventually it was decided to go back to 225 ns batch spacing. The intensity achieved thanks to the damper is now higher than 3e11 charges at flattop.

On Wednesday the UA9 cycle was prepared and tested with beam to be ready for next week UA9 run.

A lot of work was performed yesterday (30th November) on the LHCION2 cycle, both on the transverse and longitudinal planes. As result the transmission through transition and along the ramp improved (the overall transmission went from 60% to 80%), and allowed SPS to fully benefit from LEIR intensity increase.

This morning (Tuesday 1st December) the North Area 2015 physics run ended.

Concerning the downtime, there were 55 min for a primary ion interlock BCT seeing a spike and 2 h 3o min due CPS access chain issue (see PS report). Additional 42 min were lost electrical discharge switch on MKD dump kickers. More that 4 h were lost for LEIR RF issues. SPS Cavities 3 and 4 with/or their corresponding transmitters tripped again frequently during the week.

North Area (A. Fabich)

The North Area had a very difficult Sunday night with the re-occurring issue of a dump in H8C that could not be moved into safe position any more. It tripped the chain 11 and hence stopped NA physics. A temporary solution was found. The system will be repaired during the YETS.

North Area Users (H. Wilkens)

During the last weeks, the North Area duty cycle was significantly reduced by the LHC ion cycle commissioning. **H. Wilkens** asked if a similar situation would repeat next year. **D. Manglunki** and **M. Lamont** explained that this is intrinsic to the multi-batch injection of the LHC ion cycle.

NA61 completed a successful test run in preparation of their Pb ion program in the coming years. Next to NA61 there were 6 test beam users in H4 and H8.

UA9 used the Pb beam to characterize the crystals for ion beam collimation.

Four satellite bourn cosmic ray detector projects used the beam:

- HERD a detector concept proposed for the Chinese Space Station, to be launched in the next decade.

- DAMPE, scheduled for launch on December 17th, tested detector from the engineering prototype.
- NUCLEON, a Russian satellite launched last year, brought their engineering prototype for calibration studies,
- CALET/Super-Tiger, a group from NASA tested detector elements of the CALET satellite and Super-Tiger balloon experiment.

There was also a test-beam from the Compressed Baryonic Matter experiment prepared for FAIR at PSI, testing many of the detectors foreseen in the experiment.

On behalf of the users, **H. Wilkens** acknowledged all people involved in the ion run.

LHC interface with the Injectors (M. Lamont)

The beam performance was very good: 456 bunches were injected. ALICE is running at its nominal luminosity. LHC benefited from improved injector performance and has reached twice the design peak luminosity (2e27 Hz/cm^2).

D. Manglunki commented that during the current fill, after 2 hours of stable beams, the LHC accumulated as much integrated luminosity as during the whole 2010 run (10 μbarns^{-1})

TI (J. Nielsen)

In addition to the already mentioned problem with the TT2 fall-back mode (see PS report), yesterday (30th November) due to database communication problems there were several PVSS alarms in the OP-TI consoles. In addition there were several spurious calls from the CPS CCC island. People (also outside CERN) were notified to have received a call from this island, but not real call was dialed.

J. Nielsen asked to inform OP-TI about the special requests/procedures during the Christmas stop. **R. Steerenberg** commented that a special procedure in case of door alarm for the CPS complex is going to be prepared.

J. Nielsen informed that during the Christmas stop the site access will be restricted. **M. Lamont** informed that a shutdown access list is going to be prepared and distributed by the Group Leaders.

3. Schedule

K. Hanke presented the Injector Schedule 2015 v1.12 (Annex 1).

D. Manglunki and **W. Scandale** asked to move the UA9 MD by 24 h (from Thursday 3rd to Friday 4th December). The proposal was approved.

K. Hanke presented the Injector Schedule 2016 (Annex 2). **R. Scrivens** informed that the LEIR restart will be moved by 2 weeks from the 18th April to the 3rd May.

4. New procedure for the beam permits (M. Tavlet)

A new procedure for the beam permits (BP) was presented by **M. Tavlet** (Annex 3).[1]

A team of specialists revised the BP procedure with the aim clarify some safety aspects. The goal was to review the BP templates, to prepare an EDMS platform to manage them, to define their limits and their suspension/cancellation procedures.

For the 2016 YETS all beam permits will be cancelled as soon the facilities stop. The EIS-b will be condemned in agreement between OP and the DSO. As soon the BP is cancelled or suspended the operation key of the Access Console will be removed or, in case of test, replaced by the safety key used for the patrol (key tagging). This will allowed to know the beam permit validity directly from the access console.

Together the Beam Permit a Powering Permit (PP) was introduced. **R. Steerenberg** explained that its aim is to allow to put a zone in Beam Mode without a valid BP. **R. Scrivens** asked it the PP will be suspended/cancelled automatically with the BP. **M. Tavlet** explained that the procedures for the PP have still to be finalized.

5. AOB

K. Hanke informed that the access door YEA01.LN2=363 will undergo special maintenance from Tuesday 1th to Wednesday 2nd November (IMPACT 69590). RP approved the intervention.

Next Meeting: Tuesday 8th December

Minutes reported by G. Sterbini on 3rd December

[1] After the FOM, **M. Tavlet** uploaded an updated version of the document.