



Summary of the 18th FOM Meeting

Held on Tuesday 25th July 2017

Agenda (<https://indico.cern.ch/event/655432>)

1. *Follow-up of the last FOM*
2. *Status of the machines*
3. *Schedule updates*
4. *AOB*

B. Mikulec chaired the meeting.
The list of presence can be found in [Annex 1](#).

1. Follow-up of the last FOM

Minutes of the previous meeting were approved.

2. Status of the machines

Linac2&Linac3

R. Scrivens reported the status of the linacs ([Annex 2](#)).

Linac2:

- ~99.6% availability
- On Monday an issue with a pulse repeater caused incorrect BCT acquisition, leading to the Watchdog continuously cutting the beam. CO was asked to clarify to us the call procedure (Timing? Hardware?)

Comment from M. Gouber-Pace: The call procedure applied on last Monday was right: OP called the FE Operational support (BI) who diagnosed a timing problem; at this stage, BI had no means to guess if the problem was on the generation or on the reception side. It was then logical that he called a timing expert. This one was able to identify the root cause of the problem (misbehaving HW) and advised OP to call the INFRASTRUCTURE support team. As you correctly outlined, INFRASTRUCTURE was NOT the right qualifier, the expert should have used the term 'HW INSTALLATION' team.

With the new pulse repeater generation (installation has started in some places and will reach its apogee in LS2), the diagnostic tools will allow the FE operational support (in this case BI) to identify the root cause of the timing issue and then to call either the timing team if the problem is generation-related OR the HW installation team if a HW module is faulty.



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- After LS2 there will be additional diagnostics, so discrimination if source or reception is faulty will be immediate.
 - A high source flashover rate (23/day) is being correlated against environmental conditions. If there is a stop, inspections will be made.
 - RF phases could not be controlled after a FESA update. Fixed.
 - If there is a 1 hour stop RF will exchange the reference line amplifier that has shown some fault conditions; it's not urgent.

Linac3:

- 94% availability.
- Poor transmission after the linac was traced to the RFQ tube failing, which was replaced on Wednesday (3 hours down in total)
- RF phases could not be controlled after a FESA update. Fixed.
- At the moment a 2 hours stop to change the FJ amplifier on tank2.
- Xe gas is getting low, but waiting longer to replace.
- Four trips of the source RF in the week. The spare is being prepared in situ, as the controls need to be better integrated before it would be used operationally. Will then require a day to retune the source. In preparation (date ready not yet known).

LEIR

N. Biancacci reported for LEIR: ([Annex 3](#))

Issues:

- On Monday recovery from BHN20/30 re-cabling procedure. Beam only in the afternoon for joint LEIR/LINAC3 MDs. Difficult restart, needed to exchange module in EI.QDN10 PC.
- On Tuesday unusual injected intensity fluctuations: identified Linac3 RFQ RF tube to be changed.
- The same day a small water leak issue on RF LEIR: quickly fixed by increasing pressure.
- Few trips in LINAC3, quickly fixed, then beam to the PS for EARLY to SPS setup still with old transfer line optics.
- On Thursday fixed BPM reading in EE, ETL, ETP lines.

Activities:

- Joint LEIR/LINAC3 MDs to study the effect of ramping and de-bunching cavity on momentum distribution.
- NOMINAL cycle setup for multiple injections and e-cooler current increased from 200 mA to 300 mA to boost cooling time.



- RF studies on EARLY and NOMINAL beam: flat bunch produced in NOMINAL with $h=4$, RF voltage calibration accuracy measured down to 1% in EARLY.
- 7 injections in NOMINAL: working on injection and capture efficiency.
- EARLY to SPS.
- LLRF MD.

PSB

A. Findlay presented the status of the PS Booster ([Annex 4](#)). Availability 96%.

Issues:

- Monday 80 minutes lost due to L2 Watchdog timing issue.
- Monday 3hrs 20mins lost due to BE.SMH15L1; electro valve changed
- Friday 1hr 40mins lost due to BE2.KFA14L1; timing card changed
- Saturday 70mins lost for ISOLDE due to BTY.QFO153; fixed by First Line.
- BPM & wire scanner issues worked on throughout the week.

ISOLDE

M. Lozano Bonito reported the status of ISOLDE ([Annex 5](#)).

Working with a new isotope Ba 144, which was delivered to the MiniBall experiment. It was a good week, got the beam on Thursday while it was expected for the following Monday.

Issues:

- Several times power supply for the target heater tripped and restart was time consuming.
- Some trips of the normal conducting cavities.

ISOLDE Users

K. Johnston: Pretty good beam, this time it was as predicted, what is not often the case. This week will switch to another Ba isotope.

PS

M. Fraser reported the status of the PS ([Annex 6](#)).

It was a good week for the PS with an average availability of well over 90%. Downtime was caused by minor faults spread across a range of equipment that could be reset after piquet interventions. On Thursday morning, and with very short notice, it was agreed between with the LHC co-ordination team that an LHC 50 ns beam would be provided to help diagnose the 16L2 issue. The beam was available for SPS on Thursday afternoon. Also on Thursday the LHC ion beam (EARLY) was sent to the SPS setting up. An issue with the ion beam transmission between the machines was solved and attributed to the PS extraction equipment having wrongly scaled settings. The LHC VdM beam was tested during the week and is ready at 2.6 mm mrad at extraction from the PS. Over the weekend, the East Area was able to profit from the extra space in the super-cycle due to the SPS mains problem and could take extra spills. Work is on-going to improve the TPS15 shadowing of



the SMH16 for MTE extraction and a further iteration was made over the weekend, needing adjustment and optimisation of all other beams extracted through SS16. The MD programme was busy and the BGI magnet was successfully powered at nominal current without perturbing the beam using an additional trim circuit, which was added during the last Technical Stop.

East Area

N. Charitonidis: Nothing to report, smooth operation throughout the week.

East Area Users

H. Wilkens: A smooth week.

nToF

M. Bacak: Also smooth operation.

AD

B. Dupuy reported on the AD status ([Annex 7](#)).

Availability was 100%, however, the beam position was drifting due to instability of fine timing at the extraction kicker what affected ATRAP and ASACUSA. It seems to be related to temperature changes. A timing card in a kicker was modified and it should solve the issue.

AD Users

H. Wilkens: The experiments suffered due to the beam position fluctuations.

SPS

V. Kain reported the status of the SPS ([Annex 8](#)).

Availability of 73% due to problems with the main power supplies (dedicated presentation in AOB of this meeting). The transmission is improving after it got worse following the technical stop interventions.

Activities:

- HiRadMat experiments, ATLAS Pixel and RotColl, are almost finished. The run was stopped by the mains problem.
- Xe beam 100 % transmission from PS and acceleration through transition.
- Q22 MDs for high bandwidth feedback.
- 50 ns beams for LHC to investigate 16L2 loss problem.
- BCMS beam Sunday fill: 1.2×10^{11} ppb, 1.5 μm emittance,

North Area

N. Charitonidis: Smooth operations.



North Area Users

H. Wilkens: In H6 we had many problems with radiation alarms.

Comment from N. Charitonidis: The alarms are indeed correlated with the beam losses. Thresholds of the BLMs were temporarily increased in accordance with RP and the issue is being investigated.

HiRadMat

N. Charitonidis: Last week HiRadMat was close to perfect, thanks for the good beams delivered by the SPS operation team. The program of the experiments was almost complete, just one pulse missing for RotColl and ATLASpixel. Monday the 24th, access was necessary for successful recovery of TCDI in preparation of TDIcoat (with beam slot in 2nd week August). Aiming for another 2-3 hours of access this week.

AWAKE

No report.

LHC

J. Wenninger: The LHC finally recovered from the technical stop. Large amount of time was spent on investigation of the losses in cell 16L2 and they are still not understood. The loss rate is larger at this point, but still within the limits. Sometimes it jumps and afterwards the beam gets unstable provoking beam dumps within a few milliseconds. It seems to be related to low energy electrons. At the moment there is an MD and tomorrow there will be VdM scans. There is a new luminosity record thanks to better emittance from the injector chain.

Comment from S. Hancock:

It is a pity that nobody reported earlier on the 16L2 issue while it was observed already for a few weeks. If we knew about it we could get prepared for 50 ns beam in advance and avoid doing it in hurry.

TI

C. Wetton: Thunderstorms made a lot of equipment unstable from Friday to Saturday, but the biggest problems happened on Saturday afternoon and evening.

3. Schedule Updates

B. Mikulec presented the latest version of the [injector schedule](#).

Currently LHC MD2 is ongoing. The HiRadMat runs that were scheduled for week 28 and 31 were both delayed by one week. AWAKE run 2 will also be delayed by one week (from week 32 to 33).



4. AOB

Q. King reported on the SPS Main Power Converter issues ([Annex 9](#)).

Glitches started on Tuesday provoking large spill intensity fluctuations. On Saturday it was identified as the active filters being switched off and on because of Profibus communication failures. On Sunday it was fixed after:

- reducing the bus data-rate from 187.5 kbps to 93.75 kbps
- enabling missing bus termination resistors in the Profibus repeaters
- replacing the master PLC Profibus interface

On Sat could not restart QF power supply fault. The cause was identified on Sunday afternoon as the loss of 400VAC for an auxiliary power supply. The circuit breaker had tripped during the storm and after re-closing, the faults could be reset. The reason it took so long is age of the equipment and missing technical documentation.

On Saturday night BEQ3 F5 Filter tripped due to current imbalance. All the capacitors were measured on Sunday morning, which identified two that had lost ~5% of their capacity since the previous measurement at the start of the year. These were replaced by spares and the SVC was restarted at 17:30. The replacement was complicated because the spare capacitors are a different shape, so extra-long bolts and additional nuts had to be used.

The intervention was complicated due to multiple unrelated overlapping issues – there were several minor issues not mentioned in this presentation that still took time to resolve.

1. Concerning the glitches, the CIS PLC software will be upgraded to make it more resilient to occasional communication failures – this will be deployed in the next TS, if it is ready in time. The CIS is nearly 20 years old. Some components were already consolidated in LS1, but not the Profibus interfaces or repeaters. This will be planned for the YETS. Profibus links between the SPS buildings used free pairs of existing unshielded multi-core cables. These do not conform to the Profibus standard and may contribute to the communication errors. Replacement by dedicated Profibus cables will be studied.
2. Concerning the QF spurious faults, much of the control and interlock electronics in the SPS main power converters is original, dating from 1973-75. Documentation will be improved so any similar pattern of faults in future will be quickly traced to this power supply. Consolidation of the controls electronics is planned for LS2, provided there are sufficient resources. Since LS1, the QS converter cannot seamlessly replace QF or QD without major retuning of the functions.
3. Concerning the SVC trip, the spare SVC (BEQ1) is so old and fragile that attempting to restart it takes more effort than repairing minor issues with BEQ2 or BEQ3. This will be resolved in LS2 with the replacement of BEQ1. The SVC repair was delayed by more than



an hour by the spare capacitors being a different size. The procedure and material needed to handle this will be prepared to avoid this additional delay in future.

Question from B. Mikulec: Can the Profibus communication also be monitored?

A.: Yes, it is also in the plan to implement it.

D. Chapuis requested maintenance of TFP access point YEA01.TFP=801 from July 26 08h30 until July 27 17h00 ([Annex 10](#)). **Intervention was approved.**

Next Meeting: 1st of August.

Minutes reported by P.K. Skowronski on 26th of July.