

MSWG Meeting #6, 2-June-2017

Present: R. Alemany Fernandez, F. Asvesta, M. Barnes, H. Bartosik, K. Cornelis, H. Damerau, V. Forte, E. Gschwendtner, G. Guidoboni, V. Kain, J.B. Lagrange, A. Lasheen, T. Lefevre, B. Mikulec, A. Santamaria Garcia, M. Serluca, G. Sterbini, F. Tecker, P. Zisopoulos

Agenda:

[Link to the Indico Event](#)

- Approval of minutes – Karel Cornelis
- Status of operational beams – Machine supervisors
- Main presentations:
 - AWAKE: Summary of 2016 and Plans for 2017 – Edda Gschwendtner
- MD updates:
 - Tune modulation on the PS injection bump – Panos Zisopoulos
- AOB

The MSWG minutes of the last meeting were approved.

Status of Operational Beams:

PSB – Bettina Mikulec

Due to a problem with the cavity C02 of R2 during the startup after the Technical Stop (3 thyristors broke at input stage of the final amplifier) there was no beam available from R2. The LHC 25 ns beam was prepared in a 3+3 bunch transfer to the PS in the meantime. Options for recuperating power supply from other cavities in the PSB had been investigated. Finally the spare C04 cavity power supply was patched to the C02 of R2.

H. Bartosik reported about a simulation study on the possibility of correcting the chromaticity in both planes using the existing sextupole correctors of the PSB performed by F. Schmidt and H. Bartosik. Although theoretically possible, the required sextupole strength for a full correction exceeds the available strength by a factor 10 already at 160 MeV.

PS – Frank Tecker

The MTE beam was prepared up to $2e13$ for the intensity increase foreseen by the SPS. All other beams were operational according to specs. However, since the restart after the technical stop, the beams are slightly degraded due to PSB R3 problem. NTOF was setup with PSB R3, and the LHC25ns beam was adapted to 3+3 injections. For the moment there were still some issues with the vertical emittance to be sorted out.

The new B-train can be tested (PPM settings) following the modification during the technical stop.

B. Mikulec asked if the LHC25ns could be setup with 3+3 injections by default. **H. Damerou** explained that 4+2 injections in the PS are preferred for the longitudinal plane (less impact of energy error of newly injected bunches).

SPS – Verena Kain

The 800 MHz setting up for 288 bunches is not yet finished (running out of time for LHC scrubbing run). At the moment the emittance measurements of the LHC25ns beam are inconsistent between SPS flat-top and LHC injection, possibly because the LHC devices are not yet calibrated.

Studies on the spot size at the BTV screen in front of the HiRadMat experiment are ongoing. Offline analysis shows good reproducibility, but non-Gaussian profiles and a too large beam size are observed (measured 0.5 compared to 0.25 expected). This maybe linked to the special optics with large dispersion, which was implemented to fulfil requirement of beam window, and fluctuations of the momentum spread of the beam.

The aperture restriction from RF fingers in 511 was removed during the TS, the aperture restriction in 133 is still there even after exchanging the dipole magnet. The dipole that was taken out did not show elevated activation, but the dipole downstream showed a hot spot during the RP survey. To be further investigated.

Main presentations

[AWAKE: Summary of 2016 and Plans for 2017 \(Edda Gschwendtner\)](#)

Proton drivers are interesting because the proton bunches have a high energy content that can be transferred to the electron witness beam. The acceleration mechanism is based on a longitudinal wakefield that is generated by microbunching of the incoming proton beam triggered by a laser pulse (self-modulation instability).

The AWAKE run 1 is split in two phases. The experimental program in Phase 1 (2017) concentrates on understanding of the self modulation instability. In Phase 2 (2018) the self modulation instability is used for accelerating an electron beam.

The AWAKE facility was successfully commissioned in 2016. The proton beam line is running stably. First signs of the self modulation instability were seen on all available diagnostics during a 48 hour run in December. During the shutdown, some beam diagnostics were upgraded (e.g. two cameras for the 2 screen imaging to provide more flexibility if the beam is not perfectly aligned).

The alignment of the laser beam with proton beam line is ongoing. The plan for the next weeks is to repeat some measurements from December and then increase the plasma density to continue with a long list of studies. Later on, a relatively long electron beam will be used for testing the accelerating effect of the longitudinal wakefield generated in the plasma: some electrons will fall within the accelerating structure from the plasma and will be accelerated.

Discussion

- **K. Cornelis** asked about the electron gun repetition rate. The electron gun used is operated at 10 Hz. The possibility of using a high frequency electron gun was not considered.
- Answering the question of **T. Lefevre**, **E. Gschwendtner** explained that there were no plans to produce microbunches of the proton beam already in the SPS.

[Tune modulation on the PS injection bump \(Panos Zisopoulos\)](#)

The novel method of measuring the tune using the turn-by-turn data from all BPMs was recalled, which allows measuring the tune within about 40 turns in the PS.

Using this method a tune modulation of about $1e-2$ during the PS injection bump was observed in MDs at the end of 2016. This tune modulation seems to be related to the Bdot (eddy currents) of the injection bumpers. Further studies in 2017 were performed using the trigger of the injection bump at the moment of the second injection but without injecting additional bunches, confirming these observations. Detailed analysis is still ongoing.

This dynamic tune modulation induced by the injection bump needs to be understood with the present system to serve as input for designing the new injection bumpers of the LIU upgrade.

Discussion

- **K. Cornelis** asked how the oscillation amplitude is changing during the bump. **P. Zisopoulos** explained that not much decoherence was observed during the measurement window.
- **V. Forte** asked if the measurements were done already with different chromaticity settings. Not yet.