

LHC Beam Operation Committee

Notes from the meeting held on 20th September 2011

List of Participants

1. Plans for Physics with 90m beta* (Massimiliano Ferro-Luzzi)

M. Ferro-Luzzi gave an overview of the completed 90m beta* MDs and presented a proposal on the continuation of the studies in two blocks. A crucial question is, if the AC dipole can be safely operated with a few bunches with $7 \cdot 10^{10}$ protons per bunch. If this is not the case, an additional fill for optics measurements would be needed. ***Amendment: In the rMPP on 21.09.2011 the operation of the AC dipole with up to 1 nominal bunch and standard collimator settings was approved.***

The 90m beta* studies are scheduled for Friday, 30th September and Saturday, 1st October. For the studies, the experts for 90m squeeze and ALICE polarity switch, a collimation expert, the optics measurement team and a BLM threshold expert are needed to be present.

M. Ferro-Luzzi pointed out that TOTEM and ALFA prefer data acquisition in the beam mode “adjust”. For this, the vertical roman pots are typically retracted by half a sigma behind the primary collimators, the horizontal roman pots are at about 11σ . For data acquisition in stable beams, the roman pots are typically at about 12σ (horizontal) and 10σ (vertical). The exact settings for the upcoming studies and a generalized procedure for data acquisition in the beam mode “adjust” still need to be defined.

M. Ferro-Luzzi presented calculations concerning the single-turn loss of a bunch in a roman pot, e.g. after an asynchronous beam dump. For a bunch with $1 \cdot 10^{11}$ protons, about $2.4 \cdot 10^7$ inelastic interactions with a 1mm thick aluminum target are expected.

Discussion:

J. Wenninger and A. Rossi pointed out that during the previous 90m beta* MDs the collimators were set closer than nominal. The exact settings are to be checked.

M. Lamont asked what happens if a roman pot is moved into the beam. M. Ferro-Luzzi pointed out that in this case the beam will be dumped by the BLM system. This was accidentally tested already, when the roman pots were moved in too large steps.

R. Tomas pointed out that running the AC dipole with intensities of a few 10^{10} protons would save time for optics measurements also in other cases.

2. Injection Status (Wolfgang Bartmann)

W. Bartmann presented the latest issues concerning beam losses at injection. After the ALICE polarity flip, injection losses of beam 1 at the TCTH.4R2.B2 led to several beam dumps. The injection studies revealed that the grazing losses start at an injection oscillation amplitude of $+4\sigma/-6\sigma$ at the TDI. Consistent with this asymmetry, the losses were found to be more sensitive to the lower TCLIA jaw position than to the upper jaw position, possibly due to the change in orbit position and angle after the polarity flip. The losses at the TCTH.4R2.B2 stay rather constant with respect to the number of injected bunches (from 36b to 144b). As mitigation, the TCLIA was recentered by $400\mu\text{m}$ towards the lower jaw and set to ± 6.8 sigma of measured beam size. Investigations on these losses are ongoing.

The present injection oscillations are dominated by shot-to-shot trajectory differences caused by the SPS extraction septum. Additionally, the transfer line trajectory was found to depend on the SPS super cycle. Especially the presence of the ion cycle has a significant influence.

Recent measurements show that the TI 2 trajectory had after careful corrections a maximum drift of 0.3 sigma at the critical collimators. Therefore the TCDI protection check with retraction of 5σ from 5-March-11 remains valid.

W. Bartmann suggests to open all TCDIs in TI2 from $\pm 4.5\sigma$ to $\pm 5\sigma$. This could reduce the injection losses by about a factor 3. ***Amendment: The rMPP on 21.09.2011 approved to open the TCDIs to 5σ , as suggested.***

To mitigate trajectory drifts (which are of the same order as shot-to-shot variations), a YASP autosteering would be very helpful. W. Bartmann also reminds that the injection cleaning should be routinely switched on, which is often forgotten.

During the injection studies, the polarity of a BPM was found to be wrong. W. Bartmann suggests to requalify the BPM polarities by a kick-response measurement.

Discussion:

J. Wenninger points out that the steering of the transfer line is very complicated; an automatization is not easily achievable. He also underlines that neither HiRadMat nor CNGS have problems with the transfer line reproducibility.

J. Wenninger states that the 2011 transfer line kick-response measurements were only done up to the TED.

3. AOB

M. Lamont announced that the Evian Workshop will be held from December 12th (morning) till December 14th in the Hotel Royal, Evian.

E. Tedesco summarized the ongoing studies of the Fidel team: N. Aquilina is analyzing the chromaticity corrections. The next steps are to understand the tune decay and to analyze the optics corrections at 1m beta^* in the view of a

further beta* reduction. J. Wenninger pointed out that it is planned to study the decay of the b1 at injection for about 45min during week 39.

R. Steinhagen elaborated that longitudinal oscillations create noise in the tune signal and that he wants to study the dependency on the RF voltage. He points out that the transverse tune signal is dominated by intra-bunch oscillations (head-tail mode).

J. Wenninger explained that the kink in the beam intensity in fill 2129 at about 14:30 is caused by a filling of the abort gap due to a RF problem. He motivates to discuss if the abort gap cleaning should be kept active at flat top. J. Uythoven pointed out that the related losses at the TCTs came close to the dump threshold. He suggests to dump the beam in case a certain abort gap population is exceeded.

4. Upcoming meetings:

Tuesday, 27th September: **next LBOC meeting (15:30 in 874-1-011)**.

Tuesday, 4th October: LSWG, planning of upcoming MD (15:30 in 874-1-011).

Monday, 12th December – Wednesday, 14th December: **Evian Workshop 2011**.