Minutes of LIU-PSB Beam Dynamics WG #8 written by D. Quartullo

Participants

S. Albright, F. Antoniou, H. Bartosik, G. Bellodi, C. Bracco, V. Forte, A. Lombardi, B. Mikulec, Y. Papaphilippou, D. Quartullo, F. Roncarolo, G. Rumolo.

Approval of minutes

Minutes are approved.

Status of PSB injection simulations for LHC beams with updated Linac4 current (V. Forte)

Slide 4: G. Rumolo asks if the transverse emittance value of 0.3 um is at PSB injection. A. Lombardi confirms and specifies that no emittance growth is expected in the beam transport to PSB.

Slide 5: G. Rumolo asks if an increase of injected turns can influence stripping foil lifetime. V. Forte and C. Bracco answer that the heating is negligible. B. Mikulec mentions that V. Forte's studies did not consider losses even if it is known that losses are present at PSB injection, V. Forte confirms and says his values refer to zero margin for losses.

Slide 7: B. Mikulec observes that there is still some slope on the emittance curves after the green dashed line, V. Forte answers that is very small and in any case it is worth to stop the simulations after 5 ms because of their computational heaviness. G. Rumolo asks why for some cases the emittance keeps growing while for others it remains flat. V. Forte answers that can be due to vertical beta beating that is not zero in the machine (imperfect correction of beta beating due to space charge).

Slide 10: C. Bracco says that LHC beams are dominated by space charge and changing the simulation conditions changes the time needed for the emittance to get stable while larger offsets in alignment imply emittance value divergence.

After-talk discussion: A. Lombardi comments that there is more sensitivity to beam alignment and matching than starting Linac4 emittance. V. Forte answers that it seems to be the case at least for this specific (LIU LHC Standard) beam.

Questions from LINAC4 (A. Lombardi)

Slide 4: B. Mikulec asks which BCT the measurement refers to. A. Lombardi answers the BCT is placed after the source before the RFQ (45 keV).

Slide 6: A. Lombardi asks how the emittance depends on the number of turns for the low intensity beam. V. Forte answers that emittance values would not change since simulations are dominated by space charge.

Slide 7: Corrections on this slide from C. Bracco: ISOLDE beam intensity 1e13, emittance 10 um horizontal, 6 um vertical. A. Lombardi asks if it is possible to inject 150 turns per ring for ISOLDE beams. C. Bracco answers that it is possible. However she adds that a drawback could be increased losses and

for this reason injecting more turns should be avoided for LHC beams where no transverse painting is done. Y. Papaphilippou asks if the foil could be damaged using these higher values for the intensity and number of turns. C. Bracco answers there should be no problems according to simulations done in the past. A. Lombardi comments that is very good since then the effort can be put more on pulse quality than on the intensity which is currently a limitation (since more number of turns can be injected provided that losses are still acceptable).

Slide 8: A. Lombardi asks if the value of 65% for the chopping factor can be reduced. V. Forte mentions his previous PhD studies which showed that values so high for the chopping factor are needed to follow the iso-hamiltonian in the longitudinal plane when painting is performed. He adds that if injection will be without acceleration the bucket area increases and the chopping factor could decrease. However the presence of a flat bottom after LS2 is not in the baseline.

After-talk discussion: Y. Papaphilippou asks what is the timeline to have an ISOLDE beam with baseline specifications. He adds that the timeline should be clearly defined and comunicated to the ISOLDE team. G. Rumolo answers that the baseline beam would be needed after LS2. A. Lombardi observes that with 150 turns an intensity of 1.2e13 ppb can be delivered.

Actions

1) **Simulations of LIU LHC BCMS beams and ISOLDE beams with a realistic current pulse shape (V. Forte)**
2) **Adding measured fringe fields to BSW magnets (V. Forte)**
3) **Migrate to PyOrbit (V. Forte)**