

Status of the machine studies

MSWG meeting, 21/05/10

1) Preparation of an ~ ultimate LHC beam in the PSB (G. Rumolo and B. Mikulec)

- Reminder: Weeks 18 to 21 were (are) devoted to finalize in the PSB of the preparation (in //) of an ~ ultimate intensity LHC cycle (with larger transverse emittances than nominal) and then study it in the PS (still in //) => This cycle will be used for SPS studies during the next Long Injector MD of week 22, from WE 02/06 08:00 to FR 04/06 08:00, (<https://ab-mgt-md-users.web.cern.ch/ab-mgt-md-users/2010/pmd18to21.htm>).

- Users: MD3/LHC25B.

- Results: Intensities between 250 and 260e10 p per ring within the correct longitudinal parameters (i.e. $bl=180\text{ns}$ and $ez=1.3\text{eVs}$) and transverse emittances (total, sum of x and y) of $\sim 8\mu\text{m}$ (Rings 3&4) and $\sim 10\mu\text{m}$ (Rings 1&2).

- My (Elias) comments:

- Why do we stick to these longitudinal parameters (i.e. $bl=180\text{ns}$ and $ez=1.3\text{eVs}$) whereas the nominal values were said to be (and used) in the past: 195 ns and 1.5 eVs? This could perhaps explain why the results obtained in the past (see Figure A1 in <http://indico.cern.ch/getFile.py/access?contribId=43&sessionId=8&resId=0&materialId=0&confId=45433>) could not be found again. Reminder: For 250e10 p/ring (i.e. the same intensity as with the newly prepared beam), the sum of the transverse (average) emittances was 7 microm, which is the limit at SPS exit. To be checked in detail (discussions with Steve, Heiko and Gabi are ongoing).

- See for instance Table of slide 8 in this PS-OP shutdown lecture (<https://emetral.web.cern.ch/emetral/OP%20Shutdown%20Lectures/LHCBeam2002.ppt>) where the nominal parameters are said to be 195 ns and 1.5 eVs, and what was done in 2001 was 195 ns and 1.4 eVs.

- The longitudinal emittance of 1.4 eVs was for instance also mentioned in the talk of R. Garoby at Chamonix2003 (see page 9): https://ab-div.web.cern.ch/ab-div/Conferences/Chamonix/2003/transpar/1_1_Garoby.pdf.

- I would therefore propose to make other MDs in the future to try and use the nominal longitudinal parameters, which hopefully would help to reduce the sum of the transverse (average) emittances at ~ 7 microm (recovering the results obtained in the past, see above).

2) Next steps:

- Results in the PS and planning of the next Long Injector MD block of week 22 => Will be discussed at the MD planning meeting of next Wednesday 26/05/2010 to see which beam can be sent to the SPS and how it will be used in the SPS.