

Other Means to increase the SPS 25 ns Performance - Transverse Plane

Wednesday, September 24, 2014 11:20 AM (10 minutes)

The LHC Injectors Upgrade (LIU) project aims at extending the brightness and intensity reach of the injector complex. To go beyond the SPS RF and longitudinal limitations remaining after the implementation of all the LIU upgrades, further optimisation is proposed on the following aspects: 1) Alternative SPS optics configurations with intermediate transition energy between Q20 and Q26. Although the presently operational Q20 optics pushed the TMCI threshold from 1.6×10^{11} p/b to 4×10^{11} p/b, it might not be the optimal choice for maximizing the intensity of the 25 ns beam due to the RF power limitations. Possible optics configurations with intermediate transition energy could achieve a better balance between TMCI threshold and RF power requirements. 2) Increase of the number of colliding bunches in the LHC by transferring a larger number of bunches between the PS and the SPS. In this context, schemes for transferring 80 or more bunches per PS batch and their operational implications are discussed, together with possible advantages for mitigating other limits in the SPS and LHC. Finally, machine development studies during Run 2 for evaluating the feasibility and potential of these schemes are addressed.

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Session Classification: Session 5 - LIU

Track Classification: LIU