

SPS-to-LHC transport with Q22

F.M. Velotti, W. Bartmann, H. Bartosik, C. Bracco,
E. Shaposhnikova, B. Goddard, C. Hessler, V. Kain, K. Li, H. Timko

Motivation

- Q22 is an optics that has been proposed and studied in the SPS as possible option to facilitate the acceleration of very high intensity beams
 - ↳ For the same bucket area, Q22 requires less power wrt Q20
 - ↳ Larger momentum acceptance wrt Q20 as lower dispersion

- Studies in the SPS have been carried out since last year
 - ↳ No significant gain observed so far when comparing with Q20 => voltage margins possibly still not fully exploited

- Transfer to LHC still missing => rematching of the lines needed
 - ↳ Only possible for TI2 now (for TI8 this will be possible with the new PC that will be added in LS2)

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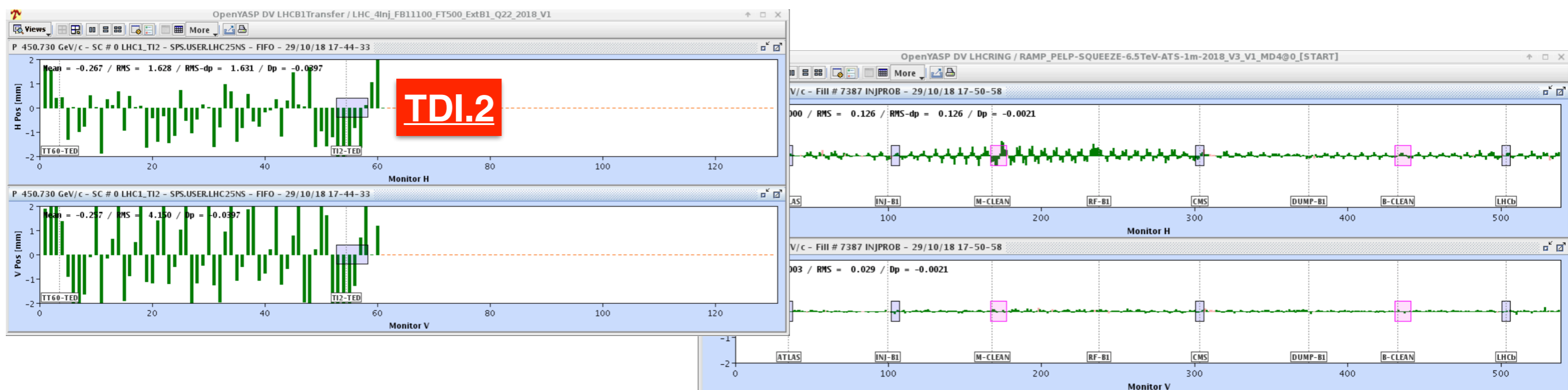
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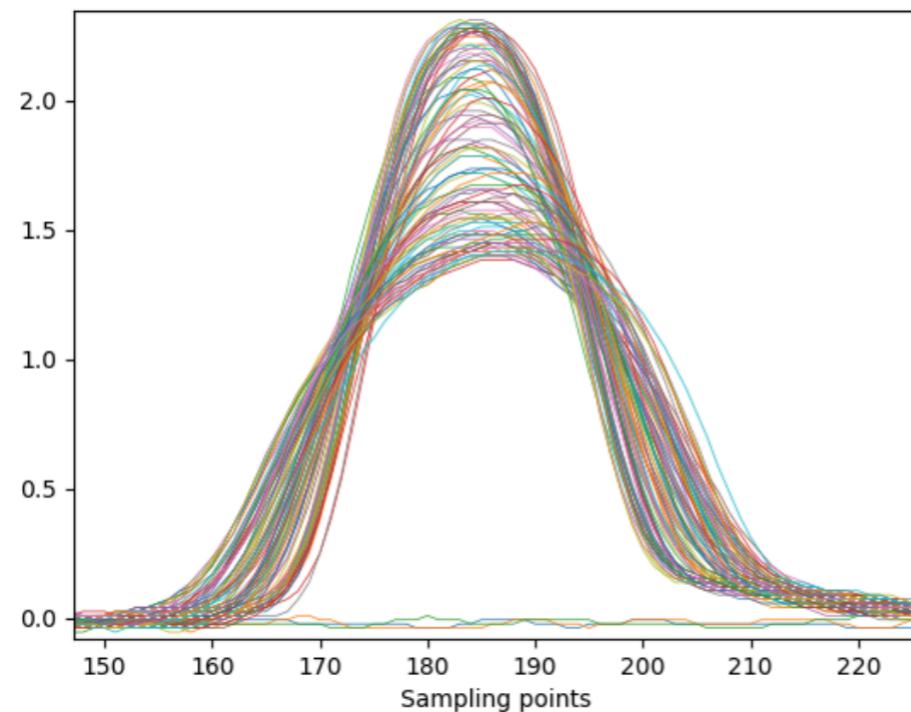
- MD started on time and beam ready from the SPS
- TCDIs moved to coarse settings
 - ↳ TDI.2 closed for the first shots
- After loading the theoretical values for extraction settings and correction from Q20 => beam down to TI2 and reached the TDI
 - ↳ **After correction, B1 circulating with no problems!**
- Measurement campaign started



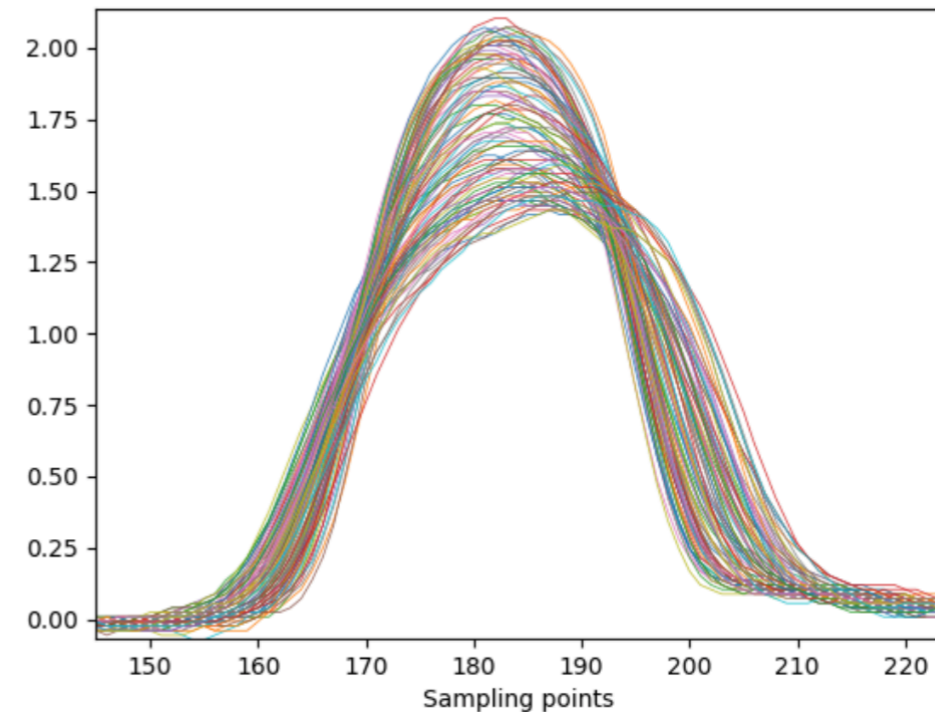
MD Summary

- Scan of capture voltage done, comparing Q20 and Q22 optics with INDIVs
 - ↳ For the same bunch length and SPS RF voltage, larger dp/p in SPS Q22, therefore larger capture voltage in the LHC needed
 - ↳ The controlled emittance blow-up in the SPS required adjustment for the Q22 optics (triangular bunches when not well adjusted)
 - ↳ Losses and damping times of injection oscillations to be analysed

Q20 with 6 MV in LHC



Q22 with 6 MV in LHC



MD Summary

→ Optics measurements:

↳ Dispersion measured in TI2 => very good agreement with the model...beating in the LHC observed but comparable with previous measurements of both Q26 and Q20. Detailed followup analysis will be performed

↳ 3/4 screen measurements done

▶ When online fit worked (only horizontal), optics measurements in very good agreement with model...to be analysed offline for complete picture

