Update on Optics 1.5

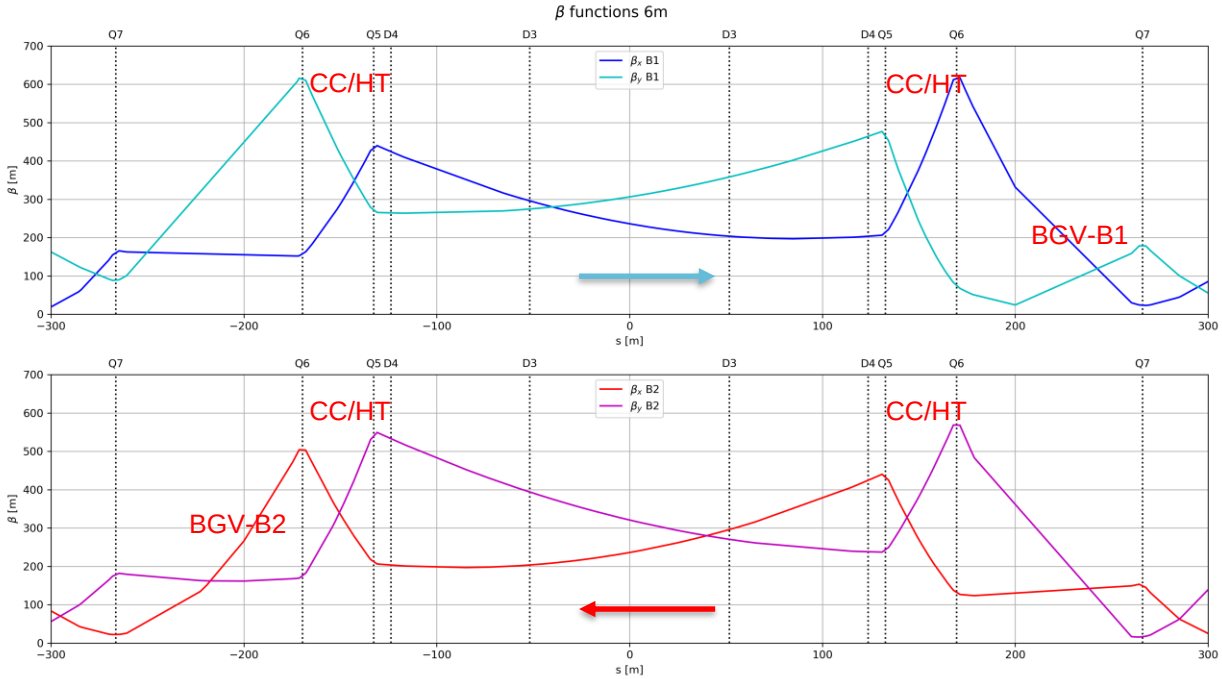
T. Levens and T. Lefevre (BE-BI)

HL-LHC WP2 Meeting– 29th September 2020

Outline

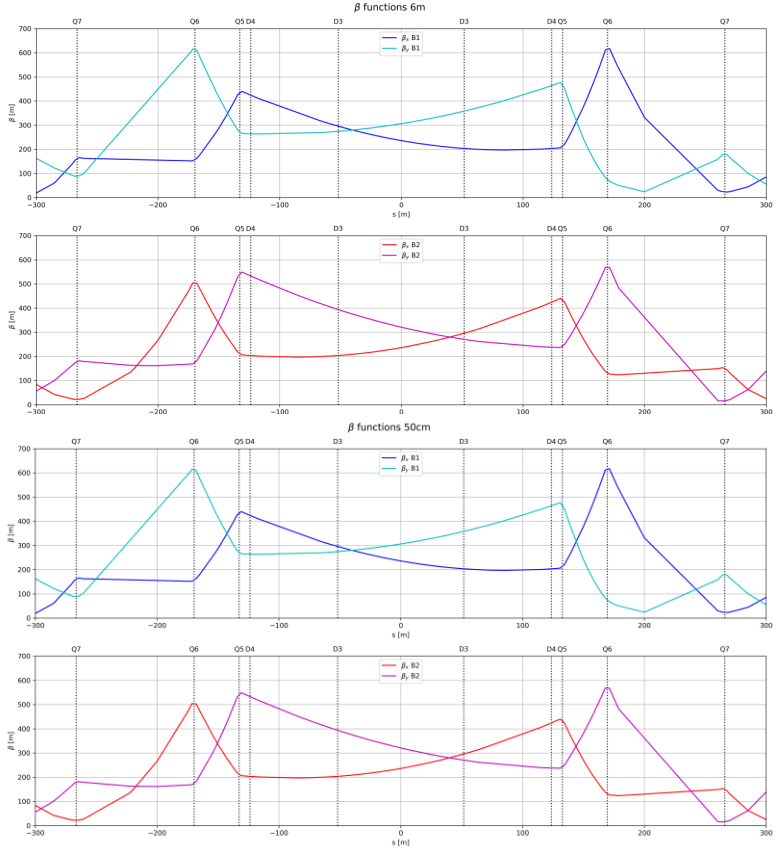
- Optics in IP4
  - Differences between optic scenarios
  - Possible Impact on Crab cavity diagnostics
  - Question/Issues on Beam Gas Vertex detector
- Optics in IP6

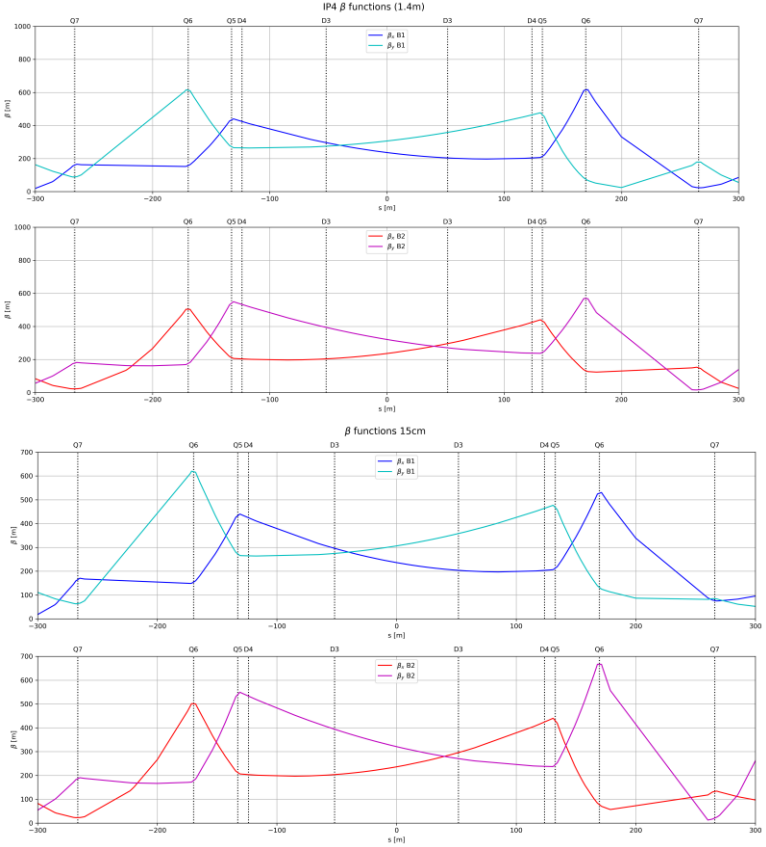
IP4 - Beta - Normal



- CC/HT monitor at Q6/Q5
- BGVs at +/- 200-240m: Issue for BGVB1 with small beta

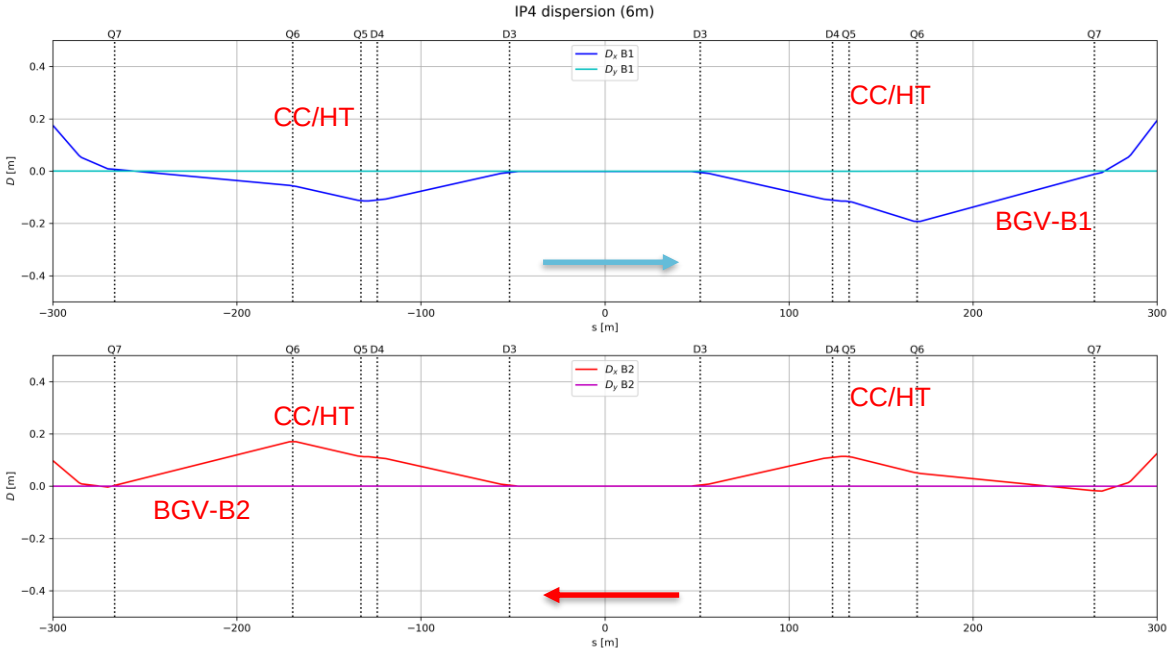
IP4 - Beta - Normal





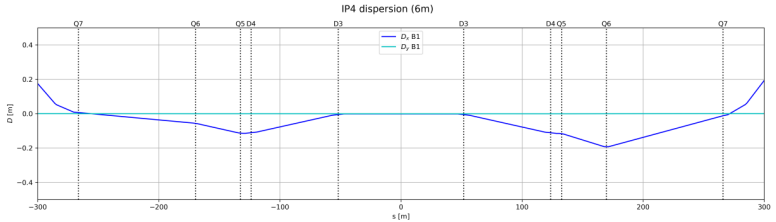
Little variations during beta-levelling

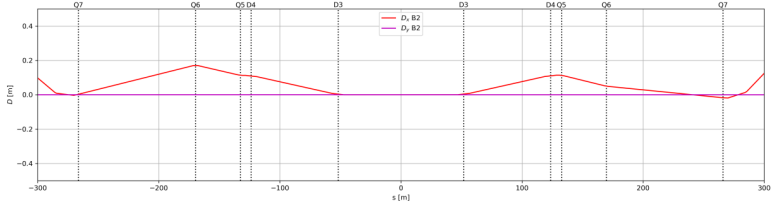
IP4 - Dispersion - Normal

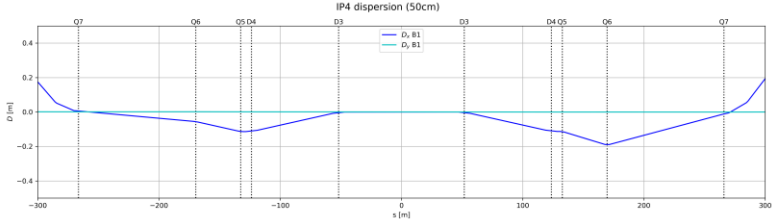


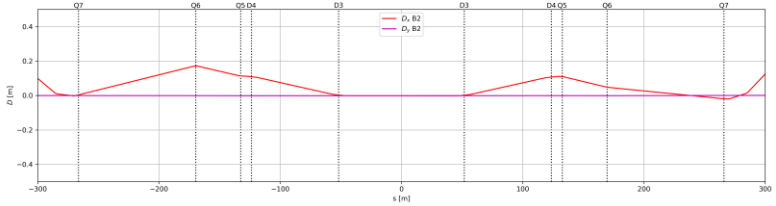
- To be taken into account for SR@D3/4 and BGVs

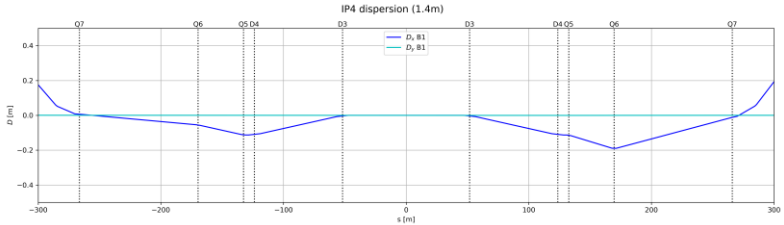
IP4 - Dispersion - Normal

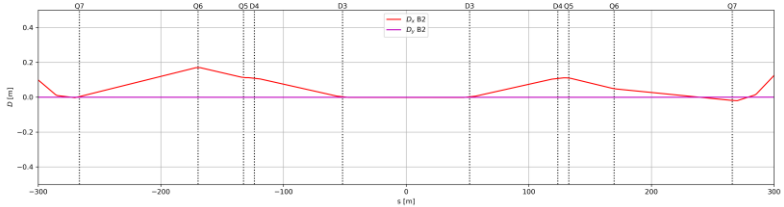


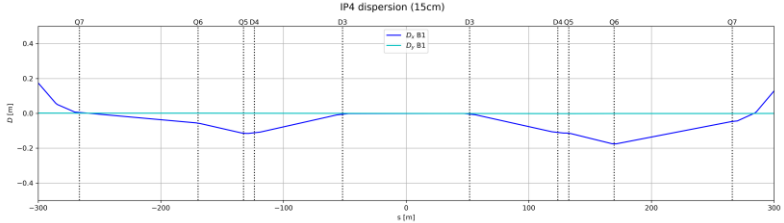


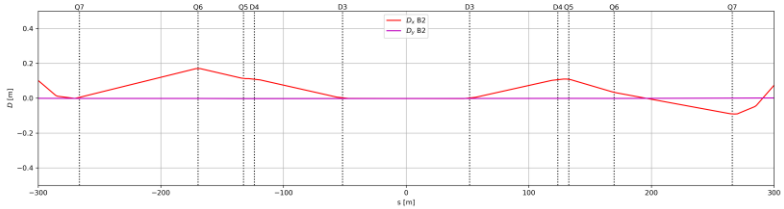






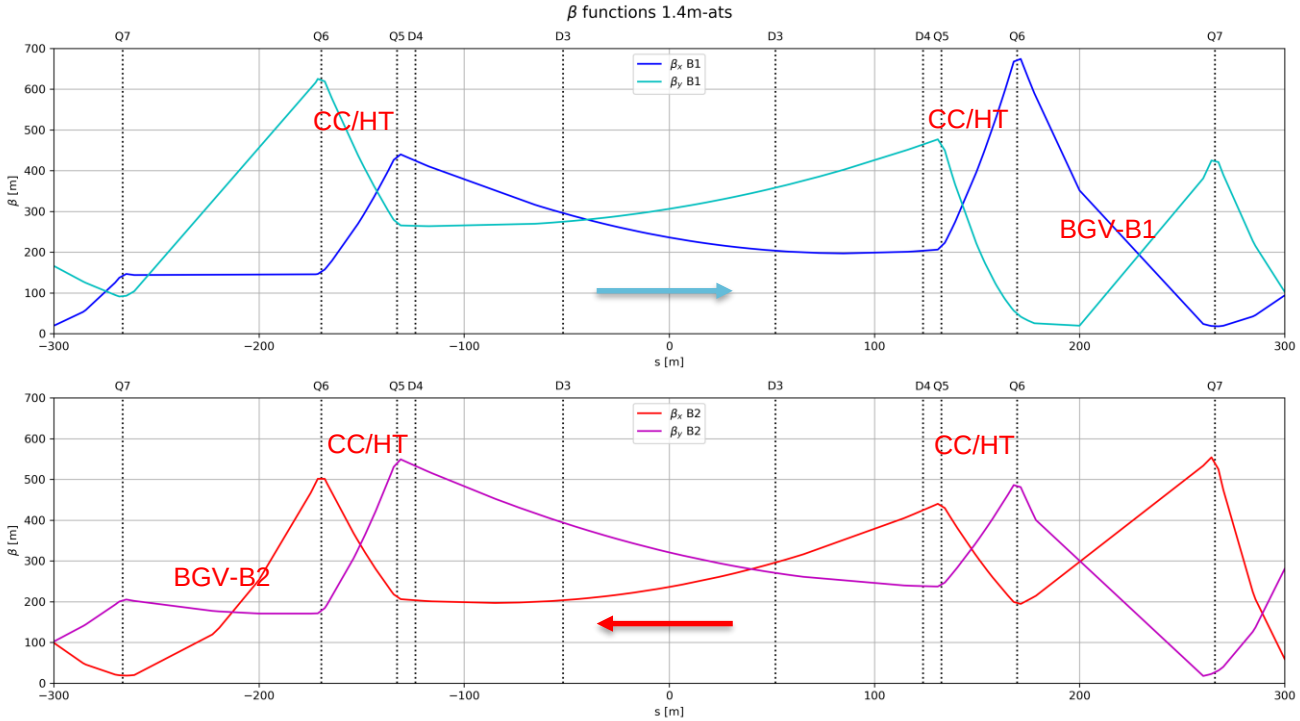






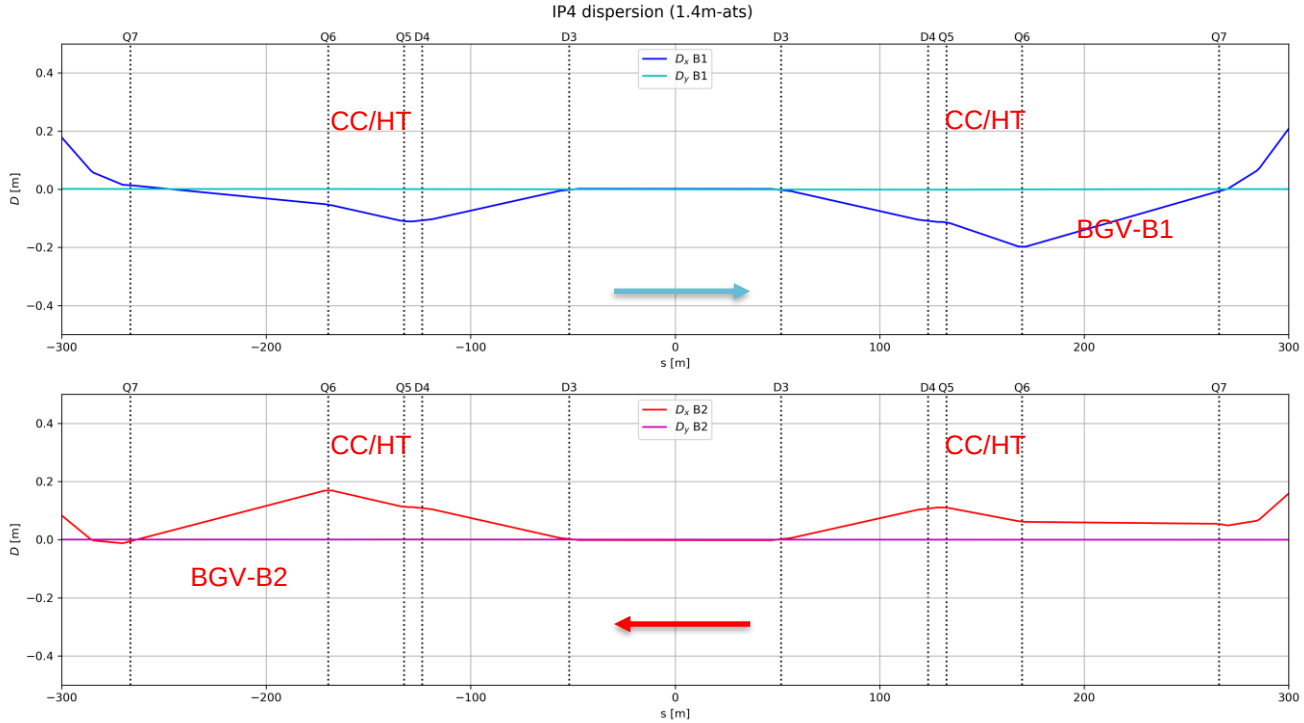
Very little variations during beta-levelling

IP4 - Beta - ATS



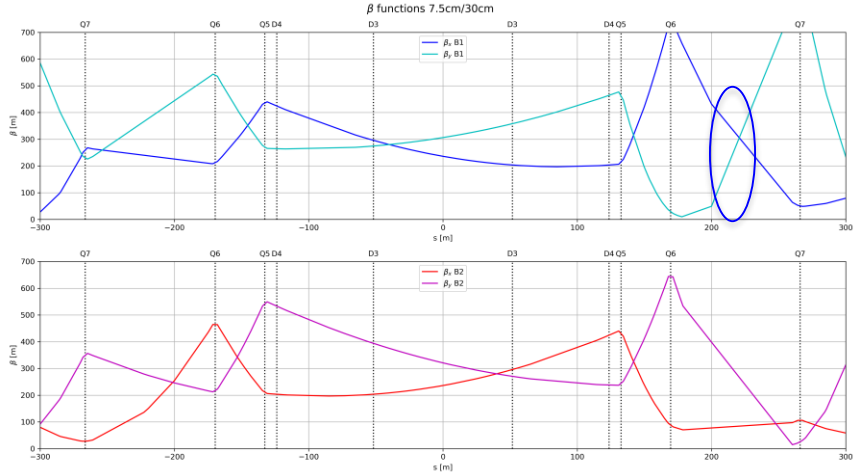
- Similar values for beta compared to normal optics but optimum for BGV-B1 at different z positions

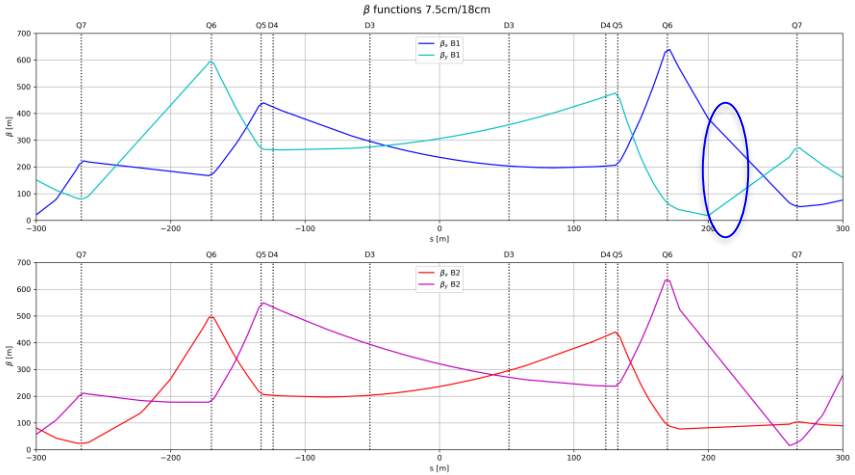
IP4 - Dispersion - ATS



- Similar to normal optics

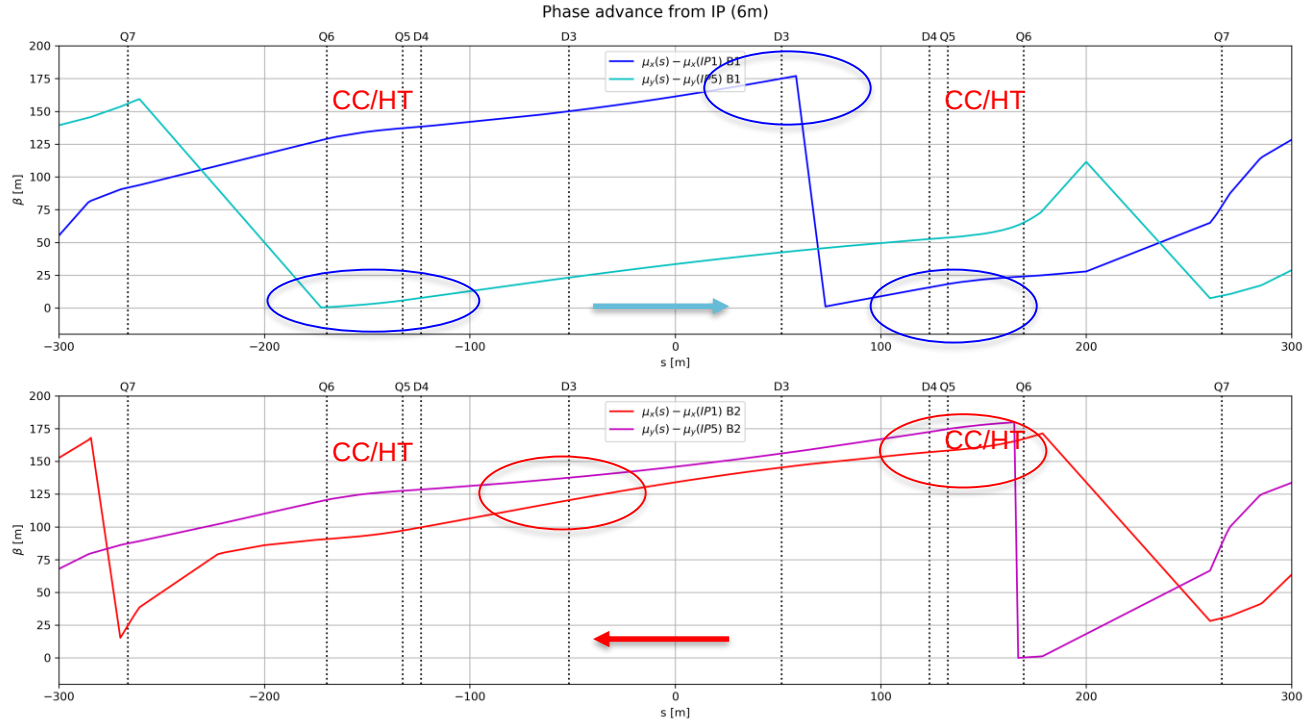
IP4 - Beta- FLAT





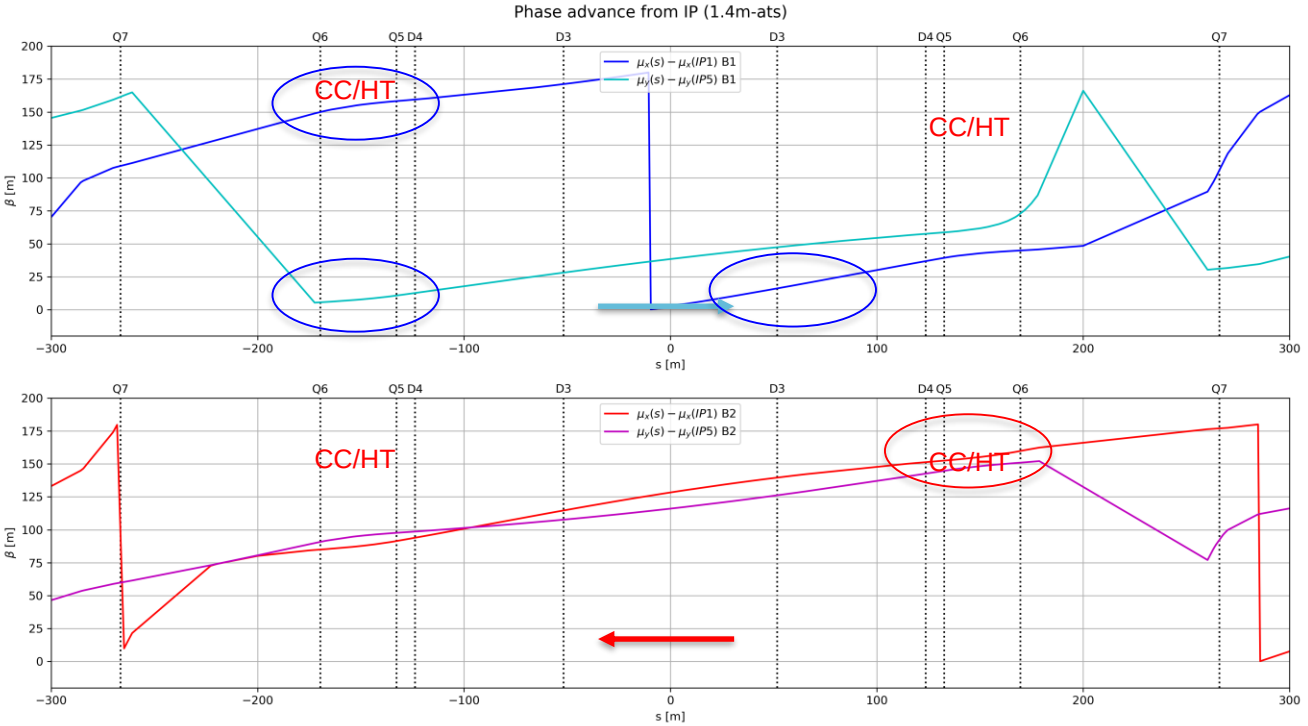
- again issues for BGV-B1

IP4 - Phase advance- Normal



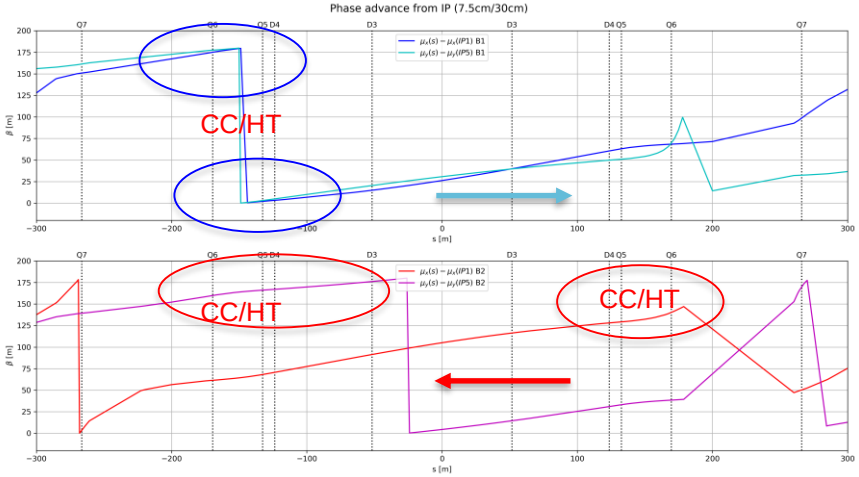
- Q6/Q5 best location for CC diagnostics
- D3/D4 can also work

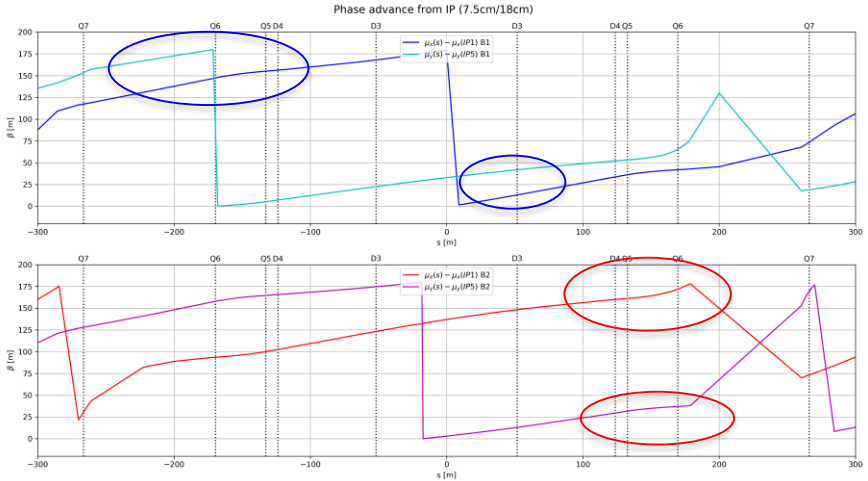
IP4 – Phase advance- ATS



- Q6/Q5 again but different location L vs R

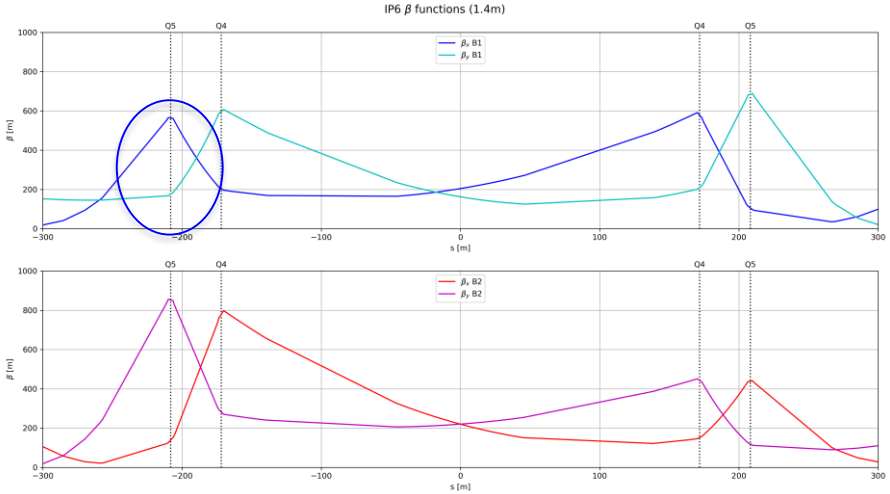
IP4 - Phase advance - FLAT

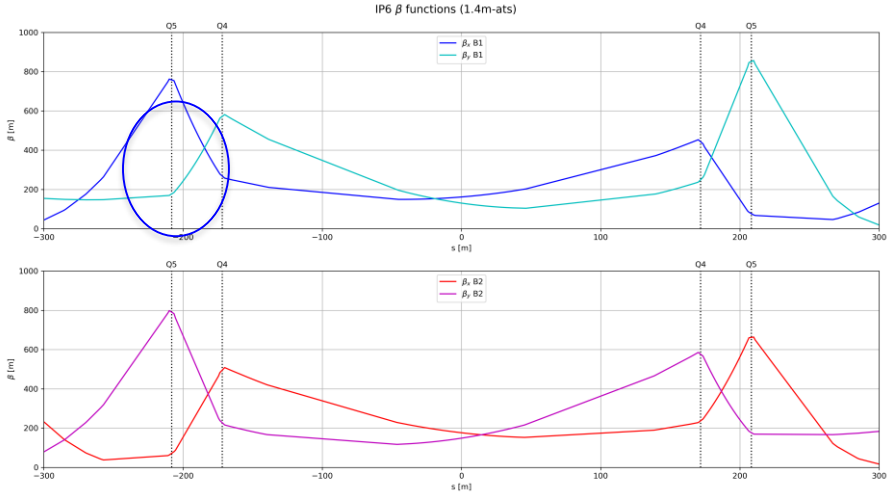




- Q6/Q5 and D3/D4 again but different locations L vs R

Optics in IP6



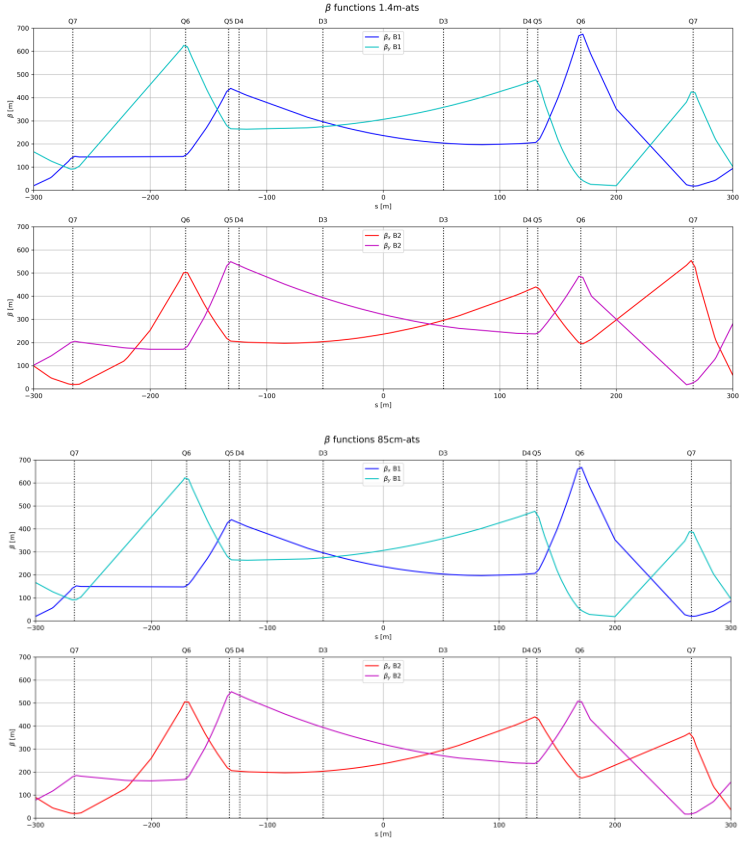


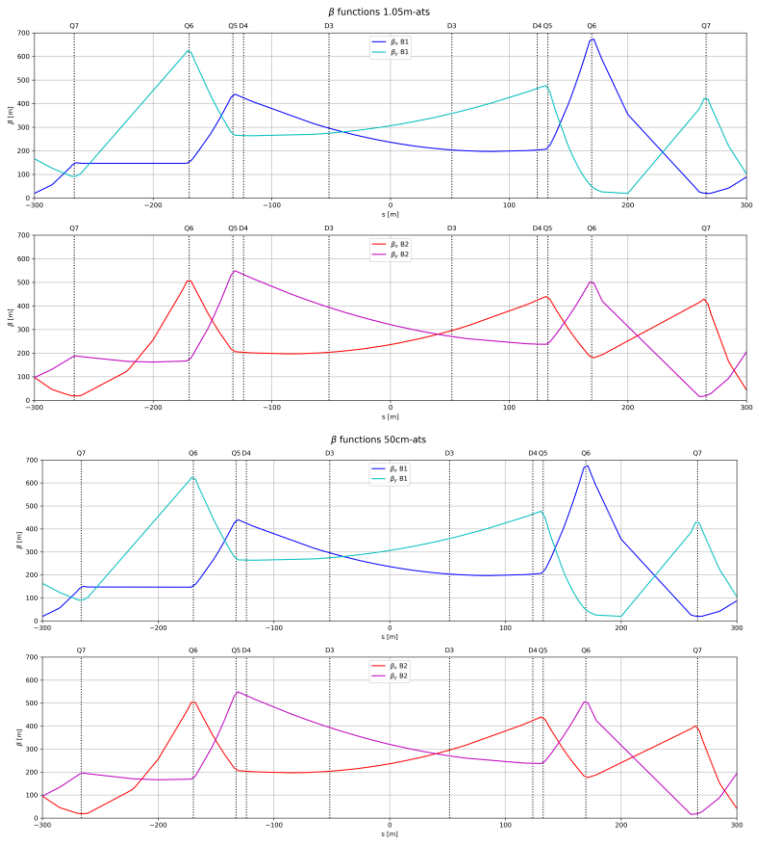
Possible location for BGV-B1

Conclusions

- Optics v1.5 is compatible with BI needs
  - Beam diagnostic performance may change for different optics: small changes during beta-levelling
- To cover CC diagnostics in all scenarios, need to equip both Q6/Q5 L&R with Head-tail PUs (possibly both planes)
- Streak camera measurements with D3/D4 may also work for CC monitoring
- BGV-B1 not optimum in IP4, should investigate in IP6

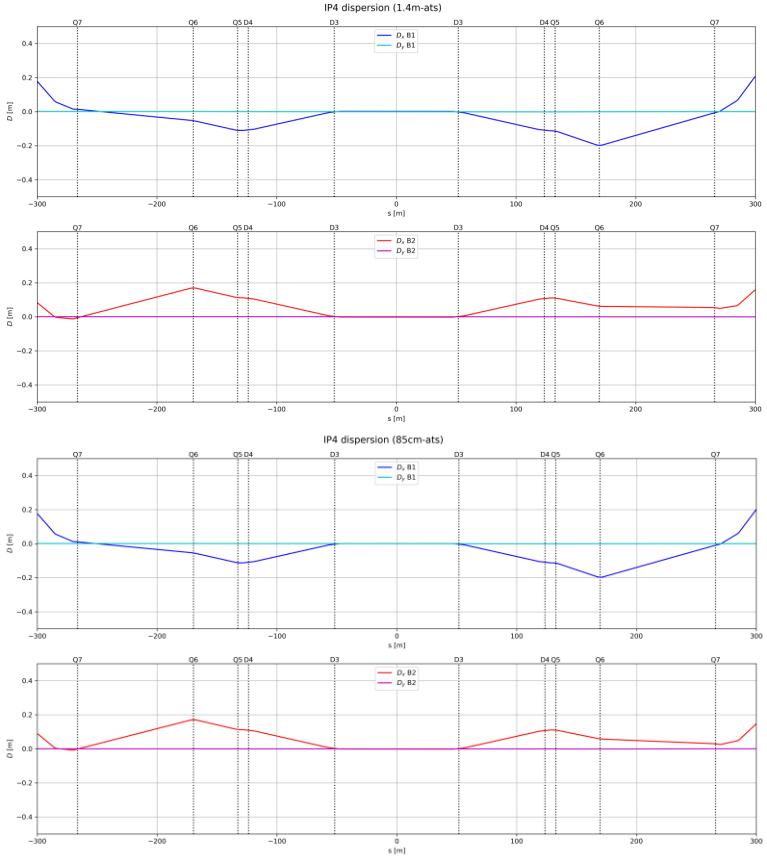
IP4 – Beta - ATS

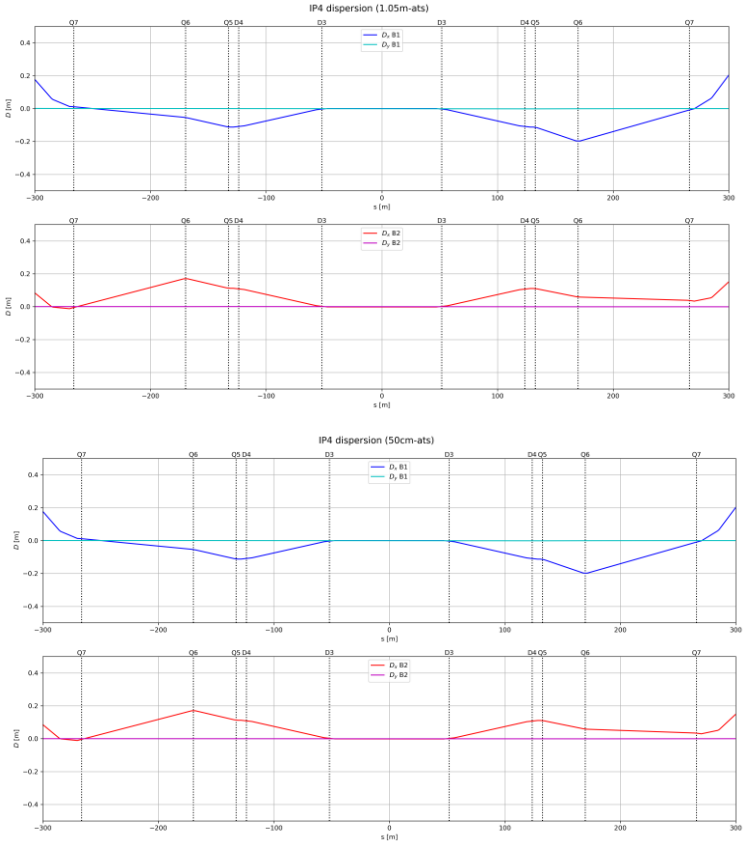




Little variations during beta-levelling

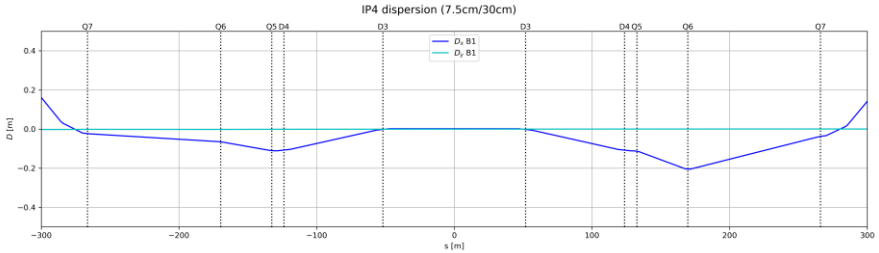
IP4 – Dispersion - ATS

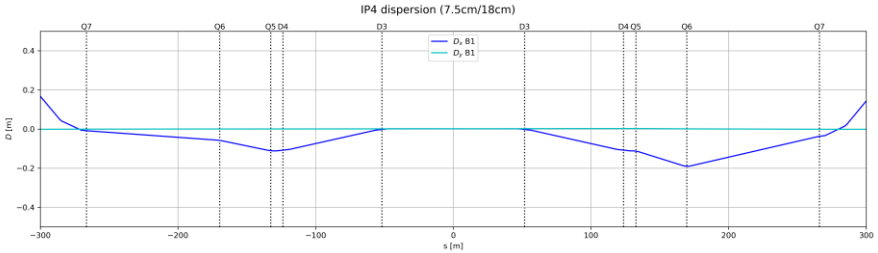


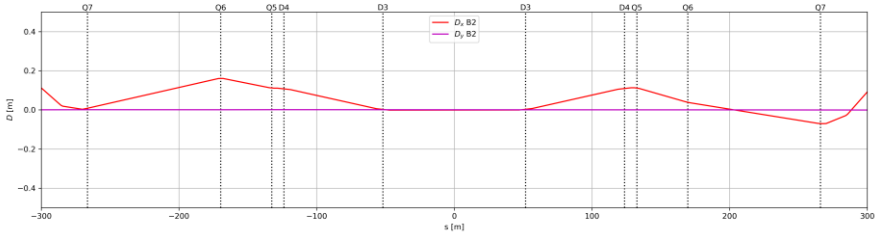


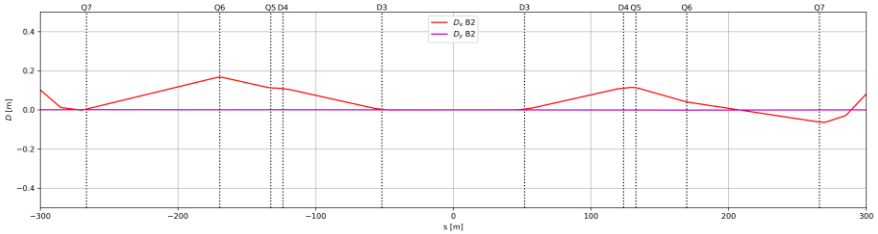
Very little variations during beta-levelling

IP4 - Dispersion- FLAT



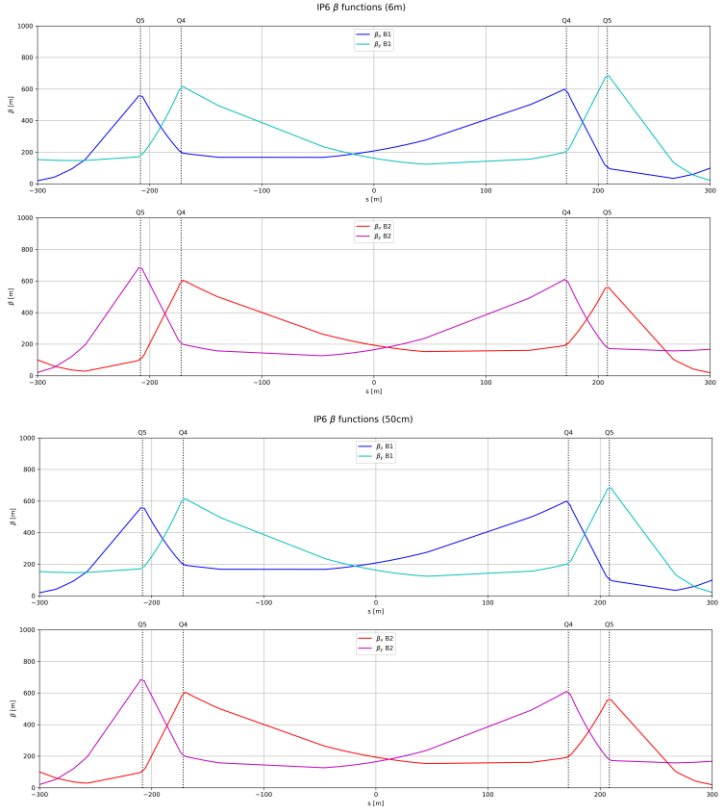


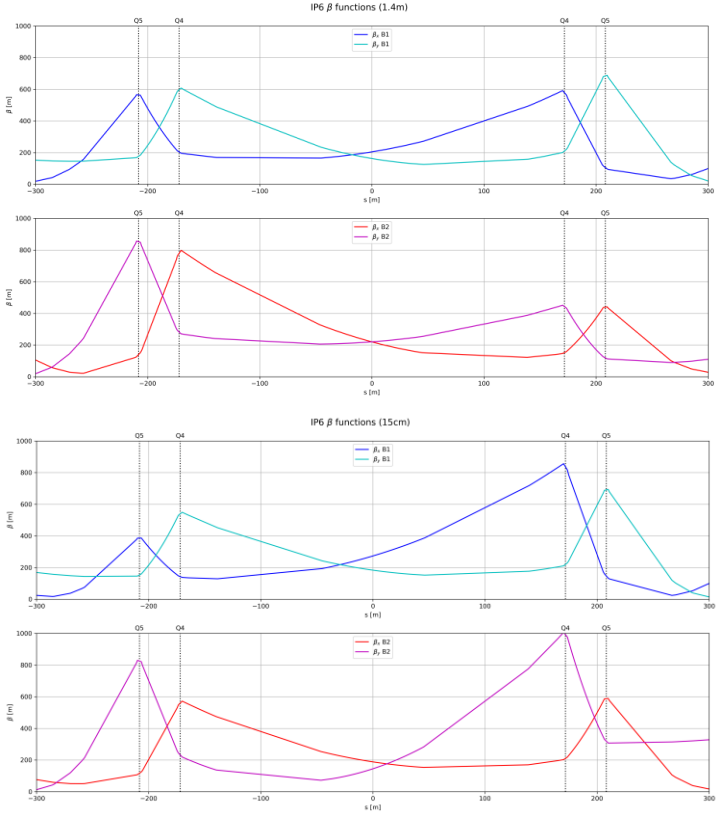




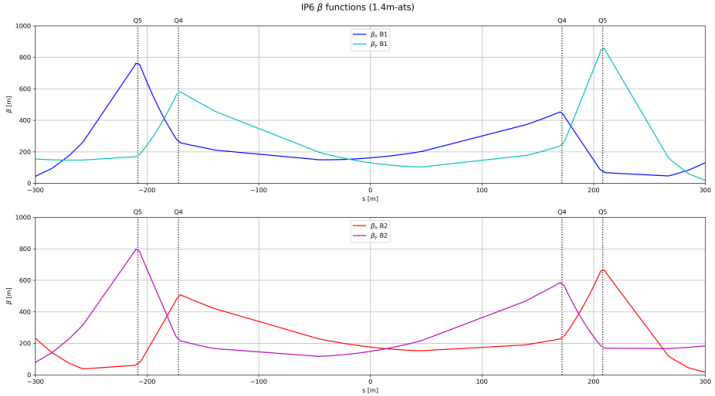
Similar to Normal/ATS optics

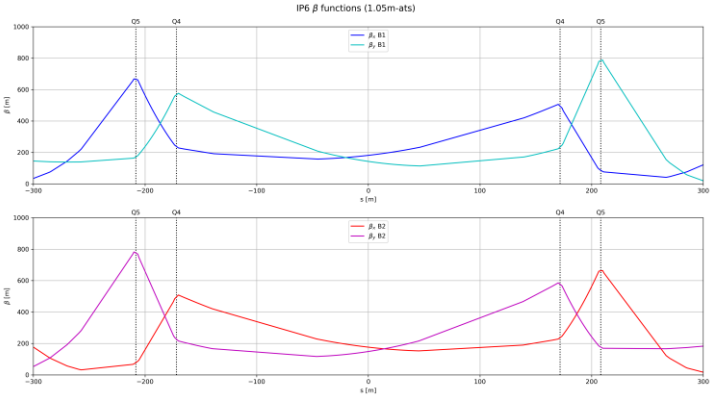
Optics in IP6 - Round

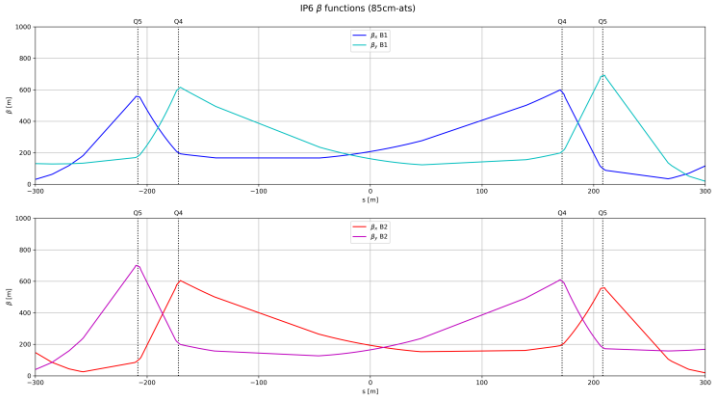


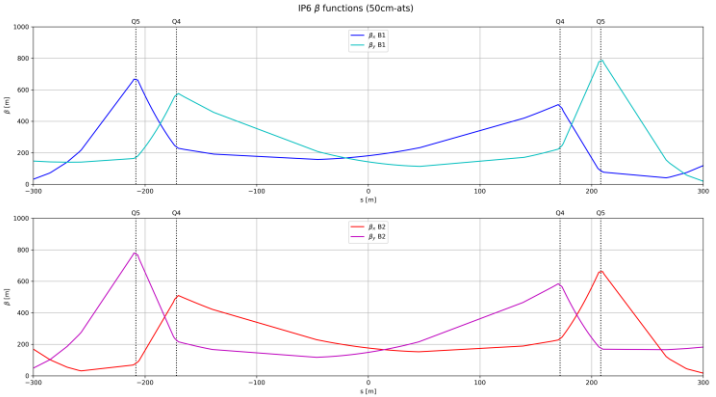


Optics in IP6 - ATS

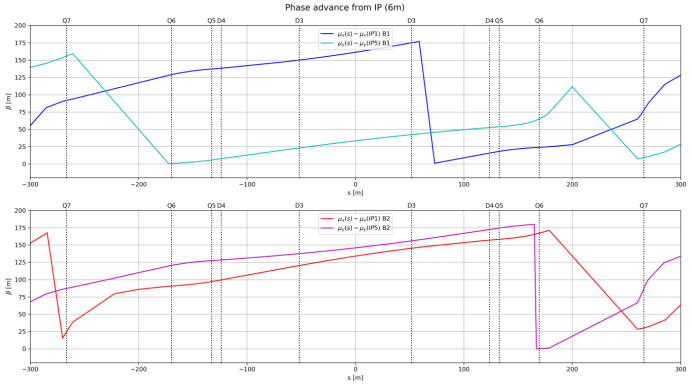


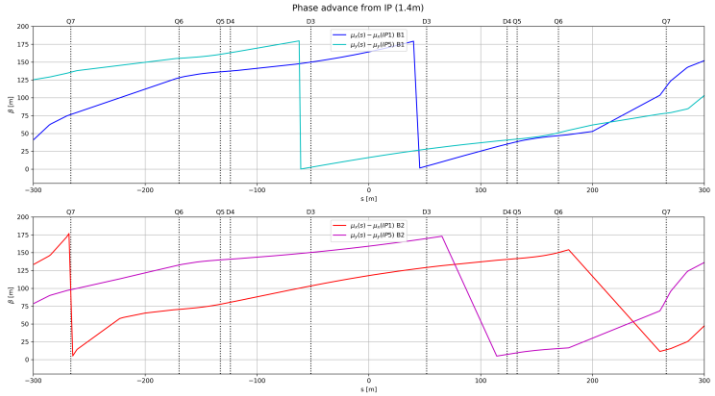


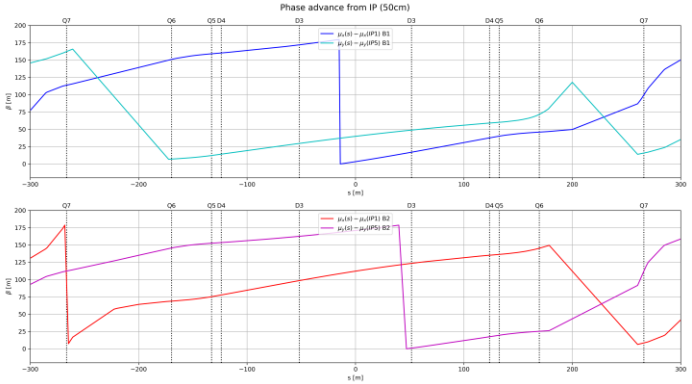


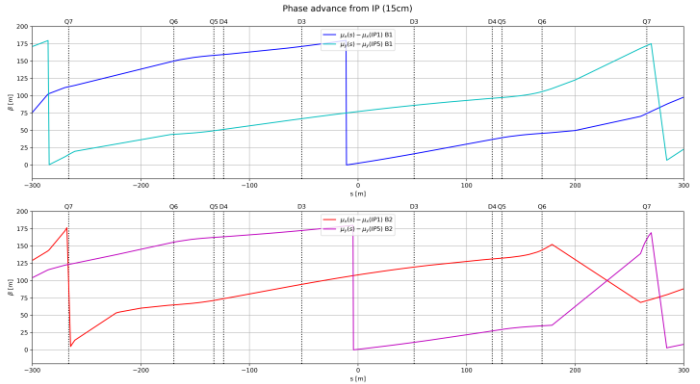


IP4 - Phase advance- Normal



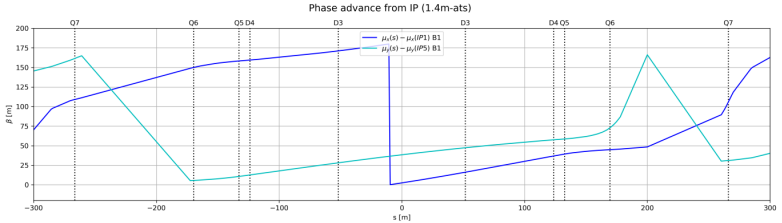


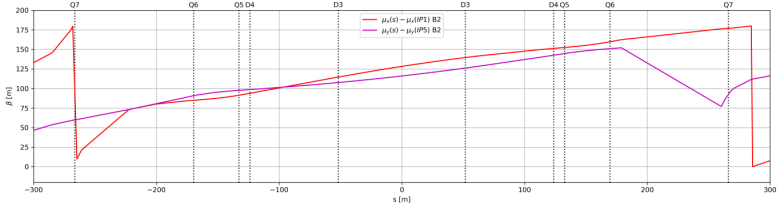


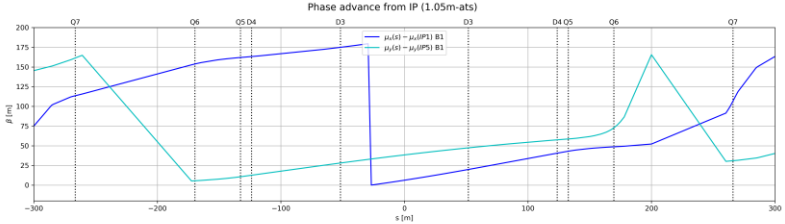


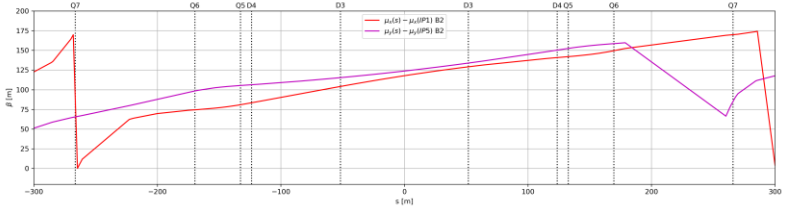
- Changes during squeeze

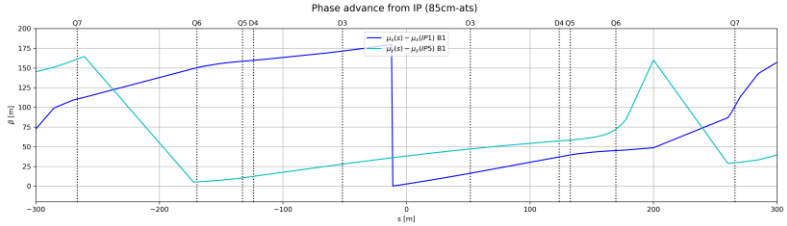
IP4 – Phase advance- ATS

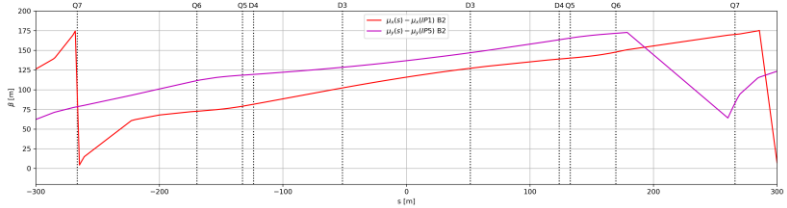


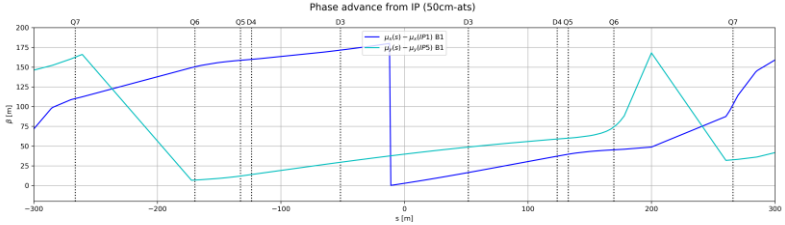


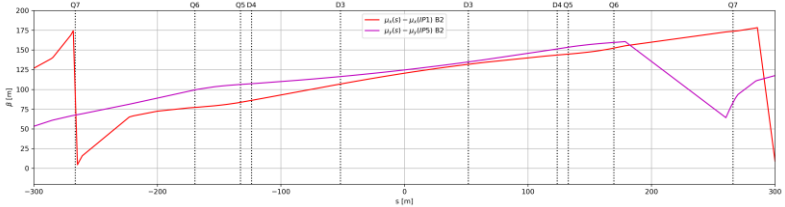












Optics in IP6 - Flat