Update on IP8 optics and crossing scheme

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Thanks to Thys Risselada

Unsqueeze optics

- IP8 optics B1 and B2 matched from 10m to 30m
- Smooth transition in between 0.5 m steps
- Crossing schemes recomputed:
  - With warm magnet MCBWHS5.L8.B1 (instead of MCBHS5.L8.B1): crossing angle matched from 10m to 20m optics, for both LHCb polarities.
  - Beyond 20m, limitation on maximum corrector strengths for positive LHCb polarity
  - With nominal magnet MCBHS5.L8.B1: crossing scheme matched to 30m optics, for both LHCb polarities

Crossing scheme with warm corrector magnet

- **Crossing scheme available for all IP8 optics, injection, ramp, pre-sequeeze, squeeze, unsqueeze**
- **Knobs calculated at 7 TeV, 100% of LHCb powering, both polarities**
- **Should be scaled for alternative operational scenarios**

IP8 scenarios

- **Values for LHCb positive polarity**
- **At 5 TeV, internal positive crossing angle is $\pm 189 \mu$rad**

Energy	β^*	**External** α	**Effective** α	σ^*	**sep**$_{min}$	**Y/N**
[TeV]	**[m]**	μ**rad**	μ**rad**	μ**m**	σ	
5	**2**	$\mp$ **250**	$\mp$ **61**	**37.5**	**5.7**	**N**
5	**3**	$\mp$ **280**	$\mp$ **91**	**46.0**	**9.2**	**Y**
5	**4**	$\mp$ **310**	$\mp$ **121**	**53.0**	**12.5**	**Y**
5	**6**	$\mp$ **310**	$\mp$ **121**	**65.0**	**11.4**	**Y**
5	**10**	$\mp$ **310**	$\mp$ **121**	**84.0**	**9.6**	**Y**
7	**10**	$\mp$ **210**	$\mp$ **75**	**71.0**	**7.0**	**Y**

IP8 Unsqueeze optics

Energy	β^*	**External α (+LHCb)**	**External α (-LHCb)**
[TeV]	**[m]**	**μrad**	**μrad**
7	**10**	$\mp$ **210**	$\mp$ **65**
7	**15**	$\mp$ **225**	$\mp$ **65**
7	**20**	$\mp$ **240**	$\mp$ **65**
7	**25**	$\mp$ **255**	$\mp$ **65**
7	**30**	$\mp$ **270**	$\mp$ **65**

IP8 optics

Energy	β^*	**External α (+LHCb)**	**External α (-LHCb)**
[TeV]	**[m]**	**μrad**	**μrad**
450	**10**	$\mp$ **170**	$\mp$ **170**
Ramp	**10**	$\mp$ **170**	$\mp$ **170**
7 Presqueeze	**10**	$\mp$ **170**	$\mp$ **170**
7 Physics	**10**	$\mp$ **210**	$\mp$ **65**
7	**8**	$\mp$ **210**	$\mp$ **75**
7	**6**	$\mp$ **200**	$\mp$ **85**
7	**4**	$\mp$ **200**	$\mp$ **100**
7	**2**	$\mp$ **200**	$\mp$ **140**