IR8 optics for pre-squeeze and squeeze crossing scheme and aperture

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Generalities

- > /afs/cern.ch/eng/lhc/optics/V6.500/V6.5.seq
- > /afs/cern.ch/eng/lhc/optics/V6.500/V6.5.inj.newnominal.str
- \triangleright pre-squeeze is done at 7 TeV and followed by squeeze
- \rightarrow pre-squeeze: reduce kqx from about 222 T/m to about 200 T/m
- squeeze: reduce β^* from 10 m to 2m
- > keep $\beta^* = 10$ m during the pre-squeeze (both planes)
- avoid up and down in the powering of quads, in particular kq4 and kq5
- calculate crossing scheme and check aperture

kq4.l8b1, kq5.l8b1, kq4.r8b1, kq5.r8b1 0.006 "alldata" using 2:3 "alldata" using 2:4 0.005 "alldata" using 2:10 "alldata" using 2:11 0.004 0.003 0.002 kq4,5 strength 0.001 0 -0.001 -0.002 -0.003 -0.004 -0.005 0.0086 0.0087 0.0088 0.0089 0.009 0.0091 0.0092 0.0093 0.0094 0.0095 0.0096 kqx.l8 strength

kq6.l8b1, kq7.l8b1, kq6.r8b1, kq7.r8b1



kq8.l8b1, kq9.l8b1, kq8.r8b1, kq9.r8b1



kq4.l8b2, kq5.l8b2, kq4.r8b2, kq5.r8b2



kq6.l8b2, kq7.l8b2, kq6.r8b2, kq7.r8b2



kq8.l8b2, kq9.l8b2, kq8.r8b2, kq9.r8b2



Additional info

- reduce the number of optics files during the pre-squeeze from about 30 to 15
- futher checks of powering of magnets (min. value time of squeeze)

kq4.l8b1, kq5.l8b1, kq4.r8b1, kq5.r8b1



kq6.l8b1, kq7.l8b1, kq6.r8b1, kq7.r8b1



kq8.l8b1, kq9.l8b1, kq8.r8b1, kq9.r8b1



kq4.l8b2, kq5.l8b2, kq4.r8b2, kq5.r8b2



kq6.l8b2, kq7.l8b2, kq6.r8b2, kq7.r8b2



kq8.l8b2, kq9.l8b2, kq8.r8b2, kq9.r8b2



IP8 crossing scheme

- **a** matched for external angle of \mp 210 μ rad
- **[** mcbx1 = -35 μ rad for all squeeze optics
- **matrix** mcbx1 = -35 down to 7 μ rad during the pre-squeeze
- during pre-squeeze and squeeze, all other crossing scheme correctors at max 70%

crossing angle at IP8, start of squeeze, 10m optics

x (*m*), *y* (*m*)



crossing angle at IP8, end of squeeze, 2m optics

x (*m*), *y* (*m*)



Aperture checks - start of squeeze, 7 TeV, 10m



onelem, n1, spec

Aperture checks - end of squeeze, 7 TeV, 2m



onelem, n1, spec

Aperture checks - Injection optics, 450 GeV, 10m, \mp 170 μ rad



onelem, n1, spec

Aperture, 7 TeV

Optics	β^*	n1 B1	n1 B2	location
	m	σ	σ	
start pre.sq.	10	23	23	mqxb.b2.r(l)8
end pre.sq.	10	23	23	mqxb.b2.r(l)8
squeeze	5	17	17	mqxb.b2.r(l)8
squeeze	4	15	15	mqxb.b2.r(l)8
squeeze	3	12	12	mqxb.b2.r(l)8
squeeze	2	9.6	9.6	mqxb.b2.r(l)8

Conclusion

- I pre-squeeze and squeeze optics matched with β^* of 10 m, both planes
- check with PO to be done
- **crossing scheme implemented**
- **a**perture checked