Aperture Check for Two-beam Collimators

summary of J. B. Jeanneret analysis

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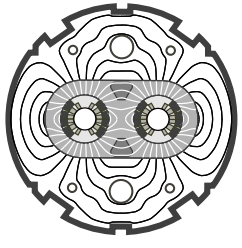
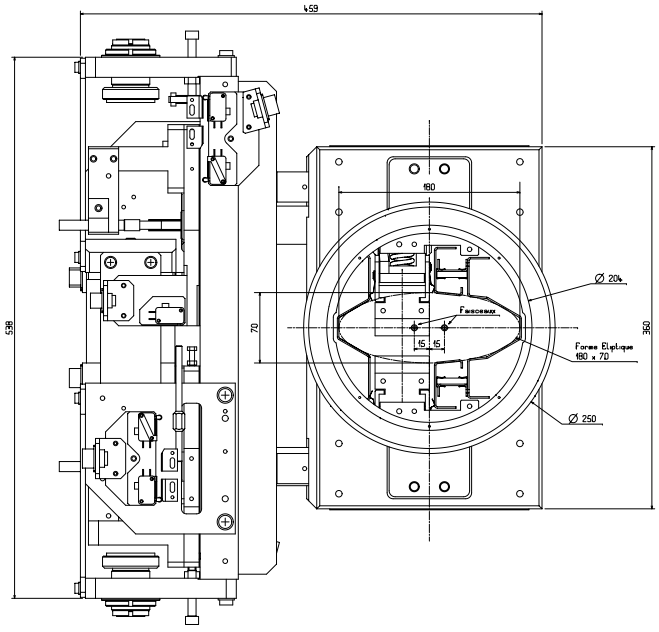
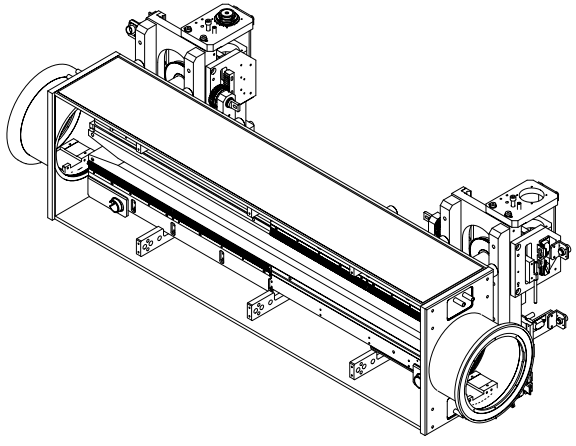
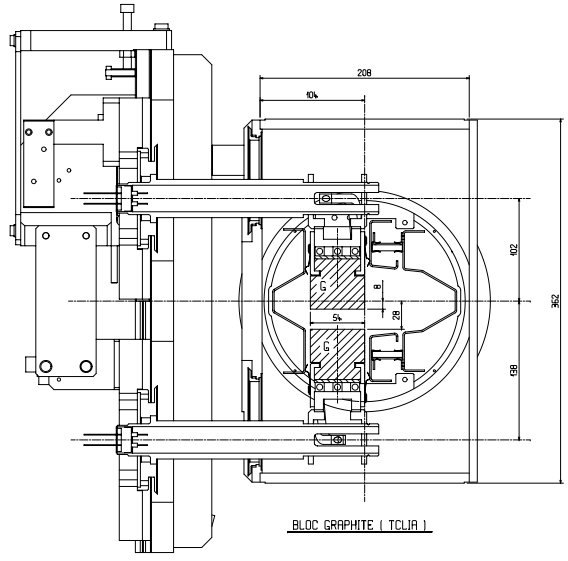
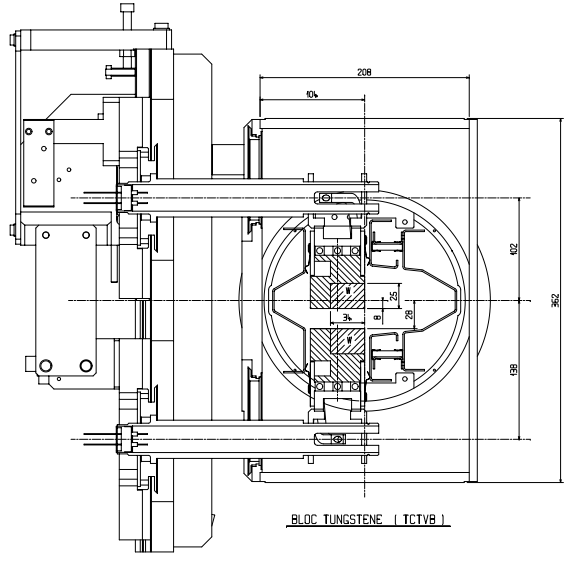


Two-beam Design (TCLIA, TCTVB)









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Locations of the Two-beam Collimators I

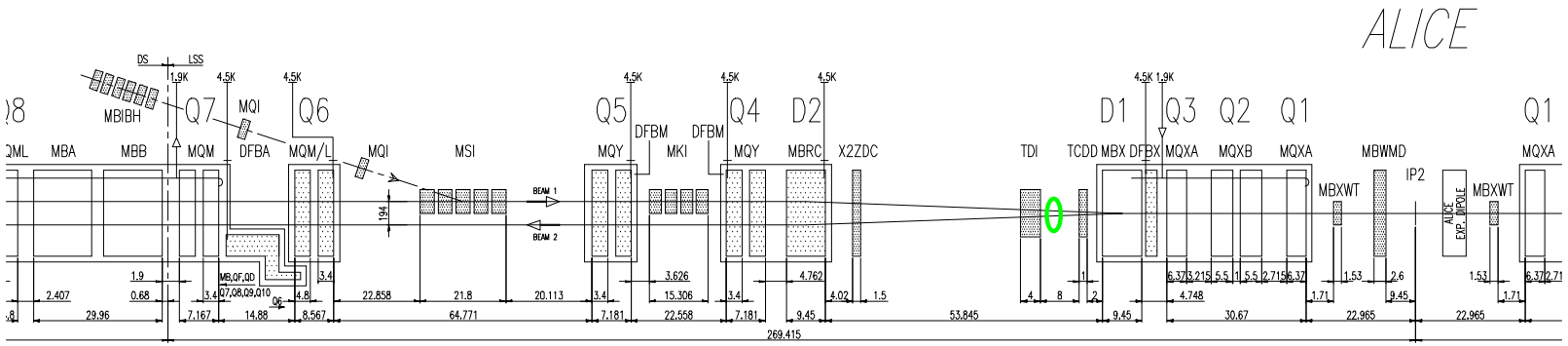


Figure 3.8: The left side of the matching section in IR2.

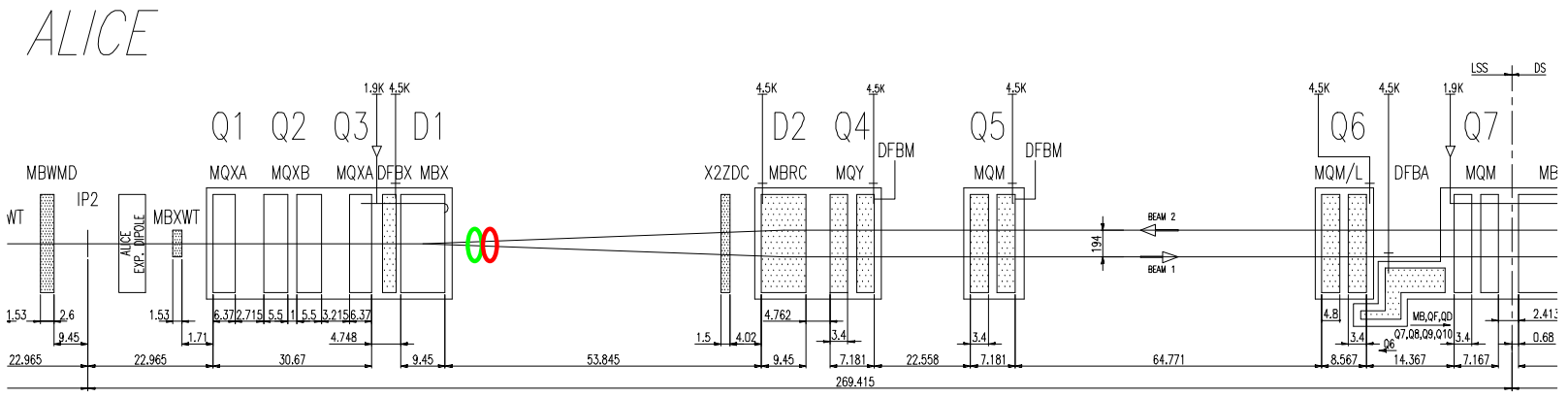


Figure 3.9: The right side of the matching section in IR2.

Locations of the Two-beam Collimators II

Name	Pos. from IP [m]	limits aperture on
TCLIA.4R2	76.0080	beam1
TCTVB.4R2	73.7480	beam2
TCTVB.4L2	-73.7480	beam1
TCLIA.4L8	-76.0080	beam1
TCTVB.4L8	-73.7480	beam2
TCTVB.4R8	73.7480	beam2

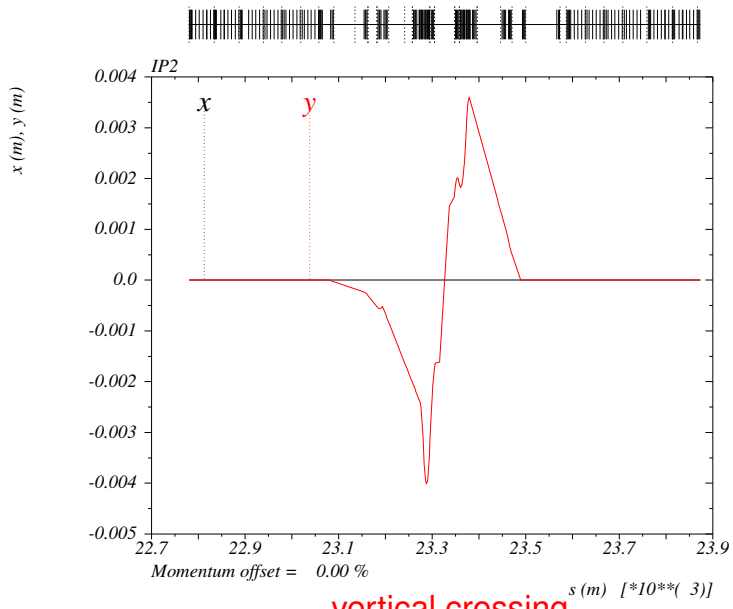
used for studies:

optics Version 6.500 with standard injection and early collision strength ($\beta^* = 2$ m at IP8 and $\beta^* = 10$ m at IP2)

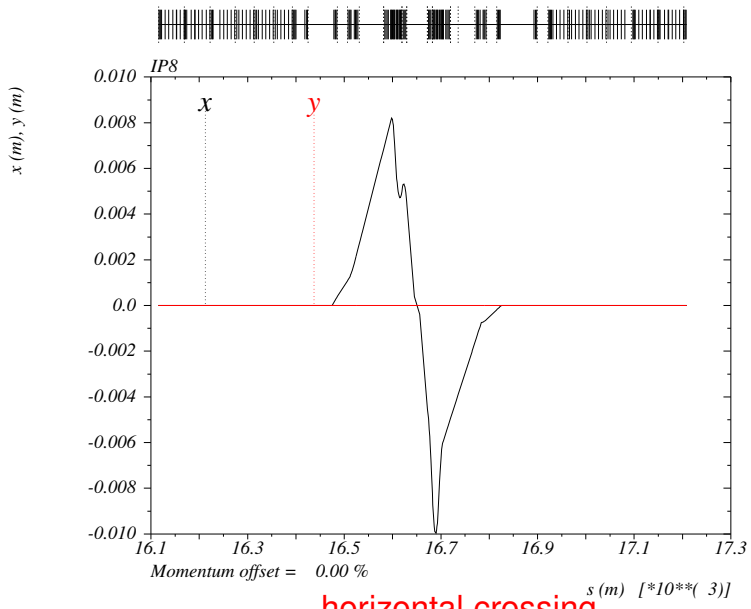
summary on afs:

/afs/cern.ch/eng/lhc/aperture/tclia

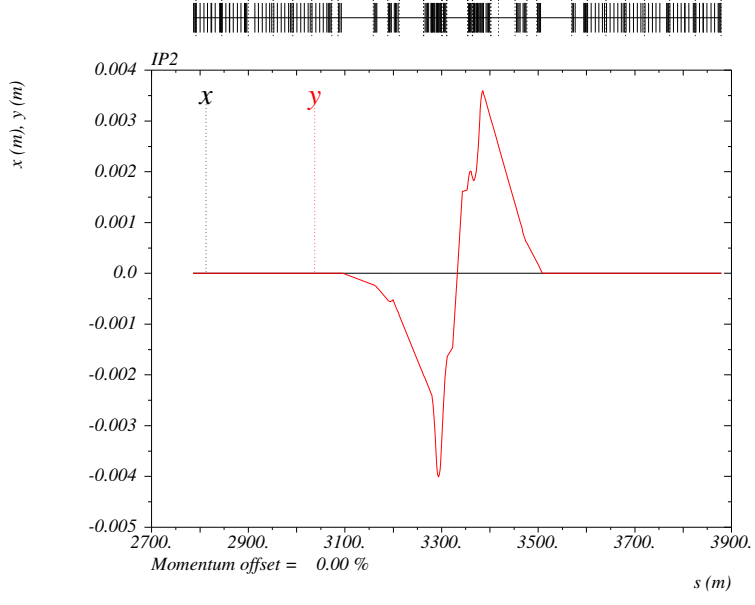
Crossing Scheme IP2 and IP8

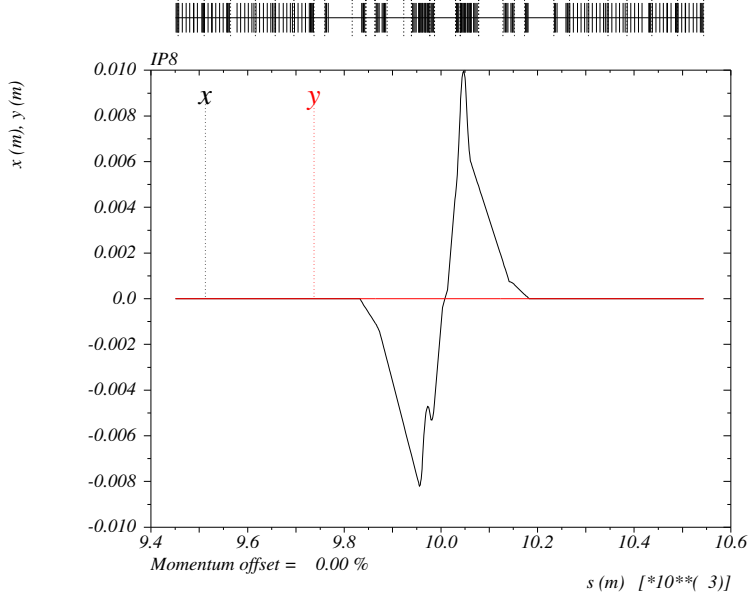


vertical crossing



horizontal crossing





Results for IP2

- beam 2
  - injection no crossing and separation: limiting aperture is TCLIA.4R2 at 10.94σ, but well above 7σ
  - injection energy with crossing and separation: limiting aperture is TCLIA.4R2 at 5.59, increasing horizontal jaw position by 2 mm results in 7.10σ
  - top energy with crossing and separation: available aperture at TCLIA.4R2 at 5.00σ and TCTV.4L2 at $5.32\sigma \Rightarrow$ shift of at least 2.5 mm needed
- beam 1
  - injection with crossing and separation: limiting aperture is TCTV.4R2 at 8.22σ, but well above 7σ
  - top energy with crossing and separation: limiting aperture is TCTV.4R2 at $5.57 \Rightarrow$ shift of at least 2.2 mm needed

Results for IP8

- beam 1
  - injection energy with crossing and separation: all three collimator have an available aperture of more than 8.92σ
  - top energy with crossing and separation: smallest available aperture at TCTV.4R8 with $8.32\sigma \Rightarrow$ no horizontal shift needed
- beam 2
  - injection energy with crossing and separation: available aperture above 8.89σ
  - top energy with crossing and separation: available aperture above 8.89σ