Implementation of SR absorbers in the aperture model

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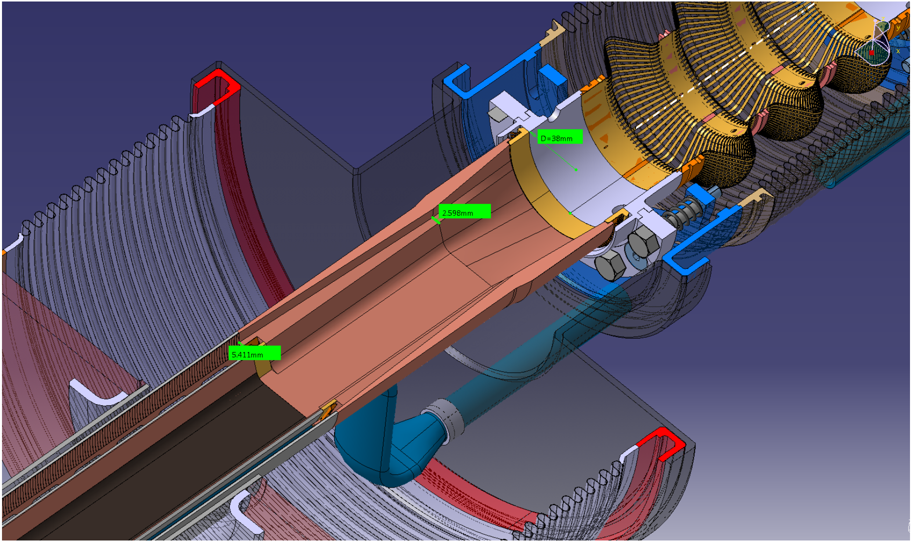
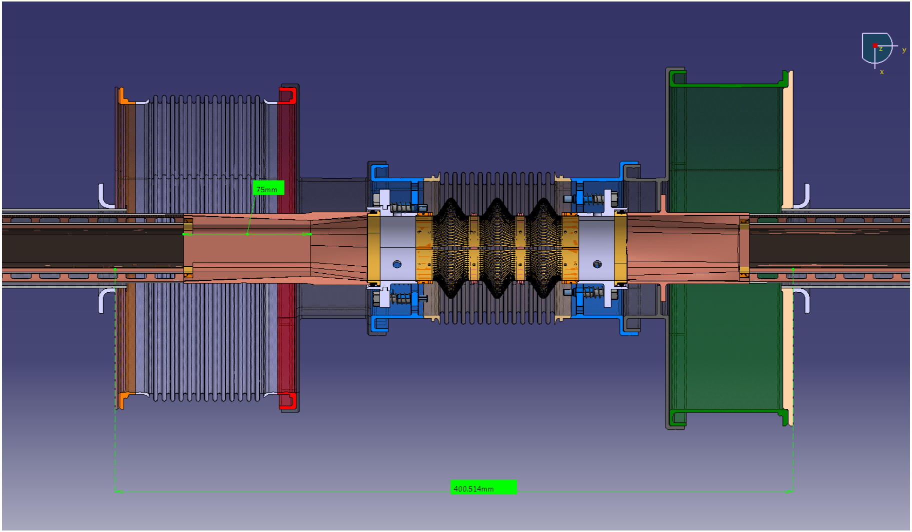
Magnet interconnects



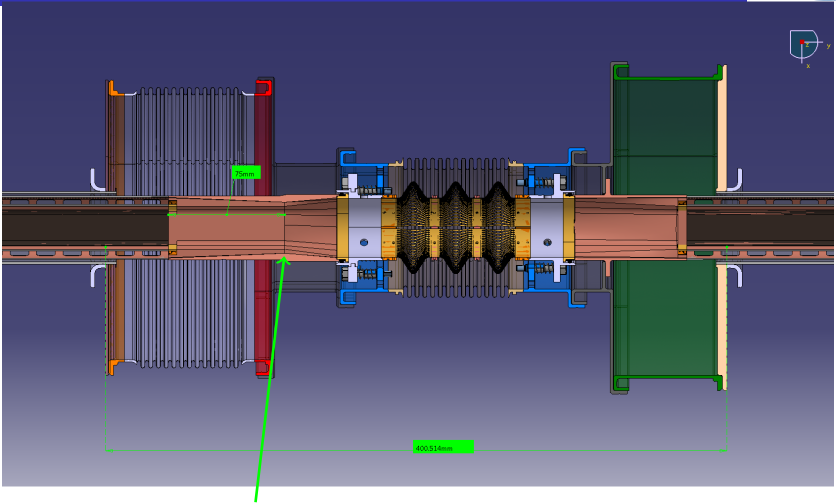
C. Garion, I. Bellafont et al.

Magnet interconnects



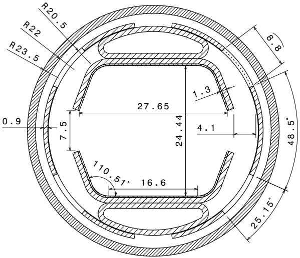
C. Garion, I. Bellafont et al.

Implementation in MAD-X

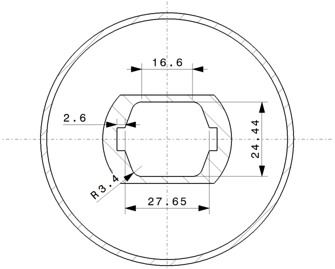


- Implemented as MARKER at narrowest position
- $\Rightarrow$ also largest sagitta before inner chamber size increases

Synchrotron absorber bottle neck



Beam screen I. Bellafont, C. Garion et al.

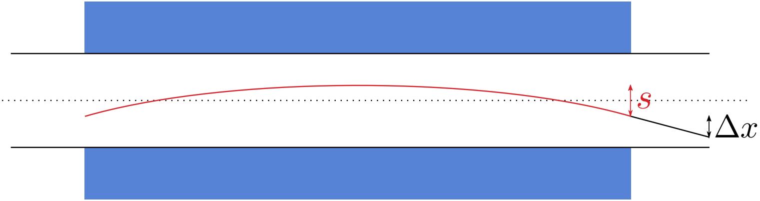


Narrowest SR absorber aperture I. Bellafont, C. Garion et al.

- Same beam chamber size as beam screen
- Smaller slit depth
- Slit depth in MAD-X model was already limited ⇒ almost no difference

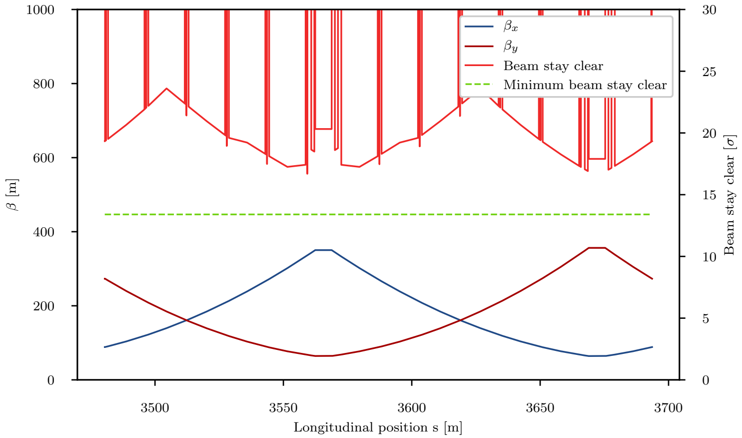
Sagitta

- Sagitta previously included a little margin for beam screen beyond magnet but not much
- SR absorber bottle neck about 66.5 cm behind magnet
- Sagitta model: only “dipole sagitta” *s* centered in dipole

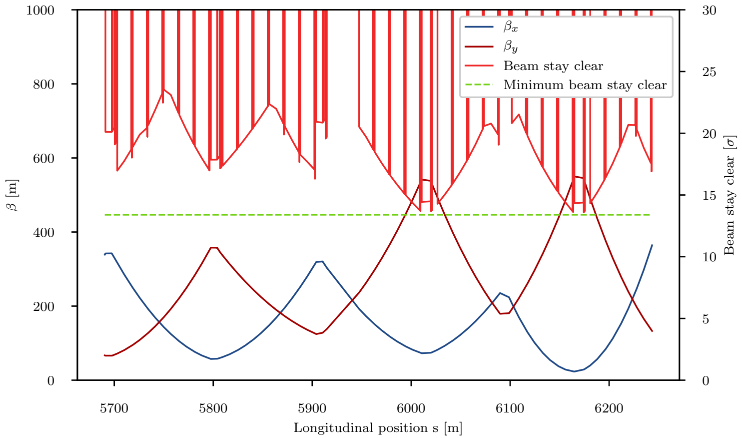


- Best in terms of field errors and dynamic aperture, worst in terms of mechanical aperture
- Sagitta in SR absorber: $\frac{s}{2} + \Delta x = 1.63\,\text{mm}$

Arc apertures: Arc cell AB



DS apertures: Narrowest point in LB



Beam stay clear $> 13.5\,\sigma \Rightarrow$ ok

Why is aperture still ok?

- Sagitta increased significantly in SR absorbers, but...
- "New" beam stay clear at injection: 13.4 σ (was 15.5 σ when we gave "worst case ellipses" to vacuum group)
- Better field quality in arc dipoles $\Rightarrow$ smaller arc β function at injection

Discussion in Collimation meeting:

- Large sagitta in SR absorbers could lead to localized losses
  - $\Rightarrow$ localized heat load
  - $\Rightarrow$ localized secondary showers
- $\Rightarrow$ Need tracking studies with correct Beam Screen geometry including slits
- Possible (?) mitigation: SR absorber aperture opening up on inner side towards end