First estimate of vacuum chamber size at the IP

J. Wenninger

❑ Since the beam size in the horizontal plane is >> than in the vertical plane, it is the horizontal plane parameters that define the limits – assuming a round chamber.

❑ <u>Aperture margin</u>: as a starting point **30 σ** are considered to be sufficient, assuming the beams are collimated to 15-20σ.

  o *The low-beta quadrupole is likely to be the aperture margin in the vertical plane due to the large beam size $\Leftrightarrow$ small β*.*

  o *We will inject with detector on, oscillations of 12σ or so !*

❑ <u>Emittance</u>: for the current parameter list the <u>horizontal</u> emittance is in the range of 1-30 nm. Use **50 nm** as maximum emittance.

❑ <u>β*</u>: for the current parameter list the largest <u>horizontal</u> β* is 1m. Use **1 m** as maximum value.

❑ <u>Alignment</u>: assume a tolerance of **2 mm** for the relative alignment of beam line, experiment and vacuum chamber (also orbit).
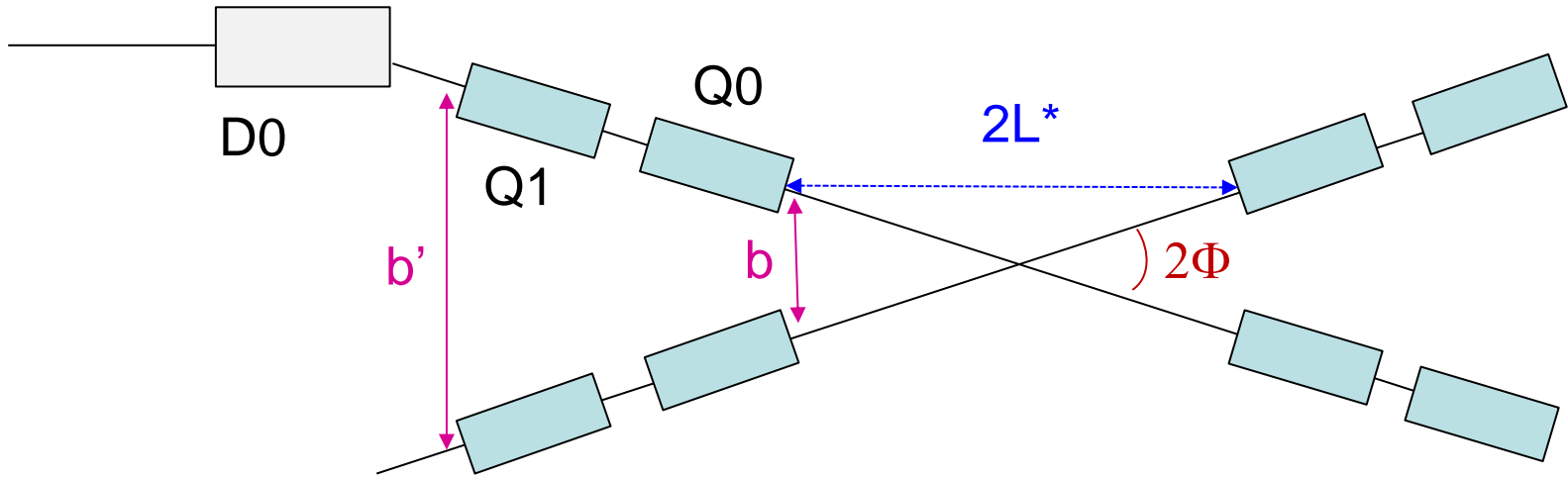
□ In case we operate with a large crossing angle, 2Φ ≈ 10-50 mrad, the crossing of the beams requires an extra margin.

❑ For the crossing angle (2F) margin, a chamber length of 40 cm (total length, ± 20 cm wrt IP) is assumed.

Parameter	Scenario1	Scenario2	Scenario3
β^* (m)	1	1	2
ε (nm)	50	50	100
σ (μm)	224	224	447
No. sigma	30	40	40
Margin beam (mm)	**6.7**	**8.9**	**17.9**
Alignment	**2**	**3**	**3**
2Φ (mrad)	50	0	0
Margin Φ (mm)	**5**	**0**	**0**
Radial clearance (mm)	13.7	11.9	20.9

A radius of 15 mm seems to be a reasonable starting point !

TLEP IP chamber size

12/1/2013