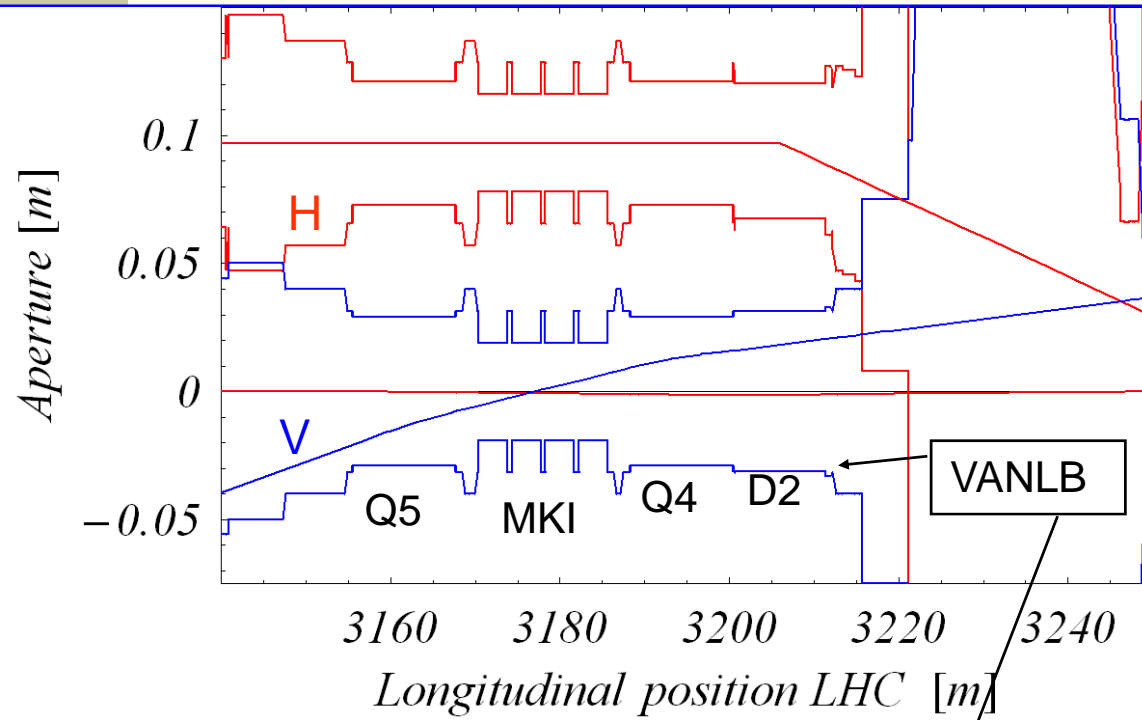


# Y-Chamber Displacement L2

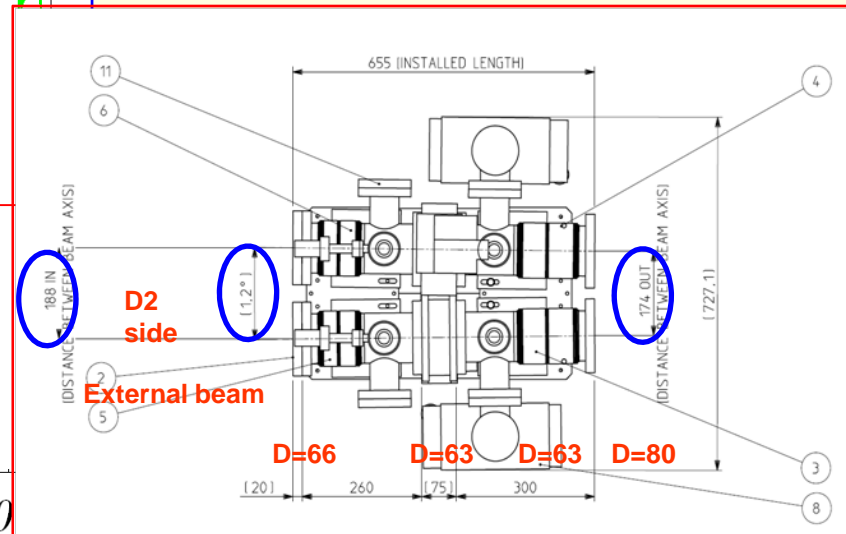
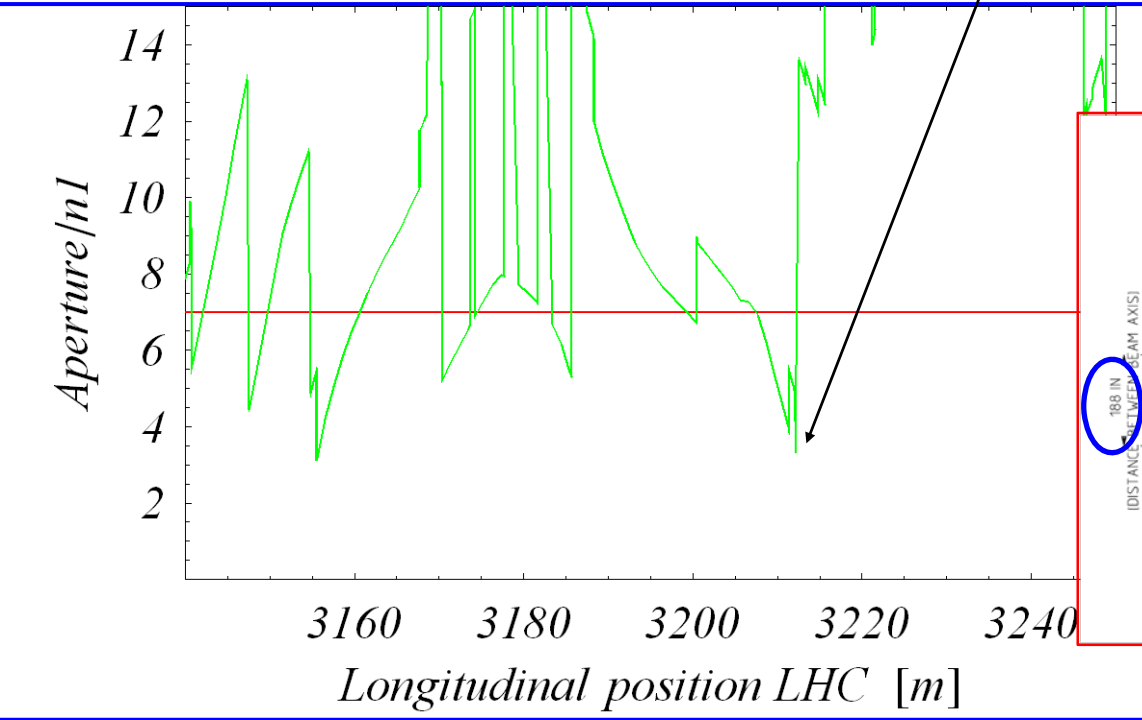
- Y-chamber aperture was increased because of injection trajectories: **edms 804241**
  - Trajectory of non kicked injected beam
    - Setting-up the beam, position BTV in front of TDI
    - Error scenario when problems with kicker timing
  - Trajectory of the kicked stored beam
    - Extraction of injected pilot
    - Error scenario when problems with kicker timing
- Other beam energies and optics (collision optics ions) not studied here
- Beam parameters for these studies identical as what was used in previous discussions (see injection working group):  $co_{x,y} = 4$  mm circle, 1mm alignment.

# Calculations IP2



Results similar to IP8, see next slide  
Reported in memo distributed 20/7/07

Aperture VANLB depends on alignment under angle of element (shown not aligned)



# Conclusions

## Circulating Kicked

	n1IP8	n1 IP2
MKI	6.1	<b>5.4</b>
D2	5.1	<b>4.2</b>
VANLB	5.5	<b>4.4</b>

## Injected not kicked (calc. with halo)

	n1IP8	n1 IP2
Q5	2.17	3.1
MKI	4.9	5.3
D2	5.2	<b>3.8</b>
VANLB		<b>4.4</b>

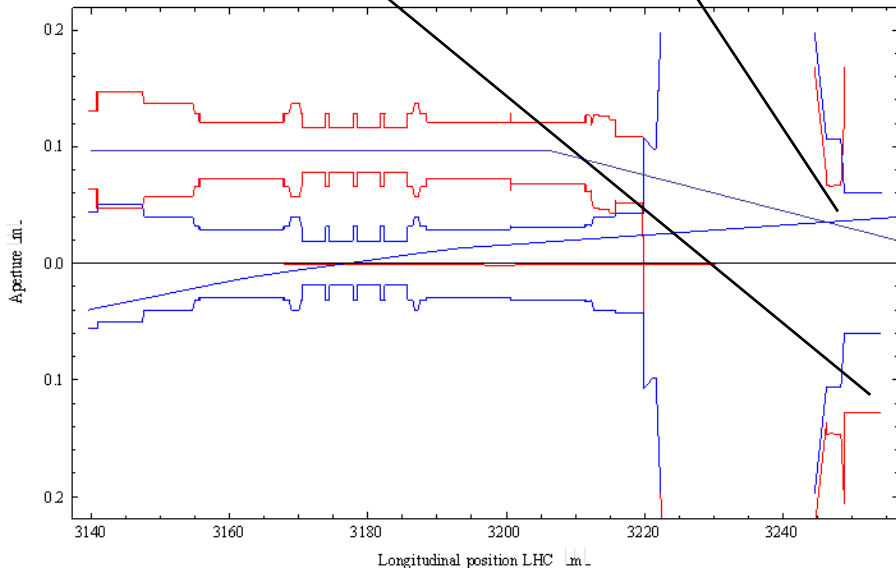
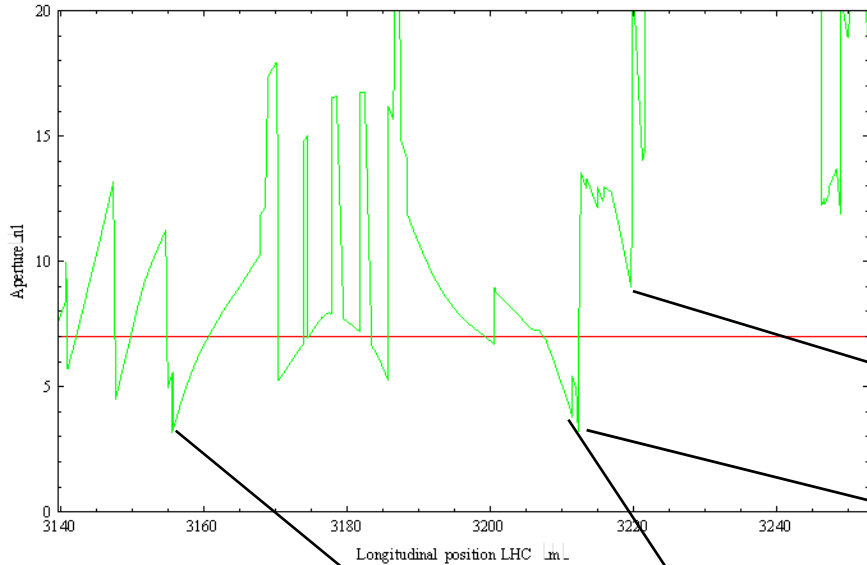
After modif.

4.5 – 4.9

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- Apertures in injection region remains tight with  $co=4$  mm circle
  - Circulating kicked beam worse for IP2 than for IP8
  - MKI will be tight for all injected beams!
  - D2 non kicked injected beam is tightest apertures
    - Need tracking studies for real assessment
- Q5 will improve when tilt angle introduced
  - Real assessment needs tracking studies
  - IP8 worse than IP2
- VANLB will be fine if large valve with ID=100 mm is installed

# Re-calculated with Actual Y-chamber, nominal position



- Worst case is the injected beam not kicked
- Actual situation with enlarged Y-chamber

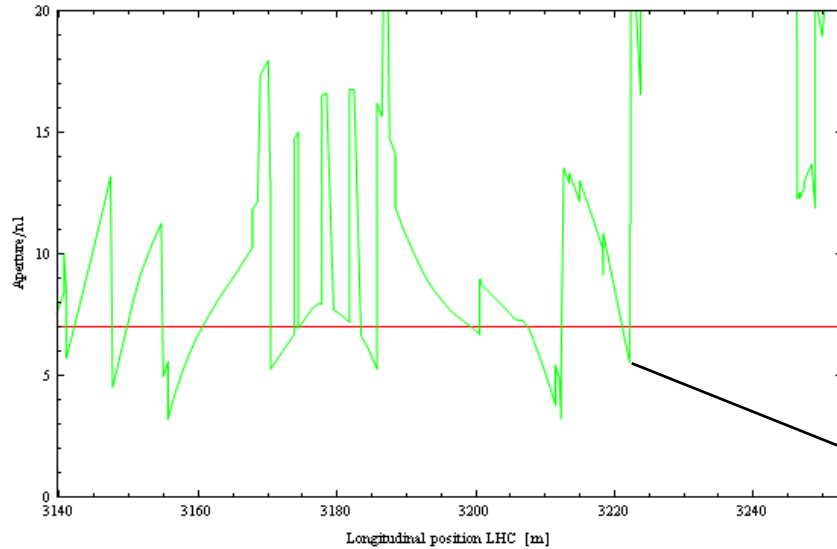
Y-Chamber,  $n1 = 9.0$

Valve, but enlarged, not critical any more

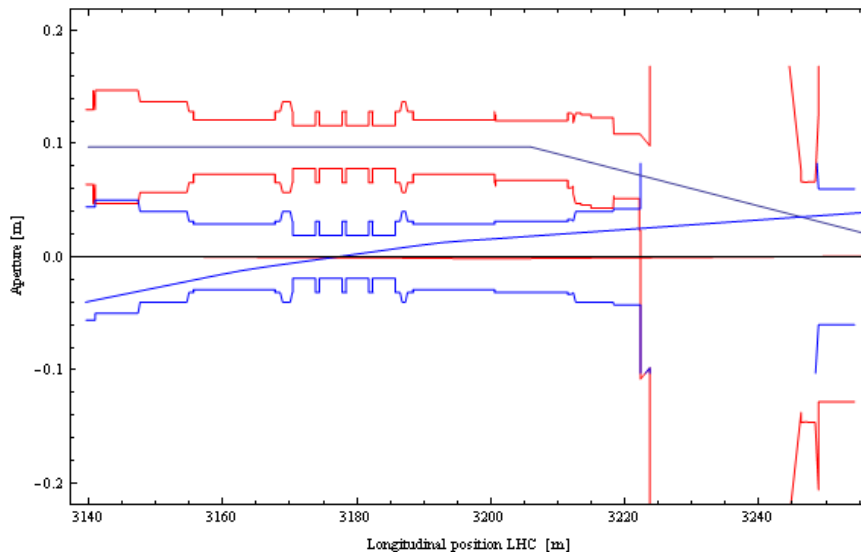
D2,  $n1=3.8$ ; remains critical

Q5, tilted –  $n1$  between 4.5 and 4.9

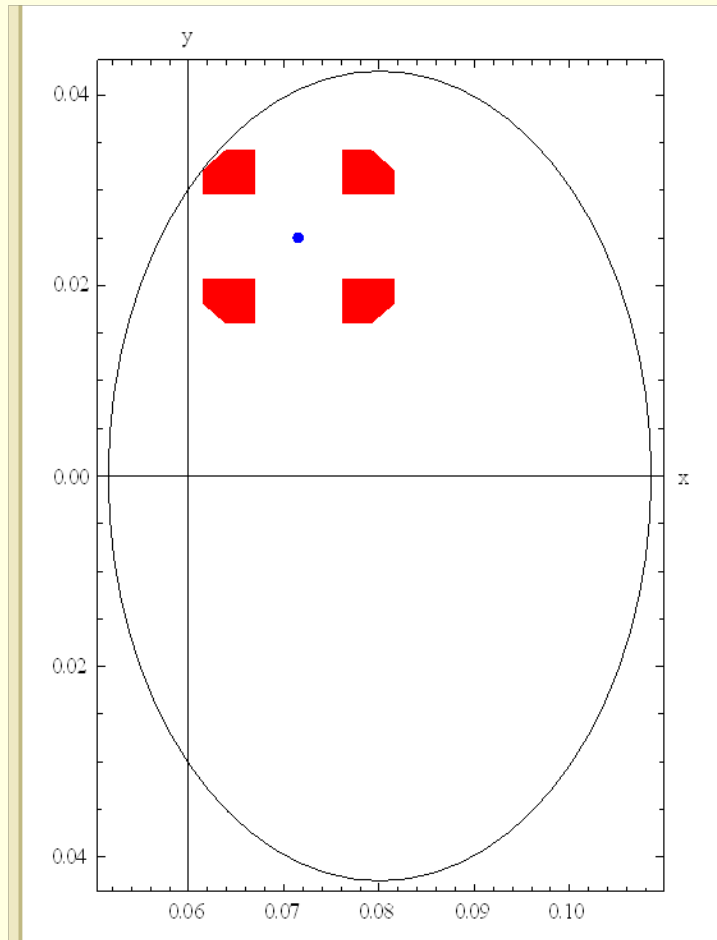
# Y-Chamber shifted RIGHT by 2.5 m



Y-Chamber,  $n1 = 5.52$   
Close to critical value at D2  
where  $n1 = 3.8$

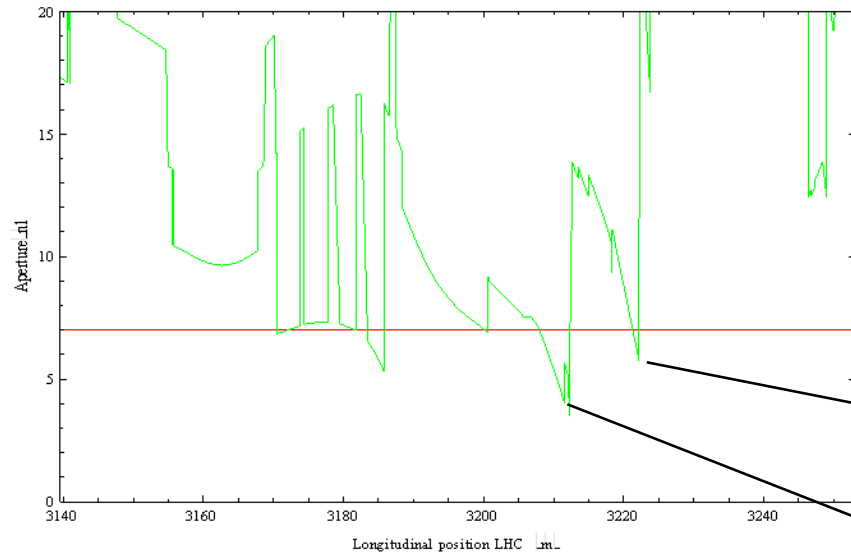


# Details n1 calculation at the Y-chamber



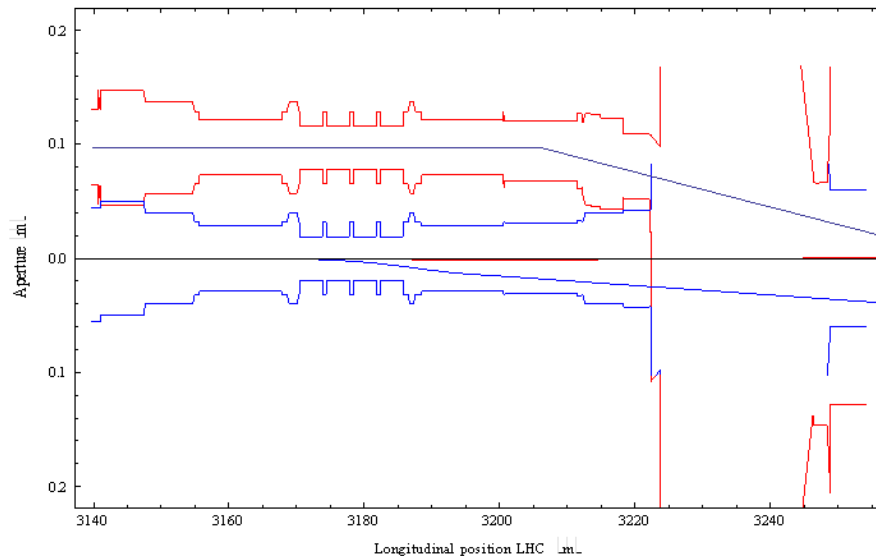
Injected not kicked  
Chamber shifted 2.5 m  
 $n1 = 5.52$

# Other critical case is the kicked stored beam

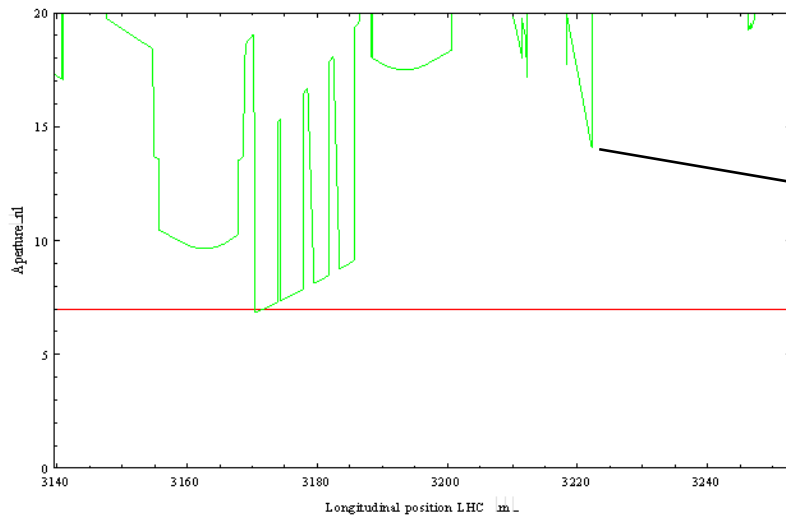


Y-Chamber:  $n_1=5.75$

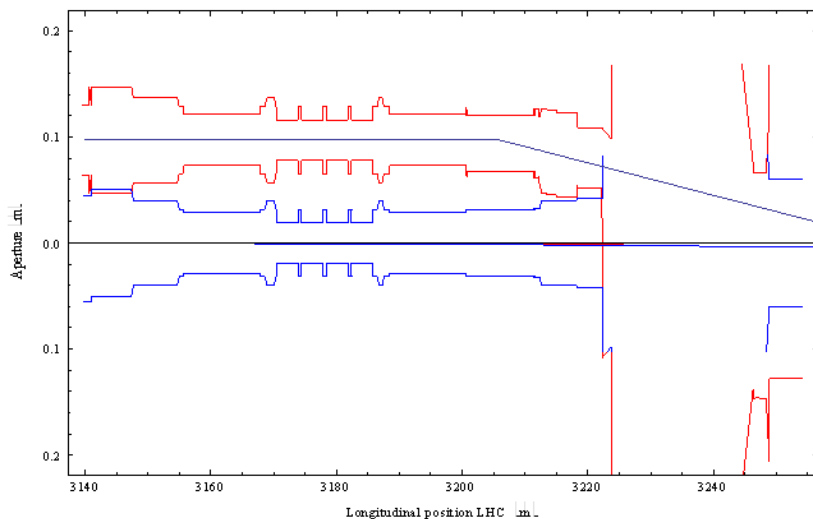
D2:  $n_1=4.2$



# Y-Chamber shift right 2.5 m circulating beam @ injection

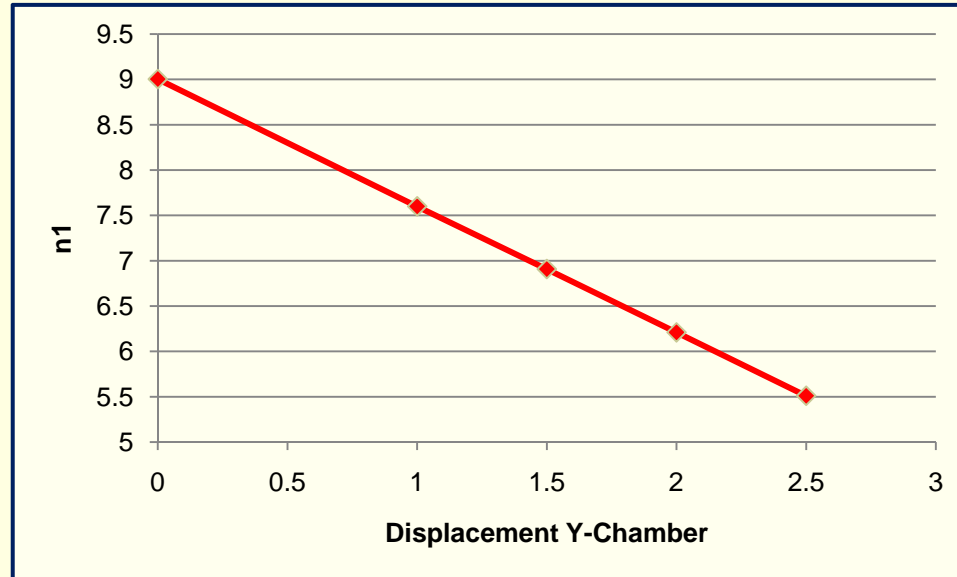


Y-Chamber,  $n_1=14.1$   
(Rob found  $n_1=16.5$ )





# Injected not kicked for different displacement of Y-Chamber



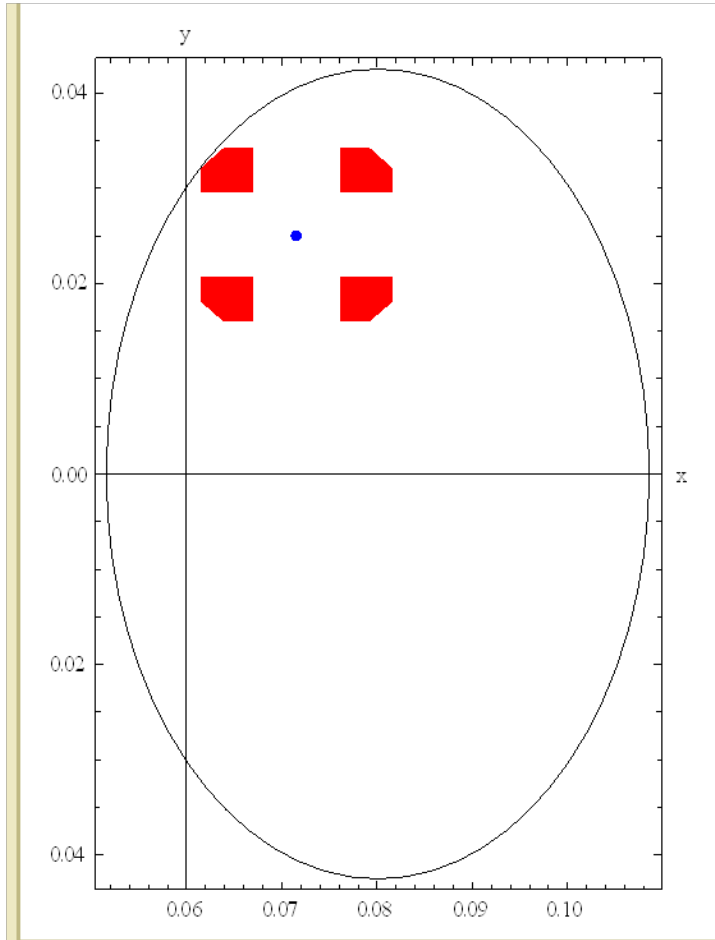
<i>Displ Y-chamber</i>	<i>n1</i>
0	9.004
1	7.6
1.5	6.908
2	6.21
2.5	5.51

Rather linear...

# Conclusions

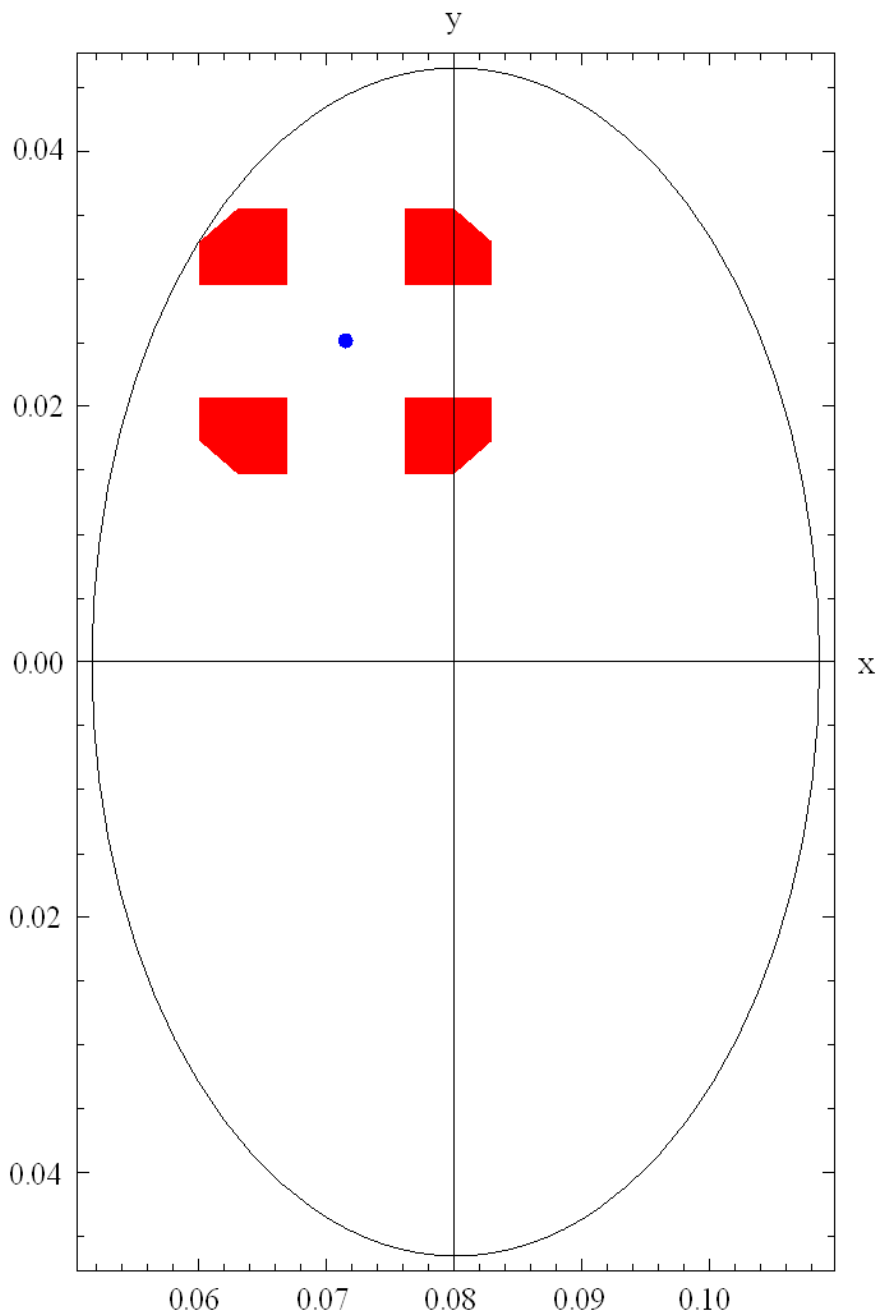
- With the modified and presently installed Y-chamber the aperture is sufficient also for the special injection trajectories:  $n1 \approx 9.0$
- Moving the chamber by 2.5 m towards the IP results in  $n1 = 5.5$  for the injected non-kicked beam case and becomes, another, critical aperture
- Other critical apertures in the area have been 'improved'
  - Q5 tilt introduced (only in data base 'geometre')
  - Valve and BPM increased diameter: **to be updated in layout db and checked !**
- However, D2 remains critical with  $n1 = 3.8$
- **Do we accept to insert another aperture bottleneck close to D2 with the argument that we are in the 'shade' of D2?**
  - Not guaranteed to be in the shade, depending on the sampling of the error margins included in the calculations (alignment, orbit, beta-beat etc.)
- **Is a Y-chamber displacement of < 2.5 m also possible?**
  - **Displacement of 1.5 m would be acceptable with  $n1 = 6.9$**
- Do we need to do further calculations with ions & collision optics?

# Details n1 calculation at the Y-chamber

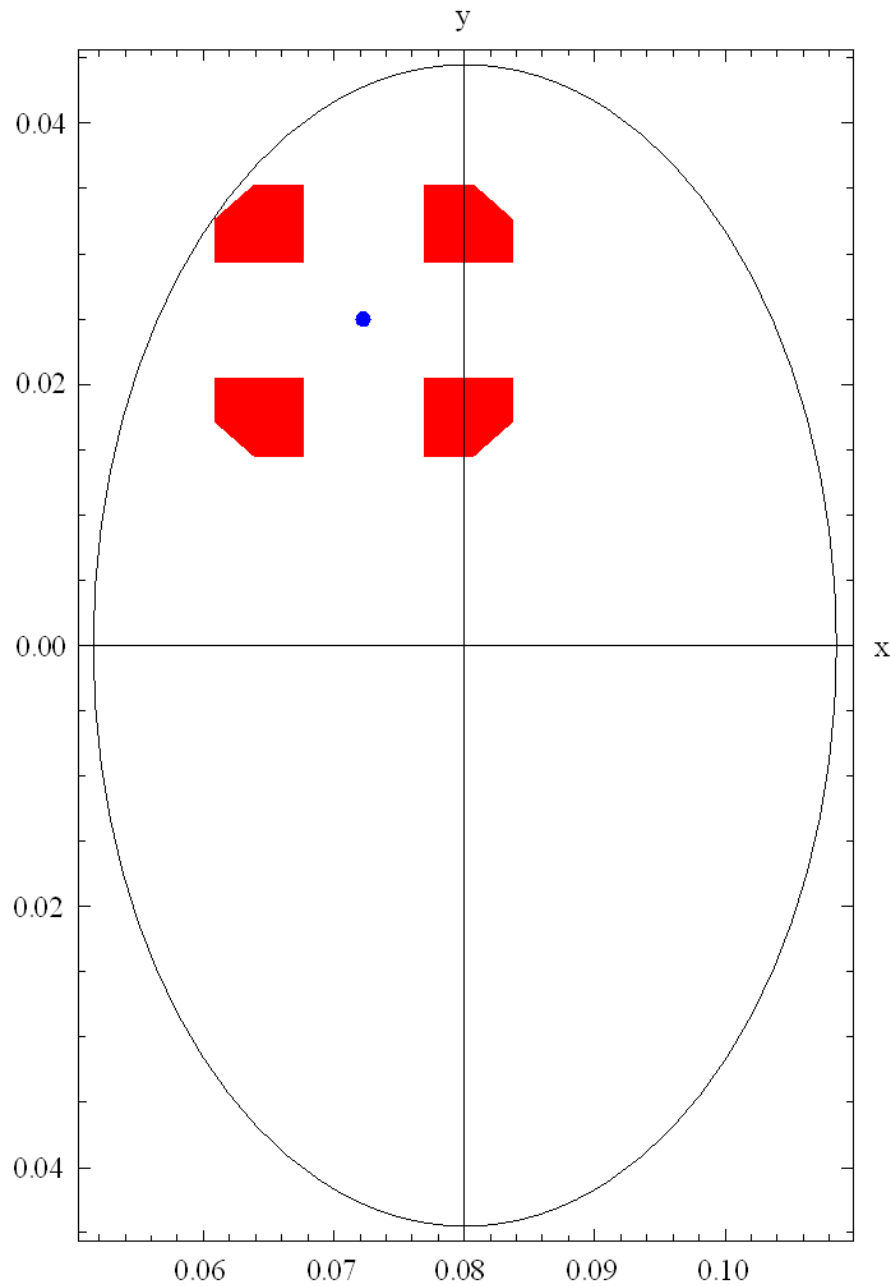


Injected not kicked  
Chamber shifted 2.5 m  
 $n1 = 5.52$

(slide shown this morning)



Y-Chamber displaced by 2.5 m  
Injected, not kicked trajectory  
 $n_1 = 7$   
Chamber  $D_x = 0.057$  m;  $D_y = 0.093$  m  
(present values 0.057/0.085)



Y-Chamber displaced by 2.0 m  
Injected, not kicked trajectory  
 $n1 = 7$   
Chamber  $Dx=0.057$  m;  $Dy=0.089$  m  
(present values 0.057/0.085)