

# ALICE LS2 beampipe

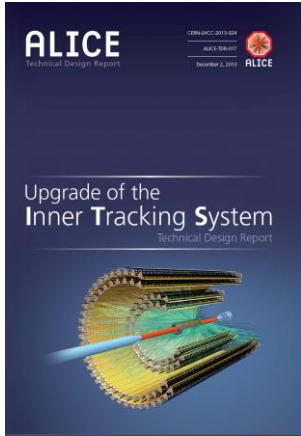
A.Tauro on behalf of the ALICE TC group

## **Outline:**

- Status
- Previous approval steps from LEB
- Design
- Tolerances
- Time constraints

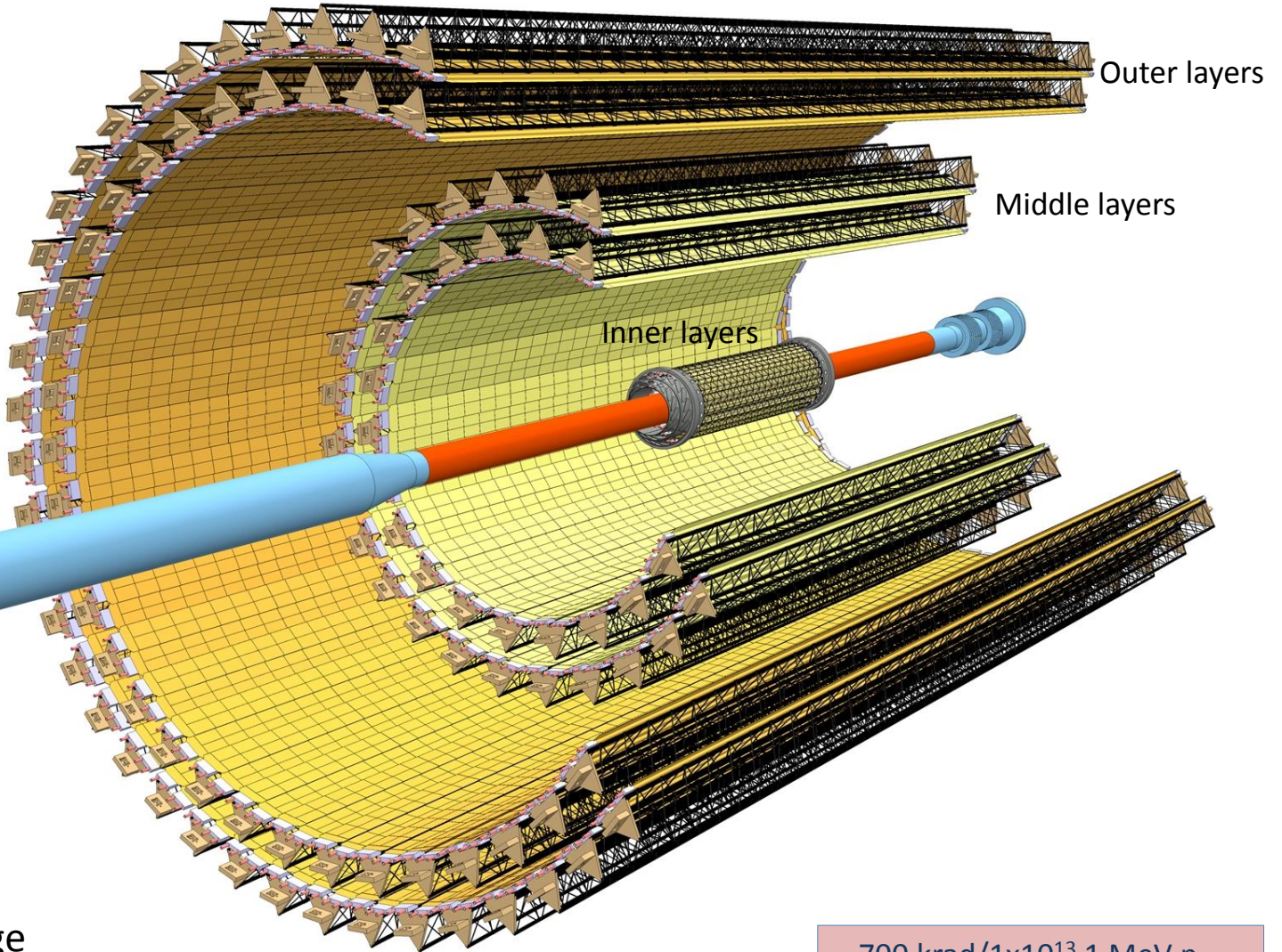
# New ITS Layout

25 G-pixel camera  
(10.3m<sup>2</sup>)



ITS TDR CERN-LHCC-2013-024

7 layers of MAPS



Radial coverage  
22-406mm

700 krad/1x10<sup>13</sup> 1 MeV neq  
Includes safety factor 10

# Status and past LEB discussions

ALICE wants to install a new beampipe in LS2.

The reason is to build a new silicon tracker with greatly improved features in terms of determination of the distance of closest approach to the primary vertex, tracking efficiency at low transverse momenta, and read-out rate capabilities.

Past LEB discussions:

19<sup>th</sup> LEB meeting (April '12): OD 3.6cm cylindrical beampipe (5.5m long) was submitted to LEB

20<sup>th</sup> LEB meeting (June '12): Conclusion from aperture study: **too small aperture at injection beyond -2 m from IP!**

...

25<sup>th</sup> LEB (December '13): New layout submitted to LEB. OD 3.6cm cylindrical only in the region around IP.

Spring 2014: Increase central section OD to 3.8cm to relax alignment tolerance.

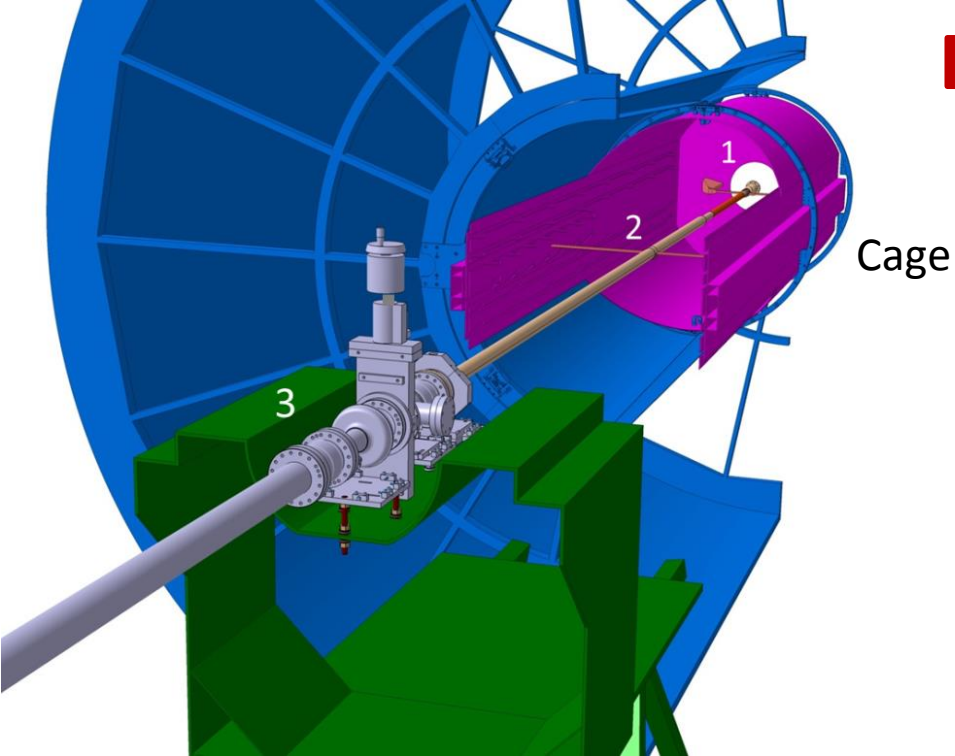
# Summary – Dec 2013

Approval required	Responsible	ALICE
Aperture for high and low beta (LHC)	BE/ABP M.Giovanozzi	<b>New geometry required (20<sup>th</sup> LEB)</b>
Aperture for high and low beta (HL-LHC)	BE/ABP B.Holzer	<b>New geometry required (20<sup>th</sup> LEB)</b>
Injection optics & Beam Dump	C. Bracco & B. Goddard	<b>New geometry required (20<sup>th</sup> LEB)</b>
Machine protection	BE/OP J. Wenninger	<b>19<sup>th</sup> LEB (Check aperture @ injection)</b>
Impedance Heating	BE/ABP E.Metral, B.Salvant, N.Mounet	<b>20<sup>th</sup> LEB – 1.7 W/m to check for ultimate</b>
E-cloud, dynamic and static vacuum	TE/VSC V.Baglin, G .Lanza	<b>OK - 20<sup>th</sup> LEB</b>
Background	BE/ABP H. Burkhardt	<b>To be checked by experiment</b>
Collimation	BE/ABP S. Redaelli	<b>New geometry required (20<sup>th</sup> LEB)</b>
Positioning Tolerances	BE/ABP J-C.Gayde, A Behrens	<b>OK - 17<sup>th</sup> LEB</b>
Mechanical Tolerances	TE/VSC M.Gallilee	<b>OK - 18<sup>th</sup> LEB</b>
Stability Tolerances	BE/ABP J-C.Gayde, A Behrens and Technical Coordinators	<b>OK - 18<sup>th</sup> LEB</b>

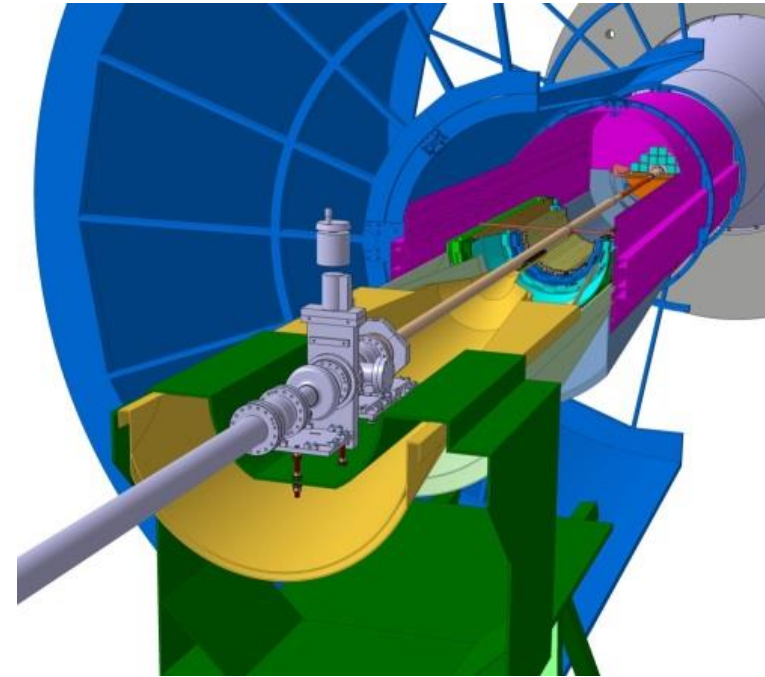
# Design

	Present beampipe	LS2 beampipe
Outer diameter	6cm	3.8cm (only central part)
Wall thickness	800um	800um
Length	482cm	550cm
Length beryllium	395cm	88.8cm
Bellows/flanges	SS	Al
Nb of supports	3	3

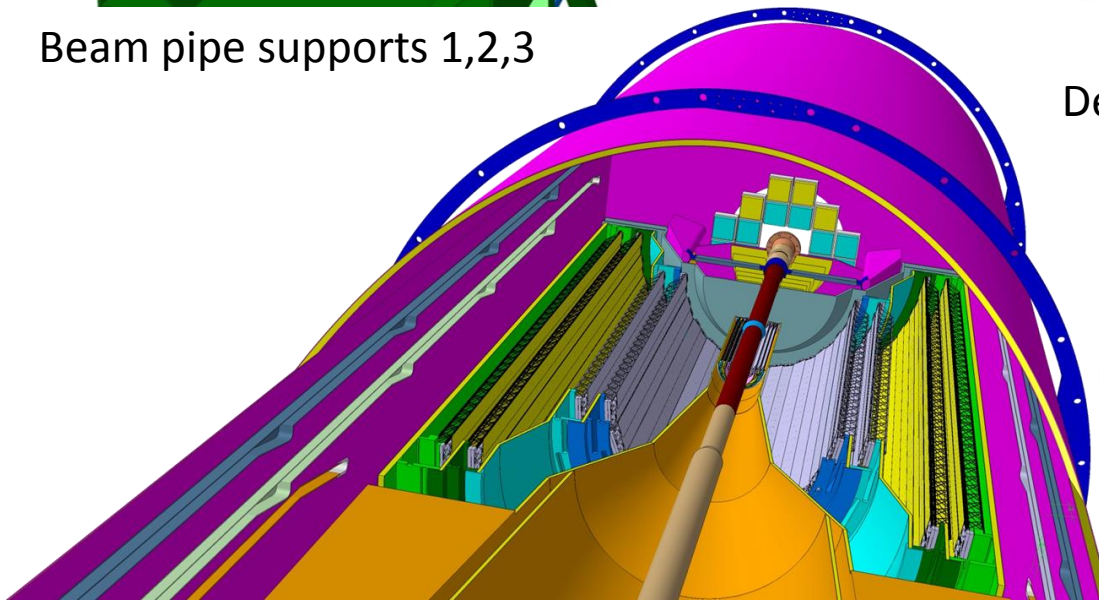
# Design



Beam pipe supports 1,2,3



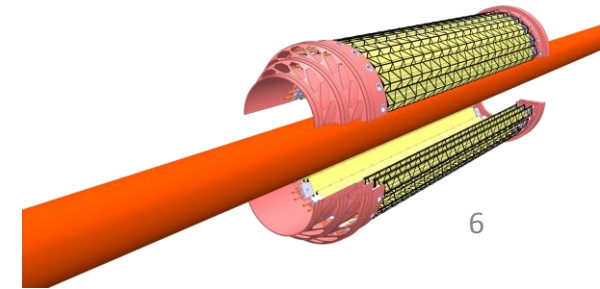
Detector/Service Barrels installation



TREX 19/06/14

ALICE LS2 beam pipe

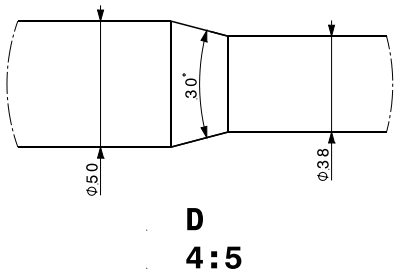
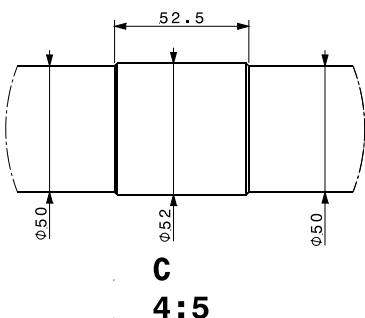
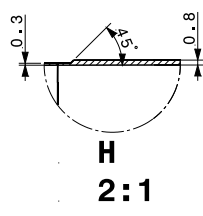
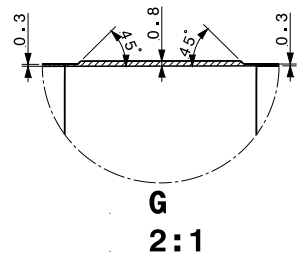
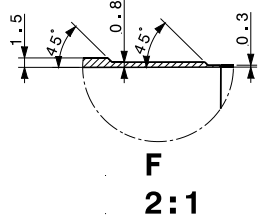
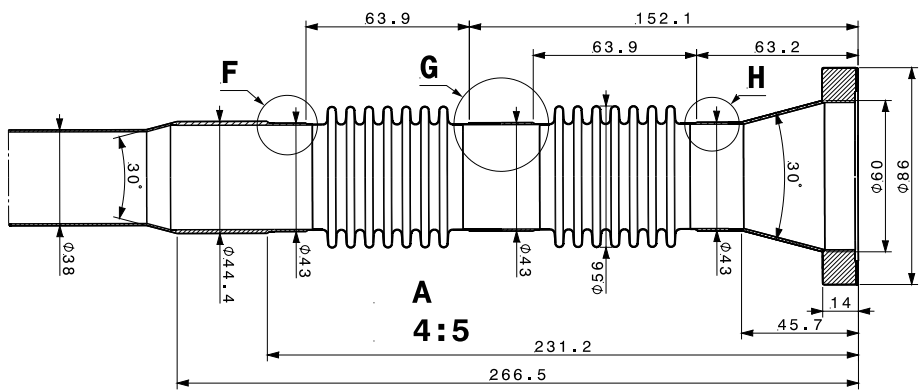
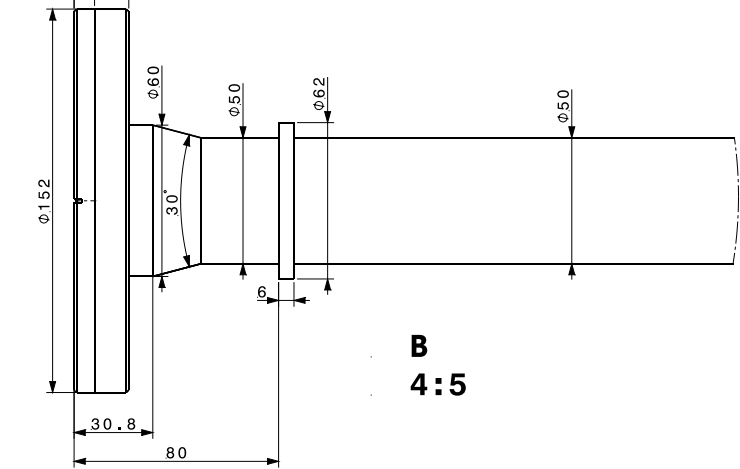
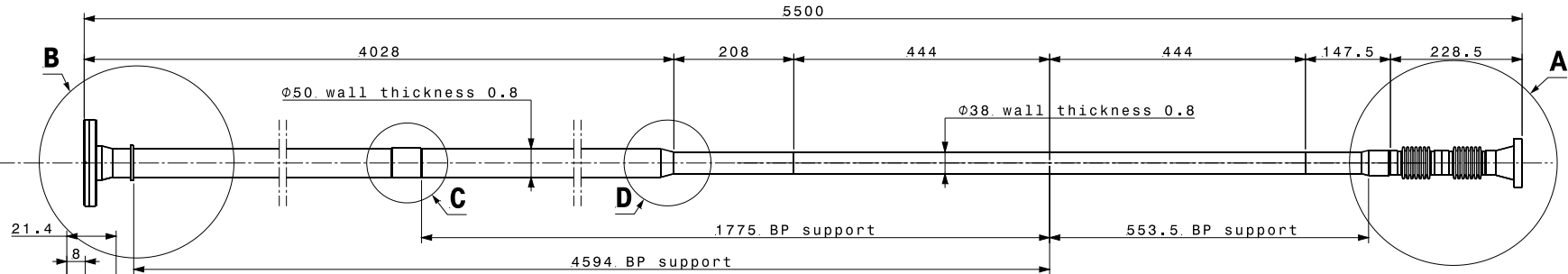
Detectors VS Beam pipe



DESIGN, PROTOTYPE, TOLERANCES  
 SELON NORMES ISO  
 PRODUCTION  
 ACCORDING TO ISO STANDARDS



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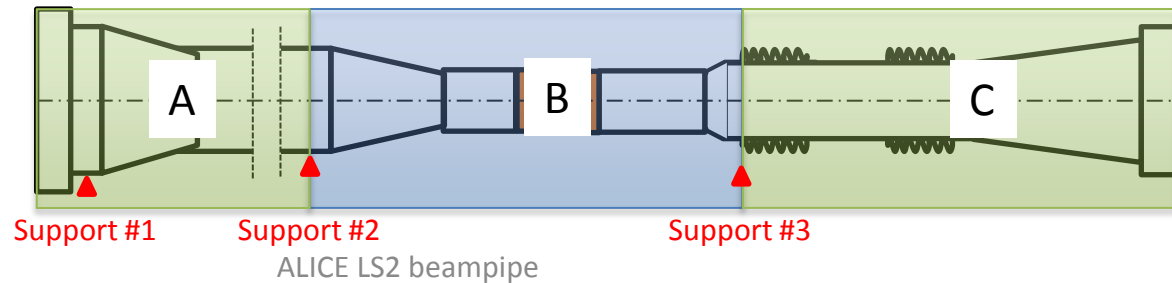


1		1			
QUA	DESCRIPTION	POS	MAT.	OBSERVATIONS	REF. CERN
ENS/ASS		S.ENS/S.ASS			
ALBPLS2_DWA_1000_R01				SCALE	Drawn: T. Caudron 2014-02-21
				1:5	CONTROLLED: C. Gargiulo
					APPROVED
					CAD Document Number: ST0569615_02
					REPLACES
NON VALABLE POUR EXECUTION NOT VALID FOR EXECUTION			DATE		SIZE 1/10
			-		2

# Tolerances

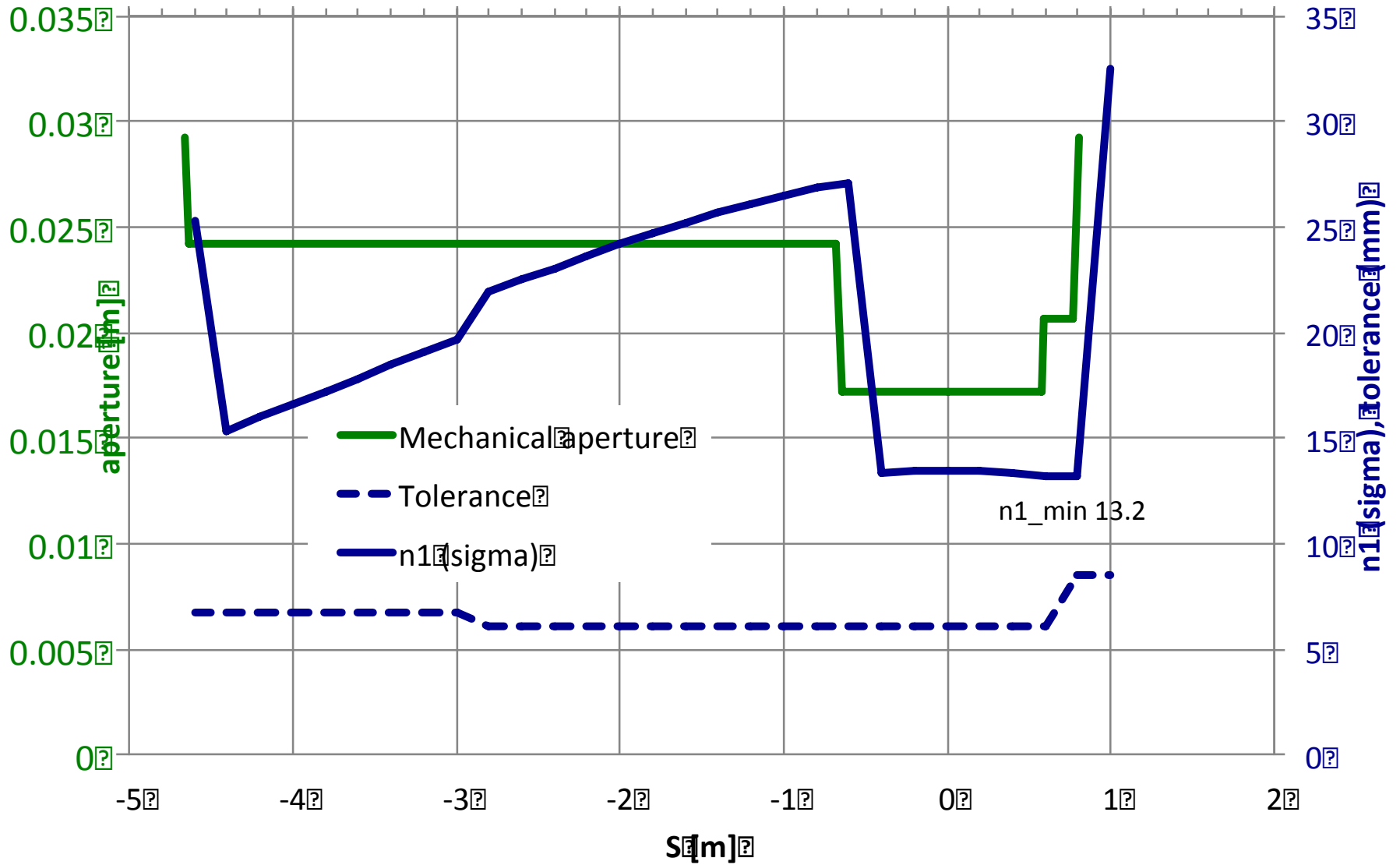
Quantity	A-side part (A)	Central part (B)	C-side part (C)
Construction and deflection	1.3mm	0.6mm <sup>(1)</sup>	0.5mm
Mechanical adjustment precision	2.5mm		
Survey to beamline uncertainty	1.5mm <sup>(2)</sup>		
Quad fiducial to beamline uncertainty	0.5mm <sup>(2)</sup>		
L3 movement	<0.5mm <sup>(3)</sup>		
B field movement	<0.5mm		<2.5mm
<b>Linear sum</b>	<b>6.8mm</b>	<b>6.1mm</b>	<b>8.5mm</b>

- 1) LEB 21.3.12
- 2) LEB 22.2.12
- 3) LEB 23.3.12





# Aperture



# Time constraints

With Mark, we have agreed upon the following schedule:

Departmental Request → Q1 2014 - done

Market Survey → Q2 2014

LMC approval

Engineering design → September 2014

ITT → Q4 2014

FC Jan → 2015 (if required)

Order Placement → Q1 2015

Order receipt → Q1 2017

Delivery to ALICE → end Q2 2017

# Conclusions

- ALICE wants to install a 3.8cm OD beampipe in LS2.
- With the presented geometry and tolerances, we have estimated the  $n_1$  min at injection of more than 13 sigma.

# Backup slides

# Design

