



# SiD Collaboration Meeting Highlights

Tom Markiewicz/SLAC  
ILC BDS Meeting  
08 May 2007

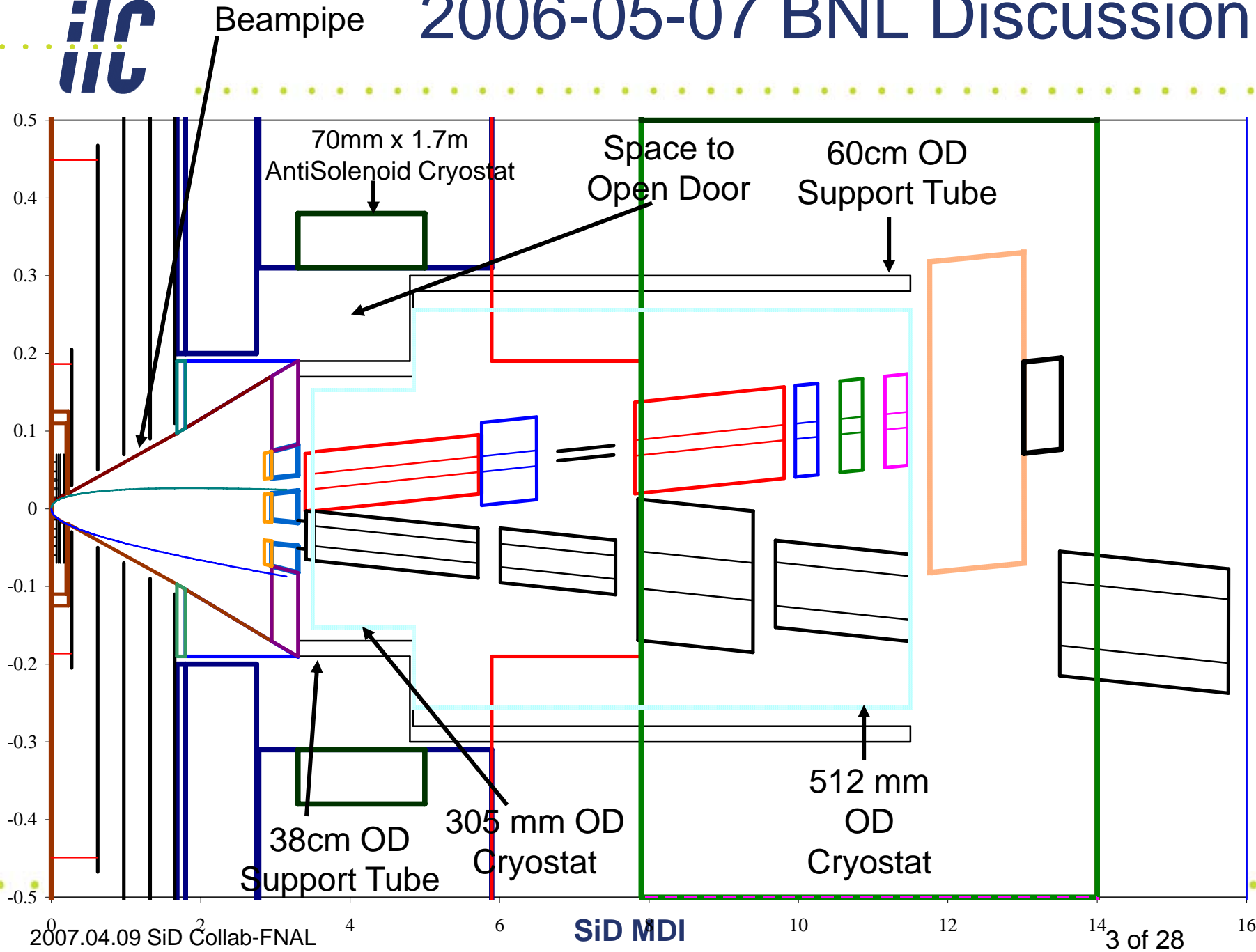


# SiD MDI Issues

Tom Markiewicz/SLAC  
SiD Collaboration Meeting  
09 April 2007

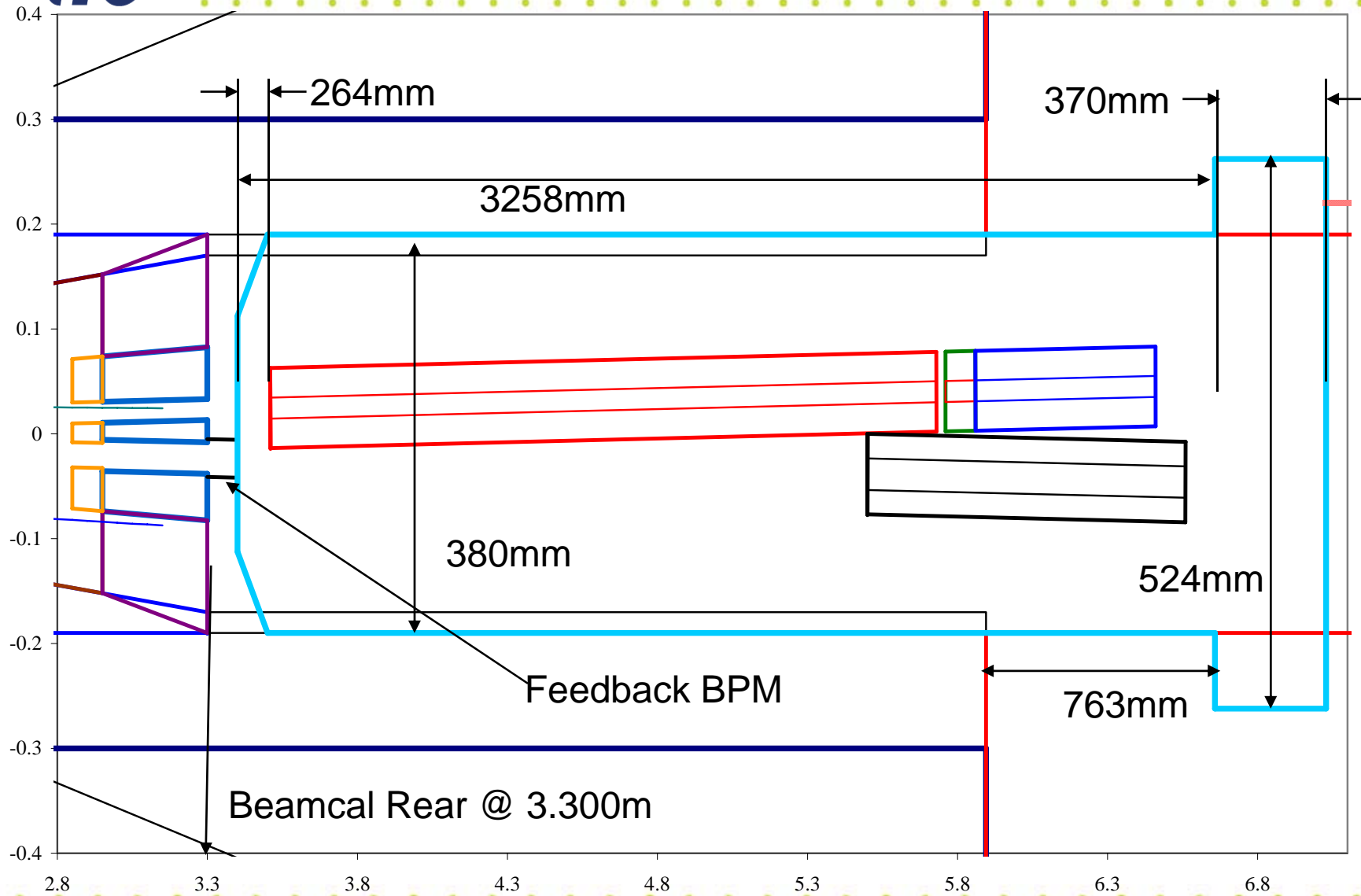


# 2006-05-07 BNL Discussion



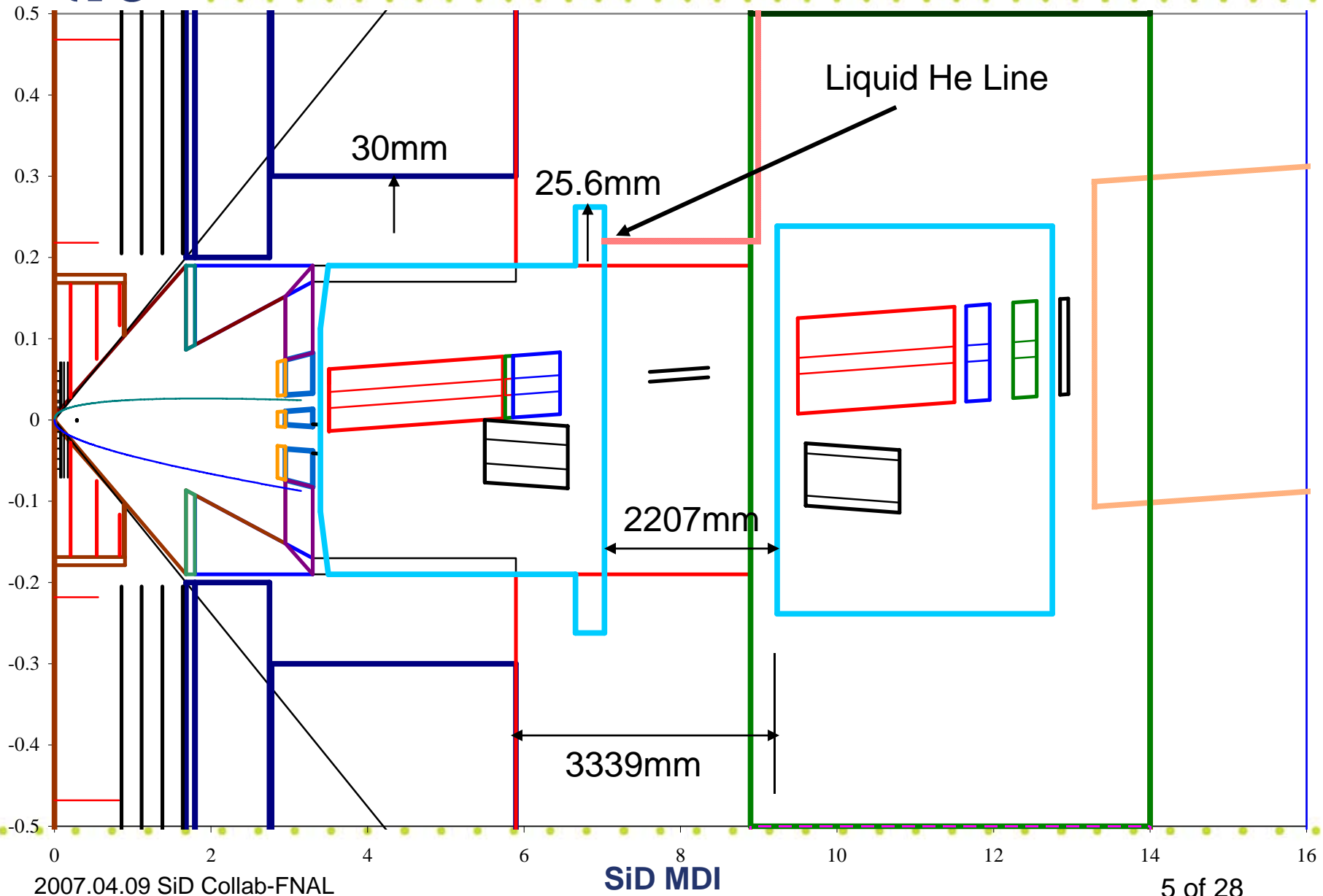


# QD0 Cryostat in SiD @ $L^*=3.664\text{m}$





# SiD $r < 50\text{cm}$ , $L^* = 3.664\text{m}$ , $14\text{mrad}$ , Push-Pull, QF @ $9.5\text{m}$ , Door Closed



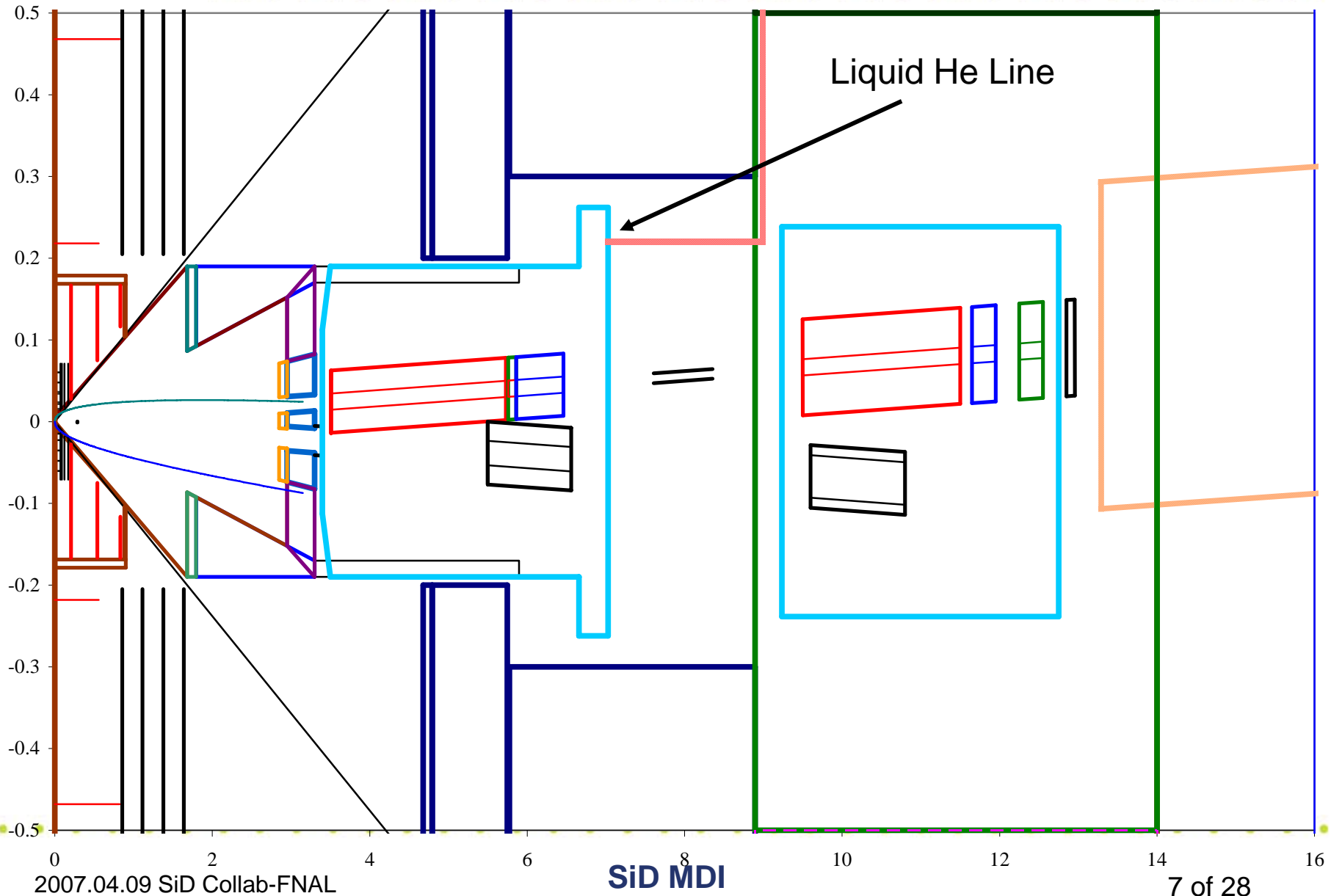


## SiD Final Doublet Support and Access Plan with Push Pull @ 14mrad Crossing angle, $L^*=3.664\text{m}$

- Three concepts
  - **Permanent liquid He feed line from barrel to QD0 with loop large enough to allow 3m door opening**
    - Need to iterate with BNL on diameter of pipe and geometry constraints of cold current and liquid helium feeds
  - **10cm (?) radial cutback in endcap iron yoke to allow it to pass over back end of QD0 cryostat**
  - **Drop idea of cantilevered support tube**
    - QD cryostat and FCAL package **have integrated rail system**
    - Endcap doors have linear bearings which support the rails and permit door to slide over the QD0+FCAL package when door is open
    - Is this compatible with “cutback” in yoke?

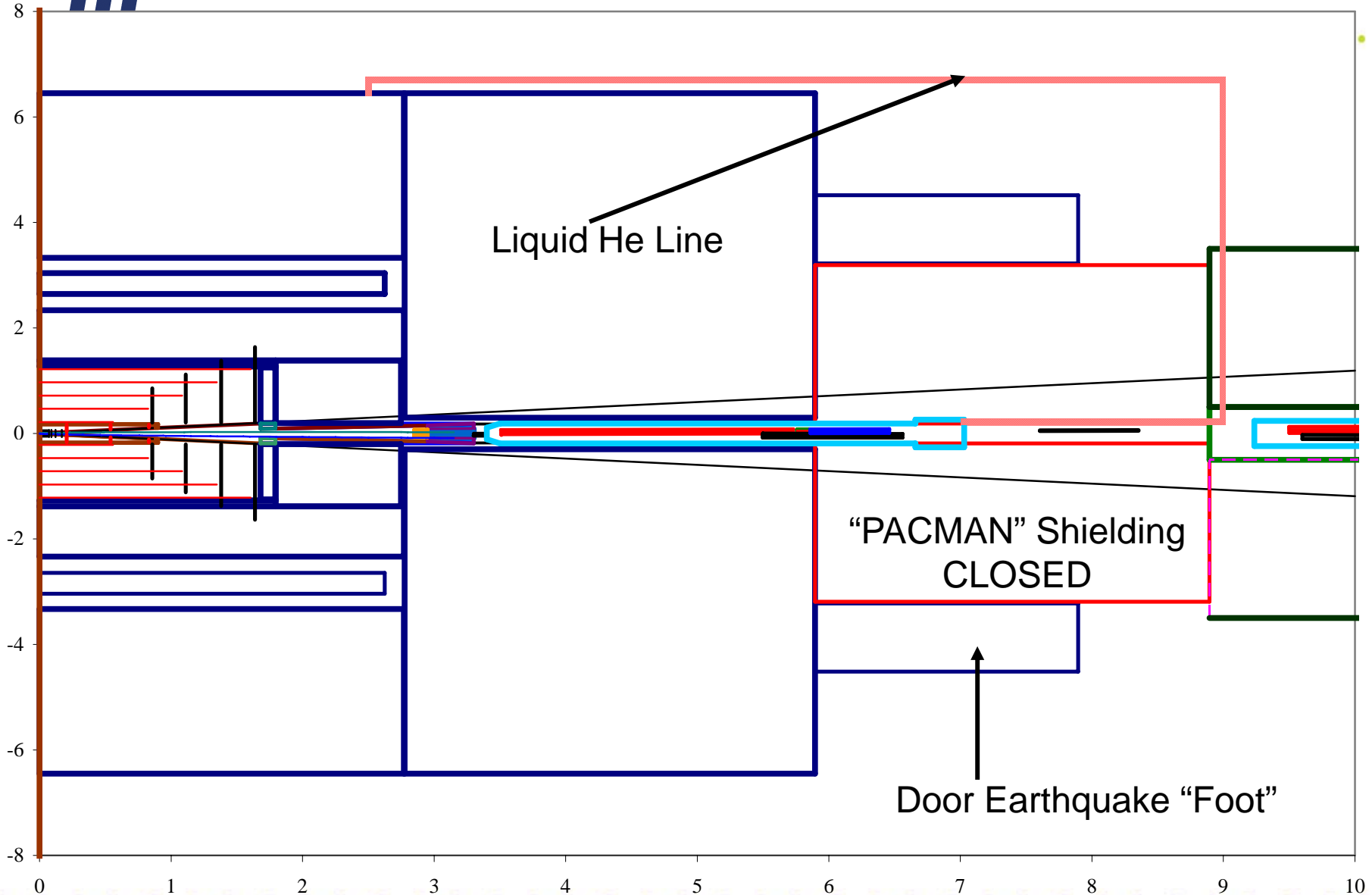


# SiD $r < 50\text{cm}$ , $L^* = 3.664$ , $14\text{mrad}$ Crossing Angle, Push-Pull, Door **Open**





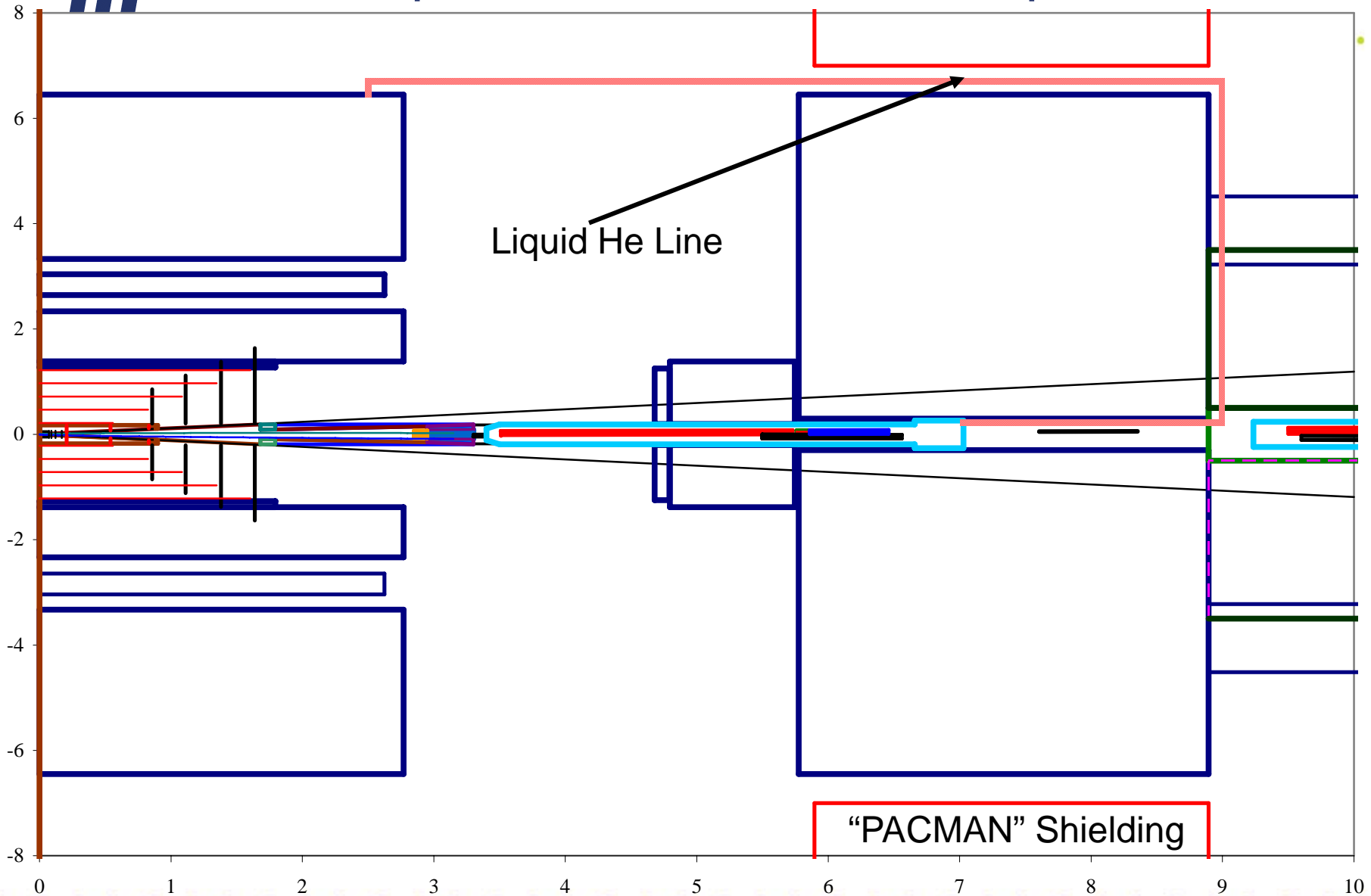
# Door Closed, Permanent QD0 Liquid He Line







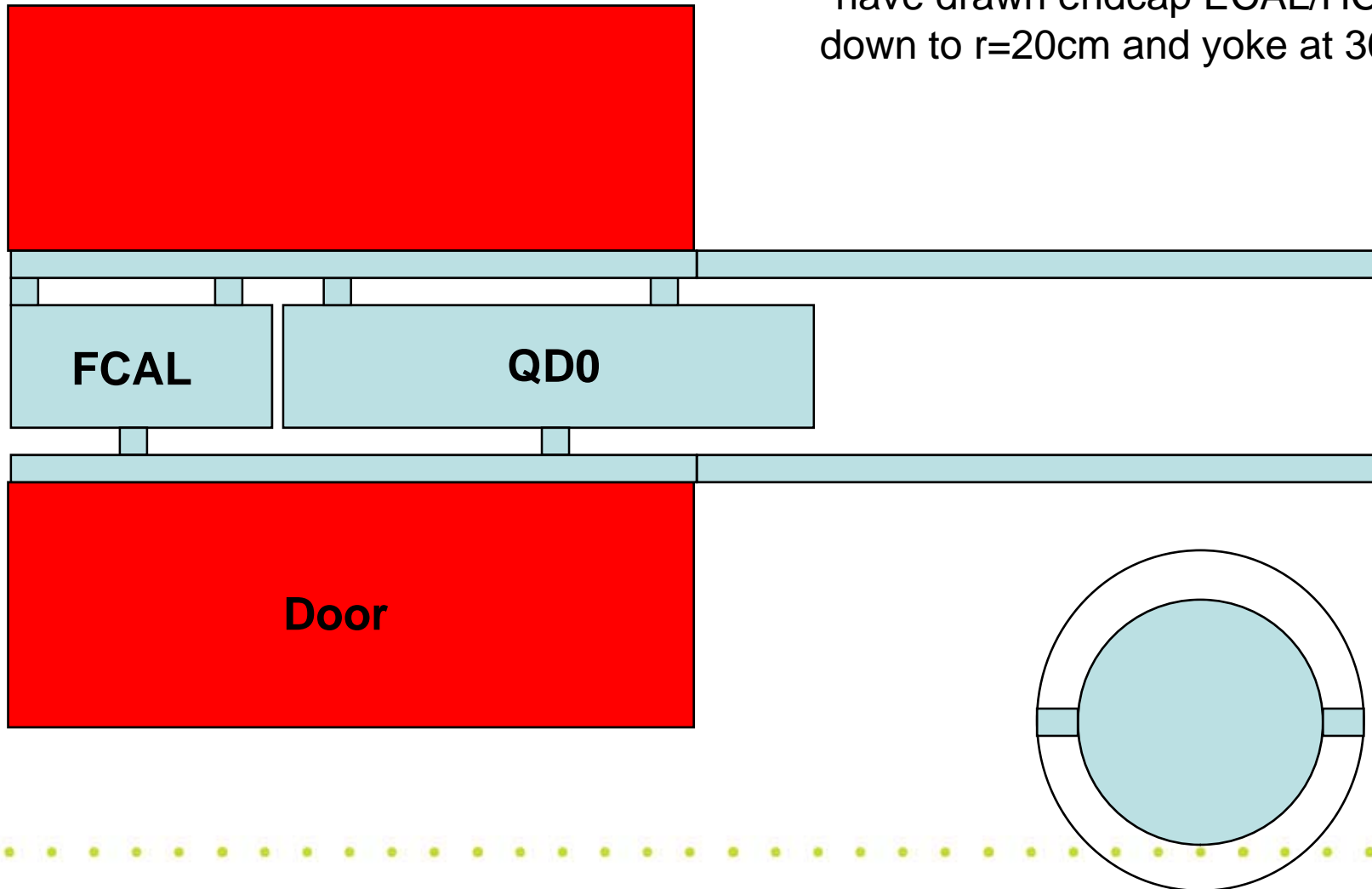
# Door Open, Permanent QD0 Liquid He Line





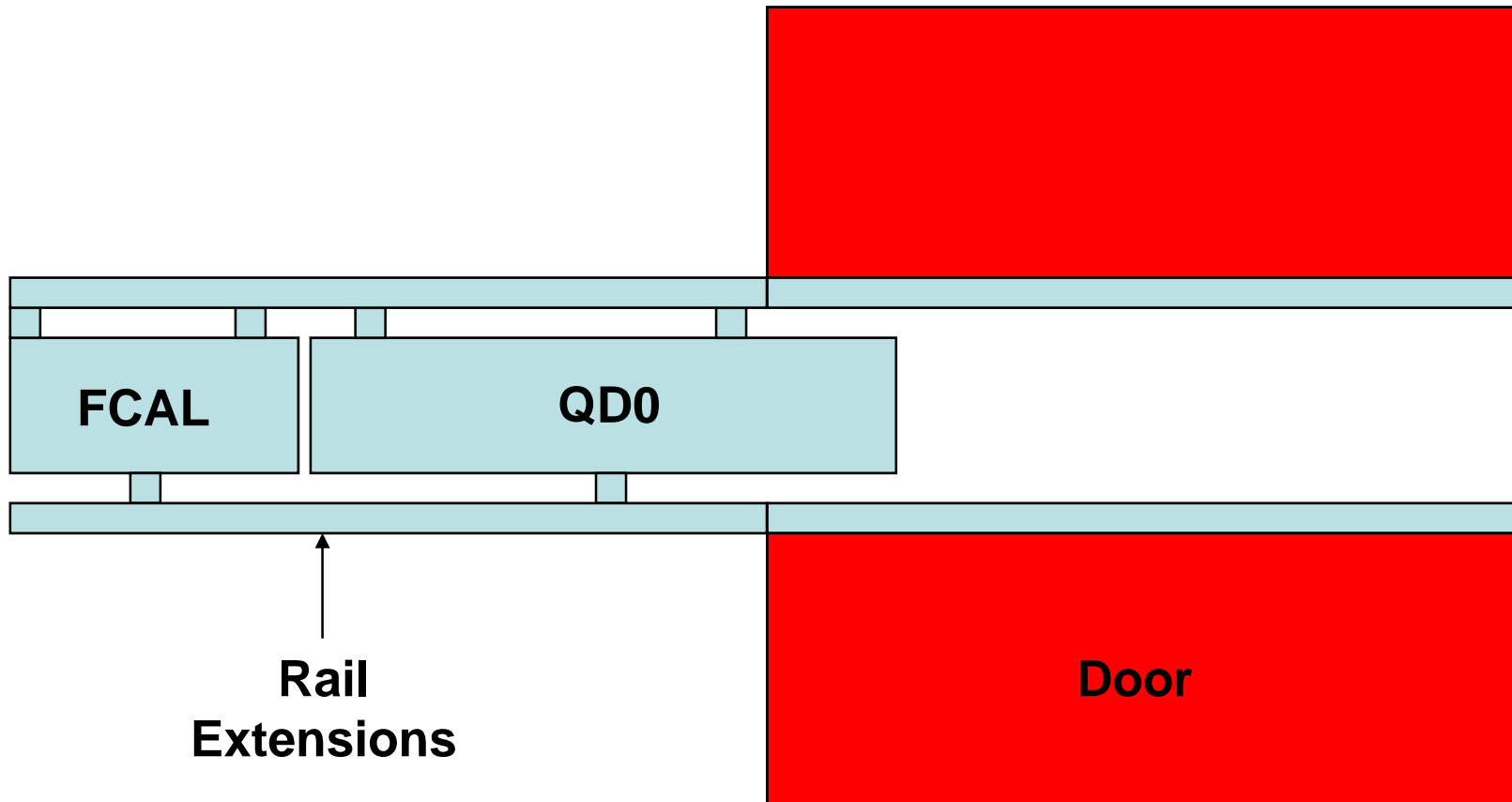
# Plan & Elevation View of FCAL/QD0 Support

Ignore for the moment fact that I have drawn endcap ECAL/HCAL down to  $r=20\text{cm}$  and yoke at  $30\text{cm}$





# FCAL/QD0 Supported with Door Open



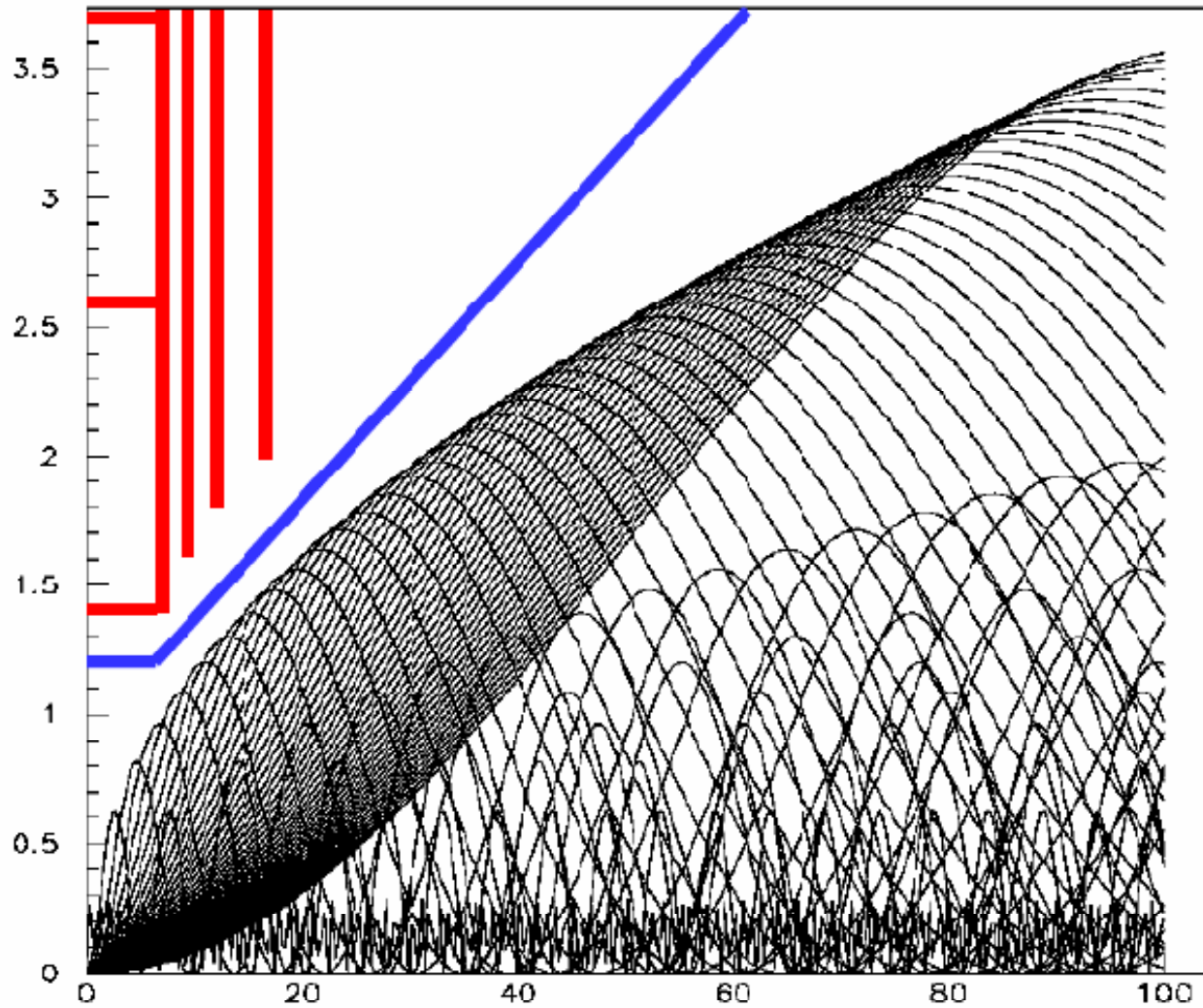


## Three beampipe shapes have been considered over time for SiD

- Flat at 12mm for VXD, flared to O.D. of Lumical (190mm) @  $z_{\min} = 1.68\text{m}$  of endcap ECAL
- Flat at 12mm for VXD, flared to I.D. of Lumical (86.5mm) @  $z_{\min} = 1.68\text{m}$  of endcap ECAL
- Flat at 12mm for VXD, flared rapidly to clear pair stay free until  $r=86.5\text{mm}$  ( $r_{\min}$  of Lumical @  $z_{\min} = 1.68\text{m}$ ), then cylindrical
- In all cases, beam pipe then becomes conic and follows inner surface of mask until beampipe

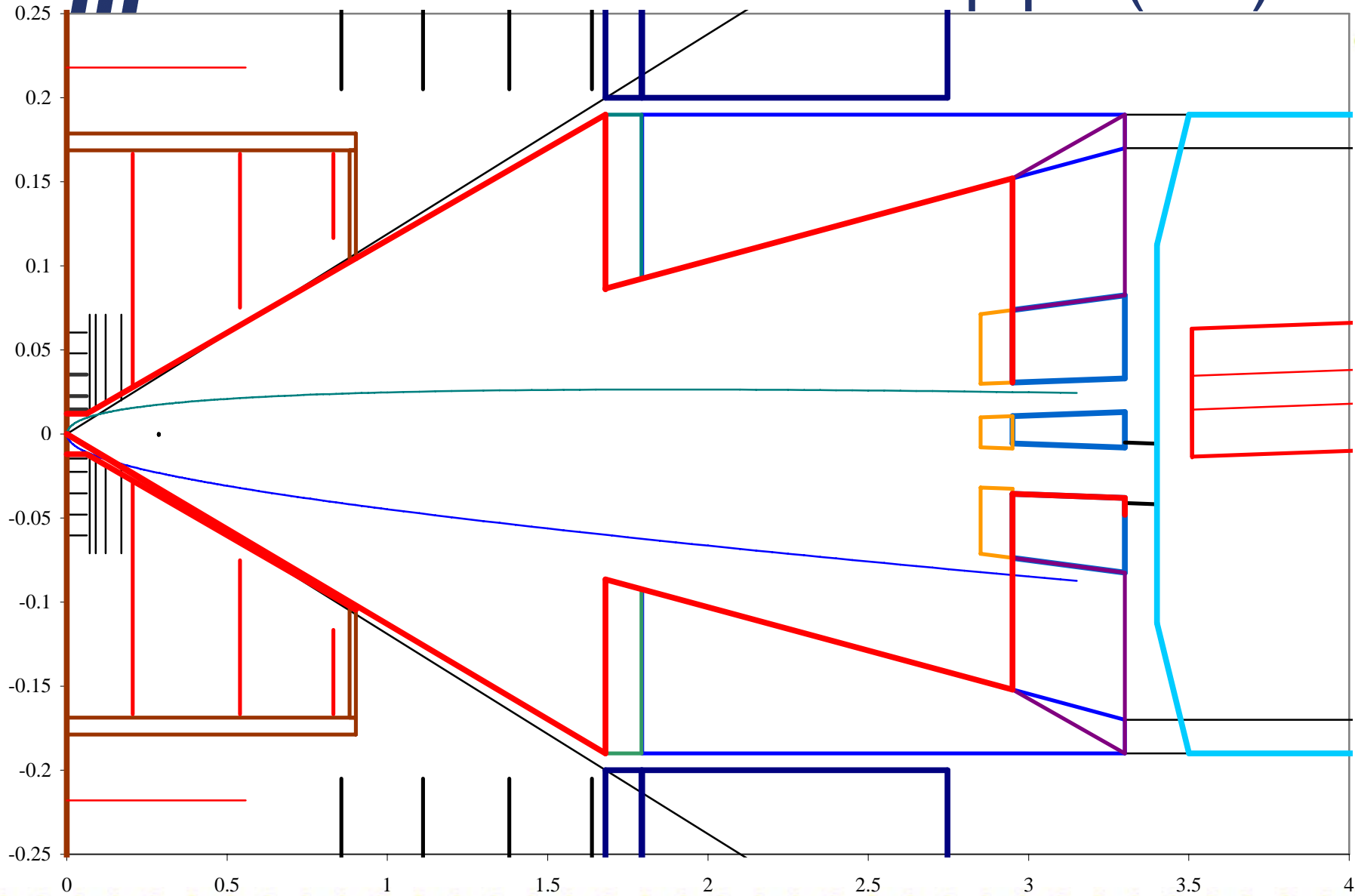


# 12mm Beam Pipe and VXD Detail





# Detail of current beampipe (red)





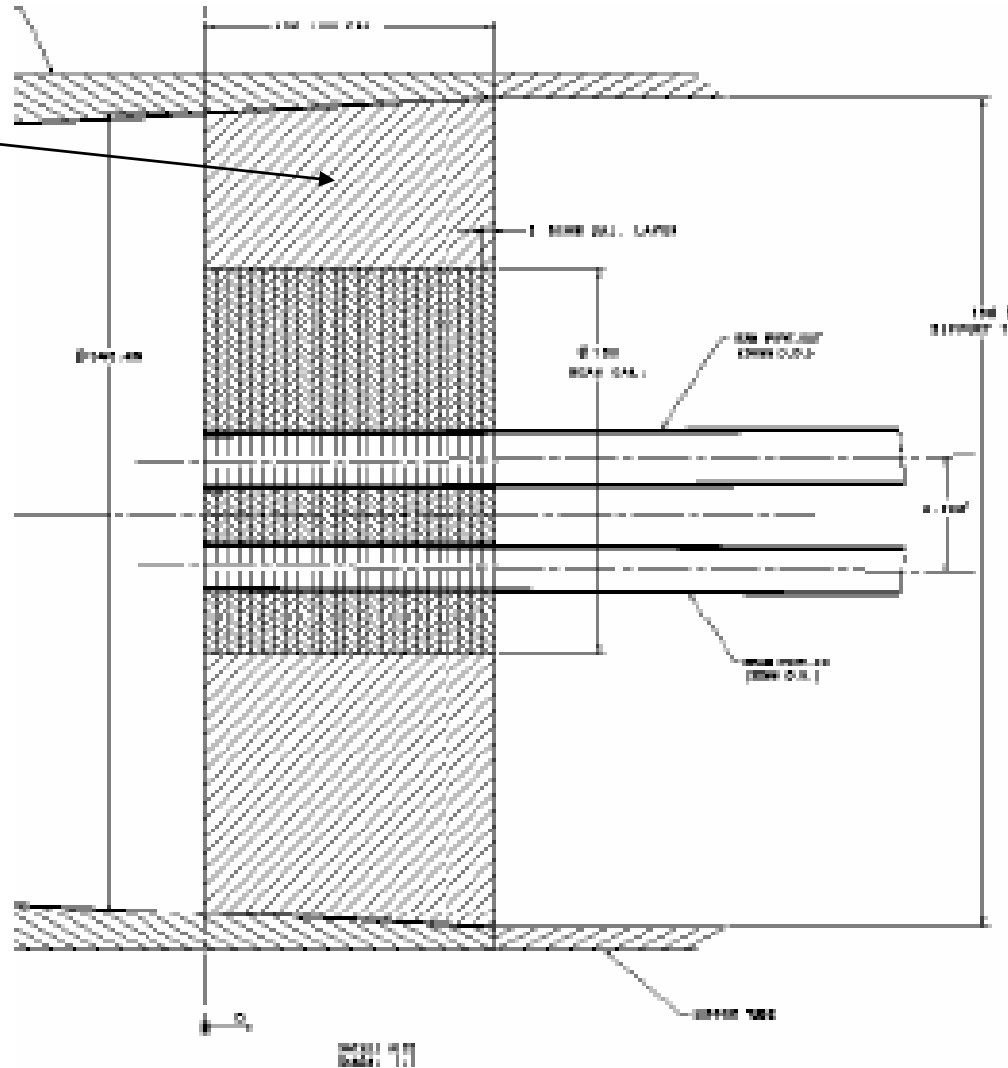
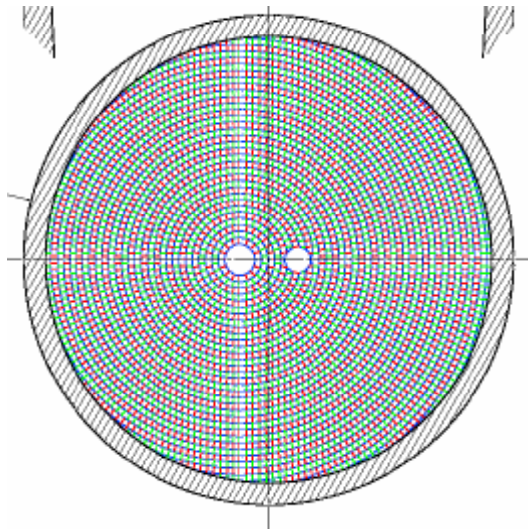
## Often forgotten points that need discussion

- There are **TWO** parts to “LumiCAL” whose relative importance has yet to be studied
  - **Low radius extension of endcap ECAL=Lumi1**
  - **Large radius part of “Beamcal” beyond region where pairs hit= Lumi2**
- The very heavy forward detector and masking system (Lum1, Mask (instrumented as HCAL or not?), Lum2+Beamcal package must **NOT** be cantilevered off QD0 cryostat **EXCEPT** when the door is open



# Elevation & Plan Views of Far-Lumi/BeamCal from SiD DOD

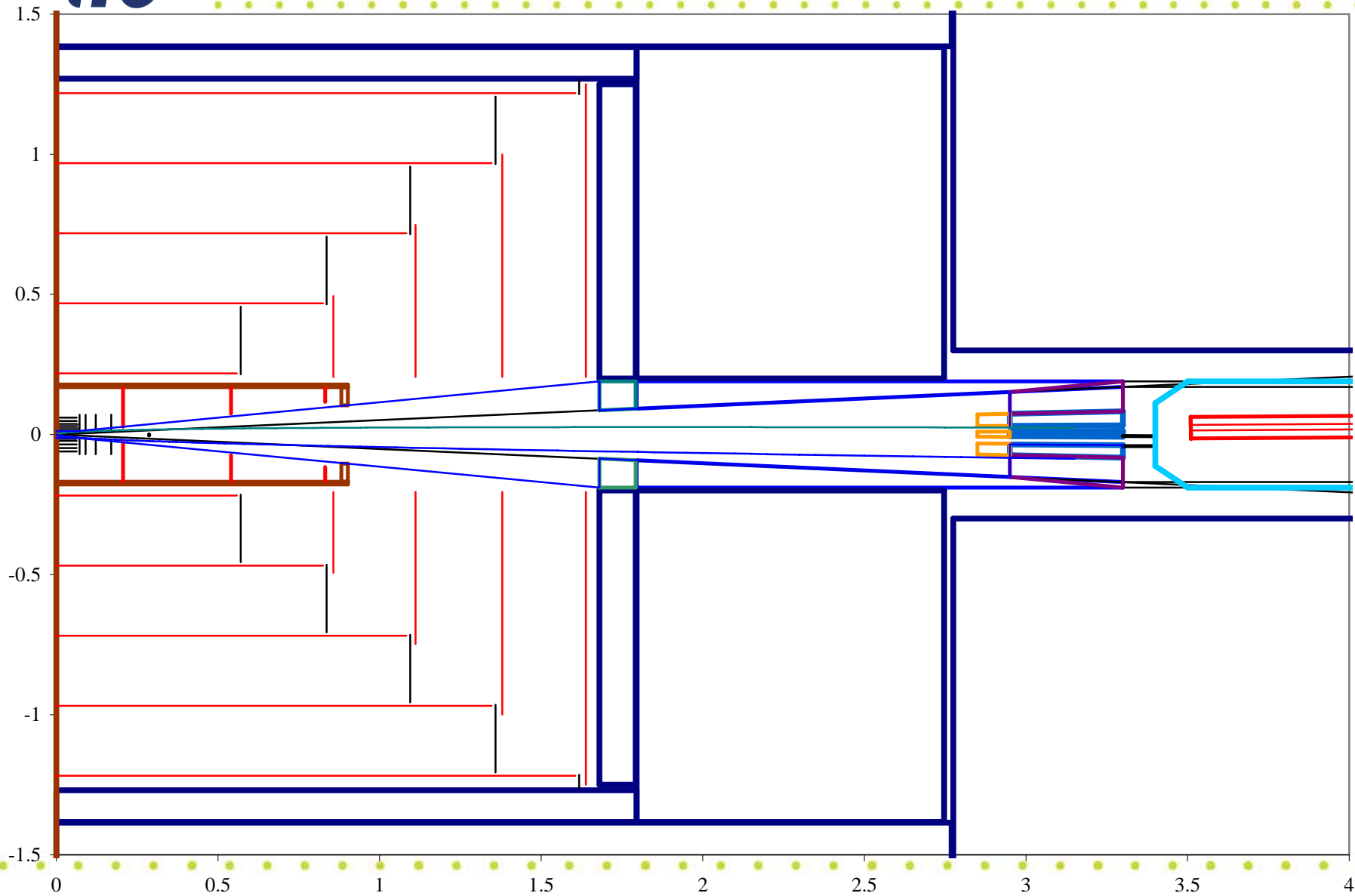
Has any thought been given to details of the Far Luminosity Monitor?







Unlike SLD, Tracker **CANNOT** Be used to Support  
FCAL+Mask Package → **MUST HANG OFF QD0**

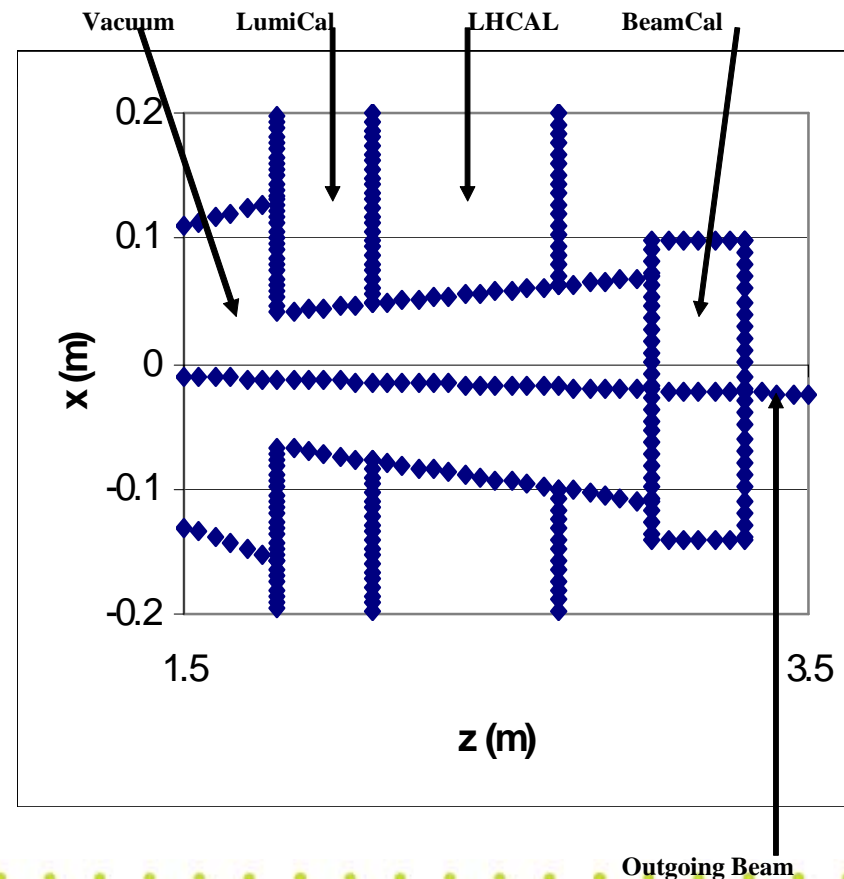




# FCAL BeamPipe Discussions

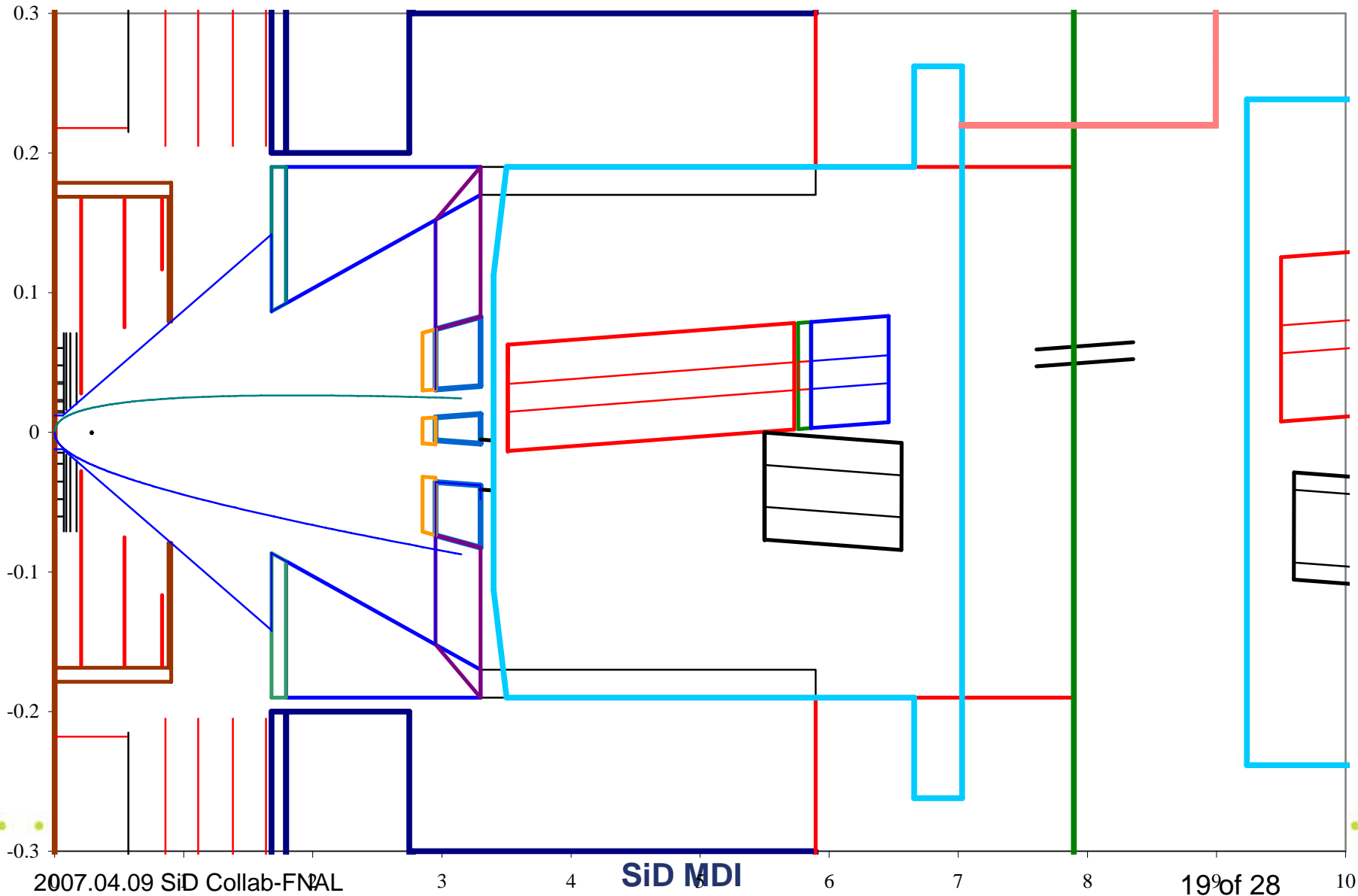
- SiD FCAL group focused on ONE Device which covers 30-80mrad and to a first approximation ignores LUMI aspects of BEAMCAL (inspired by LCD Design)

LumiCal Inner Edge	$\approx 30\text{mrad}$ about outgoing beam
LumiCal Outer Edge	$\approx 113\text{mrad}$ about 0mrad (ECAL)
LumiCal Fiducial Region	$\approx 40\text{-}80\text{mrad}$ about outgoing beam
BeamCal Outer Edge	$\approx 40\text{mrad}$ about outgoing beam
LumiCal	$\approx 25 X_0$ Silicon - Tungsten
BeamCal	$\approx 25 X_0$ Rad-hard Silicon or Diamond - Tungsten





113mrad <math>FCAL < 51\text{mrad}</math> with 80 mrad beampipe  
need to rethink LUMICAL-ECAL radial overlap @  $z=1.68\text{m}$





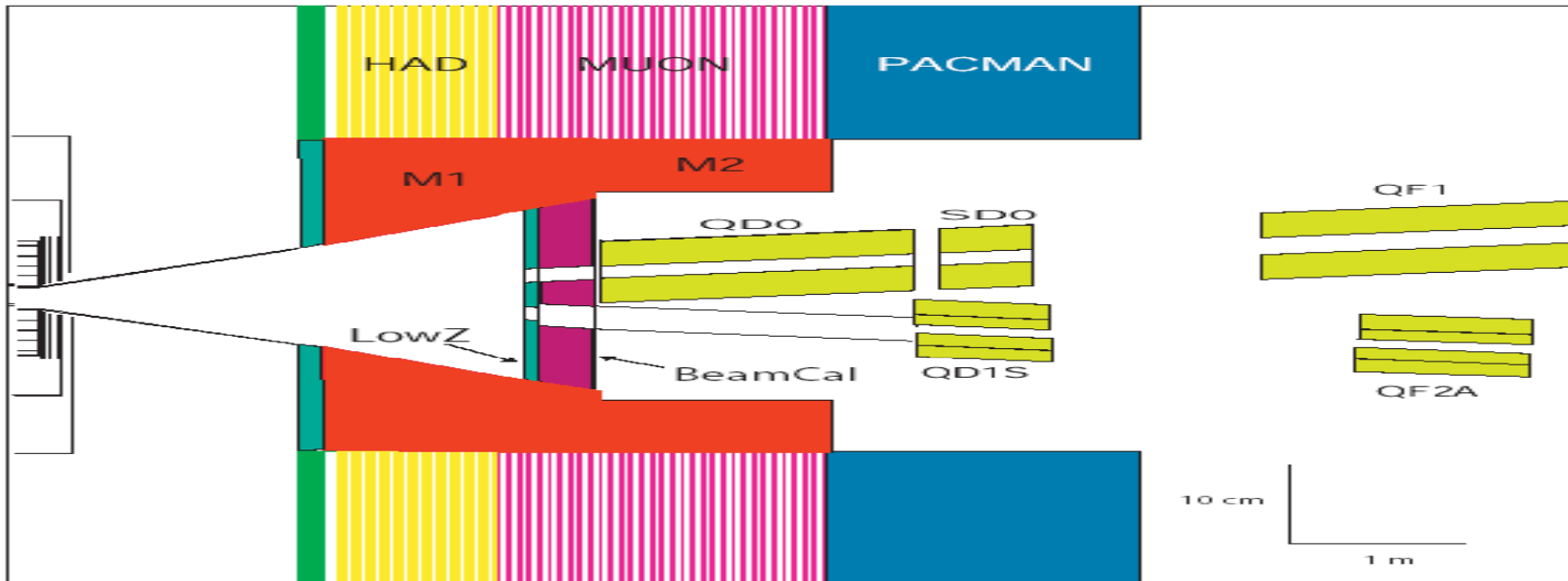
# Conceptual Solution for R20 Mechanics is Needed

- Support points
- Bellows
- Flanges
- Alignment and adjustment features
- Vacuum features (if any) at  $z < 7\text{m}$  (end of QD0 cryostat)
- Cable & Gas service routing
- Rethinking of access requirements in PUSH-PULL
  - **On-beamline access for rapid repair**
    - Bill Cooper reminds us that length of endcap CAL package (1.1m) must be subtracted from nominal door opening to find remaining access length
  - **Off-beamline access for VXD or TRACKER replacement**

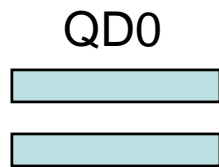


# T. Maruyama Recalculation of ALL Backgrounds for Current Layout 03 April 2007 (see BDS)

14 mrad crossing geometry in Geant 3 and FLUKA

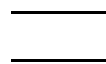


Apertures:



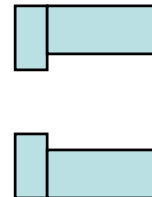
R=1.0 cm @ z=-3.51 m

Beampipe@IP



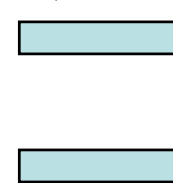
1.2 cm @ 0.0m

Low Z



1.35 cm @ 2.85-2.95m

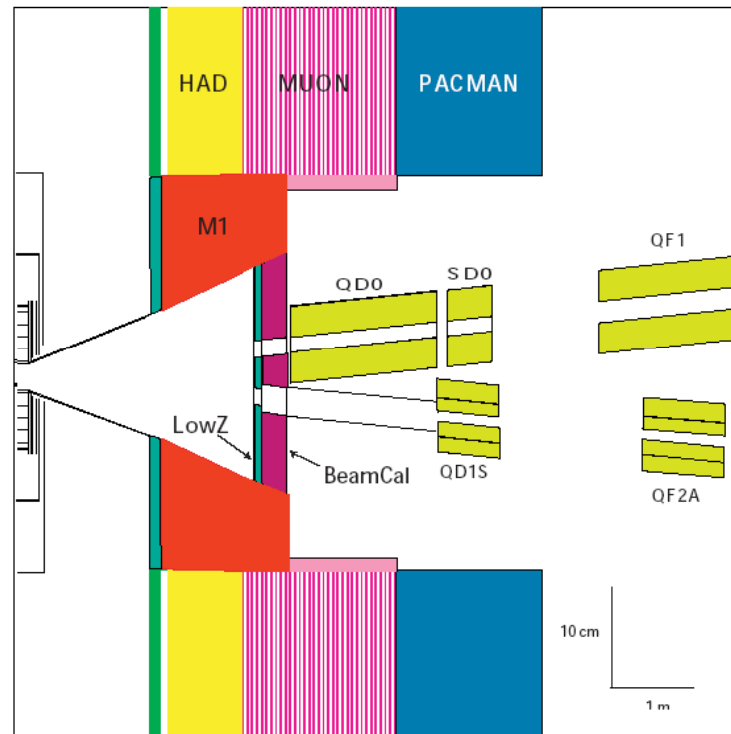
QD1S



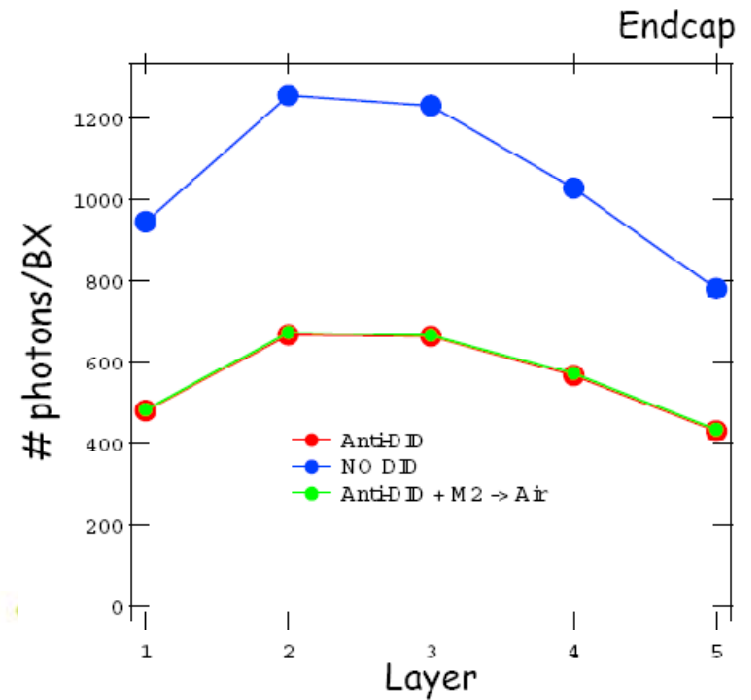
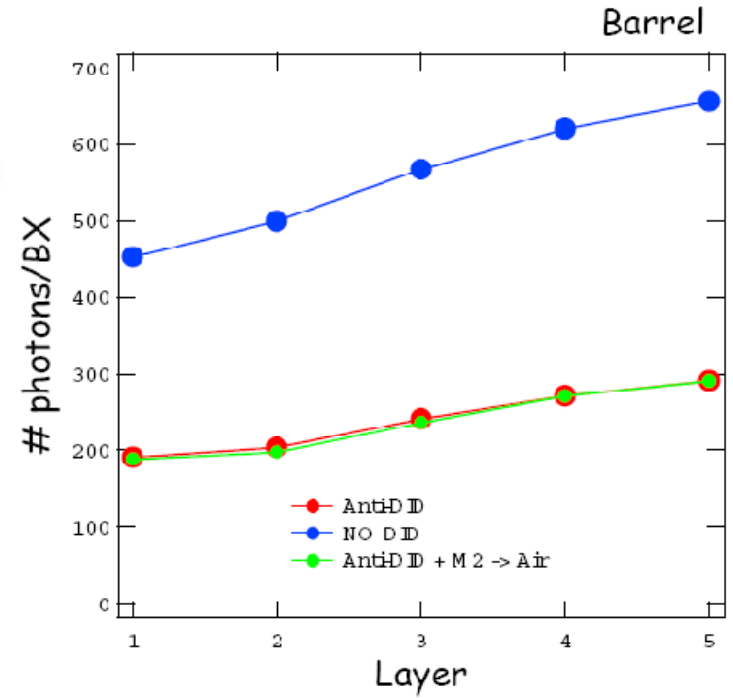
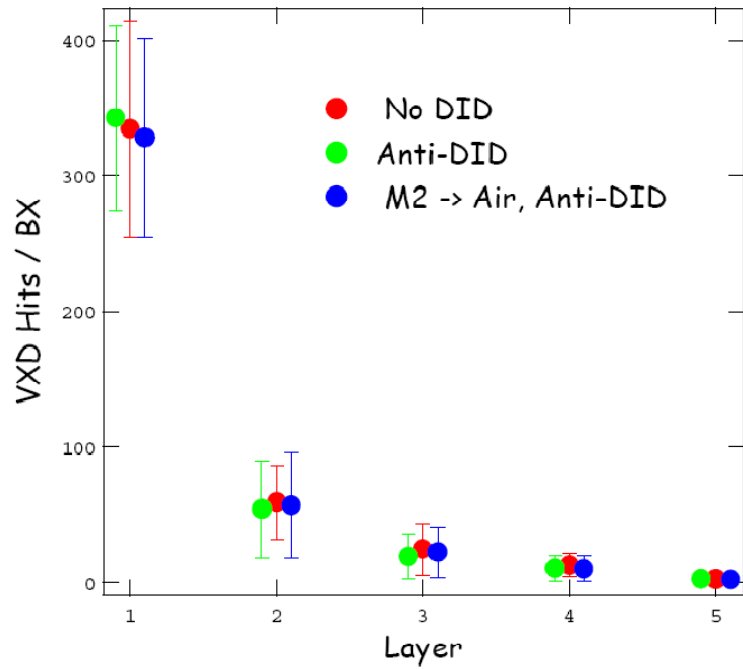
1.5 cm @ 5.5-6.56m



# Is M2 NEEDED or NOT????



# ilc No M2 Mask Needed





**Bonus Material Follows**







# Pair Radius in cm at Z=168 cm

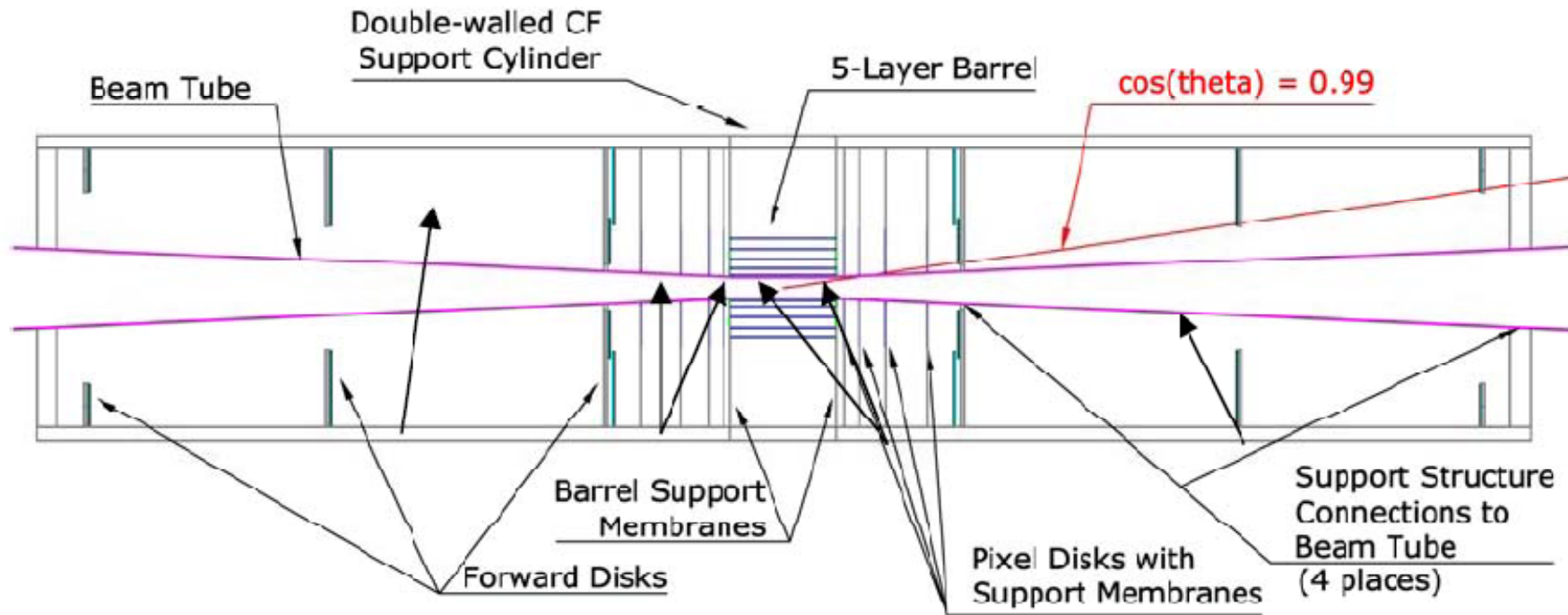
	4 Tesla			5 Tesla		
	ANTI-DID	NO DID	DID	ANTI-DID	NO DID	DID
N	5.2 / 4.7	5.1 / 5.5	5.8 / 6.5	4.7 / 4.1	4.4 / 5.1	5.3 / 6.1
Q	4.7 / 4.2	4.4 / 5.1	5.3 / 6.0	4.2 / 3.8	3.8 / 4.6	4.8 / 5.6
Y	4.6 / 4.2	4.6 / 5.1	5.5 / 6.0	4.3 / 3.9	4.1 / 4.6	4.9 / 5.7
P	6.3 / 6.0	6.2 / 6.8	6.8 / 7.6	5.7 / 5.3	5.5 / 6.1	6.4 / 7.0
H	7.0 / 6.6	6.8 / 7.3	7.4 / 8.2	6.2 / 5.9	6.1 / 6.7	6.7 / 7.5

Radius in black is measured from solenoid axis  $(x,y) = (0., 0.)$ .

Radius in red is measured from extraction line  $(x,y) = (-1.176 \text{ cm}, 0.)$

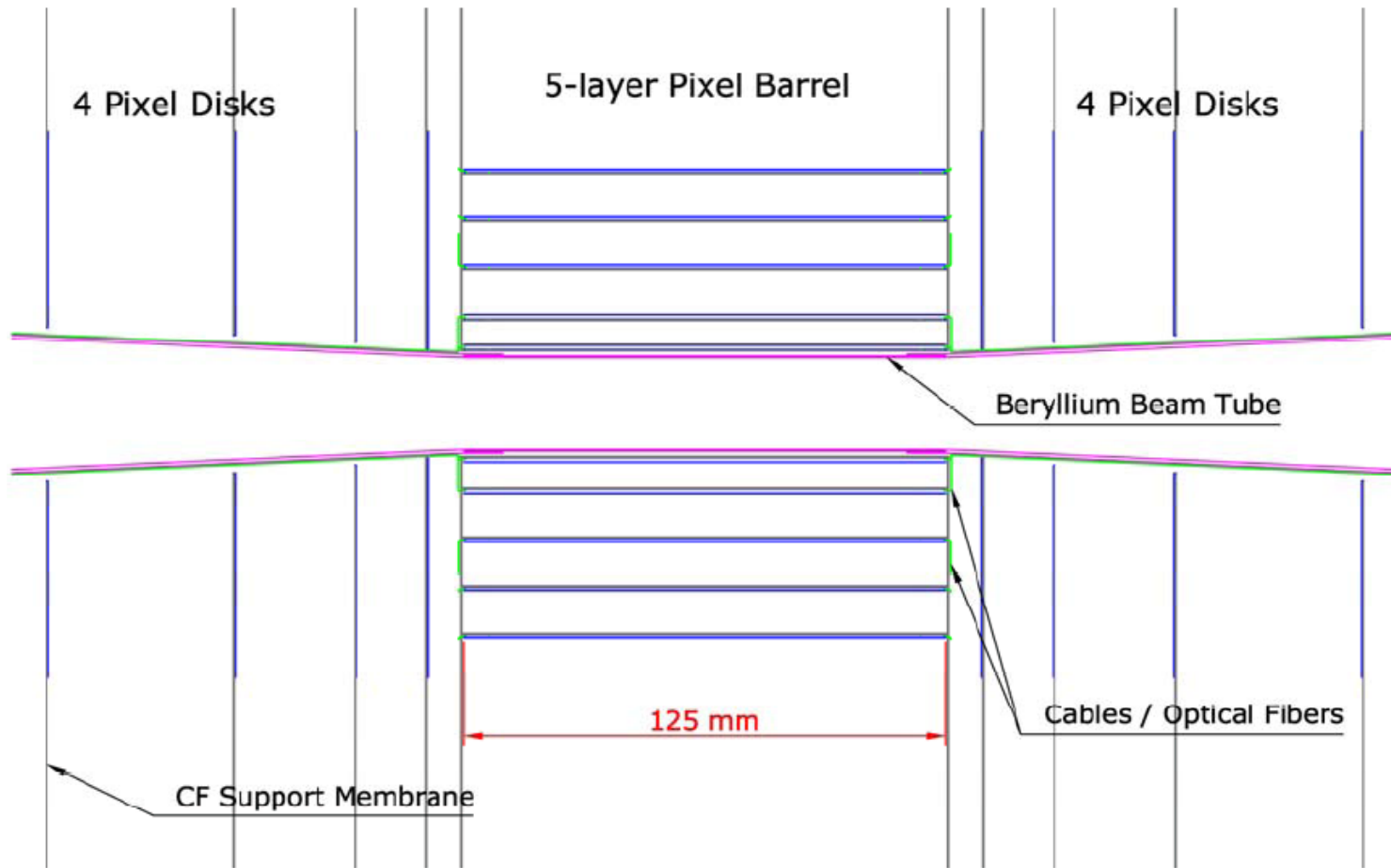


# VXD and Support Structures





# R-Z View of the Pixel VXD





# SiD Open for Access to the VXD Region

What Opening is Required for Access ON Beamline?

